

Supplement to

Annals

of

Emergency

Medicine

OCTOBER 1999, PART 2

VOLUME 34 NUMBER 4

*Journal of the  
American College of  
Emergency Physicians*



# ACEP RESEARCH FORUM

October 11–12, 1999

**Las Vegas Convention Center  
Las Vegas, NV**

4A

**Schedule of Presentations**

17A

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**Oral Presentations**

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**Poster Presentations**

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**OCTOBER 1999, PART 2**

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**Annals of Emergency Medicine**

*Journal of the  
American College of  
Emergency Physicians*

*Annals of Emergency Medicine is owned by  
the American College of Emergency  
Physicians. Manuscript submissions and  
editorial correspondence should be sent to the  
Editorial Office.*

Annals  
ACEP  
PO Box 619911  
Dallas, TX 75261-9911

1125 Executive Circle  
Irving, TX 75038-2522  
800-803-1403  
Fax 972-580-0051

*Instructions for Authors and the Manuscript  
Submission Agreement are published in every  
issue.*

Vol. 34, no. 4, Part 2. Annals of Emergency  
Medicine (ISSN 0196-0644) is published  
monthly by Mosby, Inc, 11830 Westline  
Industrial Drive, St Louis, MO 63146-3318.  
Periodicals postage paid at St Louis, MO, and  
additional mailing offices.

POSTMASTER: Send change of address to  
Annals of Emergency Medicine, 11830  
Westline Industrial Dr, St Louis, MO  
63146-3318.

Subscription rates are effective through  
December 31, 1999: Member: \$78. Individual:  
\$104, USA; \$131, international. Resident,  
student, EMT: \$52. Institution: \$179, USA;  
\$199, international. Single issue: \$22.

Business correspondence (subscriptions,  
permission, and reprint requests, advertising  
sales and production) should be sent to Mosby,  
Inc at the above address, telephone 800-325-  
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# ACEP RESEARCH FORUM

**October 11–12, 1999**

**Las Vegas Convention Center  
Las Vegas, NV**

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## **1999 Research Forum Planning Task Force**

Charles V Pollack, Jr, MA, MD, FACEP, Chair  
Charles B Cairns, MD, FACEP  
Brian R Tiffany, MD, PhD, FACEP

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## **1999 Research Forum Abstract Reviewers**

Charles V Pollack, Jr, MA, MD, FACEP  
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Robert E O'Connor, MD, MPH, FACEP  
Brian J O'Neil, MD, FACEP  
Adam J Singer, MD

**ORAL PRESENTATIONS**

**8:00 – 9:00 AM**

**PLENARY SESSION**

**ROOM N243**

**MODERATOR: CV POLLACK, MARICOPA MEDICAL CENTER, PHOENIX, AZ**

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- 1 Zafirlukast Improves Emergency Department Outcomes After an Acute Asthma Episode *Silverman RA, Long Island Jewish Medical Center, New Hyde Park, NY*
- 2 Trauma Airway Management in the Emergency Department—Indications, Methods, and Success Rates *Gurr DE, Brigham and Women's Hospital, Boston, MA*
- 3<sup>+</sup> Initial Use of an Automatic Collision Notification System to Relate Dynamic Vehicle Data With Occupant Injuries *Billittier AJ, Center for Transportation Injury Research, SUNY, Buffalo, NY*
- 4 Characteristics Associated With Positive Stool Cultures in Emergency Department Patients With Bloody Diarrhea *Karras DJ, Temple University, Pittsburgh, PA*

**POSTER PRESENTATIONS**

**9:00 – 10:00 AM**

**CARDIOVASCULAR**

**ROOM N237**

**MODERATOR: JL GARVEY, CAROLINAS MEDICAL CENTER, CHARLOTTE, NC**

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- 77\* Elevated CK-MB in the Presence of a Normal Total CK as an Indicator of Myocardial Complication *Janchar T, Georgetown University, Washington, DC*
- 78\* Association of Acute Cardiac Ischemia Time—Insensitive Predictive Instrument Results With Disease and Test Outcomes in Emergency Department Chest Pain Observation Unit Patients *Pribble J, William Beaumont Hospital, Royal Oak, MI*
- 79 A Rapid Rule-Out Protocol for Acute Myocardial Infarction: Serial ECG Monitoring in Conjunction With the 2-Hour ΔCK-MB *Fesmire FM, University of Tennessee, Chattanooga, TN*
- 80 The Comparative Value of an Emergency Diagnostic and Treatment Unit Protocol for Acute Cardiac Ischemia (ACI) in Patients With Cocaine-Associated Chest Pain *Zalenski RJ, Wayne State University, Detroit, MI*
- 81 Electrocardiographic ST-Segment Elevation: Correct Identification of AMI and Non-AMI Syndromes by Emergency Physicians—Preliminary Results *Brady WJ, University of Virginia, Charlottesville, VA*
- 82 The Effect of 2-D Echocardiography on Medical Decision-making With Emergency Department Patients *Levitt MA, Alameda County Medical Center, Highland Campus, Oakland, CA*
- 83 Prevalence and Determinants of QT Dispersion in Patients Presenting With Acute Congestive Heart Failure *Summers RL, University of Mississippi, Jackson, MS*

**9:00 – 10:00 AM**

**EDUCATION/ADMINISTRATION**

**ROOM N237**

**MODERATOR: GJ KUHN, MAIN HOSPITAL, RICHMOND, VA**

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- 84 Overcrowding in Emergency Departments: California Versus Other States *Derlet RW, University of California—Davis, Sacramento, CA*

- 85 Communication of Preexisting Advanced Directives: Impact on Patient Care in the Emergency Department *McLaughlin P, University of Massachusetts, Worcester, MA*
- 86 A Comparison of Emergency Medicine Ultrasound Training With Guidelines of the Society for Academic Emergency Medicine *Witting MD, University of Maryland, Baltimore, MD*
- 87 Effective Communication With Deaf Patients and Awareness of the Americans With Disabilities Act Among Emergency Department Personnel: A National Survey *Larsen TJ, East Carolina University, Greenville, NC*

- 88 Patient Satisfaction Scores With or Without Resident Involvement *Shih RD, Morristown Memorial Hospital, Morristown, NJ*
- 89 A Comparison of Provider Self-Adjudication of Outpatient Emergency Department Claims Using a Symptom-Based System With an MCO Claims Review Process That Uses a Diagnosis-Based Methodology *Shesser R, George Washington University, Washington, DC*
- 90 Personality Types and Preferences of Emergency Medicine Residents: Correlation With Clinical Performance Evaluations *Risucci D, North Shore University Hospital, Manhasset, NY*

**9:00 – 10:00 AM**

**DIAGNOSTICS**

**ROOM N237**

**MODERATOR: RM NOWAK, HENRY FORD HOSPITAL, DETROIT, MI**

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- 91 Frequency and Costs Associated With Laboratory Test Repetition in Trauma Patients Undergoing Interfacility Air EMS Transport *Orf J, Boston MedFlight, Boston, MA*
- 92 The Prediction of a 19-Lead Electrocardiogram from 3 Lead Vectors Using Factor Analysis *Schreck DM, Muhlenberg Regional Medical Center, Plainfield, NJ*
- 93 Intraoral Sonography of Peritonsillar Abscesses: Feasibility and Sonographic Appearance *O'Brien E, University of Mississippi, Jackson, MS*
- 94 A Prospective Study of the Accuracy and Reliability of Urine Dipsticks *Filice M, SUNY, Buffalo, NY*
- 95\* Criteria for Analyzing Flexion/Extension Radiographs of the Cervical Spine *Parker JS, Regions Hospital, St. Paul, MN*
- 96 Can Venous Blood Gas Measurements Be Used in Place of Arterial Blood Gas Determinations in Emergency Department Patients? *Sexton JD, Emergency Medicine Residency of the Lehigh Valley, Bethlehem, PA*
- 97\* Hematuria in the Evaluation of Renal Colic: Is It Helpful? *Jones JB, Indiana University, Indianapolis, IN*

**9:00 – 10:00 AM**

**INFECTIOUS DISEASE**

**ROOM N237**

**MODERATOR: GJ MORAN, OLIVE VIEW, UCLA, SYLMAR, CA**

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- 98 Respiratory Isolation Precautions in HIV-Infection Patients With Pneumonia—A Preliminary Analysis *Chiang WK, Bellevue Hospital Center, New York, NY*
- 99<sup>+</sup> An Emergency Department—Based Pneumococcal Vaccination Call-Back Program *Martin DR, Ohio State University, Columbus, OH*
- 100 The Misdiagnosis of Liver Abscess in the Emergency Department *Chern C-H, Veterans General Hospital-Taipei, Yang-Ming University, Taiwan, Republic of China*
- 101\* Antibiotics Are Rarely Required Following Rattlesnake Envenomation *LoVecchio F, Good Samaritan Poison Center and Maricopa Medical Center, Phoenix, AZ*
- 102 Abscess Location and Wound Culture Results: A Comparison Between Intravenous Drug Users and Nonusers With Extremity Abscesses *Diercks DB, University of California—Davis, Sacramento, CA*

- 103** Initiating Antibiotic Therapy in the Emergency Department Decreases Length of Stay for Patients With the Diagnosis of Community-Acquired Pneumonia *Balentine J, St. Barnabas Hospital, Bronx, NY*
- 104** Chagas' Disease in a Chest Pain Unit *Mallon WK, Los Angeles County—University of Southern California, Los Angeles, CA*

9:00 – 10:00 AM

**PHARMACOLOGY/TOXICOLOGY**

**ROOM N237**

**MODERATOR: F LOVECCHIO, GOOD SAMARITAN REGIONAL POISON CENTER, PHOENIX, AZ**

- 105** Frequency of Adverse Reactions to Prochlorperazine in the Emergency Department *Olsen JC, Lutheran General Hospital, Park Ridge, IL*
- 106** Geriatric Trauma in the State of Illinois: Substance Use and Injury Patterns *Coker SB, University of Illinois, Chicago, IL*
- 107** Tracking Iatrogenic Poisoning Fatalities Using the American Association of Poison Control Centers Toxic Exposure Surveillance System *Wax P, University of Rochester, Rochester, NY*
- 108** The Use of Herbal Medications Among the Pediatric Population at a Large Urban Community Hospital *McRae A, New York Methodist Hospital, Brooklyn, NY*
- 109** A Survey on the Use of Alternative Therapy in Children by Adult Caregivers *Jacobson S, Mount Sinai School of Medicine, New York, NY*
- 110** Body Weight Gain and Food Intake Following Recurrent Methcathinone Intoxication *Jones AE, Carolinas Medical Center, Charlotte, NC*
- 111** Combined Evidence-Based, Consensus Guidelines for the Stocking of Emergency Antidotes *Dart RC, Rocky Mountain Poison and Drug Center, Denver, CO*

9:00 – 10:00 AM

**TRAUMA/RESUSCITATION**

**ROOM N237**

**MODERATOR: BR TIFFANY, MARICOPA MEDICAL CENTER, PHOENIX, AZ**

- 112** Factors Associated With Head and Neck Injury in Air Bag–Deployed Crashes *Gregory ME, SUNY, Syracuse, NY*
- 113\*** The Effect of Bretylium Tosylate on EKG-Guided Pericardiocentesis *Muhammad A, Beth Israel Medical Center, New York, NY*
- 114** Review of the Compliance With Advanced Trauma Life Support Protocol Among Patients Referred to a Level I Trauma Center *Lewell M, London Health Sciences Center, University of Western Ontario, London, Ontario, Canada*
- 115** The Utility of the Lateral Chest Radiograph in Trauma Patients *Chang AK, Massachusetts General Hospital, Boston, MA*
- 116** Efficacy of Anterior Versus Lateral Chest Compressions: A Cadaver Study *Allegra JR, Morristown Memorial Hospital, Morristown, NJ*
- 117\*** Pattern of Injuries in Helmeted Motorcyclists in Singapore *Tham K-Y, Tan Tock Seng Hospital, Singapore, Republic of Singapore*
- 118** Confirmation of Endotracheal Tube Placement: Analysis of 2,392 Emergency Department Intubations *Walls RM, Brigham and Women's Hospital, Boston, MA*

9:00 – 10:00 AM

**CLINICAL PRACTICE**

**ROOM N237**

**MODERATOR: CB CAIRNS, UNIVERSITY OF COLORADO HEALTH SCIENCES CENTER, DENVER, CO**

- 119** The Use of Analgesia by Physicians and Physician Assistants: Who Will Get Me Relief? *Kozlowski MJ, William Beaumont Hospital, Royal Oak, MI*

- 120** Documentation of Pelvic Examination Findings in Adult Women With History of Consensual Sexual Intercourse and Without History of Nonconsensual Sexual Intercourse *Jackson MC, University of Maryland, Baltimore, MD*
- 121** A Brief Video Improves Antibiotic Compliance in Emergency Patients *Pregerson DB, Los Angeles County Medical Center—University of Southern California, Los Angeles, CA*
- 122** Lower Mortality Rates Among Patients Treated in the Emergency Department for Bacterial Meningitis *Miner J, Hennepin County Medical Center, Minneapolis, MN*
- 123** A Breast Knowledge Survey in an Urban Emergency Department *Takakuwa KM, University of California—Davis, Sacramento, CA*
- 124** Emergency Department Profile of Domestic Violence Victims in Singapore *Sathiaselvan S, Tan Tock Seng Hospital, Singapore, Republic of Singapore*
- 125\*** Health Risk Behaviors by Domestic Violence Status in a Random, Emergency Department Sample *Larkin GL, Mercy Hospital of Pittsburgh, Pittsburgh, PA*

9:00 – 10:00 AM

**CLINICAL PRACTICE**

**ROOM N237**

**MODERATOR: EA PANACEK, UNIVERSITY OF CALIFORNIA—DAVIS, SACRAMENTO, CA**

- 126** Who Are the Young Victims of Interpersonal Violence? *Zun L, Mount Sinai Hospital Medical Center, Chicago, IL*
- 127** The Relationship Between Clinical Symptoms and Laboratory Measures of Dehydration in Children With Dehydration *Ryan JG, North Shore University Hospital, Manhasset, NY*
- 128** Cerebrospinal Fluid (CSF) in a Pediatric Emergency Unit: Indications and Positiveness Related With the Patient's Age *dos Reis MC, University of Campinas, Campinas, State of São Paulo, Brazil*
- 129** Trauma Care in Latin American: A Survey to Determine Available Resources and Needs Assessment *Milzman D, Providence Hospital, Washington, DC*
- 130** Arterial Serum Adenosine Levels in Patients Undergoing Coronary Artery Angioplasty *Alexander J, University of Massachusetts, Worcester, MA*
- 131** Pediatric Emergency Medicine in Vietnam's Largest City, Ho Chi Minh *Lewiss RE, Brigham and Women's Hospital, Boston, MA*
- 132†** Cardiopulmonary Effects of the Spit Buster Mask in Pulmonary Diseased Patients *Broderick KB, SUNY, Buffalo, NY*

9:00 – 10:00 AM

**TRAUMA/RESUSCITATION**

**ROOM N237**

**MODERATOR: TBA**

- 133** Age-Related Differences of Pediatric Trauma Patients in the Emergency Department *Kim KH, Inje University Sanggye Paik Hospital, Seoul, Korea*
- 134** Survival Inversely Related to Time to Laparotomy or Thoracotomy in Trauma Patients *Porter RS, Albert Einstein Medical Center, Philadelphia, PA*
- 135** Serum Glucose Levels in Elderly Trauma Victims *Ernst AA, University of California—Davis, Sacramento, CA*
- 136** Relationship of Injury Severity to Timing of Surgery and Mortality in Trauma Patients *Lane PL, Albert Einstein Medical Center, Philadelphia, PA*
- 137** Intubating Laryngeal Mask Airway: A Novel Approach to Emergency Department Airway Management *Linder JJ, Maricopa Medical Center, Phoenix, AZ*

- 138\*** Distracting Injuries in Blunt Trauma Patients Requiring Cervical Radiography *Ullrich AN, University of California—Los Angeles, Los Angeles, CA*
- 139\*** The Use of Head Computed Tomography in Elderly Patients Sustaining Minor Head Trauma *Mack LR, Resurrection Medical Center, Chicago, IL*

9:00 – 10:00 AM

**EMS/OUT-OF-HOSPITAL**

**ROOM N237**

**MODERATOR: JW RUNGE, CAROLINAS MEDICAL CENTER, CHARLOTTE, NC**

- 140** Prehospital Provider Stroke Knowledge Base Assessment *Bruns J Jr, Mount Sinai Medical Center, New York, NY*
- 141** EMT Knowledge About Domestic Violence and the Effectiveness of Training *Weiss SJ, University of California—Davis, Sacramento, CA*
- 142** Gender Differences in Statewide EMS Transports *Weiss SJ, University of California—Davis, Sacramento, CA*
- 143** A Retrospective Evaluation of the Performance of Prehospital Advanced Life Support Providers During Cardiac Arrest *Lewell M, London Health Sciences Center, University of Western Ontario, London, Ontario, Canada*
- 144** Top Five Lessons Learned in Disaster Medicine *Sapira A, Mount Sinai Medical Center, New York, NY*
- 145\*** Helicopter Transport of Acute Stroke Patients *Duldner JE Jr, Akron General Medical Center, Akron, OH*
- 146** Emergency Department Staff Evaluation of EMS Provider Performance *Carroll RF, University of Connecticut, West Hartford, CT*
- 147** Air Versus Ground: Which Method of Transport Is Better for Short- and Intermediate-Range Interfacility Transport? *O'Connor RE, Christiana Care Health System, Newark, DE*

**ORAL PRESENTATIONS**

1:00 – 3:00 PM

**BASIC SCIENCES**

**ROOM N243**

**MODERATOR: CB CAIRNS, UNIVERSITY OF COLORADO HEALTH SCIENCES CENTER, DENVER, CO**

- 5** The Kinetics of Hyperbaric Oxygen on Cellular Proliferation, and Growth Factor Receptor Expression *Reenstra W, Boston University, Boston, MA*
- 6** Hyperbaric Oxygen Decreases Intercellular Adhesion Molecule-1 mRNA Expression in an In Vitro Model of Ischemia/Reperfusion *Buras JA, Brigham and Women's Hospital, Boston, MA*
- 7** Restoration of Translational Competence by Insulin Is Not Observed in CA3 Hippocampal Neurons During Reperfusion *Sullivan JM, Wayne State University, Detroit, MI*
- 8** Comparison of Calpain and Caspase Activity in Postischemic Brain *Mills AM, University of Pennsylvania, Philadelphia, PA*
- 9** Effects of Ethanol on Systemic Hemodynamics in a Swine Model of Accidental Hypothermia *Loppnow G, Fairview University Medical Center, Minneapolis, MN*
- 10** Immediate Countershock Versus CPR Before Countershock in a Five-Minute Ventricular Fibrillation Arrest Swine Model *Cruz B, Los Angeles County-UCLA Harbor, Torrance, CA*
- 11** The Effect of Epidermal Debridement on Reepithelialization and Infection in Porcine Burns Treated With Octyl-Cyanoacrylate and Dry Gauze *Singer AJ, SUNY, Stony Brook, NY*
- 12** Differential Responses of Peripheral and Central Tissue Oxygen Availability and Utilization in Patients With Acute Shock and Hypoxia *Colmer CU, University of Colorado Health Sciences Center, Denver, CO*

1:00 – 3:00 PM

**CARDIOVASCULAR**

**ROOM N238**

**MODERATOR: BR TIFFANY, MARICOPA MEDICAL CENTER, PHOENIX, AZ**

- 13** Which Chest Pain Patients Benefit From Continuous ST-Segment Monitoring With Automated Serial ECG? *Fesmire FM, University of Tennessee College of Medicine, Chattanooga, TN*
- 14** Prevalence and Severity of Coronary Artery Disease in Low-Risk Chest Pain Patients *Mangione A, Albert Einstein Medical Center, Philadelphia, PA*
- 15** Serious Problems With Utilization of Troponin I for Diagnosing AMI at Emergency Department Presentation of Chest Pain *Milzman D, Georgetown University, Washington, DC*
- 16** The Cost-Effectiveness of Electron Beam Computed Tomography in the Evaluation of Chest Pain in Emergency Department Observation Units *Laudon DA, Mayo Foundation, Rochester, MN*
- 17** Cholesterol Screening in Chest Pain Unit Patients *Gershoff L, University of California—Davis, Sacramento, CA*
- 18** Abstract Withdrawn
- 19** Abstract Withdrawn
- 20** Occult Myocardial Injury in Severe Carbon Monoxide Poisoning *Aurora TK, Henry Ford Hospital, Detroit, MI*

1:00 – 3:00 PM

**CLINICAL PRACTICE**

**ROOM N234**

**MODERATOR: JE HOLLANDER, UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA, PA**

- 21\*** The Ottawa Ankle Rules: How Confident Are Our Patients? *Rosenbaum RA, Christiana Care Health System, Newark, DE*
- 22\*** Diagnostic Yield of Head Computed Tomography Scanning in the Evaluation of 112 Consecutive Patients With Dizziness *Wasay M, Dent Neurologic Institute, Buffalo, NY*
- 23** Effect of the Initiation of Bi-PAP on Hemodynamic Stability *Patch J, University of Mississippi, Jackson, MS*
- 24** Etiology and Outcome of Patients With a Final Diagnosis of Noncardiac Chest Pain Admitted From the Emergency Department Under Suspicion of Acute Coronary Syndrome *High WA, Mayo Medical School, Rochester, MN*
- 25** Hyponatremia in Community-Acquired Pneumonia (CAP): Is It Truly a Marker for Legionella? *Hendifar AE, Louisiana State University, New Orleans, LA*
- 26** The Use of Serum Progesterone to Predict Ectopic Pregnancy in Symptomatic First-Trimester Patients *Buckley RG, US Naval Hospital, Rota, Spain*
- 27** Changing Rural Physician Behavior in Response to Shared Patient Satisfaction Survey Results *Sloan RA, Northern Michigan Hospital, Petoskey, MI*
- 28** Magnesium–Aluminum Hydroxide Suspension for the Treatment of Dermal Capsaicin Exposures *Lee DC, North Shore University Hospital, Manhasset, NY*

**POSTER PRESENTATIONS**

3:00 – 5:00 PM

**CLINICAL PRACTICE**

**ROOM N237**

**MODERATOR: WJ BRADY, UNIVERSITY OF VIRGINIA, CHARLOTTESVILLE, VA**

- 148** Practice Variation in the Diagnosis and Treatment of Deep Vein Thrombosis Presenting to the Emergency Department: A Call for Practice Guidelines *Rowe BH, University of Alberta, Edmonton, Alberta, Canada*



- 149 Documentation of the Emergency Evaluation of the Adult Sexual Assault Victim *Dubich EM, Medical College of Ohio, Toledo, OH*
- 150 Use of Percussion as a Screening Tool in the Diagnosis of Occult Hip Fractures *Tiru M, Changi General Hospital, Singapore, Republic of Singapore*
- 151 Emergency Department Evaluation of Male Victims of Sexual Assault *Ernst AA, University of California—Davis, Sacramento, CA*
- 152 Comparison of Quality of Medical Documentation for Findings Related to Sexual Assault Prior and Post the Development of a Sexual Assault Forensic Examiner Program *Jackson MC, University of Maryland, Baltimore, MD*
- 153 An Evaluation of an Evidence-Based Renal Colic Algorithm: Implications for Codifying Physician Ordering and Improving Efficiency *MacKenzie R, Lehigh Valley Hospital, Allentown, PA*
- 154\* Hyponatremia in Marathon Runners: Experience With the Inaugural Rock 'n' Roll Marathon *Davis D, University of California—San Diego, San Diego, CA*
- 155\* The Effect of Trendelenburg Position on Subclavian Vein Diameter in Euvoletic and Hypovolemic Volunteers *Gibson GP, University of California—San Francisco, Fresno, CA*
- 156 The Sexual Assault Examination: A Comparison of Physical Findings Between an Emergency Department and a Freestanding Nurse Examiner Clinic *Rossmann L, Spectrum Health, Michigan State University, Grand Rapids, MI*
- 157 Do Diabetic Patients Present to Emergency Departments With Infectious Complications at a Higher Rate than Nondiabetic Patients? *Feuer H, Mount Sinai School of Medicine, New York, NY*
- 158 Empiric Treatment of Gonorrhea and Chlamydia in the Emergency Department *Weist DR, Albany Medical College, Albany, NY*
- 159 The Incidence, Treatment, and Disposition of Hemorrhagic CVA in the Emergency Department *Bunney EB, Our Lady of Resurrection Medical Center, Chicago, IL*
- 160 Emergency Medicine Resident Training in Mechanical Ventilation *Sigillito R, Medical Center of Louisiana at New Orleans, New Orleans, LA*
- 161 Perceptions of Medical Providers Regarding Their Care of HIV-Positive Patients in the Emergency Department Setting *Alcindor F, Beth Israel Medical Center, New York, NY*
- 162\* Differences in Patient Age and Antibiotic Type in the Inappropriate Use of Antibiotics in the Emergency Department *Stone S, University of Colorado Health Sciences Center, Denver, CO*

3:00 – 5:00 PM

# DIAGNOSTICS

ROOM N237

**MODERATOR: RK CYDULKA, METRO HEALTH MEDICAL CENTER, CLEVELAND, OH**

- 163 Leukocyte Esterase as a Marker of the Presence of Fecal Leukocytes *Grillo A, Christiana Care Health Systems, Newark, DE*
- 164 Validation of a Computer Model for the Determination of Aortic Compliance Curves *Summers RL, University of Mississippi, Jackson, MS*
- 165\* Pneumothoraces on Abdominal CT in Pediatric Blunt Trauma Patients *Holmes JE, University of California—Davis, Sacramento, CA*
- 166 Observation Improves CT Scan Utilization in Abdominal Pain Evaluation for Appendicitis *Mahadevan M, New Britain General Hospital, New Britain, CT*
- 167 Impact of ACI-TIPI on Resource Utilization in Emergency Department Patients With Chest Pain *Zalenski RJ, Wayne State University, Detroit, MI*

- 168\* Early Centrifugation of Chemistry Specimens and Hemolysis *Verma R, Beth Israel Medical Center, New York, NY*
- 169 Accuracy of Day 4 Bone Scans and Efficacy of Clinical Findings in the Assessment of Patients With Clinical Scaphoid Fractures *Woolfrey K, Carteret General Hospital, Morehead City, NC*
- 170 Use of Cerebrospinal Fluid (CSF) Cell Count as Screening Test in the Evaluation of Afebrile Emergency Department Patients Presenting With Headache *Minnigan H, Health Partners-Regions Hospital, St. Paul, MN*
- 171† Evaluation of Computerized Esophageal Detector Device (CEDD) in Patients With Morbid Obesity and Severe Pulmonary Disease *Kimball EJ, University of Utah, Salt Lake City, UT*
- 172 Is a Clinical Rule for Predicting the Need for Shoulder X-Rays Feasible? *Silver BE, Emergency Medicine Residency of the Lehigh Valley, Bethlehem, PA*
- 173 Noncontrasted Abdominal Computerized Tomography Compared to Intravenous Pyelography for the Evaluation of Suspected Renal Colic *O'Brien JF, Orlando Regional Healthcare System, Orlando, FL*
- 174 Arterial-Central Venous Carbon Dioxide Difference in the Emergency Department: An Indicator of Cardiac Index *Mullen MT, Henry Ford Hospital, Detroit, MI*
- 175 Prospective Evaluation of a Protocol for Selective Thoracolumbar Radiography *Nyce A, Cooper Hospital, University Medical Center, Camden, NJ*
- 176 Hemodynamic Evaluation of the Critically Ill in the Emergency Department: A Comparison of Clinical Impression Versus Transesophageal Doppler Measurement *Urrunaga JJ, Henry Ford Hospital, Detroit, MI*

3:00 – 5:00 PM

# CARDIOVASCULAR

ROOM N237

**MODERATOR: LG GRAFF, NEW BRITAIN GENERAL HOSPITAL, NEW BRITAIN, CT**

- 177 Now Evaluate Chest Pain With 12-Lead Electrocardiograms and Rapid Markers for Early Recognition of Myocardial Infarctions in the Ambulance (New ERA) *Dadkhad S, St. Francis Hospital, Evanston, IL*
- 178 Do Age and Gender Affect  $\beta$ -Blocker Utilization in Emergency Department Management of Acute Myocardial Infarction? *Pancu DM, Emergency Medicine Residency of the Lehigh Valley, Bethlehem, PA*
- 179 Obstructive Shock in Pulmonary Embolism: Thrombolytic Therapy and Survival *Antro C, Medicina D'Urgenza, AO San Giovanni Battista, Torino, Italy*
- 180\* The Efficacy of Cardiac Monitoring in Syncope Admissions from the Emergency Department *Sipay SS, Resurrection Medical Center, Chicago, IL*
- 181 How Many CK-MB Determinations Are Necessary to Rule Out Acute Myocardial Infarction in Patients Without ST-Segment Elevation? *Bassan R, Pró-Cardíaco Hospital, Rio de Janeiro, Brazil*
- 182 Gender Differences of Echocardiographic Findings in Acute Cardiogenic Pulmonary Edema *Goldman DA, Long Island Jewish Medical Center, New Hyde Park, NY*
- 183 Is Sestamibi Useful for Identifying Cardiac Disease in Patients With Equivocal Chest Pain? *Rodriguez E, SUNY, Syracuse, NY*
- 184 Indigent Patients' Utilization of Emergency Department-Based Chest Pain Centers for Nonmedical Reasons *Robinson B, Emory University, Atlanta, GA*
- 185 Improvement in Documentation of Nontraumatic Chest Pain After Implementation of a Chest Pain Evaluation

- Form in a University Hospital Emergency Department  
*Youdelman BA, Westchester Medical Center, Valhalla, NY*
- 186** Outcomes With Observation Units for Chest Pain Evaluation in a Multihospital Network *Prete M, Charlotte Hungerford Hospital, Torrington, CT*
- 187** Low Molecular Weight Heparin in the Treatment of Unstable Angina: A Systematic Review *Rowe BH, University of Alberta, Edmonton, Alberta, Canada*
- 188** Noninvasive Estimation of Myocardial Oxygen Consumption *Summers RL, University of Mississippi, Jackson, MS*
- 189** Enhanced Diagnosis of Narrow Complex Tachycardias Using Increased ECG Speed *Accardi AJ, University of California-Davis, Sacramento, CA*
- 190** Comparison of Accuracy of Plasma Myoglobin and CK-MB for the Diagnosis of Acute Myocardial Infarction *Bassan R, Pró-Cardíaco Hospital, Rio de Janeiro, Brazil*
- 191** Physician Probability Estimates for Patients Presenting With Chest Pain *Schaider J, Cook County Hospital, Chicago, IL*
- 214** Reduction in the Cobalt Binding Capacity of Human Albumin With Myocardial Ischemia *Bar-Or D, Swedish Medical Center, Englewood, CO*

**3:00 – 5:00 PM**

**TRAUMA**

**ROOM N237**

**MODERATOR: TE TERNDROP, UNIVERSITY OF ALABAMA, BIRMINGHAM, AL**

- 192** Serious Head Injury and Death Associated With the Operation of All-Terrain Vehicles and Motorcycles by Minors *Kapur RK, Baystate Medical Center, Tufts University, Springfield, MA*
- 193** Emergency Department Observation of Trauma Patients: Predictors of Further Hospitalization *Dominguez S, Maricopa Medical Center, Phoenix, AZ*
- 194** Relationship of Age to Timing of Surgery in Trauma Patients *Lane PL, Albert Einstein Medical Center, Philadelphia, PA*
- 195** Out-of-Hospital Blood Administration for Critically Injured Patients Transported by Helicopter *Price DD, Oregon Health Sciences University, Portland, OR*
- 196** The Use of ISS and TRISS as Measures of Injury Severity and as Mortality Predictors in the DCLHb Traumatic Hemorrhagic Shock Trial *Sloan EP, University of Illinois, Chicago, IL*
- 197** The Incidence of Hypothermia in the Setting of Major Trauma: Strategies for Prevention and Timely Identification *Lauder CT, Christiana Care Health System, Newark, DE*
- 198\*** Triage Score: A New Triage Tool for Rapid Categorization of Injured Patients *Hong E-S, Ulsan University Hospital, Ulsan, South Korea*
- 199** Accuracy of Estimation of External Blood Loss by EMS Personnel *Patton KR, Albany Medical College, Albany, NY*
- 200** The Initial Cross-table Lateral Cervical Spine Film for the Helmeted Athlete in the Emergency Department With a Suspected Neck Injury: Helmet/Pads On or Off? *Veenema KR, University of Rochester, Rochester, NY*
- 201\*** Does the Presence of Street Drugs or Ethanol Increase the Risk of Intracranial Pathology in Minor Head Injury Patients? *Haydel MJ, Louisiana State University at New Orleans, New Orleans, LA*
- 202** New Diagnostic Peritoneal Lavage (DPL) Criteria to Detect Hollow Viscous Injury for Blunt Abdominal Trauma *Lee CC, Bellevue Hospital Center, New York, NY*
- 203** The Utilization of the Burden Nasoscope for Nasotracheal Intubation in the Prehospital Setting *Waters DS, University of Kentucky, Lexington, KY*

- 204** The Use of Blood Banking Resources in a Large Urban Trauma Center *Henderson SO, Los Angeles County-University of Southern California, Los Angeles, CA*
- 205** Severe Head Trauma: Prehospital Assessment and Management *Gorenstein S, Mount Sinai Medical Center, New York, NY*
- 206** Does Emergency Transport Really Stress the Patient? *Doerges V, University of Luebeck, Luebeck, Germany*

**3:00 – 5:00 PM**

**TOXICOLOGY/PHARMACOLOGY**

**ROOM N237**

**MODERATOR: SR WHITE, CHILDRENS HOSPITAL OF MICHIGAN POISON CENTER, DETROIT, MI**

- 207** Opiate Overdose: What Is the Total Time of Significant Intoxication? *Panacek EA, University of California-Davis, Sacramento, CA*
- 208** Hazardous Materials Events at a New York City Trauma Center *Trutt J, Mount Sinai School of Medicine, New York, NY*
- 209** Quantitative Comparison of Fluoride Neutralization Potential of Various Hydrofluoric Acid Burn Therapies *Cox RD, University of Mississippi, Jackson, MS*
- 210** The Use of Alternative Medicine Therapies by Emergency Department Patients *Sullivan DE, San Antonio Uniformed Services Health Education Consortium, San Antonio, TX*
- 211†** How to Maintain Medications at a Reasonable Temperature? Evaluating a New Method of Product Packing *Sayah AJ, Brigham and Women's Hospital, Boston, MS*
- 212** Caveat Emptor—Buyer Beware! *Challoner KR, Los Angeles County-University of Southern California, Los Angeles, CA*
- 213†** Consecutive Doses of Levalbuterol and Racemic Albuterol Result in Comparable Safety and Efficacy: A Pharmacokinetic (PK) and Pharmacodynamic Study in Mild-Moderate Asthmatics *Vaikus L, Sepracor, Inc., Marlboro, MA*
- 215** Use, Understanding, and Beliefs About Alternate Medicines *Weiss SJ, University of California-Davis, Sacramento, CA*
- 216** Serious Injury and Death Associated With Alcohol and Drug Use in Adolescents *Mader TJ, Baystate Medical Center, Springfield, MA*
- 217** Epidemic US Opiate Mortality Rates: 1979-1996 *Martin TG, University of Washington, Seattle, WA*
- 218** Clinical Analysis of Puffer Fish Poisoning *Park CW, Gil Medical Center, Gachon Medical School, Incheon, Korea*
- 219** Double-Blinded Randomized Comparison of Oral Doxepin and Diphenhydramine in Treating Acute Urticaria *Meggs WJ, East Carolina University, Greenville, NC*

**3:00 – 5:00 PM**

**EDUCATION/ADMINISTRATION**

**ROOM N237**

**MODERATOR: DM BIRNBAUMER, UCLA, HARBOR, TORRANCE, CA**

- 220\*** Emergency Medicine Residents' Perceptions of Bioethical Education *Salen PN, Emergency Medicine Residency of the Lehigh Valley, Bethlehem, PA*
- 221** Redundancies in a Database of Emergency Department Patient Visits *Zimmer GD, Brigham and Women's Hospital, Boston, MA*
- 222\*** The Administrative Dilemma: Perceptions and Misconceptions *Mulvey AW, Resurrection Medical Center, Chicago, IL*
- 223** College Research Associates as Screeners for Firearms Injury Risk Assessment in an Urban, Community Teaching Hospital Emergency Department *Cordone M, Bridgeport Hospital, Bridgeport, CT*

- 224** The Relation Between Stressors, Strain, and Coping Among Emergency Medicine Residents *Boudreaux ED, Earl K. Long Medical Center, Baton Rouge, LA*
- 225** How Do Emergency Medicine Residents Learn Compared to Non-Emergency Medicine Residents? A Novel Assessment of Behavior and Learning Styles *Ramalanjaona GR, Seton Hall University, South Orange, NJ*
- 226** Stressors Experienced by Emergency Medicine Residents *Boudreaux ED, Louisiana State University, Baton Rouge, LA*
- 227** Evaluation of an Integrated Conscious Sedation Curriculum *Newton KI, University of Southern California, Los Angeles, CA*
- 228** Initiation of X-Rays by the Triage Nurse: Competency and Its Effect on Patients' Total Time Spent in the Accident and Emergency Department *Than KC, Changi General Hospital, Singapore, Republic of Singapore*
- 229** Medical Student Comfort With Lifesaving Clinical Skills *Ander DS, Emory University, Atlanta, GA*
- 230\*** Team 7000: A Look at an Emergency Department-based In-Hospital Emergency Response Team *Ko PP, Mount Sinai Medical Center, New York, NY*
- 231** Patient Perceptions of the Specialty of Emergency Medicine *Brown AM, University of Chicago, Chicago, IL*
- 232** Why This Emergency Department? *Rucker DW, Beth Israel Deaconess Medical Center, Boston, MA*
- 233** A Comparison of Teaching Models for Focused Abdominal Sonography for Trauma *Salen P, Emergency Medicine Residency of the Lehigh Valley, Bethlehem, PA*
- 234** Emergency Medicine Resident Ultrasound Evaluation in Patients Suspected of Having Renal Colic *Stava M, University of Kentucky, Lexington, KY*

**3:00 – 5:00 PM**

**CLINICAL PRACTICE**

**ROOM N237**

**MODERATOR: BR TIFFANY, MARICOPA MEDICAL CENTER, PHOENIX, AZ**

- 235** Injury Control in Honduras: A Survey of Injury Mortality *Richman M, Emory University, Atlanta, GA*
- 236** New Technique for Emergency Stabilization of Dentoalveolar Fracture *Lee CC/Matos J, Bellevue Hospital Center, New York, NY*
- 237** Adolescents Need Adequate Health Risk Assessment in the Emergency Department *Mahadeo R, Mount Sinai Medical Center, New York, NY*
- 238** Effect of the 1994 Northridge Earthquake on Patient Volume, Injury, and Illness at a Level I Trauma Center Near the Epicenter 24 Hours After the Event *Silka PA, Cedars-Sinai Medical Center, Los Angeles, CA*
- 239** Evaluation of Documentation Practices of Sexual Assault Nurse Examiners *Minshall L, Kern Medical Center, Bakersfield, CA*
- 240** Should Parents Be Present? Physician Perception of Parental Presence During Emergency Department Procedures *Beckman A, Indiana University, Indianapolis, IN*
- 241** HIV Counseling, Testing and Referral Practices for Patients With Sexually Transmitted Diseases in Emergency Departments *Fincher-Mergi M, SUNY, Buffalo, NY*
- 242** Prevalence of Cardiac Ischemia and Infarction in Emergency Department Patients With Chief Complaint of Chest Pain *Tabas JA, San Francisco General Hospital, San Francisco, CA*
- 243** Vaginal Bleeding: Documentation and Frequency of Coagulopathy *Singer AJ, SUNY, Stony Brook, NY*
- 244** Diagnostic Accuracy of the ECG for Acute Myocardial Infarction and Unstable Angina: Experience in a Chest Pain Unit *Bassan R, Pro-Cardiaco Hospital, Rio de Janeiro, Brazil*

- 245** Is Routine Acetaminophen Screening Necessary for All Overdose Patients? *Burke C, SUNY, Buffalo, NY*
- 246** Can Room Air Pulse Oximetry Be Used to Screen for Clinically Significant Hypercapnia? *Witting MD, University of Maryland, Baltimore, MD*
- 247** Have Emergency Department Patients Used or Are Willing to Use Alternative Medicine? *Singer AJ, SUNY, Stony Brook, NY*
- 248** Utilization of Saline Wells in a University Center Emergency Department *Rovere RM, Albany Medical College, Albany, NY*
- 249** A Pilot Study Using Low-Dose Ketamine as an Analgesic for Acute Pain in Adults *Smith DC, Baystate Medical Center, Springfield, MA*

**TUESDAY, OCTOBER 12, 1999**

**ORAL PRESENTATIONS**

**8:00 – 10:00 AM**

**PEDIATRICS**

**ROOM 243**

**MODERATOR: TE TERNDROP, UNIVERSITY OF ALABAMA, BIRMINGHAM, AL**

- 29** Air Ambulance Utilization for Pediatric Transport in an Urban Setting *Jantos T, Los Angeles County-University of Southern California, Los Angeles, CA*
- 30** Factors Associated With Youth Bicycle Helmet Usage *Brown K, SUNY, Syracuse, NY*
- 31** Compliance to Follow-Up appointments Generated in the Pediatric Emergency Department *Kondamudi N, Brooklyn Hospital Center, Bronx, NY*
- 32** Polymerase Chain Reaction Diagnosis of Enterovirus in Children With Aseptic Meningitis *Silverman R, Long Island Jewish Medical Center, New Hyde Park, NY*
- 33** Foley Catheter Balloon Technique for Visualizing the Hymen in Adolescent Sexual Assault Victims *Genco M, Spectrum Health, Michigan State University, Grand Rapids, MI*
- 34\*** Knowledge of Child Car Seat Safety in a Tricultural Southern California Emergency Department *Lew C, University of California-Irvine, Irvine, CA*
- 35\*** Two-Thumb Versus Two-Finger Chest Compression in an Infant Model of Prolonged CPR *Dorfsman ML, Center for Emergency Medicine for Western Pennsylvania, Pittsburgh, PA*
- 36** Heads or Tails: Comparison of a New Pacifier Thermometer With Rectal Temperatures in Children *Hensley TG, Spectrum Health, Michigan State University, Grand Rapids, MI*

**8:00 – 10:00 AM**

**TRAUMA/RESUSCITATION**

**ROOM N238**

**MODERATOR: RW NEUMAR, UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA, PA**

- 37** Hemodynamic Study of Mechanical Cardiopulmonary Resuscitation With and Without Active Decompression and Interposed Abdominal Compression *Yuan HX, Sun Yat-Sen University of Medical Sciences, Guangzhou, Guangdong, Peoples Republic of China*
- 38†** Oxygen Dose Response in Open-Chest ACLS in Swine After a 25-Minute Cardiopulmonary Arrest *Van Meter K, Louisiana State University, New Orleans, LA*



- 39** Treatment of Hypothermia-Induced Ventricular Fibrillation With Warm Lavage Perfluorocarbon Ventilation *Burns M, University of Massachusetts, Worcester, MA*
- 40** Association of Initial Serum  $\tau$  Protein Level and Disposition at Hospital Discharge in Closed Head Injury Patients *Shaw GJ, University of Cincinnati, Cincinnati, OH*
- 41** Automated External Defibrillator Use and the Effect of Provider Exposure to Cardiac Arrest *O'Connor RE, Christiana Care Health System, Newark, DE*
- 42** Evolution of Serum Cytokines (TFN- $\alpha$ , Interleukin-1, Interleukin-6) in Postinjury Systemic Inflammatory Response Syndrome (SIRS) *Lee KH, Wonju College of Medicine, Yonsei University, Wonju, South Korea*
- 43** Long-Term Effects of Octyl-Cyanoacrylate on Scarring After Partial-Thickness Burns in Pigs: A Randomized Trial *Singer AJ, SUNY, Stony Brook, NY*
- 44** Utility of Pretest Probability to Assess the Risk of Abnormal Head Computed Tomography Scans: Can Risk Stratification Be Used to Eliminate Scanning in Low-Risk Patients? *Leisey JR, Christiana Care Health System, Newark, DE*

**8:00 – 10:00 AM**

**AIRWAY MANAGEMENT  
ROOM N234**

**MODERATOR: RM WALLS, BRIGHAM AND WOMEN'S HOSPITAL, BOSTON, MA**

- 45** The Use of Systemic  $\beta$ -Agonists in Acute Asthma in North American Emergency Departments *Travers A, University of Alberta, Edmonton, Alberta, Canada*
- 46\*** Asthma Education in the Emergency Department *Emond SD, St. Luke's-Roosevelt Hospital, New York, NY*
- 47** COPD Exacerbations in Patients With Traditional High-Risk Criteria for Admission: Is the Clinical Decision Unit an Alternative? *Klausner H, Henry Ford Hospital, Detroit, MI*
- 48** Use of the Intubating Laryngeal Mask Airway Compared With Laryngoscopic Intubation Among Emergency Medicine Staff Using Both a Mannequin and Cadaver Model *Lauder CT, Christiana Care Health System, Newark, DE*
- 49** Utility of the Bullard Laryngoscope for Emergency Department Trauma Intubations *Wadbrook P, Maricopa Medical Center, Phoenix, AZ*
- 50\*** Use of Physical Examination, Pulse Oximetry, and ETCO<sub>2</sub> to Predict Deep Endotracheal Tube Placement *Jewett PD, Health Partners-Regions Hospital, St. Paul, MN*
- 51** 2,392 Emergency Department Intubations: First Report of the Ongoing National Emergency Airway Registry Study (NEAR 97) *Walls RM, Brigham and Women's Hospital, Boston, MA*
- 52** Trauma Airway Management in the Emergency Department: A Comparison of First-Pass Success Rate, Indications, and Cricothyrotomy by Specialty *Kulkarni RG, Brigham and Women's Hospital, Harvard Medical School, Boston, MA*

**POSTER PRESENTATIONS**

**10:00 – 11:15 AM**

**EMS/OUT-OF-HOSPITAL  
ROOM N237**

**MODERATOR: MA SUCHER, SCOTTSDALE MEMORIAL HOSPITAL, SCOTTSDALE, AZ**

- 250** Concordance Between Prehospital Notification by EMS and Actual Patient Presentation With Relation to the Allocation of Hospital Resources *Carlson TE, Mount Sinai School of Medicine, New York, NY*
- 251<sup>†</sup>** Prehospital Use of a Sternal Intraosseous Infusion Device *Horwood BT, Maricopa Medical Center, Phoenix, AZ*

- 252** Automated External Defibrillators Can Appropriately Recognize Ventricular Fibrillation in High Electromagnetic Fields *Stolzenberg BT, Geisinger Medical Center, Danville, PA*
- 253\*** Patterns in Complaints Filed by the Public Against Paramedics in an Urban Emergency Medical Services (EMS) System *Pi RD, Denver Health Medical Center, Denver, CO*
- 254** Prehospital Evaluation of Patients With Suspected Stroke *Eckstein MD, University of Southern California, Los Angeles, CA*
- 255** The Impact of "Mosh Pits" on Medical Incidents at Mass Gatherings *Janchar T, Georgetown University, Washington, DC*
- 256** Spinal Immobilization After Motor Vehicle Collision in Patients Who Are Ambulatory at the Scene: Is It Justified? *Bennett MA, Christiana Care Health System, Newark, DE*
- 257** Reliability of Prehospital Triage Criteria for Pregnant Blunt Trauma Patients *Goodwin HC, University of California–Davis, Sacramento, CA*
- 258** Evaluation of EMD Priority Coding and Disposition of Patients *Bishop P, Rural Metro, Rochester, NY*

**10:00 – 11:15 AM**

**CLINICAL PRACTICE  
ROOM N237**

**MODERATOR: RD SHIH, MORRISTOWN MEMORIAL HOSPITAL, MORRISTOWN, NJ**

- 259** An Effective Salvage Technique for Severed Endotracheal Cuff Pilot Tubes and Incompetent Pilot Balloon Valves *Sing R, Carolinas Medical Center, Charlotte, NC*
- 260** The Use of Analgesia by Physicians and Physician Assistants: Who Will Get Me Relief? *Wiater JG, William Beaumont Hospital, Royal Oak, MI*
- 261<sup>†</sup>** One-Month Follow-up and Natural History of Patients Presenting to an Emergency Department With Symptoms Suggestive of Acute Cardiac Ischemia *Nagurney JT, Massachusetts General Hospital, Boston, MA*
- 262** Clinical Characteristics and Outcomes of Rhabdomyolysis: A Case Review of 247 Patients *Chin RL, San Francisco General Hospital, University of California, San Francisco, CA*
- 263** How Good Are Emergency Physicians in Predicting the Results of Shoulder X-Rays? *Silver BE, Emergency Medicine Residency of the Lehigh Valley, Bethlehem, PA*
- 264** Circadian Variation in the Presentation of Sickle Cell Pain Crisis *del Mundo A, University of Illinois, Chicago, IL*
- 265** Emergency Care Delivery in an Overcrowded Metropolis: The Challenges and Goals for Ho Chi Minh City *Nguyen M-T, Louisiana State University, New Orleans, LA*
- 266** Recidivism Among Elderly EMS Patients Brought to an Urban Emergency Department *Russell S, University of California–Davis, Sacramento, CA*
- 267\*** Can Patients With Renal Colic Be Safely Discharged From the Emergency Department Without an Imaging Procedure? *Lee S, University of Toronto, Toronto, Ontario, Canada*

**10:00 – 11:15 AM**

**EDUCATION/ADMINISTRATION  
ROOM N237**

**MODERATOR: NJ JOURILES, METROHEALTH MEDICAL CENTER, CLEVELAND, OH**

- 268** The Emergency Medicine CyberSchool: Computer Assisted Instruction on the Internet as a Useful Tool for Educating Medical Students *Bessette M, Mount Sinai Medical Center, New York, NY*

- 269** Emergency Department Observation Unit Occupancy Is Maximized by a Novel Hybrid Design *Gibb K, William Beaumont Hospital, Royal Oak, MI*
- 270** Do Emergency Departments Comply With the New EMTALA Guidelines Regarding Preauthorization? *Hunt C, St. John Hospital and Medical Center, Detroit, MI*
- 271** Why Do Patients Come to Emergency Departments? *Derlet RW, University of California—Davis, Sacramento, CA*
- 272** Functional Limitations of Emergency Department International Classification of Diseases, Ninth Revision Codes *Tintinalli JE, University of North Carolina, Chapel Hill, NC*
- 273** Emergency Department Staff Estimates of Patient Satisfaction: The Squeaky Wheel Gets the Grease *Boudreaux ED, Louisiana State University, Baton Rouge, LA*
- 274†** The Utility and Futility of UB-92 Data for Emergency Department Profiling *Harris RH, Our Lady of Lourdes Medical Center, Camden, NJ*
- 275** Colorado Physicians' Knowledge of and Attitudes Toward Mandatory Reporting Laws *Houry D, Denver Health Medical Center, Denver, CO*
- 276** Wide Interresident Procedure Variability Suggests Need for National Standards in Emergency Medicine *Lottifpour S, Henry Ford Hospital, Detroit, MI*

**10:00 – 11:15 AM**

**EMS/OUT-OF-HOSPITAL  
ROOM N237**

**MODERATOR: JJ SHUFELDT, CASA GRANDE REGIONAL MEDICAL CENTER, CASA GRANDE, AZ**

- 277** A National Survey of the Aeromedical Transport of High-Risk Obstetrics Patients *Jones AE, Carolinas Medical Center, Charlotte, NC*
- 278†** An Evaluation of a Multisite First Responder Automated External Defibrillation Program *Lerner EB, SUNY, Buffalo, NY*
- 279** An Evaluation of Paramedics' Ability to Recognize Chest Pain of Cardiac Origin *Sandy CC, George Washington University, Washington, DC*
- 280** The Utility of Routine Fire Department Response to Motor Vehicle Crashes *Funk DL, Albany Medical College, Albany, NY*
- 281** Evaluation of the "Appropriateness" of Triage Requests for Air Transport to Level I Trauma Centers Directly From the Scene Versus a Community Hospital *Tracy J, Boston University, Boston, MA*
- 282** The Impact of a System-wide Airway Management In-Service on Paramedic Intubation Practices *Heck J, Uniformed Services University, Bethesda, MD*
- 283** Physicians in Tactical Emergency Medicine *Smock W, University of Louisville, Louisville, KY*
- 284†** The California 500: Medical Care at a NASCAR Winston Cup Race Event *Grange JT, Loma Linda University, Loma Linda, CA*
- 285** Diversions of Advanced Life Support Ambulances: Causes and Effects in a Large Urban System *Silka PA, Cedars-Sinai Medical Center, Los Angeles, CA*

**10:00 – 11:15 AM**

**DIAGNOSTICS  
ROOM N237**

**MODERATOR: RJ ZALENSKI, WAYNE STATE UNIVERSITY, DETROIT, MI**

- 286** An Evaluation of the Clinical Predictors for the Presence of Ureteral Calculi on Spiral CT in Patients With Suspected Renal Colic *Leisey JR, Christiana Care Health System, Newark, DE*

- 287** Incidence of Negative Hematuria in Emergency Department Patients Diagnosed With Acute Renal Colic by Spiral CT Scan *Pelayo A, Stanford University Hospital, Stanford, CA*
- 288** Effect of Cold Water Immersion on Finger Pulse Oximetry Readings *Kolb JC, University of Mississippi, Jackson, MS*
- 289** The Analysis of Erythrocyte Sedimentation Rate, C-Reactive Protein, White Blood Cell Count, and Temperature in the Diagnosis of Acute Endocarditis *Chuang R, University of Texas at Houston, Houston, TX*
- 290\*** Is Spiral Computed Tomography the Diagnostic Imaging of Choice for Patients With Renal Colic? *Lee S, University Health Network, University of Toronto, Toronto, Ontario, Canada*
- 291** Cardiac Ultrasound Evaluation of Pulseless Patients in the Emergency Department *Salen P, Emergency Medicine Residency of the Lehigh Valley, Bethlehem, PA*
- 292\*** Bedside K<sup>+</sup> Determination in Intraosseous Aspirates Using an Arterial Blood Gas Analyzer *Ruggero R, Beth Israel Medical Center, New York, NY*
- 293** Safety of Emergency Department Transesophageal Echocardiography in Acute Aortic Disease *Hwang SO, Wonju College of Medicine, Yonsei University, Wonju, South Korea*
- 294** Correlation of the Radiographic Cardiothoracic Ratio With Cardiac Function in Patients With Acute Congestive Heart Failure *Summers RL, University of Mississippi, Jackson, MS*

**10:00 – 11:15 AM**

**CARDIOVASCULAR  
ROOM N237**

**MODERATOR: BJ O'NEIL, DETROIT RECEIVING HOSPITAL, DETROIT, MI**

- 295** Abstract Withdrawn
- 296** How Many Patients With Acute Myocardial Infarction Would Be Missed If a Chest Pain Unit Was Not Available? *Bassan R, Pró-Cardíaco Hospital, Rio de Janeiro, Brazil*
- 297** Is It Possible to Identify Patients With Chest Pain and No ST-Segment Elevation Who Have Acute Coronary Insufficiency? *Bassan R, Pró-Cardíaco Hospital, Rio de Janeiro, Brazil*
- 298** Outcomes in Acute Myocardial Infarction Patients Transferred for Acute Angioplasty *Silva J, Resurrection Medical Center, Chicago, IL*
- 299** Prevalence and Determinants of QT Dispersion in Patients Presenting to the Emergency Department With Chest Pain *Jones AE, Carolinas Medical Center, Charlotte, NC*
- 300** Outcome Evaluation of Goal-Driven Therapy Utilizing Central Venous Oxygen Saturation *Powell D, Grace Hospital, Detroit, MI*
- 301** The Role and Cost-Effectiveness of Emergency Department Observational Units in the Evaluation of Transient Ischemic Attacks (TIAs) *Jauch EC, University of Cincinnati, Cincinnati, OH*
- 302** Prevalence and Reliability of Hypercholesterolemia Assessment in the Emergency Department *Chandra A, Wayne State University, Detroit, MI*
- 303** Effect of Primary Changes in Heart Rate on Circulatory Dynamics *Summers RL, University of Mississippi, Jackson, MS*

**10:00 – 11:15 AM**

**EDUCATION/ADMINISTRATION  
ROOM N237**

**MODERATOR: GJ KUHN, MAIN HOSPITAL, RICHMOND, VA**

- 304** Utilizing Project Management as an Organizational Model for Modifying Emergency Physician Behavior *Richardson D, Lehigh Valley Hospital and Healthcare Network, Allentown, PA*

- 305** Emergency Medicine Resident Preparedness for the Threat of Weapons of Mass Destruction: Results of a National Residency Program Director Survey *Bonucci P, Cook County Hospital, Chicago, IL*
- 306** Content and Source of Patient Health Care Education *Smith B, Cook County Hospital, Rush University, Chicago, IL*
- 307** Training for Domestic Terrorism Response in Emergency Residency Program *Diner B, Brooklyn Hospital Center, Brooklyn, NY*
- 308** Walking Distances During an Emergency Department Shift: A Comparison Between Types of Hospitals and Physician Training Levels *Panacek EA, University of California—Davis Medical Center, Sacramento, CA*
- 309** What Proportions of Hospital Admissions From the Emergency Department Are Suitable for a Subacute Care Unit? *Wilson AG, William Beaumont Hospital, Royal Oak, MI*
- 310** Value of CPR Training for Friends/Family of Emergency Department Chest Pain Patients *Zlidenny A, Georgetown University, Washington, DC*
- 311** Study of Psychosocial Needs of Young Persons Who Are Victims of Interpersonal Violence *Zun L, Mount Sinai Hospital Medical Center, Chicago, IL*
- 312** The Excess of “Case Reports” in the Emergency Medicine Literature *Korn CS, Los Angeles County—University of Southern California, Los Angeles, CA*

**10:00 – 11:15 AM**

**EMS/OUT-OF-HOSPITAL**

**ROOM N237**

**MODERATOR: JG YOUNGER, UNIVERSITY OF MICHIGAN MEDICAL CENTER, ANN ARBOR, MI**

- 313** Loss of Consciousness and Mechanism of Injury Helicopter Scene Triage Criteria and Presence of Neurosurgical Traumatic Injury *Thomas SH, Boston MedFlight, Boston, MA*
- 314** The Safety and Efficacy of an Emergency Department—Controlled Interhospital Critical Care Transport Team *Olshaker J, University of Maryland, Baltimore, MD*
- 315** Emphasis on EMS Medical Director Positions by EMS Systems Correlates With Greater Medical Director Involvement and EMS System Output *Stone RM, University of Maryland, Baltimore, MD*
- 316** Paramedic Identification of Acute Stroke *Eckstein M, University of Southern California, Los Angeles, CA*
- 317** Prehospital Resuscitation Practices: A Survey of Prehospital Providers *Marco CA, St. Vincent Mercy Medical Center, Toledo, OH*
- 318** Out-of-Hospital Provider Beliefs Regarding Use of Red Lights and Sirens *Funk DL, Albany Medical College, Albany, NY*
- 319** Safety of Managed Care Organization Directed Interfacility Transfer of Cardiac Patients *Maravelli AJ, Geisinger Medical Center, Danville, PA*
- 320** Sildenafil Citrate: Changes in Paramedic Practice? *Reed D, SUNY, Syracuse, NY*
- 321** In-flight Defibrillation by Cabin Attendants: Varig's Experience *Timmerman S, Fundacao Ruben Berta, Rio de Janeiro, Sao Paulo, Brazil*

**10:00 – 11:15 AM**

**CLINICAL PRACTICE**

**ROOM N237**

**MODERATOR: RA SILVERMAN, LONG ISLAND JEWISH HOSPITAL, NEW HYDE PARK, NY**

- 322** Endocrine Markers as Predictors of Outcomes in Elderly Patients Admitted Through the Emergency Department

With Febrile Illnesses *Hlibczuk V, New York Methodist Hospital, Brooklyn, NY*

- 323** Emergency Department Revisit-Admissions for Ectopic Pregnancy: A Case Series and New, Evidence-Based, Diagnostic Protocol *Kohn MA, San Francisco General Hospital, San Francisco, CA*
- 324** The Use of Noncardiac Laboratory Tests in an Emergency Department Chest Pain Center *Kosowsky J, University of Cincinnati, Cincinnati, OH*
- 325** Child Abuse and Neglect Presentations to a Pediatric Emergency Department *Keshavarz R, St. Joseph's Hospital, Patterson, NJ*
- 326** The Value of Measured Anticonvulsant Levels in Patients With Known Seizure Disorder Who Admit Noncompliance With Medications *Paula R, Louisiana State University, New Orleans, LA*
- 327** Aggressive Emergency Department Management of Diabetic Ketoacidosis Can Reduce ICU Admissions and Hospital Costs Without Adversely Impacting Outcomes *Gonzaba WT, Louisiana State University, New Orleans, LA*
- 328** Evaluation of Physical Examination in Determining the Outcomes of Ultrasound for Deep Vein Thrombosis *Chan L, Albany Medical College, Albany, NY*
- 329** Patient Preferences Regarding Pain Medication in the Emergency Department *Beel TL, St. Joseph Mercy Hospital, Ann Arbor, MI*
- 330** What Does “Risk of MI” Mean to the Emergency Physician? Results of an Observational Study *Wallace E, Boston Medical Center, Boston University, Boston, MA*

**1:00 – 2:30 PM**

**AIRWAY MANAGEMENT**

**ROOM N237**

**MODERATOR: BR TIFFANY, MARICOPA MEDICAL CENTER, PHOENIX, AZ**

- 331** Inhaled Corticosteroids in Acute Asthma: A Systematic Review of the Literature *Rowe BH, University of Alberta, Edmonton, Alberta, Canada*
- 332** Intravenous Magnesium Sulfate in the Treatment of Severe Asthma: A Systematic Review of the Evidence *Rowe BH, University of Alberta, Edmonton, Alberta, Canada*
- 333** Edentulism Worsens Obstructive Sleep Apnea *Pivetti S, Medicina D'Urgenza, AO San Giovanni Battista, Torino, Italy*
- 334<sup>†</sup>** Inhaled Corticosteroids Versus Cromolyn Among Pediatric Patients Presenting to the Emergency Department With Acute Asthma *Clark S, Massachusetts General Hospital, Boston, MA*
- 335** Effect of PEEP Therapy on Intrapulmonary Shunt Caused by Pulmonary Contusion *Lee KH, Wonju College of Medicine, Yonsei University, Wonju, South Korea*
- 336** Does Implementation of an Asthma Pathway Improve the Quality of Care in a High-Volume Emergency Department? *Cuculino GP, Christiana Care Health System, Newark, DE*
- 337** The Utilization of the Burden Nasoscope in Nasotracheal Intubation: Does It Make a Difference? *Rock TC, University of Kentucky, Lexington, KY*
- 338** National Emergency Airway Registry (NEAR) Showed Midazolam Significantly Lowers Blood Pressure Compared to Etomidate When Used for Tracheal Intubations *Weissman A, University of Connecticut, Hartford, CT*
- 339** Noninvasive Positive Pressure Ventilation in Acute Respiratory Failure: A Preliminary Experience in the Emergency Department *Urbino R, Medicina D'Urgenza, Torino, Italy*
- 340** Smaller Tidal Volumes, Laryngeal Mask, Combitube: Beneficial During Basic Life Support? *Doerges V, University of Luebeck, Luebeck, Germany*



- 341** Intravenous  $\beta$ -Agonists in Acute Asthma: A Systematic Review of the Literature *Travers A, University of Alberta, Edmonton, Alberta, Canada*

**1:00 – 2:30 PM**

**SEDATION/ANALGESIA**

**ROOM N237**

**MODERATOR: JE HOLLANDER, UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA, PA**

- 342\*** An Inhaled Nitrous Oxide–Oxygen Mixture Versus Placebo as an Analgesic and Anxiolytic Adjunct to Peripheral Intravenous Cannulation: A Clinical Trial *Gerhardt RT, Brooke Army Medical Center, San Antonio, TX*
- 343** Efficacy of Topical Diclofenac in Emergency Department Patients With Corneal Abrasion *Kupas DF, Geisinger Medical Center, Danville, PA*
- 344** Prospective Evaluation of Intravenous Midazolam–Atropine–Ketamine for Conscious Sedation in the Pediatric Population: A Comparison of Emergence Phenomena by Age *Hostetler MA, University of Rochester, Rochester, NY*
- 345** Effect of Ethnicity on Emergency Department Analgesia for Low Back Pain and Headache *Patterson JW, Emergency Medicine Residency of the Lehigh Valley, Bethlehem, PA*
- 346\*** Sublingual Hyoscyamine Sulfate With Ketorolac Tromethamine Provides No Additional Benefit in the Management of Ureteral Colic Compared to Ketorolac Tromethamine Alone *Jones JB, Indiana University, Indianapolis, IN*
- 347** Patients' Perception of Pain and Embarrassment During Internal Examination in the Emergency Department: Effect of Physician Gender *Patton KR, Albany Medical College, Albany, NY*
- 348** Etomidate and Emergency Department Procedural Sedation *Ruth WJ, Maine Medical Center, Portland, ME*
- 349** Pain Assessment: Are Words Better Than Numbers? *Neighbor ML, San Francisco General Hospital, San Francisco, CA*
- 350** Propofol and Ketamine Sedation in the Pediatric Emergency Department: A Pilot Study *Trocinski DR, Children's Hospital and Health Center, San Diego, CA*
- 351** Management of Patients Attempting to Obtain Narcotics by Deception: A Physician Survey *Blanda M, Summa Health System, Akron, OH*

**1:00 – 2:30 PM**

**BASIC SCIENCES/RESUSCITATION**

**ROOM N237**

**MODERATOR: BJ O'NEIL, DETROIT RECEIVING HOSPITAL, DETROIT, MI**

- 352** Roles of p67 and Nitric Oxide on eIF2 $\alpha$ (P) Following Global Postischemic Cerebral Reperfusion *DeGracia DJ, Wayne State University, Detroit, MI*
- 353\*** Restoration of Cerebral Blood Flow Does Not Restore Function After Brain Ischemia *Little CM, University of Colorado Health Sciences Center, Denver, CO*
- 354** Postischemic Myocardial Bioenergetic Recovery With Inotropic Reperfusion: A Comparison of Epinephrine, Dobutamine, and Phenylephrine in the Perfused Heart *Gorsline RT, Ohio State University, Columbus, OH*
- 355** Cardiac Function After Resuscitation in Human Cardiac Arrest *Hwang SO, Wonju College of Medicine, Yonsei University, Wonju, South Korea*
- 356** The Laryngeal Tube: Good Ventilation, Less Risk During Basic Life Support? *Doerges V, University of Luebeck, Luebeck, Germany*
- 357** Field Time Unrelated to Survival in Trauma Patients Having Laparotomy or Thoracotomy *Porter RS, Albert Einstein Medical Center, Philadelphia, PA*

- 358** Thermodynamic and Initial Laboratory Evidence Supporting the Use of Perfluorocarbon Liquid Ventilation in the Treatment of Hypothermia *Joe L, University of Massachusetts, Worcester, MA*

- 359** Fractal Dimension of Heart Rate in Emergency Department Patients With Chest Pain *Ruiz F, San Francisco General Hospital, San Francisco, CA*

- 360** Fractal Versus Harmonic Components of Heart Rate in Atrial Tachyarrhythmias *Ruiz F, San Francisco General Hospital, San Francisco, CA*

- 361** Resuscitation From Prolonged Ventricular Fibrillation and Induction of Selective Brain Hypothermia via Extracorporeal Bypass *Mori K, Sapporo Medical University, Sapporo, Japan*

**1:00 – 2:30 PM**

**INJURY PREVENTION**

**ROOM N237**

**MODERATOR: RE O'CONNOR, CHRISTIANA CARE HEALTH SYSTEM, NEWARK, DE**

- 362** Legislation, When Enforced, Impacts Seat Belt Use in Urban Taxis *Zlidenny A, Georgetown University, Washington, DC*
- 363** The Influence of Skill Level on Snowboarding Injuries *Janchar T, Georgetown University, Washington, DC*
- 364** Parental Report of Child Restraint Device Use in an Emergency Department Population *Funk DL, Albany Medical College, Albany, NY*
- 365** Comparison Between Frequency and Location of Skiing and Snowboarding Injuries *Zlidenny A, Georgetown University, Washington, DC*
- 366†** The Influence of Race and Other Demographic Factors on Seat Belt Use *Lerner EB, Center for Transportation Injury Research, SUNY, Buffalo, NY*
- 367\*** Population-based Survey of a Sample Community's Training and Knowledge in Basic Cardiopulmonary Resuscitation *Scheatzle MD, MCPHU, Allegheny General Hospital, Pittsburgh, PA*
- 368** The Epidemiology of Sports and Recreational-Related Injuries Treated in the Emergency Department *Rowe BH, University of Alberta, Edmonton, Alberta, Canada*
- 369** Sledding and Tobogganing Injuries Presenting to the Emergency Department in a Northern Urban Center *Rowe BH, University of Alberta, Edmonton, Alberta, Canada*
- 370** Occupationally Related Hand Injuries in the Emergency Department *Lopez OA, Bellevue Hospital Center, New York, NY*
- 371†** Comparison of Helmet Use Between Bicyclists and Skaters *Lerner EB, SUNY, Buffalo, NY*
- 372** Occupational Exposure: Organizing Emergency Department Care to Determine Postexposure Prophylaxis Within Hours Instead of Days *Price TG/Kallenborn JC, University of Louisville, Louisville, KY*

**1:00 – 2:30 PM**

**PEDIATRICS**

**ROOM N237**

**MODERATOR: JG YOUNGER, UNIVERSITY OF MICHIGAN MEDICAL CENTER, ANN ARBOR, MI**

- 373** Frequency and Relevance of Disparity Between Formula-Recommended and Actual Size of Pediatric Endotracheal Tubes *Ahmed W, Duke University, Durham, NC*

- 374\*** Out-of-Hospital Management of Foreign Body Aspiration in Children *Milligan LD, UCLA, Harbor, Torrance, CA*



- 375** Hypoglycemia and ABC'S (Sugar) of Pediatric Resuscitation *Losek JD, St. Paul Children's Hospitals and Clinics, St. Paul, MN*
- 376** Emergency Department Visits for Acute Asthma by Pediatric Patients Who Ran Out of Their Inhaled Corticosteroids or Cromolyn *Brenner BE, Brooklyn Hospital Center, Brooklyn, NY*
- 377** An Enhanced Method of Pediatric Urine Collection: Negative Pressure Bladder Catheterization *Ambroz K, Resurrection Medical Center, Chicago, IL*
- 378** Recognition of the Critically Ill Neonate With Ductal-Dependent Cardiac Lesions *Fields D, Mount Sinai Medical Center, New York, NY*
- 379\*** Pediatric Afebrile Seizures: A Community Emergency Department Experience *Preciado G, Resurrection Medical Center, Chicago, IL*
- 380** Medical Resource Utilization by Children Requiring Psychiatric Consultation in the Pediatric Emergency Department *Santiago L, New York Methodist Hospital, Brooklyn, NY*
- 381** Survey on Clinical Management of Febrile Infants and Children, Birth to 24 Months of Age *Egland AG, Naval Medical Center Portsmouth, Portsmouth, VA*
- 382** Pediatric Febrile Seizures: A Community Emergency Department Experience *Day M, Resurrection Medical Center, Chicago, IL*
- 383** Outcomes of Interhospital Transfers of Critically Ill Pediatric Patients: A Comparison of Air and Ground Transport *Quinn-Skillings GQ, Maine Medical Center, Portland, ME*

**1:00 – 2:30 PM**

**EDUCATION/ADMINISTRATION**

**ROOM N237**

**MODERATOR: EC LEIBNER, WAYNE STATE UNIVERSITY, DETROIT, MI**

- 384** Academic Emergency Department Areas of Specialization: Results From the 1998-1999 SAEM Emergency Medicine Faculty Salary Survey *Krista SL, Henry Ford Hospital, Detroit, MI*
- 385** Academic Emergency Department Funding Sources and Incentives: Results From the 1998-1999 SAEM Emergency Medicine Faculty Salary Survey *Kristal SL, Henry Ford Hospital, Detroit, MI*
- 386\*** Minor Trauma: A Major Contributor to Emergency Department Workload *Tham KY, Tan Tock Seng Hospital, Singapore, Republic of Singapore*
- 387** Documentation Deficiencies in the Evaluation of Nontraumatic Abdominal Pain: Effects of a Structured Template *McMahan SD, St. Vincent Mercy Medical Center, Toledo, OH*
- 388** Is a Trauma Service a Financial Winner for the Hospital? *McPherson MK, William Beaumont Hospital, Royal Oak, MI*
- 389** Documentation of Domestic Violence in the Emergency Department Record *Moscato R, SUNY, Buffalo, NY*
- 390** Practice Variation in a Community Emergency Department Asthma Consortium *Rydman RJ, Cook County Hospital, Chicago, IL*
- 391** Leading Change in the Emergency Department Admission Process Through an Interdisciplinary "Quality Team" *Nester B, Lehigh Valley Hospital and Healthcare Network, Allentown, PA*
- 392** State-to-State Variation in Statutes Regarding the Reporting of Medically Impaired Drivers *Aschkenasy MT, University of Connecticut, Farmington, CT*

- 393** Do Demographics Influence Selection of Emergency Medicine Residents? *Blackburn P, Maricopa Medical Center, Phoenix, AZ*
- 394** Recidivism in an Urban Emergency Department *Miller P, University of California-Davis, Sacramento, CA*

**1:00 – 2:30 PM**

**CLINICAL PRACTICE**

**ROOM N237**

**MODERATOR: MH BIROS, HENNEPIN COUNTY MEDICAL CENTER, MINNEAPOLIS, MN**

- 395\*** Laceration Length: A Comparison of Visual Estimation, Ruler Measurement, and Suture Measurement *Rosenbaum RA, Christiana Care Health System, Newark, DE*
- 396** Clinical Presentation of Acute Aortic Dissection in the Emergency Department: Who Is At Risk for Missed Diagnosis? *Glenn KS, Mayo Medical School, Rochester, MN*
- 397** Outcome in Adult Seizure Patients Treated in the Emergency Setting *Sloan EP, University of Illinois, Chicago, IL*
- 398** Fever in the Elderly: Are Rectal Temperatures Indicated? *Varney SM, Wilford Hall Medical Center, Lackland AFB, TX*
- 399** Sudden Death Following Injury: Analysis of the "Talk and Die" Scenario *Mandavia DP, University of Southern California Medical Center, Los Angeles, CA*
- 400** Gastrointestinal Hemorrhage and the Critical Decision Unit: Which Patients Are Appropriate? *Amponsah D, Henry Ford Hospital, Detroit, MI*
- 401** "Medical Clearance" in the Psychiatric Patient Presenting to the Emergency Department: Is it Necessary? *Korn CS, Los Angeles County-University of Southern California, Los Angeles, CA*
- 402** Lumbar Puncture in the Emergency Department: Complications and Their Costs *Sternfeld D, University of Cincinnati, Cincinnati, OH*
- 403** An Emergency Department Protocol for Management of Nonverifiable Pain *Gaffney P, Summa Health System, Akron, OH*
- 404** Emergency Physician Management of Musculoskeletal Low Back Pain: Are We Following Published Guidelines? *Velendzas D, University of Connecticut, Farmington, CT*
- 405\*** Acute Stroke Treatment in the Rural Emergency Department: Effect of Helicopter Transport Coordinated Care Track *Duldner JE Jr, Akron General Medical Center, Akron, OH*

**1:00 – 2:30 PM**

**CARDIOVASCULAR**

**ROOM N237**

**MODERATOR: JW HOEKSTRA, OHIO STATE UNIVERSITY, COLUMBUS, OH**

- 406** Duration and Causes of Delay in Seeking Care Among Patients Hospitalized for Acute Chest Pain *Smith B, Cook County Hospital/Rush University, Chicago, IL*
- 407** Do Women With MIs Have a Delay in Time to Treatment With Angioplasty? *Kugler D, North Shore University Hospital, Manhasset, NY*
- 408\*** Thrombolytic Therapy and Helicopter Transport of Acute Ischemic Stroke *Duldner JE, Akron General Medical Center, Akron, OH*
- 409** Acute MI Triage Scores for Emergency Medical System Bypass to Cardiac Centers *Blaustein N, Wayne State University, Detroit, MI*
- 410\*** Prophylactic Aspirin Use in an Emergency Department Population *Broderick J, Albany Medical College, Albany, NY*
- 411** Coronary Triage Unit Utility in an Indigent County Population *Henderson SO, Los Angeles County-University of Southern California, Los Angeles, CA*

- 412** Knowledge of Risk Factors for Coronary Artery Disease: Comparison Among Gender and Races *Diercks DB, University of California-Davis, Sacramento, CA*
- 413** Demographics, Descriptors, Diagnosis, and Disposition of 1,677 Chest Pain Patients in an Indigent Acute Care Hospital *Henderson SO, Los Angeles County-University of Southern California, Los Angeles, CA*
- 414** Evidence of Myocardial Complement Activation Following Hemorrhagic Shock and Resuscitation *Craig K, University of Michigan, Ann Arbor, MI*
- 415** The Clinical Presentation of Emergency Department Patients Who Are Evaluated for Acute Cardiac Ischemic Syndromes *Nagurney JT, Massachusetts General Hospital, Boston, MA*
- 416** Bedside Cardiac Markers and the Emergency Evaluation of Chest Pain *Conforto A, Los Angeles County-University of Southern California, Los Angeles, CA*

**1:00 – 2:30 PM**

**ADMINISTRATION/EDUCATION**

**ROOM N237**

**MODERATOR: LM LEWIS, WASHINGTON UNIVERSITY, ST. LOUIS, MO**

- 417** Types, Benefits, and Follow-up of Social Worker Consultations for Emergency Department Patients *Olshaker J, University of Maryland, Baltimore, MD*
- 418** Focused Abdominal Sonography for Trauma: Evaluation of a Half-Day Curriculum *Mandavia DP, Los Angeles County-University of Southern California, Los Angeles, CA*
- 419** Developing a New Model for Transmitting Advance Directives From Long-Term Care Facilities to Emergency Departments *Pauls M, University of Toronto, Toronto, Ontario, Canada*
- 420** Direct Nurse Triage to a Respiratory Therapist Does Not Decrease Time to Treatment of Patients Presenting With Dyspnea *O'Connell J, Hartford Hospital, Hartford, CT*
- 421** Delays in Diet Initiation for Emergency Department Patients Impacts Clinical Outcome *Zlidenny A, Georgetown University, Washington, DC*
- 422\*** EMGuidelines: A Web-Based Index of Clinical Guidelines for Emergency Medicine *Kim JJ, Boston Medical Center, Boston, MA*
- 423** Incorporating College Students Into a Departmental Research Program *Henderson SO, Los Angeles County-University of Southern California, Los Angeles, CA*
- 424** A Comparison of Conscious Sedation Teaching Practices in Emergency Medicine Residency Training Programs *McCormick III JJ, Los Angeles County-University of Southern California, Los Angeles, CA*
- 425** Documentation by Physicians and Nurses in Cases of Intentional Assault *Houry D, Denver Health Medical Center, Denver, CO*
- 426** Advanced Cardiac Life Support Training: Comparison of Brazilian Versus North American Student Responses *Timerman S, NCR Brazil, Sao Paulo, Brazil*
- 427** A Breast Screening Behavior Survey in an Urban Emergency Department *Takakuwa KM, University of California-Davis, Sacramento, CA*

**ORAL PRESENTATIONS**

**2:30 – 4:30 PM**

**EMS/OUT-OF-HOSPITAL**

**ROOM N243**

**MODERATOR: JW RUNGE, CAROLINAS MEDICAL CENTER, CHARLOTTE, NC**

- 53** Prehospital Storage Degrades the Physiological Effects of Epinephrine in Human Myocardium *Cairns CB, University of Colorado Health Sciences Center, Denver, CO*

- 54** Sternal Intraosseous Infusion: Flow Rates and Utility *Tiffany BR, Maricopa Medical Center, Phoenix, AZ*
- 55** The Role of On-Line Medical Control in Elderly Patients Who Initially Refuse Medical Transport *Richmond N, New York City Fire Dept. and Long Island Jewish Medical Center, New Hyde Park, NY*
- 56** Do Warning Lights and Sirens Reduce Ambulance Response Times? *Brown L, SUNY, Syracuse, NY*
- 57** EMS Providers and Violence in the Field *Sayah AJ, Brigham and Women's Hospital, Boston, MA*
- 58†** Prehospital Administration of Reteplase in Patients With Acute Myocardial Infarction *Rosenberg D, University of Miami, Miami, FL*
- 59\*** Performance Analysis of Semiautomatic Defibrillators Used in the Out-of-Hospital Setting *Swanson JM, Boston University, Boston, MA*
- 60\*** Time to Recurrent Ventricular Tachycardia or Ventricular Fibrillation After Defibrillation *Blouin D, SMBD Jewish General Hospital, Montreal, Quebec, Canada*

**2:30 – 4:30 PM**

**CLINICAL PRACTICE**

**ROOM N238**

**MODERATOR: CL EMERMAN, METROHEALTH MEDICAL CENTER, CLEVELAND, OH**

- 61** Ultrasound Detection of Blunt Hepatic Trauma: Hemoperitoneum and Parenchymal Patterns of Injury *Pali M, University of California-Davis, Sacramento, CA*
- 62** Serologic Examination of the Acute Scrotum: An Evaluation of Clinical Utility *Karriem-Norwood V, Henry Ford Hospital, Detroit, MI*
- 63** The Utstein Template and the Effect of In-Hospital Decisions: The Impact of Do-Not-Resuscitate Status on Survival to Discharge Statistics *Stratton SJ, UCLA, Harbor, Torrance, CA*
- 64** Lactic Acid Clearance in the Emergency Department Prognosticates Multisystem Organ Failure and Death *Knoblich B, Henry Ford Hospital, Detroit, MI*
- 65** An Effective Educational Program to Decrease Antibiotic Use for Acute Bronchitis *Martin DR, Ohio State University, Columbus, OH*
- 66** The Epidemiology of Animal Exposures Presenting to Emergency Departments: Adults Versus Pediatrics *Steele MT, University of Missouri-Kansas City, Kansas City, MO*
- 67** Clinical Effects of Combined Anti-H<sub>1</sub> and Anti-H<sub>2</sub> Treatment in Patients Presenting With Acute Allergic Syndromes: A Randomized Controlled Trial *Knight R, St. Vincent's Hospital, New York, NY*
- 68†** The Efficacy of Cyanoacrylate-Derived Surgical Adhesive for Use in the Repair of Lacerations During Competitive Athletics *Perron AD, University of Virginia, Charlottesville, VA*

**2:30 – 4:30 PM**

**EDUCATION/ADMINISTRATION**

**ROOM N234**

**MODERATOR: EA PANACEK, UNIVERSITY OF CALIFORNIA-DAVIS, SACRAMENTO, CA**

- 69** Validity of Urgency of the Emergency Department Visit in the National Hospital Ambulatory Medical Care Survey, 1994 (NHAMCA '94) *Wendel TD, Beth Israel Medical Center, New York, NY*
- 70** Rapid Process Redesign in a University-Based Emergency Department: Decreasing Waiting Time Intervals and

**TUESDAY, OCTOBER 12—cont'd**

- Improving Patient Satisfaction *Spaite DW, University of Arizona, Tucson, AZ*
- 71** 8,874 Critical Decision Unit Admissions: What Are Appropriate Hospital Admission and Discharge Rates?  
*Tokarski GF, Henry Ford Hospital, Detroit, MI*
- 72** Urgency, Demographics, Payer, and Location in the Emergency Department: The National Hospital Ambulatory Medical Care Survey, 1994 (NHAMCS '94)  
*Wendel TD, Beth Israel Medical Center, New York, NY*
- 73** The Implementation of a Forward-Rotating Template Schedule and the Effects Upon Physician Wellness  
*Bohstadt J/Agrawal V, Medical University of South Carolina, Columbia, SC*
- 74** Female Faculty Salaries and Work Hours: Results From the 1998-1999 SAEM Emergency Medicine Faculty Salary Survey  
*Kristal SL, Henry Ford Hospital, Detroit, MI*
- 75** Physical Diagnosis in the Emergency Department: An Innovative Educational Program for Medical Students  
*Crowley A, University of Massachusetts, Worcester, MA*
- 76** Bedside Ultrasound Education in Emergency Medicine Residencies  
*Melanson SW, Emergency Medicine Residency of the Lehigh Valley, Bethlehem, PA*

**4:45 – 6:00 PM**

**HIGHLIGHTS OF RESEARCH FORUM**

**ROOM N243**

**FACULTY: CHARLES V. POLLACK, JR., MA, MD, FACEP; CHARLES B. CAIRNS, MD, FACEP; BRIAN R. TIFFANY, MD, PHD, FACEP; RON M. WALLS, MD, FACEP**

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\*Young Investigator.

<sup>†</sup>In accordance with the Accreditation Council for Continuing Medical Education (ACGME) Standards and the policy of the American College of Emergency Physicians, the presenters noted with an (†) have indicated that they have a relationship which, in the context of their presentation, could be perceived by some as a real or apparent conflict of interest (eg, ownership of stock, or honoraria or consulting fees), but these presenters do not consider that it will influence their presentations.

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# Research Forum Abstracts

From the American College of Emergency Physicians 1999 Research Forum,  
October 11-12, 1999,  
Las Vegas Convention Center,  
Las Vegas, NV.

## 1 Zafirlukast Improves Emergency Department Outcomes After an Acute Asthma Episode

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**Study objective:** Acute asthma exacerbations lead to 1.8 million emergency department visits and 500,000 hospitalizations yearly in the United States. Leukotriene-modifying agents have demonstrated efficacy for the treatment of chronic asthma; however, these drugs have not been evaluated in a large multicenter trial in patients with acute asthma. The objective of this study was to evaluate the effects of zafirlukast (20 mg or 160 mg) added to standard therapy for acute asthma in ED patients.

**Methods:** In this 20-center, placebo-controlled, double-blind, randomized trial, patients aged 12 to 60 years presenting to the ED with acute asthma were eligible if their FEV<sub>1</sub> was  $\leq$  70% predicted before and after 1 albuterol treatment. Patients received 2.5 mg nebulized albuterol at time 0 (ED entry), and 30, 60, 120, and 180 minutes after ED arrival. At 30 minutes, patients were randomized to treatment with a single dose of either placebo or zafirlukast 20 mg (Z20) or 160 mg (Z160) po. All patients also received 60 mg prednisone orally at 30 minutes. FEV<sub>1</sub> and dyspnea (assessed by the Borg index) were measured during the ED period and at 240 minutes. Admissions were defined as the need for additional ED observation or hospitalization, and patient disposition was decided by the treating clinician at 240 minutes. Data were analyzed using analysis of covariance and logistic regression.

**Results:** Six hundred forty-one patients were randomized to treatment (placebo=321, Z20=158, Z160=162). The mean age was 32.5 years, 57% were female, and FEV<sub>1</sub> on ED arrival was 38% of predicted and at randomization was 47% of predicted. Dyspnea was significantly reduced in the zafirlukast-treated patients compared with placebo (zafirlukast versus placebo,  $P=.043$ ). FEV<sub>1</sub> (L) at 240 minutes improved by 39.1% relative to time of randomization in zafirlukast groups compared with 31.3% in the placebo group ( $P=.033$ ). In the Z160 group, there was a trend for decreased admissions compared with placebo (10% versus 15%; Z160 versus placebo odds ratio for admission 0.551; 95% confidence interval [CI] 0.294 to 1.035;  $P=.064$ ). Admissions were similar for the Z20 and placebo groups ( $P=NS$ ). If National Asthma Education and Prevention Program disposition criteria were adhered to, admissions would have been significantly fewer in zafirlukast-treated patients (zafirlukast versus placebo odds ratio for admission 0.689, 95% CI 0.489 to 0.971;  $P=.033$ ).

**Conclusion:** Zafirlukast used as an adjunct to standard therapy for acute asthma episodes improves pulmonary function and decreases dyspnea. Zafirlukast may be effective in reducing the need for hospital admissions.

## 2 Trauma Airway Management in the Emergency Department—Indications, Methods, and Success Rates

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Airway management in trauma is a lifesaving skill vital to the initial stabilization of the patient.

**Study objective:** To characterize trauma airway management in US emergency departments using indications, methods, and success rates.

**Methods:** Prospective observational study of 2,864 ED intubations in 21 US teaching hospitals recorded in the database during the second phase (August 1997 to November 1998) of the ongoing National Emergency Airway Registry (NEAR 97). Data

included indication, method, specialty of person performing the intubation, first-pass rate, and "failed" or cricothyrotomy rate.

Results: Of the 2,864 intubations registered over this period, 1,303 were trauma patients. Of these, 1,177 (90.3%) were managed by emergency physicians, 71 (5.5%) by anesthesiologists, and 55 (4.2%) by surgery/other. The first method used was rapid sequence intubation (895 [79.6%]), oral intubation with sedation only (23 [2.1%]), oral intubation without medications (113 [10.1%]), and nasal intubation (61 [4.7%]). Indications, success rates, and rate that went on to cricothyrotomy are as shown in the Table.

Conclusion: In the largest study to date, emergency physicians managed the vast majority of airways in trauma patients at these 21 centers. There was a tremendously high success rate and lower cricothyrotomy rate than previously reported.

**Table, abstract 2.**

Indication	No.	First-Pass Success (%)	Cricothyrotomy No. (%)
Head injury	495	96.5	2 (0.4)
Airway control	237	92.0	3 (1.3)
General management	208	90.3	5 (2.4)
Trauma arrest	54	83.7	1 (1.9)
Burn/inhalation	58	87.5	0
Face/neck trauma	166	92.3	5 (2.3)
Shock	58	98.3	2 (3.5)
Combative	27	96.2	0
<b>Total</b>	<b>1,301</b>		<b>18 (1.3)</b>

### 3 Initial Use of an Automatic Collision Notification System to Relate Dynamic Vehicle Data With Occupant Injuries

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Study objective: To relate dynamic vehicle data acquired in motor vehicle crashes (MVC) by the in-vehicle Automatic Collision Notification (ACN) system to actual occupant cervical strain injuries.

Methods: More than 700 cars had been equipped with ACN devices consisting of a triaxial accelerometer unit, a global positioning device, and a cellular modem and phone. The ACN detects a crash by examining vehicular acceleration in real time. When a preestablished crash threshold is exceeded, a 911 call is placed and the crash location, as well as the principal direction of crash force (PDOF) and crash change of velocity ( $\Delta V$ ), is transmitted. Injury information was collected after the crash for all occupants by patient interview and medical record review. All patients with cervical strain were identified. PDOF and  $\Delta V$  were compared for patients with and without cervical strain.

Results: Dynamic vehicle data were obtained for 10 ACN crashes involving 19 occupants. The  $\Delta V$  of the crashes ranged from 32 kph to 14 kph. PDOF was 12 o'clock (5 vehicles), 2 o'clock (1 vehicle), 3 o'clock (2 vehicles), 6 o'clock (1 vehicle), and 11 o'clock (1 vehicle). Nine occupants sustained a variety of injuries including 5 cervical strains. Three sustained cervical strain injuries in a rear crash (PDOF 6 o'clock,  $\Delta V$  30 kph). One sustained a cervical strain injury in a frontal crash (PDOF 12 o'clock,  $\Delta V$  20 kph). One sustained a cervical strain injury in a left frontal crash (PDOF 11 o'clock,  $\Delta V$  22 kph). Occupants who did not report cervical strain injuries were involved in 4 frontal crashes ( $\Delta V$ s 32, 20, 20, and 16 kph), 3 right-side impacts at 2 o'clock ( $\Delta V$  26 kph) and 3 o'clock ( $\Delta V$ s 25, 14 kph).

Conclusion: Although the number of crashes is small, no cervical strain injuries were reported in crashes at  $\Delta V$ s below 20 kph. Actual acceleration time history from a real-world crash has never been available to analysts before. Dynamic vehicular information gained from the onboard ACN system may be useful for correlation of vehicular mechanics with injuries to develop an instantaneous injury predictive model. The ability to reliably predict injury in "real time" may some day allow public safety dispatchers to better allocate on-scene resources such as paramedics and helicopter transport. This information may also allow prehospital care providers to safely and cost-effectively provide only necessary care such as evidence-based spinal immobilization.

### 4 Characteristics Associated With Positive Stool Cultures in Emergency Department Patients With Bloody Diarrhea

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Objective: To determine which demographic and historical factors are associated with enteropathogen detection among patients with bloody diarrhea presenting to the emergency department.

Methods: Data were collected prospectively between July 1996 and October 1997 at 11 university-affiliated, geographically diverse urban US EDs comprising the EMERGENCY ID NET. Demographic information and data related to the history of present illness were obtained from all patients presenting with a chief complaint of bloody diarrheal illness of less than 7 days' duration, as well as patients found to have bloody diarrhea on examination. Stool specimens were plated for standard bacteriologic cultures and assayed for Shiga toxin. Subjects were grouped according to presence or absence of bacterial enteropathogen. Subject characteristics were analyzed using positive likelihood ratios (LR+) for categorical variables and Student's *t* test for continuous variables (mean $\pm$ SD).

Results: Six hundred thirty-four subjects were eligible for the study; final culture results were available for 494 subjects. Bacterial enteropathogens were identified in 149 subjects (30.1%) with the following organisms detected: *Shigella* (75 [15.2%]), *Campylobacter* (29 [5.8%]), *Salmonella* (26 [5.3%]), *Escherichia coli* (7 [1.4%]), *Vibrio* (3 [0.8%]), *Plesiomonas/Aeromonas* (1 [0.2%]), *Yersinia* (0 [0.0%]), other pathogen (8 [5.4%]). Characteristics distinguishing those with bacterial enteropathogens from those without are years of age (20.8 $\pm$ 17.0 versus 27.7 $\pm$ 20.5, *P*<.001), history of fever (74.5% versus 36.8%, LR+=3.16), ED temperature  $\geq$ 38.0°C (41.6% versus 19.4%, LR+=2.03), and number of stools per day (13.0 $\pm$ 11.7 versus 10.5 $\pm$ 9.0, *P*=.01).

Factors not distinctive of group membership (*P*=NS or LR+ 0.5 to 2.0) are duration of symptoms, amount of blood in stool, presence of cramps, HIV status, recent antibiotic use, daycare attendance, recent travel, presence of stool blood on examination, and WBC count elevation. No single characteristic or combination of characteristics predict positive cultures with both high sensitivity and high specificity.

Conclusion: Among patients presenting to the ED with bloody diarrhea, younger age, history of fever, greater stool frequency, and fever on examination are associated with a higher incidence of a bacterial enteropathogen detection. No characteristics were found that predict enteropathogen presence with a high degree of accuracy.

### 5 The Kinetics of Hyperbaric Oxygen on Cellular Proliferation and Growth Factor Receptor Expression

Reenstra W, Tracy J, Orlow D, Buras JA/Brigham and Women's Hospital, Boston University School of Medicine, Boston, MA

Study objective: Wound healing requires cellular proliferation, matrix deposition, and is related to tissue oxygen levels. Hyperbaric oxygen (HBO) has been shown to increase healing rates. However, little is known of the mechanisms involved. Growth factor receptors are presumed to influence cellular proliferation. The objective was to determine the kinetic effects of HBO on proliferation of dermal fibroblasts. Specifically, we asked whether HBO increases growth factor receptor protein levels. Utilizing our in vitro model system, we further examined the kinetics of multiple HBO treatments on cellular proliferation and growth factor receptor expression.

Methods: Dermal fibroblasts were treated with 2.5 ATA for 90 minutes or mock treated with normal oxygen as controls. Cells were analyzed for growth factor receptors via confocal laser scanning microscopy and cell surface ELISA. Growth curves were measured after HBO treatment. Additional cultures were harvested for protein analysis at specific time intervals after HBO. The influence of repeated HBO treatments on proliferation and growth factor receptor expression was also measured.

Results: We have confirmed that a single HBO treatment increases cellular proliferation (*P*<.001 analysis of variance). Western blot analysis with anti-platelet-derived growth factor receptor revealed that growth factor receptor expression is upregulated within 6 hours of HBO treatment. Multiple treatments with HBO increase cellular proliferation (*P*<.001, analysis of variance), and growth factor receptor expression (*P*<.001, analysis of variance) above control or a single HBO treatment.

Conclusion: Cellular proliferation and growth factor receptor numbers are significantly increased with HBO treatment. These studies begin to elucidate the effects of HBO on wound healing and establish a scientific foundation on which to develop more efficacious therapeutic protocols.

## 6 Hyperbaric Oxygen Decreases Intercellular Adhesion Molecule-1 mRNA Expression in an In Vitro Model of Ischemia/Reperfusion

Buras JA, Colgan SP, Stahl GL, Reenstra WR/Brigham and Women's Hospital, Boston University School of Medicine, Boston, MA

**Study objective:** Intercellular adhesion molecule-1 (ICAM-1) is an inducible endothelial cell surface protein involved in neutrophil (PMN) adhesion to the endothelium during ischemia reperfusion (I/R) injury. Previously we have shown that hyperbaric oxygen was able to decrease ICAM-1 protein expression. We hypothesized that the mechanism of HBO action responsible for the reduction in ICAM-1 occurred through a reduction in ICAM-1 messenger RNA (mRNA) production.

**Methods:** Endothelial cells from human umbilical veins were exposed to 4 hours of hypoxia and hypoglycemia (H/H) to simulate ischemia, followed by normoxia and normoglycemia (N/N) for varied times. Alternatively, cells were treated with HBO at 2.5 ATA for 90 minutes after mock ischemia, before mock reperfusion. At varied times during N/N total RNA was harvested and analyzed by Northern blotting techniques and in situ hybridization/confocal microscopy techniques using a full-length human ICAM-1 complementary DNA probe. Experiments were repeated at least 2 times with different groups of pooled donor endothelial cells.

**Results:** Four hours of ischemia (H/H) was insufficient to induce expression of ICAM-1 mRNA. A mock reperfusion (N/N) period after H/H was required for ICAM-1 mRNA expression. Maximal ICAM-1 mRNA production occurred between 2 and 4 hours after H/H and returned to control levels at 24 hours. Hyperbaric oxygen treatment reduced peak ICAM-1 steady-state mRNA levels by approximately 2.6-fold relative to non-hyperbaric oxygen-treated cells.

**Conclusion:** Hyperbaric oxygen treatment of endothelial cells exposed to H/H and N/N reduces peak induction of ICAM-1 steady-state mRNA. These results suggest that the beneficial effect of hyperbaric oxygen in treating I/R injury may occur through alteration of ICAM-1 gene regulation at the transcriptional or posttranscriptional level.

## 7 Restoration of Translational Competence by Insulin Is Not Observed in CA3 Hippocampal Neurons During Reperfusion

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**Study objectives:** Suppression of protein synthesis in selectively vulnerable neurons has long been recognized as a hallmark of reperfusion, and recent investigations in our laboratory and others implicate the phosphorylation of eukaryotic initiation factor 2 $\alpha$  (eIF-2 $\alpha$ ) as central to this process. Additionally, several lines of evidence suggest that eIF-2 $\alpha$ (P) may play a critical role in apoptosis or programmed cell death. Recently we have shown that insulin, known to be protective in the setting of cerebral reperfusion, induces dephosphorylation of eIF-2 $\alpha$ (P) and restores protein synthesis to selectively vulnerable neurons in the CA1, dentate gyrus, and hilus of the hippocampus when administered at 20 U/kg on return of circulation. We now demonstrate that insulin does not achieve these effects in the CA3 of the hippocampus, a region known to have few insulin receptors.

**Methods:** A rat model of 10 minutes of cardiac arrest and resuscitation was used to generate brain tissue used for immunocytochemistry, autoradiography of protein synthesis, and electron microscopy, as previously described.

**Results:** Immunocytochemistry of the CA3 region for eIF-2 $\alpha$ (P) demonstrates persistence of this species in CA3 pyramidal neurons in insulin-treated animals despite clearing from other regions. <sup>35</sup>S-methionine autoradiography demonstrates that, although insulin rescues protein synthesis in other hippocampal structures concomitant with dephosphorylation of eIF-2 $\alpha$ (P), translation is not rescued in the CA3. Electron microscopy reveals that, although neurons of the dentate gyrus (an area rescued by insulin) showed little ultrastructural degradation at 90 minutes in treated animals, neurons in the CA3 demonstrate disaggregation of polyribosomes, dilatation, and disruption of the endoplasmic reticulum, loss of cytoskeletal integrity, and vacuolization of the Golgi apparatus.

**Conclusion:** These results provide indirect evidence that the insulin rescue of protein synthesis in reperfused neurons of the hippocampus is mediated through the insulin receptor rather than by nonspecific interactions with other growth factor receptors, and support a model in which insulin-induced dephosphorylation of eIF-2 $\alpha$ (P) is a necessary intermediate for such rescue. Additionally, these results indicate that insulin treatment ameliorates reperfusion-induced damage to subcellular structures in hippocampal neurons, with the notable exception of CA3.

## 8 Comparison of Calpain and Caspase Activity in Postischemic Brain

Mills AM, Meng FH, Siman R, Neumar RW/University of Pennsylvania School of Medicine, Philadelphia, PA

**Study objectives:** A growing body of evidence indicates that cytosolic proteases play a key role in postischemic neuronal death; specifically calpains and caspases. Increased neuronal calpain activity is well documented in animal models of focal and global ischemia, and postischemic calpain inhibition is neuroprotective. Caspase-3 activation, which is specific for apoptosis, has also been observed in postischemic brain, and neuroprotection with caspase inhibitors has been reported. Because these proteases have been studied independently, their relative contribution to postischemic neuronal death is not known. The aim of this study was to directly compare the activity of calpains and caspases in the brain after transient global ischemia by (1) comparing the relative contribution of each protease to the cleavage of a common substrate ( $\alpha$ -spectrin), and (2) measuring the proteolytic activation of the caspase-3 proenzyme.

**Methods:** Male Long Evans rats (400 to 450 g) were anesthetized (1% to 2% halothane), mechanically ventilated, and instrumented for temperature and hemodynamic monitoring. Each underwent 10 minutes of transient forebrain ischemia induced by bilateral carotid occlusion and hypovolemic hypotension (mean arterial pressure 30 to 35 mm Hg). Brain samples were obtained after 1, 6, 24, 36, 48, or 72 hours of reperfusion (n=3 per group). Brains from naive and sham-operated rats were used as controls. Unfractionated homogenates from the cortex, hippocampus, and striatum were analyzed by Western blot using (1) antibodies specific to the calpain-derived N- or C-terminal fragments of  $\alpha$ -spectrin (Ab38 and Ab41), (2) antibody that recognizes both calpain-derived and caspase-derived  $\alpha$ -spectrin degradation fragments (MAB1622, Chemicon), and (3) antibody specific to activated caspase-3 (Ab206).

**Results:** Calpain-derived spectrin degradation fragments were detected in the cortex, striatum, and hippocampus initially at 1-hour reperfusion followed by a more prominent increase at 36 hours. Neither caspase-derived spectrin degradation fragments nor activated caspase-3 were detected in any brain region between 1 and 72 hours of reperfusion. There was no evidence of calpain or caspase activity in samples from naive or sham-operated controls.

**Conclusion:** In this model, calpain is the predominant protease active in the postischemic cortex, striatum, and hippocampus. Calpain activity is bimodal with a minor peak at 1 hour of reperfusion and a major peak at 36 hours of reperfusion. The absence of detectable caspase-mediated spectrin degradation or active caspase-3 suggests that apoptosis is not a major injury pathway in this model. Further investigation is needed to determine if the relative activity of calpains and caspases in the postischemic brain is dependent on the type and severity of ischemic insult. Supported by National Institutes of Health grant NS01832.

## 9 Effects of Ethanol on Systemic Hemodynamics in a Swine Model of Accidental Hypothermia

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**Study objectives:** Accidental hypothermia is encountered in emergency departments throughout the country and is frequently associated with ethanol intoxication. Ethanol intoxication and hypothermia each have significant independent effects on systemic hemodynamics, but there is little research investigating the combined hemodynamic effects of ethanol intoxication and hypothermia.

**Methods:** Anesthetized farm swine were randomly assigned to either a control group (n=8) or an ethanol group (n=7) in which they received 3 g/kg of ethanol via an orogastric tube. The subjects were cooled from normothermia to 25°C using ice packs, then were warmed to their baseline core temperature with passive external and active internal core rewarming. Measurements were made at baseline, at 30 minutes after ethanol or placebo, and then at 34°C, 31°C, 28°C, and 25°C during cooling and rewarming. At each temperature interval, measurements of cardiac output, ECG, mean arterial pressure (MAP), left ventricular pressure, and contractile function, mixed venous oxygen saturation, serum ethanol concentration, and central arterial and venous blood gases were made. Statistical significance was determined by repeated measures analysis of variance with Newman-Keuls post hoc test.

**Results:** In the ethanol group, peak serum ethanol concentration was 202 mg/dL, and occurred at 25°C. Ethanol had no effect on time of cooling or rewarming. During cooling, MAP, ventricular contractility, and cardiac output decreased in the control group by 44%, 58%, and 75%, respectively (all  $P<.003$  versus baseline), whereas they



decreased by 64%, 70%, and 85% (all  $P < .001$  versus baseline) in the ethanol group. These changes in systemic hemodynamics were similar between groups, but after rewarming, MAP, contractility, and cardiac output were decreased in the ethanol group by 37%, 40%, and 49% versus baseline (all  $P < .02$ ), whereas they returned to baseline in the control group. Systemic oxygen consumption and delivery were similar in the 2 groups during cooling; however, with rewarming, oxygen consumption was significantly decreased by 29% versus control ( $P < .05$ ) in the ethanol group.

**Conclusion:** In this model, hypothermia alone caused significant effects on cardiac function and systemic hemodynamics that returned to baseline with rewarming. Ethanol intoxication had minimal additional effects on systemic hemodynamics during cooling; however, it caused more prolonged depression of cardiac function and adverse effects on systemic hemodynamics during rewarming. This may have implications for resuscitation in ethanol-intoxicated victims of accidental hypothermia.

## 10 Immediate Countershock Versus CPR Before Countershock in a Five-Minute Ventricular Fibrillation (VF) Arrest Swine Model

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**Study objectives:** A prior animal study has shown that cardiorespiratory resuscitation (CPR) and epinephrine preceding countershock of prolonged ventricular fibrillation (VF) (7.5 minutes) improves cardiac resuscitation rates. A recent prehospital clinical trial has demonstrated that CPR preceding countershock of prolonged VF increases the likelihood of successful resuscitation by approximately 20%. The lower limit of VF duration at which time pre-shock CPR provides no benefit has not been specifically studied and may be important as public access defibrillation is advanced. The purpose of this study was to compare cardiac resuscitation outcome between immediate countershock of VF of 5 minutes' duration and CPR without drug therapy before countershock in a swine model.

**Methods:** VF was electrically induced in anesthetized and instrumented domestic swine. After 5 minutes of VF, animals received 1 of 2 treatments: group 1 ( $n=20$ )—immediate countershock followed by CPR and repeated shocks if needed; group 2 ( $n=11$ )—CPR for 90 seconds preceding shock then continued CPR and repeated shocks if necessary. Drugs were not administered to either group, and resuscitation efforts were discontinued if a perfusing rhythm was not restored within 10 minutes of the first shock. Study variables included first-shock success rate (termination of VF), number of shocks to terminate VF, resuscitation rate, and ventricular function 30 minutes after resuscitation.

**Results:** The first shock terminated VF in 13 of 20 group 1 animals and 2 of 11 group 2 animals ( $P=.023$ , Fisher's exact test). All but one group 1 animal developed pulseless electrical activity after countershocks. All but one group 1 animal was successfully resuscitated with only CPR and repeated shocks if necessary. Four group 2 animals could not be resuscitated ( $P=.042$ , Fisher's exact test). In those animals that were successfully resuscitated, left ventricular dP/dt and cardiac output were better in group 1 animals than in group 2 animals at 30 minutes after restoration of circulation.

**Conclusion:** Although effective in improving outcome of VF of prolonged duration in animals and the clinical population, CPR preceding VF of 5 minutes' duration does not improve the response to the first countershock, the rate of return of spontaneous circulation, or cardiac function after resuscitation. In this study, CPR preceding countershock resulted in a significantly lower cardiac resuscitation rate.

## 11 The Effect of Epidermal Debridement on Reepithelialization and Infection in Porcine Burns Treated with Octyl-Cyanoacrylate and Dry Gauze

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**Study objective:** Debridement of burn blisters is controversial. We compared rates of infection and reepithelialization in debrided versus nondebrided second-degree burns in swine.

**Methods:** This was a prospective, blinded, controlled, experimental trial of isoflurane-anesthetized swine. Forty-two standardized burns were created by applying an aluminum bar preheated to 80°C for 20 seconds to the backs and flanks of young pigs. In half of the burns, the necrotic epidermis was manually debrided. All burns were randomly treated with octyl-cyanoacrylate spray (OCA) or dry gauze (C). Full-thickness biopsy specimens were taken at 7, 10, and 14 days for blinded histopathologic evaluation. The primary outcome was the proportion of infected burns at days 7 and 10. Burns were considered infected in the presence of intradermal neutrophils containing bacteria (intraobserver agreement,  $\kappa=1.00$ ). Secondary outcomes were the

proportion of completely reepithelialized burns and the presence of scar tissue.  $\chi^2$  Tests were used for group comparisons. This study had 90% power to detect a 40% difference in infection rates ( $\alpha=.05$ ).

**Results:** At days 7 and 10, there were more infections in debrided versus nondebrided burns (55% versus 4.5%,  $P < .001$ , and 65% versus 9.1%,  $P < .001$ , respectively). At days 10 and 14, more nondebrided wounds were epithelialized versus debrided wounds (68.2% versus 0%,  $P < .001$ , and 100% versus 65%,  $P=.003$ , respectively). On day 14, there was more scarring in the debrided group (75%) versus the nondebrided group (75% versus 4.5%,  $P < .001$ ). Burns treated with OCA had fewer infections than controls (4% versus 55%,  $P < .001$ ).

**Conclusion:** Epidermal debridement of second-degree burns results in more infections and slower reepithelialization rates in swine. The effects of epidermal debridement in human beings should be explored.

## 12 Differential Responses of Peripheral and Central Tissue Oxygen Availability and Utilization in Patients With Acute Shock and Hypoxia

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**Study objective:** Shock is characterized by reduced tissue oxygen delivery. Near infrared spectroscopy (NIRS) allows for continual monitoring of tissue oxygen delivery (oxyhemoglobin; HbO<sub>2</sub>), availability (oxygen saturation; So<sub>2</sub>) and utilization (mitochondrial cytochrome a,a<sub>3</sub> redox state). Normally, HbO<sub>2</sub> and a,a<sub>3</sub> redox states are tightly coupled; decoupling is a sign of mitochondrial dysfunction. We hypothesized that physiologic changes during clinical shock states lower oxygen delivery (HbO<sub>2</sub>), availability (So<sub>2</sub>), and utilization (a,a<sub>3</sub> redox state) differentially in peripheral versus central tissues.

**Methods:** This was a prospective, observational study of patients undergoing resuscitation in either the emergency department or ICU for shock (initial systolic blood pressures [SBP] <90 mm Hg), hypoxia (arterial pulse oximetry <90% saturation), or organ failure. All patients were continuously monitored for at least 1 hour for NIRS-derived HbO<sub>2</sub>, So<sub>2</sub> and the cytochrome a,a<sub>3</sub> redox state, as well as standard clinical recordings such as heart rate, SBP, and arterial oxygen saturation.

**Results:** Eighty-one patients (35 women) ranging in age from 26 to 86 years (mean 54±13 SD) were enrolled. Initial oxygenation varied with monitoring location (64%±15% or lower (42%±11%) extremity. Administration of fluids, blood products, vasopressors, and body positioning resulted in changes in So<sub>2</sub>, HbO<sub>2</sub> and cytochrome a,a<sub>3</sub>. Changes in cerebral, deltoid, and tibial HbO<sub>2</sub> and So<sub>2</sub> preceded changes in SBP. Overall, changes in SBP correlated with changes in cerebral So<sub>2</sub>, HbO<sub>2</sub> ( $r=0.88$ ;  $P < .05$ ), and the cytochrome a,a<sub>3</sub> redox state ( $r=0.73$ ;  $P < .05$ ). In patients successfully resuscitated, therapeutic interventions were associated with improvements in peripheral So<sub>2</sub> and cytochrome a,a<sub>3</sub>. In 78% of those who died, there was evidence of decoupling during their monitoring, consistent with impaired mitochondrial electron transport.

**Conclusion:** (1) During shock and hypoxia, oxygen availability varies greatly depending on tissue location. Peripheral extremities are more affected than the brain. (2) Shock and hypoxia can be complicated by mitochondrial oxidative dysfunction, including decoupling of the cytochrome a,a<sub>3</sub> redox state from oxygen availability. (3) Tissue HbO<sub>2</sub> and So<sub>2</sub> appear to be sensitive detectors of clinical status. Direct measurement of tissue oxygenation in various anatomic locations may prove useful in the management of patients with acute shock and hypoxia.

## 13 Which Chest Pain Patients Benefit From Continuous ST-Segment Monitoring With Automated Serial ECG?

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**Study objective:** To determine how often continuous ST-segment monitoring with automated serial ECG (SECG) results in a significant change in therapy in low- and high-risk chest pain patients.

**Methods:** A prospective observational study was performed in 706 emergency department chest pain patients who underwent our chest pain protocol, which consists of SECG monitoring in all chest pain patients, and a baseline and 2-hour cardiac serum marker measurements in patients not undergoing emergent percutaneous transluminal angioplasty (PTCA) before emergency physician making patient disposition to determine how frequently SECG results in a change in therapy. After initial history, physical, and ECG were obtained, patients were grouped into 4 categories based on

ED physicians assessment of likelihood of unstable coronary ischemic syndrome: category 1—obvious acute ischemic syndrome with ECG criteria for emergency reperfusion therapy; category 2—obvious acute ischemic syndrome with no ECG criteria for emergency reperfusion therapy; category 3—possible acute ischemic syndrome; category 4—nonischemic chest pain but presence of preexisting disease or significant risk factors for coronary artery disease warrant screening examination. Significant change in therapy was defined as emergency use of thrombolytics, emergency PTCA, rescue PTCA for failed thrombolytic therapy, and intensive antiischemic therapy with intravenous heparin and/or intravenous nitroglycerin. SECGs were obtained at least every 10 minutes using the ELI-100 ECG machine in conjunction with the Lifenet STM device (Mortara Instruments, Milwaukee, WI) and was continued until either the patient was taken for emergency PTCA or until 2-hour serum markers measurements were obtained.

Results: A total of 706 chest pain patients underwent SECG monitoring. SECG monitoring was initiated 21±20 minutes after presentation to the ED, and duration of SECG monitoring was 116±44 minutes. Discharge diagnosis consisted of 76 patients with acute myocardial infarction, 7 patients with completed acute myocardial infarction, 130 patients with unstable angina, and 493 patients with nonischemic chest pain. The Table summarizes discharge diagnosis according to chest pain category. For a total of 30 patients, therapy was changed as a result of SECG monitoring, which represented 14.3% of category 1 patients, 14.7% of category 2 patients, 1.5% of category 3 patients, and 0.5% of category 4 patients. SECG monitoring was 15.3 times more likely to result in a change in therapy in the category 1 and 2 high-risk patients compared with the category 3 and 4 low-risk patients ( $P<.0001$ ; 95% confidence interval 6.1 to 38.2). Changed therapy consisted of the following: 4 patients received rescue angioplasty, 5 patients received thrombolytics, 10 patients received emergency PTCA, and 9 patients received intensive antiischemic therapy. The SECG findings that led to change in therapy was as follows: 4 patients with ECG evidence of failure to reperfuse 90 minutes after initiation of thrombolytics, 20 patients with new injury, 4 patients with new ischemia, and 1 patient with nondiagnostic ST-segment deviations of  $\geq 1$  mm in 2 contiguous leads. Time from onset of SECG monitoring until finding that led to changed therapy was 24±32 minutes. Twenty-three (76.7%) of these patients had 30-day PTCA or coronary artery bypass grafting. The SECG finding in the 2 patients with final diagnosis of nonischemic chest pain was 1 patient with new injury and 1 patient with new ischemia.

Conclusion: SECG monitoring is much more likely to result in a change in therapy in category 1 and 2 patients with clinically obvious acute myocardial infarction or unstable angina compared with the low-risk category 3 and 4 patients. Chest pain center protocols that exclude these high-risk ED patients from SECG monitoring should be reevaluated. Our data also suggest that researchers designing randomized studies to demonstrate utility of SECG monitoring should focus on the high-risk patients as opposed to the typical low-risk chest pain center population.

Table, abstract 13.

Category	No. of Patients	Acute Myocardial Infarction (%)	Unstable Angina (%)	Completed Acute Myocardial Infarction (%)	Nonischemic Chest Pain (%)
1	28	96.4	3.6	0	0
2	136	24.3	45.6	1.5	28.7
3	333	3.9	18.9	0.3	76.9
4	209	1.4	1.9	1.9	94.7

## 14 Prevalence and Severity of CAD in Low-Risk Chest Pain Patients

Mangione A, Hillis G, Dalseg W, Zhao N, Taggart P, Oliner C/Albert Einstein Medical Center, Philadelphia, PA

Study objective: Patients with chest pain who have low-risk clinical features, are clinically stable during the emergency department observation period, and have negative cardiac markers may be suitable for direct discharge from the ED. Little is known about the prevalence and severity of coronary artery disease (CAD) in such patients, although this has major implications for follow-up.

Methods: Subjects included 432 admitted low-risk patients ( $\leq 7\%$  probability of acute myocardial infarction [AMI]) from the Cardiac Ischemia Rule Out Trial from our institution, who remained clinically stable (using predefined criteria) over 12 hours and had

negative troponin I (TnI) at 0, 6, 8, and 12 hours after ED arrival. Those undergoing stress tests during this admission had these scored (high-risk positive, positive, or negative for reversible ischemia, and positive or negative for prior MI) by 2 independent blinded observers using predefined criteria. Coronary angiograms were graded using American Heart Association/American College of Cardiology criteria: (1) high risk if coronary artery bypass grafting would be recommended on prognostic grounds, (2) positive for other patterns of CAD, and (3) normal/insignificant CAD (no stenosis  $>50\%$ ).

Results: Of the 165 stress tests performed, 7% were high-risk positive for ischemia, 20% positive, and 73% negative. Of the 82 coronary angiograms, 10% were high-risk positive, 61% positive, and 29% normal/insignificant. One hundred patients of the 432 subset (23%) had either a stress test showing ischemia or infarction and/or a coronary angiogram demonstrating significant CAD. A further 49 (11%) had a history of revascularization and/or old pathologic Q waves on their presenting ECG. Overall, therefore, a minimum of 149 (34%) of "low-risk" patients had objective evidence of CAD.

Conclusion: A high percentage of "low-risk" chest pain patients who are candidates for early ED or hospital discharge have objective evidence of CAD, which is often of significant severity. This does not preclude early and safe discharge from the ED but makes adequate and early follow-up mandatory.

## 15 Serious Problems With Utilization of Troponin I for Diagnosing AMI at Emergency Department Presentation of Chest Pain

Milzman D, Vachon G, Shibli M, Zlidenny A/Georgetown University School of Medicine and Providence Hospital, Washington, DC

Recent calls to replace the creatine phosphokinase isoenzyme MB (CPK-MB) test with troponin I (TnI) for the emergency department diagnosis and admission of acute myocardial infarction (AMI) have noted both the accuracy of TnI and its longer half-life capable of identifying AMI more than 12 hours from initial presentation when CPK-MB is no longer detectable.

Objective: To determine the actual predictive values of TnI and CPK-MB based on final diagnoses of hospitalized patients with AMI from a subset of patients admitted from the ED with acute coronary syndrome.

Methods: All patients presenting with acute chest pain to the ED of an urban, community hospital ( $>95\%$  of the patient population African-American) during a 6-month period were consecutively enrolled without subject bias. All charts were reviewed at discharge for final cardiology diagnoses of AMI based on World Health Organization criteria and added the presence of significant coronary stenosis on immediate catheterization or 2-dimensional echocardiographic (2DE) findings of new motion injury. Supporting data including 2DE and coronary angiography reports, as well as overall outcomes, were compared with the initial TnI (positive  $>1.5$  ng/mL) and CK-MB (positive if CPK  $>189$  ng/mL, 2.5% MB) levels and the CK-MB levels from 0, 6, and 12 hours after presentation. Fisher's exact and  $t$  tests were used for analysis with  $\alpha=.05$ .

Results: A total of 3,613 chest pain patients were entered with a total of 8.8% (318) meeting our criteria for AMI. At time 0, 4 hours after presentation the sensitivity and specificity for CK-MB were 57.5% and 89.8%, and for TnI were 38.9% and 73.5%. Serial CK-MB values improved the sensitivity and specificity to 92% and 85.6%. Decreasing the TnI to the equivocal level of  $>0.7$  ng/mL decreased the sensitivity and specificity to 53% and 12.2%, respectively. Five (1.8%) of the AMIs were noted only by an elevated TnI level and not by CK-MB or ECG findings. Forty percent of the patients with AMIs went to immediate catheterization with 94% of the patients having significant stenosis: 54% of these were detectable by CK-MB only, 4.2% by TnI only, and 62% by both CK-MB and TnI values.

Conclusion: ED presentation of AMI patients found CPK-MB to have higher sensitivity and specificity at time 0 than TnI. There were a significant number of elevated TnI levels in patients determined by AMI criteria to not have AMI. These elevations might have been the result of mild ischemia as troponin levels that are normally undetectable in the serum. There were also a significant number of World Health Organization criteria-confirmed MIs that had undetectable TnI levels on presentation. In contrast to other published studies to the contrary, we found little support for TnI as an isolated marker for AMI and question the criteria used in defining AMI in other studies. This study supports continued use of CPK-MB in the ED treatment of acute coronary syndrome.

## 16 The Cost-Effectiveness of Electron Beam Computed Tomography in the Evaluation of Chest Pain in the Emergency Department Observation Units

Laudon DA, Vukov LF, Breen JF, Sheedy PF/Mayo Foundation, Rochester, MN

Study objective: The detection of coronary artery calcification (CAC) by electron beam computed tomography (EBCT) is highly predictive of the presence of coronary

atherosclerosis, and the absence of CAC is highly specific for the absence of significant coronary artery disease (CAD). A pilot study suggested that EBCT could be safely used in evaluating patients with normal initial cardiac enzymes and ECGs and no prior history of CAD. In these patients, a normal EBCT allowed immediate discharge from the ED without subsequent exercise testing. This study evaluated the cost-effectiveness of such a protocol.

**Methods:** A prospective study of chest pain patients who were evaluated in our chest pain unit and underwent EBCT as part of a study protocol. Random sampling was done of women 40 to 65 years of age and men 30 to 55 years of age who presented to the ED with anginal-like chest pain yet had normal initial ECGs and cardiac enzymes.

**Results:** One hundred twenty-three patients admitted to our chest pain unit underwent EBCT of their coronary arteries for CAC. Thirty-one (25%) of the patients were admitted to the hospital with redevelopment of chest pain in the chest pain unit, elevated cardiac enzymes, or positive provocative cardiac testing. Ninety-two (75%) patients had uneventful observation periods, negative cardiac provocative testing, and were discharged from the ED. Fifty-five (60%) patients of the 92 discharged from the ED had negative EBCTs of their coronary arteries. Based on our pilot study, these 55 patients could have immediately been safely discharged from the ED without further observation or provocative testing. Performing an EBCT on these observation patients with dismissal of those with no CAC would result in an average savings of \$350 per patient, or \$850 per patient dismissed, for a 14% reduction in the overall ED chest pain evaluation charge.

**Conclusion:** Using EBCT in the ED in the evaluation of chest pain observation unit patients is cost-effective.

## 17 Cholesterol Screening in Chest Pain Unit Patients

Gershoff L, Diercks DB, Turnipseed S, Amsterdam E, Kirk JD/University of California–Davis Medical Center, Sacramento, CA

Management of dyslipidemia has been shown to be effective in the primary prevention of cardiovascular disease. National guidelines recommend cholesterol screening in adults older than 20 years.

**Study objectives:** To determine the prevalence of abnormal lipid levels in adults with chest pain admitted to an emergency department chest pain unit (CPU).

**Methods:** We conducted an observational, prospective study of all patients enrolled in an urban ED CPU from January 1, 1999, to April 30, 1999. High-density lipoprotein (HDL) and total cholesterol (TC) levels were obtained on all patients unless prior cholesterol levels were known, or at the discretion of the CPU attending physician. Data analysis was performed using  $\chi^2$  and 1-way analysis of variance statistical tools. A *P* value <.05 was statistically significant. Subjects were compared by gender. Cholesterol levels were categorized as normal ( $\leq 200$  mg/dL), borderline high (200 to 239 mg/dL), or high ( $\geq 240$  mg/dL). HDL levels were categorized as normal ( $\geq 35$  mg/dL) or abnormal (<35 mg/dL).

**Results:** A total of 350 patients were admitted to our CPU during this time period. Of these patients, 203 (58%) received lipid screening. Abnormal lipid levels were reported in 94 (46%) of those screened. Isolated low HDL levels were found in 14 (7%) of the patients, and TC was abnormal in 80 patients. Of these 80 patients with abnormal TC values, 54 (68%) were categorized as borderline high and 26 (32%) were categorized as high. Women were screened more often than men (*P*=.043), but had no significant difference in the percent of abnormal values. There was a statistically significant difference in the age of the women screened compared with men (55.1 $\pm$ 13.5 years versus 49.9 $\pm$ 14.3 years, *P*=.003).

**Conclusion:** In our CPU population, a large number of patients with abnormal lipid levels were identified. Our data suggest further study is warranted in cholesterol screening and its effect on risk factor modification in this patient population.

## 18 Abstract Withdrawn

## 19 Abstract Withdrawn

## 20 Occult Myocardial Injury in Severe Carbon Monoxide Poisoning

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Carbon monoxide (CO) poisoning is commonly known for its neurologic sequelae. The extraneurologic manifestations such as myocardial injury can be frequently overlooked in the emergency department management of CO poisoning.

**Study objective:** The purpose of this study was to examine the incidence of myocardial injury in patients presenting to the ED for severe CO poisoning over 2 years.

**Methods:** This was a prospective cohort study of patients presenting with CO poisoning to the ED with a CO level >20% or with a history of CO poisoning with neurologic symptoms. Troponin I (ng/mL), creatinine kinase (CK) or CK-Index, creatinine phosphokinase (CPK), or CPK-MB index (ng/mL), total CPK (IU/L), and ECG were obtained on all patients at presentation.

**Results:** Seventy-five patients with a mean age of 39.6 $\pm$ 16.5 years and CO level of 27.05% $\pm$ 8.98% were studied. Fifteen percent had a positive troponin I level (>2.0 ng/mL) and 56% had no ECG changes. Twenty-one percent had a positive CK-MB level (>5 ng/mL), and 73% had no ECG changes. Nineteen percent had a positive

CK-index (>3%), and 57% had no ECG changes. Eleven percent of the patients had all 3 enzyme levels suggestive of myocardial injury, and of those 56% had no ECG changes.

Conclusion: Myocardial injury is a frequent occurrence in patients presenting with severe CO poisoning even without ECG findings of myocardial injury. Diagnostic testing may be warranted in this patient population.

## 21 The Ottawa Ankle Rules: How Confident Are Our Patients?

Rosenbaum RA, Cowan PT, Bianchi A, Burgess BE, O'Connor RE/Christiana Care Health System, Newark, DE

Study objective: The validity of the Ottawa Ankle Rules (OAR) has been established in numerous studies. The clinical accuracy has been consistent regardless of whether the rules were applied by a physician or nurse. We examined the level of confidence patients with ankle injuries would have if they were told they had negative OARs by various health care providers.

Methods: A convenience sample of 140 patients who presented with ankle injuries were surveyed by phone. All patients had been treated at a single emergency medicine residency program site at 1 of 2 hospitals (inner-city or suburban trauma center). OARs are not routinely used at our facility. All were diagnosed without fractures and discharged. They were contacted by phone 5 to 10 days after their ED visit by 1 of the investigators and asked approximately 20 questions from a standardized script. Questions included evaluations of the quality of treatment and their level of satisfaction. They were also asked their level of confidence if a nurse, emergency physician, and orthopedic surgeon had told them they did not need a radiograph. They were given a 5-point scale to quantify their confidence level ranging from "doubted very much" to "very confident." Statistical analysis used  $\chi^2$ .

Results: Of the 140 patients who were enrolled, 131 (94%) had radiographs; 124 (89%) wanted to have radiography and reported that they would be willing to wait an average of 96 minutes for it. Sixty-seven (48%) reported they would have doubted or doubted very much if a nurse had told them they did not need radiography. Seventy-eight (56%) reported they would have been confident or very confident in an orthopedist's opinion. The differences in confidence levels between nurses, emergency physicians, and orthopedists were statistically significant.

Conclusion: Although the clinical accuracy of the OARs has been validated and has not been shown to be different regardless of the health care practitioner's specialty, our patients had progressively more confidence in the opinion of an orthopedist versus an emergency physician versus a nurse. The low levels of confidence in the opinion of emergency physicians and the overwhelming majority of patients expressing a desire to have radiographs suggest that implementation of the OARs may be met with resistance from patients and may adversely affect patient satisfaction with their care.

## 22 Diagnostic Yield of Head Computed Tomography Scanning in the Evaluation of 112 Consecutive Patients With Dizziness

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Study objective: Dizziness is a common reason for emergency department visits. Although these patients are often referred for head computed tomography (CT), the value of this diagnostic test is not well established. We prospectively evaluated the diagnostic yield of emergency head CT scanning in evaluation of dizziness presenting to the ED.

Methods: The study was conducted at 2 hospitals (Millard Fillmore Gates Circle and Suburban Hospitals, Buffalo, NY) from September 1998 to April 1999, and included patients who had head CT scan for the evaluation of dizziness in the ED. Those with recent head trauma, headache, altered mental status, or new-onset focal neurologic deficits were excluded. CT scans were reviewed independently by 2 experienced observers; differences were resolved by consensus.

Results: One hundred twelve patients (42 men; 38%) were included in study. Age range was 10 to 93 years (average 71 years). CT revealed normal findings (n=75; 66%), periventricular white matter disease (n=14; 12%), diffuse atrophy (n=7; 6%), chronic large-vessel infarction (n=9; 8%), chronic lacunar infarction (n=4; 4%), chronic post-operative changes (n=3; 3%), and chronic posterior watershed zone infarction (n=1; 1%). No acute abnormalities were identified; no scan showed a lesion that explained the patient's dizziness.

Conclusion: The incidence of acute intracranial lesions on head CT scans is extremely low in patients with acute dizziness without focal neurologic deficits. The diagnostic yield of emergency head CT scan is low among these patients.

## 23 Effect of the Initiation of Bi-PAP on Hemodynamic Stability

Patch J, Summers RL, Kolb JC, Jones AE/University of Mississippi Medical Center, Jackson, MS

Study objective: Noninvasive ventilation using bilevel positive airway pressure (Bi-PAP) has been shown to be an effective means of improving oxygenation and respiratory status in patients with obstructive pulmonary disease (COPD) and acute congestive heart failure (CHF). However, it is uncertain what effects this positive airway pressure has on the hemodynamic condition of these patients. This study examines the acute changes in basic circulatory parameters with the initiation of Bi-PAP.

Methods: Noninvasive measurements of the heart rate, systolic and diastolic arterial pressure, cardiac index, total peripheral resistance, ventricular ejection time, and total diastolic time were determined by impedance cardiography before and after the institution of Bi-PAP (pressures 15/5 cm H<sub>2</sub>O) in a group of healthy volunteers. In a collateral study, the same measurements were made in COPD patients in whom Bi-PAP was initiated for therapeutic reasons. Changes in the hemodynamic parameters were analyzed using a paired *t* test (*P*<.05).

Results: In the 12 healthy volunteers studied there were no significant differences in any of the hemodynamic parameters measured (average cardiac index: 2.75±0.78) over a period of 10 to 15 minutes after the placement of Bi-PAP. Similar results for most hemodynamic parameters were found in the 7 COPD patients when Bi-PAP was used with the exception of significant but small increases in the cardiac index, stroke volume, and oxygen saturation (*P*<.05).

Conclusion: Although Bi-PAP is frequently used in the rescue of patients with acute respiratory failure, little is known about its effect on hemodynamics. This study indicates that the positive airway pressure of Bi-PAP has no deleterious consequences to the general circulation and oxygen delivery.

## 24 Etiology and Outcome of Patients With a Final Diagnosis of Noncardiac Chest Pain Admitted From The Emergency Department Under Suspicion of Acute Coronary Syndrome

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Patients who present to the emergency department with chest pain after a recent negative inpatient evaluation for cardiac disease represent a diagnostic and dispositional dilemma for the emergency physician.

Study objective: To determine the frequency with which patients presented to the ED with an adverse cardiac event after a recent inpatient diagnosis of noncardiac chest pain.

Methods: Data from all patients >18 years residing in Olmsted County, Minnesota, who presented to the ED with a chief complaint of chest pain between January 1985 and December 1992 were accessed from an existing chest pain database. For the present study, patients admitted from the ED for inpatient evaluation of chest pain and subsequently discharged with a diagnosis of noncardiac chest pain were included. The discharge diagnosis, extent of inpatient evaluation, 6-month mortality, adverse cardiac event rate (myocardial infarction, stroke, congestive heart failure, arrhythmia), and ED utilization rate were determined. Associations between potential risk factors and an adverse cardiac event within 6 months were tested univariately based on the Fisher's exact test and 2-sample *t* test.

Results: From January 3, 1985, to December 31, 1992, 2,282 Olmsted County residents presented to local EDs with chest pain, and 2,181 (95.6%) were admitted to the hospital for inpatient testing. Of admitted patients, 395 (18.1%) were discharged from the hospital with a noncardiac diagnosis. Thirty-six patients declined participation in research or were not seen in our ED. The remaining 359 patients were placed in the following diagnostic categories: 230 (64.1%) indeterminate noncardiac chest pain (NCCP), 94 (26.2%) gastrointestinal/biliary disease, 15 (4.2%) pulmonary disease, 9 (2.5%) musculoskeletal/cutaneous etiology, 7 (1.9%) psychiatric etiology, and 4 (1.1%) noncardiac vascular etiology. In the category of indeterminate NCCP, there were 12 (5.2%) of patients who experienced cardiac adverse events within 6 months of discharge. There was 1 cardiac death within this group, which occurred 46 days after hospital discharge. Return visits to the ED within 6 months of discharge were seen in 17 patients with indeterminate NCCP; however, only 6 patients were seen more than once. Factors significantly associated with adverse cardiac events included



an abnormal ECG on initial admission ( $P<.001$ ), preexisting diabetes mellitus ( $P=.003$ ), preexisting coronary artery disease ( $P<.001$ ), and advancing age ( $P=.022$ ). Extent of workup during initial hospitalization was not a significant predictor of adverse cardiac events.

Conclusion: Patients found to have NCCP during an inpatient evaluation demonstrate a higher than expected rate of adverse cardiac events. An abnormal ECG, presence of diabetes mellitus, a history of coronary artery disease, and advancing age were all associated with an increased likelihood of acute cardiac events in the first 6 months after hospitalization for NCCP.

## 25 Hyponatremia in Community-Acquired Pneumonia (CAP): Is It Truly a Marker for Legionella?

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Study objectives: Previous studies suggest that pneumonia caused by *Legionella pneumophila* is associated with an increased incidence of hyponatremia. This study examines the relationship between sodium levels and pathogens identified in patients with community-acquired pneumonia (CAP). This study was conducted at a large, inner-city emergency department in the southern United States.

Methods: We conducted an analysis of data from patients prospectively enrolled in institutional review board-approved clinical trials of CAP. The information included in this study was age, sex, serum sodium, glucose, liver function tests, and pathogens identified by standard culture and serologic techniques. Patients were grouped according to the infecting agent or normal flora and subgrouped by normal versus low serum sodium concentration (defined as  $\leq 137$  mEq/L). A multivariate analysis was performed with serum sodium as the independent variable. The incidence of hyponatremia was calculated for each pathogen.

Results: Data from 142 patients were included: 41 females and 101 males, mean age 40 years (SD  $\pm 10$  years). Multiple pathogens were frequently identified in many of the patients. The incidence of hyponatremia was present in 24 of 65 patients with *Chlamydia*, 18 of 34 with *Streptococcus pneumoniae*, 12 of 26 with *Haemophilus influenza*, 11 of 24 with *L pneumophila*, 2 of 7 with *Mycoplasma*, and 12 of 20 with normal oral flora. There was no significant association between the pathogens and hyponatremia in any group. Likewise, there was no difference between the overall mean sodium levels for patients in each pathogen group. No significant association with hyponatremia was found by analysis of variance.

Conclusion: We conclude that hyponatremia is a common finding in CAP (33% to 60%). No statistical association was found to suggest that hyponatremia is a marker for any specific pathogen.

## 26 The Use of Serum Progesterone to Predict Ectopic Pregnancy in Symptomatic First-Trimester Patients

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Progesterone may be a useful screening test for ectopic pregnancy (EP).

Study objective: To prospectively measure the ability of progesterone to predict the presence or absence of EP in symptomatic patients.

Methods: A prospective cohort of 716 symptomatic first-trimester emergency department patients with abdominal pain (86%) and/or vaginal bleeding (72%) at a tertiary-care military teaching hospital had progesterone blindly measured (Coat-A-Count I-125 RIA, Diagnostics Products Corp, Los Angeles, CA). All were followed longitudinally until a criterion standard diagnosis of viable intrauterine pregnancy (VIUP), nonviable IUP (NVIUP), or EP was confirmed.

Results: A 14-month derivation phase ( $n=399$ ) used receiver operating characteristic curve testing to select a cutoff value of progesterone  $<22$  ng/mL. A 12-month validation phase ( $n=317$ ) then retested this cutoff value. Combining both phases, there were 435 (61%) VIUPs, 229 (32%) NVIUPs, and 52 (7.3%) EPs of which 17 were ruptured. Sensitivity, specificity, positive and negative predictive values (95% confidence intervals) were 100% (94% to 100%), 27% (23% to 30%), 10% (7% to 12%) and 100% (98% to 100%), respectively.

Conclusion: Given similar disease prevalence, roughly one quarter (178/716) of symptomatic ED patients can be classified as low-risk for harboring an EP (absolute risk=0 to 2%) using a progesterone cutoff value of 22 ng/mL. Whether implementation of stat progesterone testing can safely expedite care and reduce the need for urgent diagnostic evaluation and admission remains to be tested.

## 27 Changing Rural Physician Behavior in Response to Shared Patient Satisfaction Survey Results

Sloan RA, Putalik GC/Northern Michigan Hospital, Petoskey, MI

Study objectives: To improve patients' experiences as evidenced by improved patient satisfaction ratings.

Methods: A baseline was established using patient satisfaction survey results from 1995-1996 ( $N=2,736$ ). All surveys had a label with each patient's unique ID number. Computerized survey results were merged with a medical record abstract containing the unique patient ID number and attending physician ID number, allowing for computation of physician-specific results. Surveys included questions evaluating physician courtesy, waiting time to see physicians, whether physicians took patient problems seriously, whether physicians were concerned for patients' comfort, and whether physicians were informative regarding tests and treatments. The 5 questions noted above are used in a physician satisfaction index that allows comparison with the 419 emergency departments participating in a national ED satisfaction survey. Beginning in the first quarter of 1997, the emergency medical director shared each physician's results with him or her, and the collective results of the group. Results were confidential, shared with each physician privately, one-on-one, in a nonjudgmental manner, with advice being offered to physicians only if they sought it. The ED is located at a 300-bed tertiary care rural referral hospital. Seven emergency physicians treated patients selected at random, 25 per day, who were not subsequently admitted as inpatients and who were mailed a satisfaction survey approximately 10 days after their ED visit.

Results: In the baseline period, the physician satisfaction index was 83.9 of a possible 100. During the first half of 1997 when the emergency medical director started to share results with physicians, the physician satisfaction index was 85.9 ( $N=611$ ). By the first quarter of 1999, the satisfaction index was 87.1 ( $N=311$ ). Although seemingly a small change, the improvement from 83.9 in the fourth quarter of 1996 to 87.1 in the first quarter of 1999 was significant ( $P<.001$ ) and moved the emergency physician index from the 79th percentile to the 99th percentile among 419 participating EDs. During the baseline period, only 1 physician had substantially lower satisfaction scores than the 7-member emergency medical staff as a whole. His scores showed significant, sustained improvement subsequently.

Conclusion: With reliable, valid physician-specific results, physicians began to take ownership for improving patient satisfaction with their services. Once physicians began to see their results and modify their behavior accordingly, the collective performance of these emergency physicians put them among the top performers nationally of 419 participating EDs in the survey. This was achieved without any incentives, financial or otherwise, other than the desire to improve the patient's experience.

## 28 Magnesium-Aluminum Hydroxide Suspension for the Treatment of Dermal Capsaicin Exposures

Lee DC, Ryan JG, Lee K/North Shore University Hospital, Manhasset, NY

Study objective: With the rising popularity of capsaicin-containing self-defensive products ("pepper-mace sprays"), there has been an associated rise in the inadvertent exposure to these products. We report a case of a patient who accidentally wiped her face after working with chili peppers. The patient presented to the emergency department complaining of severe burning facial pain. She had a magnesium-aluminum hydroxide suspension (MgAl) spread over her face, which provided prompt and dramatic relief. A follow-up study was performed to determine whether MgAl was an effective treatment for dermal capsaicin exposures.

Methods: This was a double-blind, randomized, controlled study comparing the effect of MgAl with saline in the treatment of dermal capsaicin exposures. Ten volunteers were sprayed with a commercial defensive spray containing 10% capsaicin (10% Pepper Gard, Mace Security Inc, Benington, VT) on both aspects of their forearms. A dressing embedded with MgAl (Mylanda) was randomly applied to 1 arm, and a saline-embedded dressing was applied to the other arm. Pain was assessed on a 10-cm visual analog scale at time 0, 10, 20, 30, 60, 90, and 120 minutes.

Results: The mean of the various times are as follows (minutes: MgAl/saline,  $P$  value by Student  $t$  test) 0 minutes: 0.89 SD 1.51/1.33 SD 2.40,  $P=.22$ ; 10 minutes: 1.60 SD 1.84/2.30 SD 2.26,  $P=.02$ ; 20 minutes: 2.40 SD 1.78/3.30 SD 2.11,  $P=.01$ ; 30 minutes: 3.30 SD 1.77/4.40 SD 2.17,  $P=.01$ ; 60 minutes: 3.2 SD 0.63/4.2 SD 1.69,  $P=.70$ ; 90 minutes: 3.17 SD 1.06/3.33 SD 1.00,  $P=.7$ ; 120 minutes: 1.89 SD 0.93/1.89 SD 0.78,  $P=1.00$ . Certain participants noted dramatic relief with MgAl, whereas the majority of participants noted only slight or no relief.

Conclusion: There was statistically significant pain relief with MgAl compared with saline treatments at times 10, 20, and 30 minutes. However, the mean of these points was less than 1.29 cm, which may have questionable clinical significance. Because MgAl is cheap, safe, and readily available, this may be an appropriate treatment for dermal capsaicin exposure.

## 29 Air Ambulance Utilization of Pediatric Transports in an Urban Setting

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Study objective: To examine air ambulance (AA) utilization for pediatric patients in an urban EMS system.

Methods: A retrospective review of all AA runs for patients 18 years of age or younger transported to Children's Hospital of Los Angeles (CHLA) by Los Angeles City Fire Department (LAFD) helicopters was conducted over a 3-year period. The LAFD responds to approximately 250,000 EMS runs annually and serves a population of 3.7 million. Pediatric patients are usually transported by an air ambulance if transport to a pediatric critical care/trauma center is required (such as CHLA) and ground transport is estimated to exceed 20 minutes, as per LA County policy. EMS reports and hospital records were reviewed for key outcome indicators including demographics, mechanisms of injury, ED disposition, revised trauma scores (RTS), and injury severity scores (ISS). Shock was defined as an initial systolic blood pressure (SBP) <70 mm Hg for ages <7 years, and SBP <90 mm Hg for ages >7 years.

Results: A total of 260 patients met the study's inclusion criteria and EMS records were reviewed for these patients. The median age was 5 years (range 0 to 18 years). Two hundred nine (80%) were trauma-related incidents. A breakdown of the most common mechanisms of injury and medical chief complaints is as follows: falls, 73 (28%); auto versus bike, 60 (23%); auto versus pedestrian, 10 (4%); enclosed vehicle, 47 (18%); seizure, 16 (6%); near-drowning, 16 (6%); altered level of consciousness, 9 (4%); others, 29 (11%). Sixty-one (24%) of the patients were in shock in the field. The RTS values were available for 146 patients and were as follows: RTS >7: 118 (82%); RTS 6 to 7: 13 (9%); RTS 5 to 6: 8 (6%); RTS <5: 5 (4%). Charts were available for 175 (73%) patients, of whom 24 (14%) were intubated in the ED. Thirty-two (18%) patients were admitted to the ICU and 7 (4%) were taken directly to the operating room; 57 (33%) patients were discharged home directly from the ED. ISS values were available for 146 patients. The ISS values were as follows: ISS 0 to 15: 122 (84%); ISS 16 to 30: 21 (14%); ISS >30: 3 (2%).

Conclusion: A high degree of overtriage exists for AA transports of pediatric patients in this EMS system. A revised triage policy using additional field parameters may be warranted to better select patients who may require emergency interventions for AA transport.

## 30 Factors Associated With Youth Bicycle Helmet Usage

Brown K, Sebastian K, Barnett A/State University of New York Health Science Center at Syracuse, Onondaga County Health Department, Syracuse NY

Study objective: Our pediatric emergency department continues to see a significant number of children who fall from bicycles and suffer head injuries. This study was undertaken to determine youth bicycle helmet usage rates in our community, and to describe factors that might be associated with increased or decreased usage.

Methods: This prospective observational study was conducted in an urban/suburban community. Teams of 2 observers were stationed at parks, schoolyards, parking lots, and street corners in residential neighborhoods. For each youth bicycle rider, the 2 observers independently recorded approximate age, sex, helmet usage, presence of an adult and helmet usage by that adult, and whether or not the child was alone or with a group. The association between these variables and helmet usage was analyzed using  $\chi^2$  analysis or Wilcoxon rank sum test, as appropriate. An  $\alpha$  value of .05 was used to establish statistical significance.

Results: Three hundred eighteen children were observed. The agreement between the independent observers was excellent, with a  $\kappa$  value of 0.97 for helmet usage. Only those observations in which the 2 reviewers agreed were included in the analysis of any particular variable. One hundred thirty-five (43%) of the 314 children with concordant observations were wearing helmets. Females were more likely than males to be wearing a helmet (68% versus 36%,  $P=.001$ ); children in the presence of an adult were more likely to wear helmets than those who were not (79% versus 37%,  $P=.001$ ); children in a group were more likely to wear helmets than those who were alone (49% versus 33%,  $P=.01$ ); and helmet wearers were typically younger than non-

wearers (median age 5 to 9 years versus 10 to 14 years,  $P=.0001$ ). Median income and helmet usage by an accompanying adult were not related to youth helmet usage.

Conclusion: In our community, only 43% of the children riding bicycles were observed to be wearing a helmet, despite the presence of a statewide mandatory helmet law. Factors associated with increased helmet usage were the presence of an adult, female sex, and riding in a group as opposed to alone. These findings may be useful in designing programs intended to increase helmet usage rates.

## 31 Compliance to Follow-Up Appointments Generated in the Pediatric Emergency Department

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Study objective: To determine the rate of compliance to a follow-up appointment generated in the emergency department and identify the factors associated with poor compliance.

Methods: We used a cross-sectional survey by chart review and telephone interview. The setting was an urban pediatric ED in a tertiary care teaching institution. The study population comprised consecutive patients ( $n=300$ ) younger than age 20 years seen in the ED, and given referral for follow-up within 2 weeks. After the 2-week period, mothers/guardians were called and interviewed on the telephone using a structured questionnaire. Self-report of compliance to follow-up was verified by calling the referred facility. Seventy-nine (26%) of the subjects were lost to follow-up and excluded. There were no significant differences among demographic variables between those excluded and the 221 (74%) subjects who completed the study.

Results: The compliance rate for follow-up appointment was 70% ( $n=155$ ). Factors associated with noncompliance were age <5 years ( $n=38$ , 60%;  $P<.05$ ), single parent ( $n=42$ , 65%;  $P=.04$ ), unemployed parent ( $n=49$ , 78%;  $P=.01$ ), and multiple siblings at home ( $n=42$ , 65%;  $P=.05$ ). There was no association between compliance and enrollment in a managed care organization.

Conclusion: Compliance to follow-up of appointments generated in the ED among children is higher than reported in previous literature. Enrollment in managed care organizations did not appear to influence compliance. Age <2 years, nonsurgical diagnosis, maternal age <20 years, single parent, unemployed parent, and parents with other children at home, were associated with poor compliance.

## 32 Polymerase Chain Reaction Diagnosis of Enterovirus in Children With Aseptic Meningitis

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Study objective: Aseptic meningitis is common with estimates of up to 500,000 cases per year in the United States. Most cases occur in children and young adults and are presumed to be viral in origin. Using standard culture techniques, half of all cases where a virus is identified are enteroviral meningitis. More recently, a polymerase chain reaction (PCR) assay has been developed allowing for more accurate detection of the enterovirus. Identifying patients with enteroviral meningitis may become important in light of the development and testing of specific therapies. The goal of this study is to determine the frequency of enteroviral meningitis among children presenting to the emergency department with viral/aseptic meningitis by using a PCR assay.

Methods: We used a database from an international multicenter study of viral meningitis. Children age 4 to 13 years presenting to the ED with a moderate-severe headache of <48 hours' duration, no history of a serious underlying illness, cerebrospinal fluid (CSF)  $\geq 5$  WBCs/mm<sup>3</sup>, and a clinical presentation consistent with viral/aseptic meningitis were eligible for entry. A reference laboratory performed PCR for enteroviral strains. The ED clinical diagnosis and disposition was made by the treating physician.

Results: Two hundred twenty-one patients were included with a mean age of 8.0 years; 40% were male. One hundred seventy-seven (80%) of 221 of the CSF samples tested PCR-positive for enterovirus, and none of the children were subsequently found to have bacterial meningitis by Gram stain or culture. The following represents the 177 PCR-positive patients: on ED presentation 96% of children had nausea or vomiting, 83% fever, and 82% neck stiffness. CSF results include (median) protein 36 mg/dL, glucose 63 mg/dL, WBC count 109 mm<sup>3</sup> (47% polys, 53% lymphocytes/monocytes). The CSF/serum glucose ratio was 0.62. Eighty-nine percent of children were hospitalized for a mean duration of 3.7 days (median 3 days).

A subgroup of all patients from North America revealed 89 (94.7%) of 94 CSF samples tested PCR-positive for enterovirus.

**Conclusion:** Enterovirus is responsible for the overwhelming majority of aseptic/viral meningitis in children and is associated with high rates of hospitalization. This information will be most useful when new treatments for enteroviral meningitis become available for clinical use. The high rates of enteroviral infection, especially in North America, suggest that PCR testing would not be necessary to initiate antiviral therapy.

### 33 Foley Catheter Balloon Technique for Visualizing the Hymen in Adolescent Sexual Assault Victims

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**Study objective:** To determine the usefulness of the Foley catheter balloon technique for visualizing the estrogenized hymen in adolescent sexual assault victims.

Methods: A prospective clinical trial of 20 adolescent (ages 12 to 16 years old) victims of sexual assault evaluated at a freestanding Nurse Examiner Clinic was conducted over a 4-month study period. The clinic, affiliated with an emergency medicine residency program, is staffed by registered nurses who have been specially trained to perform medicolegal examinations using colposcopy with digital imaging. The Foley catheter technique simply uses an inflated balloon in the distal vaginal vault to expand the estrogenized hymen to its full capacity so that the edge may be readily visualized for signs of trauma. The Foley technique was compared with gross inspection using supine labial traction to photodocument hymenal abnormalities. Before and after photographs were examined by 3 emergency physicians for evidence of hymenal injury. Outcomes were clearly defined and had a high degree of interrater reliability.

Results: Twenty adolescent sexual assault victims volunteered for the study; mean age was 14 years. Gross inspection of the hymen using supine labial traction identified hymenal injuries in 3 patients (15%). Use of the Foley catheter balloon technique allowed identification of hymenal abnormalities in 13 additional cases (80%). This difference in outcomes was statistically significant ( $\chi^2=14.4$ ,  $P<.001$ ). The common injuries to the hymen included lacerations (45%), followed by ecchymosis and contusions. One patient (5%) voiced discomfort (mild pressure sensation) during inflation of the balloon.

**Conclusion:** The Foley catheter balloon technique is a simple method allowing improved detection of hymenal trauma in adolescent sexual assault victims compared with gross visual inspection and labial traction.

### 34 Knowledge of Child Car Seat Safety in a Tricultural Southern California Emergency Department

Vaca F, Lew C, Fernandez M/University of California—Irvine, Orange, CA

Study objective: In 1997, approximately 1,700 children 14 years of age and younger died in motor vehicle crashes. According to National Safe Kids Campaign (1995), if used correctly, car seats are 71% effective in preventing fatalities and 50% effective in preventing injuries. The National Highway Traffic Safety Administration has also concluded that air bags increase the fatality risk to children by 30%. The objective of our study was to determine the caretaker knowledge of child car seat and air bag safety within our tricultural Southern California emergency department population.

Methods: A prospective cross sectional survey study was undertaken. Survey questions were formulated from the American Academy of Pediatrics' recommendations on child car seats. Those eligible were parents and caretakers who might routinely ride in a motor vehicle with a child 12 years or younger. The questionnaire consisted of 2 sections of information gathering: demographics and car seat knowledge including appropriate seat type selection, direction and position according to 3 weight categories: less than 20 lb, 20 to 40 lb, 40 to 60 lb. Two additional questions were included with each weight division to determine knowledge of air bag safety, as well as the safest location in the car for any child younger than 12 years. The data were assessed by descriptive statistical analysis.

Results: Two hundred parents and caretakers were enrolled in our study. One hundred ninety-nine questionnaires were completed. The age of the parents and caretakers ranged from 15 to 58 years with nearly 50% grouped in the 21- to 30-year-old category. Ethnicity of the 192 subjects who reported this information was as follows, 60% Hispanic, 23% white, 17% Vietnamese, and other. When asked to choose the correct direction a child should face based on the child's weight, parents and caretakers were incorrect 20%, 12%, and 2% of the time for the respective weight groups. When

asked to select the safest place for a child between birth and 12 years of age to ride in a car, they incorrectly selected the location 44%, 52%, and 44% of the time. Forty percent of the parents and caretakers surveyed did not know that air bags could increase the risk of death in children.

**Conclusion:** Our findings reveal that our child caretaker population has a significant car seat and air bag safety knowledge deficit. A substantial proportion of caretakers could not correctly identify the proper direction a child car seat should face. Additionally, caretakers were frequently incorrect in selecting the safest location for a child younger than 12 years and in identifying the risk of air bag injury to children.

### 35 Two-Thumb Versus Two-Finger Chest Compression in an Infant Model of Prolonged CPR

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**Study objective:** In previous experiments in our swine laboratory, we have shown that 2-thumb chest compression with a thoracic squeeze (TT) produces higher blood and perfusion pressures when compared with the American Heart Association (AHA)-recommended 2-finger (TF) technique. Previous studies were of short duration (1 to 2 minutes). We hypothesized that TT would be superior to TF during prolonged cardiopulmonary resuscitation (CPR) in an infant model.

**Methods:** We performed a prospective, randomized crossover-designed experiment in a laboratory setting. Twenty AHA-certified rescuers performed basic CPR for two 10-minute periods, one with TT and the other with TF. Trials were separated by 5 to 10 days, and the order was randomly assigned. The experimental circuit consisted of a modified manikin (ResuscitBaby, Laerdal Medical Corp, Armonk, NY) with a fixed-volume "arterial" system attached to a Neonatal Monitor (Hewlett Packard) via an arterial pressure transducer (model PX-1800, Baxter Healthcare Corp, Irvine, CA). The arterial circuit consisted of a 50-mL bag of NSS (air removed) attached to the manikin chest plate and connected to the transducer with a 20-g intravenous catheter and tubing. Rescuers were blinded to the arterial pressure tracing. Systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean arterial pressure (MAP) were recorded in millimeters of mercury. Data were analyzed with 2-way repeated-measures analysis of variance. Sphericity assumed modeling, with Greenhouse-Geisser and Huynh-Feldt adjustments, was applied.

Results: Mean MAPs, by technique and minute, are presented in the Table. Marginal means for TT SBP (68.9) and DBP (17.6) were higher than TF SBP (44.8) and DBP (12.5). All 3 pressures were significantly different between the 2 techniques ( $P \leq .001$ ).

**Conclusion:** In this infant CPR model, TT chest compression produced higher MAP, SBP, and DBP when compared with TF chest compression during a clinically relevant duration of prolonged CPR.

**Table, abstract 35.**

	MAP	1	2	3	4	5	6	7	8	9	10
TT		36.4	35.6	36.2	36.8	36.3	35.4	34.6	34.0	34.2	33.7
TF		26.6	25.0	23.9	23.2	22.7	22.5	22.3	22.3	22.2	22.4

### 36 Heads or Tails: Comparison of a New Pacifier Thermometer With Rectal Temperatures in Children

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**Study objectives:** (1) To determine the correlation between supralingual temperatures obtained with a new electronic pacifier thermometer (Safety 1st, Inc) and rectal temperatures obtained with a digital thermometer; and (2) evaluate patient and parent acceptance of the thermometer for routine use in the emergency department or at home.

**Methods:** This was a prospective clinical trial of 200 pediatric patients (<36 months) evaluated in the ED of a community teaching hospital over a 6-month study period. A supralingual and rectal temperature were obtained for each patient. For the first 30 patients, the time needed for the pacifier thermometer to signal a final, steady-state reading was recorded. Fever was defined as a rectal temperature of 38°C (100.4°F) or more. One week after the ED visit, parents were surveyed by telephone to determine whether they had used the pacifier thermometer at home and their satisfaction with the device.

Results: Fifty-two children (26%) refused to take the pacifier thermometer for the time necessary to obtain a steady-state temperature. A total of 148 data pairs were obtained—

76 in afebrile children and 72 in febrile children. It took an average time of 3 minutes and 20 seconds for the pacifier thermometer to display a steady-state temperature. The correlation coefficient between supralingual and rectal temperatures was 0.78. The mean difference between supralingual and rectal temperatures was 0.70°C±0.72°C. Using supralingual temperatures adjusted upward by 0.7°C, the pacifier thermometer was 78% sensitive and 97% specific for detecting fever (positive predictive value, 97%; negative predictive value, 82%). The majority of parents (74%) contacted by telephone after their ED visit were "very satisfied" with the pacifier thermometer.

Conclusion: The pacifier thermometer provides reasonably good correlation with rectal temperatures when recorded measurements were adjusted upward by 0.7°C (1.3°F). Although readily accepted by parents, a significant number of children (26%) refused to take the pacifier. The additional cost of the thermometer and the time required for a final temperature determination may make the device impractical for most clinical settings.

37 Hemodynamic Study of Mechanical Cardiopulmonary Resuscitation With and Without Active Decompression and Interposed Abdominal Compression

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Study objectives: Active compression-decompression cardiopulmonary resuscitation (ACD-CPR) with interposed abdominal compression (ACDIAC-CPR) is the basis of development of our Chest Compression with External Diaphragm Pacing and External Counterpulsation (EE-CPR) and is similar to the phased chest and abdominal compression-decompression in terms of hemodynamic mechanism. The aim is to evaluate the hemodynamic effect and probe into the mechanism of ACDIAC-CPR.

Methods: We compared standard CPR (S-CPR), ACD-CPR, IAC-CPR, and ACDIAC-CPR in 8 domestic pigs (18 to 24 kg) after induction of ventricular fibrillation by the computer-controlled multifunctional resuscitation apparatus with special ACD sticker that is quick to switch between ACD and no-ACD. The aortic (Pao) and right atrial pressure (Pra) were measured with micromanometers. Sternal displacement and abdominal compression were controlled. Four CPRs were randomly performed in interval of 2 minutes in each one according to the randomized block design. Chest compressions were 80/min and sternal displacements were 4.3 to 5.9 cm without ACD and 5.3 to 6.9 cm with ACD, and abdominal compression pressures were 75 to 120 mmHg, but all parameters were the same in 1 pig.

Results: Compared with S-CPR, ACD-CPR increased diastolic Pao and decreased diastolic Pra but cerebral perfusion pressure (CPP) was not significant; IAC-CPR enhanced both diastolic Pao and Pra so that diastolic maximum of CPP was merely augmented significantly; ACDIAC-CPR augmented significantly maximum and mean CPP. The hemodynamic result is below stable (mean±SD) (Table).

Conclusion: For the pig model of cardiac arrest examined, ACDIAC-CPR improved significantly myocardial perfusion in comparison with S-CPR. It is probably due to synergism of venous return and diastolic Pao and rivalry of diastolic Pra between ACD-CPR and IAC-CPR.

Table, abstract 37.

Variable	S-CPR	ACD-CPR	IAC-CPR	ACDIAC-CPR
Systolic mean Pao	60.0±18.4	62.1±18.9	59.5±18.5	63.1±18.3
Diastolic mean Pao	33.9±12.0	34.3±12.0	45.6±13.8*	46.9±15.2*
Diastolic mean Pra	8.7±3.6	7.9±2.7	16.2±5.7*	15.0±5.1*
Diastolic maximum CPP	27.5±12.6	29.7±13.4	37.0±13.1*	40.3±16.5*
Diastolic mean CPP	25.2±12.1	26.4±11.4	29.4±12.5	31.9±13.1*

\*P<.05 versus S-CPR and ACD-CPR.

38 Oxygen Dose Response in Open-Chest ACLS in Swine After a 25-Minute Cardiopulmonary Arrest

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Study objective: A past controlled prospective, randomized study of closed-chest cardiopulmonary resuscitation (CPR) in guinea pigs demonstrated the advantage of

hyperbaric oxygen over normobaric oxygen (after a 1-ATA normothermic cardiopulmonary arrest) in effecting lasting return of spontaneous circulation (ROSC). This study investigates a similar approach using open-chest CPR in swine instead.

Methods: This IACUC-approved study incorporated the prospective randomized assignment of 6 swine each to 1-, 2-, and 4-ATA 25-minute normothermic (37.5°C) cardiopulmonary arrest induced by AC current by catheter applied directly to the epicardium to produce ventricular fibrillation. After 25 minutes of cardiopulmonary arrest, the animals received cardiac compression by a mechanical ventricular assist device (MVAD) and ventilation by mechanical ventilator with 100% O<sub>2</sub> at the randomly assigned ambient pressures used. Standard American Heart Association Advanced Cardiac Life Support (ACLS) drug and defibrillation protocols were followed. ROSC was defined as the ability of the animal to maintain a femoral arterial pressure ≥90/50 mm Hg without assistance of an MVAD. The animals were evaluated after initiation of the resuscitative effort for initial ROSC and sustainable ROSC over the next 2 hours. The animals were sacrificed at 2 hours after initial arrest. A 2-tailed Fisher's exact test was used to analyze study results to obtain a relevant P value.

Results: See Table.

Conclusion: Ventilation with oxygen at 4-ATA ambient pressure may be more effective than with oxygen at 1 and 2 ATA of ambient pressure when resuscitating swine after a prolonged normothermic cardiopulmonary arrest of 25 minutes. The tabular results for both initial ROSC and sustained 2-hour ROSC achieved a level of significance (P≤.0049) by a 2-tailed Fisher's exact test for group 3 over the combined groups 1 and 2. It would be desirable for other centers to repeat and, if possible, confirm and expand on these results, as there has been little improvement in efficacy of ACLS since the mid-1960s with new therapeutic approaches.

Table, abstract 38.

Group	Initial ROSC	ROSC Sustained Over 2-h Period
Group 1: 1 ATA (n=6)	6/6 No	6/6 No
Group 2: 2 ATA (n=6)	6/6 No	6/6 No
Group 3: 4 ATA (n=6)	5/6 Yes	4/6 Yes

39 Treatment of Hypothermia-Induced Ventricular Fibrillation With Warm Lavage Perfluorocarbon Ventilation

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Study objective: Although hypothermia results in remarkable neuroprotection, it also results in irreversible cardiac arrhythmias. Aggressive central rewarming techniques can result in excellent recovery from cardiac arrest secondary to hypothermia. Unfortunately, the majority of hypothermia victims present to facilities without central rewarming capabilities. Partial liquid ventilation (LV) with perfluorocarbon (PFC) liquids is a simple proven method of ventilating infants and adults with acute lung injury. LV with warmed PFC may be capable of core rewarming without the invasiveness of present central rewarming techniques. We tested the efficacy and effectiveness of warmed PLV in a swine model of severe hypothermia with circulatory arrest.

Methods: Common swine (n=3) were intubated and placed on a volume cycled ventilator. Hemodynamics and pulmonary artery (PA), aortic, nasal, intrapulmonary, rectal, and esophageal temperatures were monitored continuously and recorded every 10 minutes throughout cooling and every minute during rewarming. Animals were cooled in an ice/ethanol bath to a mean aortic temperature of 26.4°C±0.9°C. Ventricular fibrillation was induced in all animals. Rewarming was then instituted by continuous intratracheal instillation of 5 mL/g per minute of preoxygenated PFC, warmed to 44°C.

Results: Before rewarming, 3 attempts were made to restore normal sinus rhythm by defibrillation at 1, 2 or 4 J/kg; this failed in all cases. After 30 minutes of rewarming, mean aortic temperature increased an average of 6.73°C to 33.13°C±1.5°C. This resulted in the spontaneous return of normal sinus rhythm in 1 animal with return of normal hemodynamics and oxygenation for 2 hours until euthanized.

Conclusion: Lavage LV with oxygenated PFCs quickly rewarmed the heart in the setting of hypothermia-induced ventricular fibrillation. Warmed PFC LV may be useful in the treatment of severe hypothermia.



## 40 Association of Initial Serum $\tau$ Protein Level and Disposition at Hospital Discharge in Closed Head Injury Patients

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**Study objectives:** Closed head injury (CHI) is a major cause of morbidity and mortality in trauma patients. Permanent neurologic impairment is a common occurrence in these patients, and prediction of outcome based on clinical parameters at patient presentation is an area of increasing interest. An assay for  $\tau$  protein, which is a cytoskeletal protein found in central nervous system (CNS) neurons, has recently been developed. This protein is only released from neurons with axonal injury. The goal was to determine whether initial serum  $\tau$  protein level was associated with a worse outcome.

**Methods:** The study population consisted of trauma patients presenting to the emergency department of an urban Level I academic medical center. A convenience sample of those patients suspected of having a CHI were prospectively enrolled, and a blood sample was drawn at hospital presentation and assayed for  $\tau$  protein. A review of patients' medical records was done to record demographic data, initial head computed tomography (CT) results, time of injury, and discharge disposition. Staff radiologists' final CT readings were categorized as either "abnormal," meaning any abnormality of the brain parenchyma, or "normal." Patients' dispositions were categorized as having been discharged to home, to nursing home, or not surviving to hospital discharge.

**Results:** Nineteen patients were enrolled. Nine patients had  $\tau$  protein levels  $>0$  with abnormal CT findings. Six patients had  $\tau=0$  with a normal CT, 4 had  $\tau=0$  and abnormal CT ( $P=.011$ , Fisher's exact test). Rank order analysis for  $\tau$  level versus discharge disposition showed that those with a higher  $\tau$  level were more likely to require nursing home care on discharge or die in the hospital ( $P<.01$ ).

**Conclusion:** These results imply that an elevated  $\tau$  protein level at hospital presentation implies a poorer outcome at hospital discharge for CHI patients.

## 41 Automated External Defibrillator Use and the Effect of Provider Exposure to Cardiac Arrest

O'Connor RE, Megargel RE, Ross RW, Bitner M/Christiana Care Health System, Newark, DE

**Study objective:** Defibrillation with automated external defibrillators (AEDs) results in improved survival and has become a mainstay in the treatment of out-of-hospital cardiac arrest (OOHCA). Emergency medical technicians (EMTs) formerly unaccustomed to treating OOHCA are now using AEDs. We conducted this study to analyze the usage pattern by EMTs with varying exposure to OOHCA.

**Methods:** This observational study was conducted prospectively by 2 county-wide emergency medical service providers. EMTs received equivalent training on AED use. County A has a population of 470,000 (1,076/sq mi) and county B has a population of 125,000 (210/sq mi). OOHCA cases where the EMT with the AED was first on the scene were identified. Whether the AED was in place on paramedic arrival was determined.  $\chi^2$  and 95% confidence intervals were determined.

**Results:** County A had 23 AED provider agencies and county B had 18. Each AED provider agency used 10 to 18 AED providers. The annual rate of OOHCA where EMTs with the AED were the first to arrive was 10 per agency in county A, and 2 per agency in county B. Of a total of 203 OOHCA cases studied in county A, there were 82 (40%) opportunities for AED use. The AED was applied in 79 of these 82 (96%) cases. Of a total of 208 OOHCA cases studied in county B, there were 80 (38%) opportunities for AED use. The AED was applied in 47 of these 80 (59%) cases. The difference in AED opportunities was not significant, whereas the difference in application was ( $P<.00001$ ).

**Conclusion:** AEDs are not universally applied to victims of OOHCA. Providers with scant experience treating OOHCA fail to apply the AED in a large proportion of cases. Failure to apply AEDs in OOHCA underscores the need to provide periodic retraining. An important public health initiative would be to track all cases of OOHCA to assess whether an AED is used in all cases where it is indicated.

## 42 Evolution of Serum Cytokines (TNF- $\alpha$ , Interleukin-1, Interleukin-6) in Postinjury Systemic Inflammatory Response Syndrome (SIRS)

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**Study objective:** The purpose of this study was to assess the patterns of evolution of 3 proinflammatory cytokines including tumor necrosis factor (TNF)- $\alpha$ , interleukin (IL)-1, and IL-6 in the development of systemic inflammatory response syndrome (SIRS) caused by multiple trauma.

**Methods:** Twenty-one patients with multiple trauma who presented to the emergency department within 2 hours after injury were enrolled. Serial blood samples were collected from each patient to measure serum TNF- $\alpha$ , IL-1, IL-6 levels on admission, and at 12 hours, 24 hours, and daily for 5 days after injury. Blood samples of 15 healthy volunteers were used as a reference value. Clinical characteristics, serum TNF- $\alpha$ , IL-1, and IL-6 levels were compared between the SIRS group ( $n=10$ ) and non-SIRS group ( $n=11$ ).

**Results:** During the entire study period, serum TNF- $\alpha$  levels were higher in the SIRS group than the non-SIRS group ( $31.4\pm 18.1$  pg/mL versus  $7.3\pm 7.6$  pg/mL,  $P=.03$ ). IL-1 concentrations were not different between the SIRS and non-SIRS groups ( $P=.76$ ). IL-6 concentrations were higher in the SIRS group than the non-SIRS group during the first 2 days ( $P<.05$ ). Serum IL-6 levels correlated with injury severity score (ISS,  $P=.009$ ), but did not correlate with TNF- $\alpha$  or IL-1 ( $P>.05$ ).

**Conclusion:** This observation suggests that persistent elevation of serum TNF- $\alpha$  and IL-6 might be associated with development of SIRS.

## 43 Long-Term Effects of Octyl-Cyanoacrylate on Scarring After Partial-Thickness Burns in Pigs: A Randomized Trial

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**Study objective:** To compare the effects of octyl-cyanoacrylate (OCA), silver sulfadiazine (SSD), Tegaderm (T), and dry gauze (control [C]) on wound contracture and scarring 3 months after partial-thickness burns.

**Methods:** This prospective, blinded, controlled, experimental trial was conducted in isoflurane-anesthetized swine. Forty standardized second-degree burns were created by applying an aluminum bar preheated to 80°C for 20 seconds to the backs and flanks of young pigs. Four equal sets of 10 burns were randomly treated with OCA spray, SSD, T, or D. Dressings were changed 1, 2, 3, and 4 days later. Digital images of the scars were obtained immediately and 3 months later for blinded computerized determination of scar surface area (Scion Imaging, 1998). Full-thickness biopsy specimens were taken at 3 months for blinded histopathologic evaluation of scarring. The percent of wound contracture (WC) was calculated by subtracting the area of individual burns from the area of the largest burn and dividing this by the area of the largest burn. On a random subset of burns, WC had an intraobserver correlation of 0.99. A scar was defined by the presence of abnormally oriented collagen under polarized light combined with increased fibroblasts and blood vessels. Analysis of variance was used for comparisons among groups. This study had 80% power to demonstrate a 33% difference in WC among groups (2-tailed,  $\alpha=.05$ ).

**Results:** There were no differences in WC across the groups (OCA=25.4%, SSD=40.0%, T=25.2%, C=32.4%;  $P=.13$ ). There were also no differences in the proportion of wounds with scar tissue among the groups (OCA=10%, SSD=22%, T=2%, C=30%;  $P=.89$ ).

**Conclusion:** The long-term effects of OCA spray, SSD, T, and dry gauze on scarring and wound contracture after second-degree burns in swine are similar.

## 44 Utility of Pretest Probability to Assess the Risk of Abnormal Head Computed Tomography Scans: Can Risk Stratification Be Used To Eliminate Scanning in Low-Risk Patients?

Leisey JR, Levy BM, Jasani NB, O'Connor RE/Christiana Care Health System, Newark, DE

**Study objective:** Previous studies have attempted to identify clinical criteria that may be used to identify low-risk patients who, despite their chief complaint, might safely forego head computed tomography (CT). Most studies focused on traumatic brain injury and produced conflicting results. We conducted this study to determine whether emergency physicians order CT scans of the head for low-risk patients unnecessarily.

**Methods:** This prospective cohort study was conducted in the emergency department of a tertiary care hospital. Consecutive patients who underwent CT scans of the head were enrolled. Clinical indications for the scans included both traumatic and nontraumatic complaints. The emergency physician ordering the scan was required to complete a data form stating the reason for the scan and assigning a probability of a clinically relevant abnormality as low, intermediate, or high. Pretest probability was assessed solely on the basis of history and physical examination. All scans were interpreted by 2 radiologists who were blinded to the study. Statistical analysis included determination of  $\chi^2$  and 95% confidence intervals (CIs).

**Results:** A total of 506 patients were enrolled; 49% of patients were male. Sixty-seven percent of scans were obtained for nontrauma indications. The rate of abnormal CT scan was  $9.7\%\pm 3.3\%$  for patients with low pretest probability ( $n=309$ ),  $31.5\%\pm 7.5\%$  for patients with intermediate pretest probability ( $n=149$ ), and  $64.6\%\pm 13.5\%$  for

patients with high pretest probability (n=48). Differences in the rate of abnormal scans between the 3 probability categories are significant ( $P<.0001$ ).

Conclusion: Using clinical information, physicians are able to stratify patients according to risk of abnormal scan. Significant proportions of patients in all 3 categories have clinically relevant abnormalities. These results suggest that risk stratification cannot be used to eliminate the need for CT scans in patients deemed to be at low risk for having abnormal findings.

## 45 The Use of Systemic $\beta$ -Agonists in Acute Asthma in North American Emergency Departments

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Study objectives: Little is known about the epidemiology of the use of systemic (non-inhaled)  $\beta$ -agonists in North American emergency departments. This study examines the prevalence of systemic (intravenous, subcutaneous, intramuscular, oral)  $\beta_2$ -agonist use for acute asthma in North American EDs and the factors associated with their use.

Methods: This prospective cohort study was performed in 77 North American EDs affiliated with the Multicenter Airway Research Collaboration (MARC). Acute asthmatics, aged 2 to 54 years, presenting to the ED were interviewed during their visit and by telephone 2 weeks later. Care was left to the discretion of the treating ED physician.

Results: Of 4,099 eligible patients, 3,031 were enrolled in the study (74%); 1,847 were adults (18 to 54 years) and 1,184 were children (2 to 17 years). Overall, 5% (144/3,031) received systemic  $\beta_2$ -agonist: 117 (81%) within and 27 (19%) before ED arrival. No patients received intravenous  $\beta_2$ -agonist. Univariate analysis demonstrated that adults receiving subcutaneous  $\beta_2$ -agonist required more frequent inhaled treatment (4 versus 3 during their stay,  $P<.05$ ), more systemic corticosteroids (92% versus 67%,  $P<.05$ ), and stayed longer in the ED (243 minutes versus 180 minutes,  $P<.05$ ). Finally, admission rates were higher in the subcutaneous group (80% versus 54% in adults and 77% versus 46% in children,  $P<.05$ ). Multivariate analysis of patient characteristics revealed that increasing age (odds ratio [OR] 1.2 per 10 years, 95% confidence interval [CI] 1.0 to 1.3), use of oral  $\beta_2$ -agonist in the past 4 weeks (OR 1.8, 95% CI 1.1 to 2.9), high severity scores (OR 3.3, 95% CI 1.8 to 6.1), and ED length of stay (OR 1.1, 95% CI 1.0 to 1.2) were independent predictors of systemic  $\beta_2$ -agonist use.

Conclusion: The use of systemic  $\beta_2$ -agonist in North American EDs is uncommon, and is most frequently seen in patients with more severe exacerbations of asthma. Clinicians and researchers should reevaluate the role of systemic agents.

## 46 Asthma Education in the Emergency Department

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National guidelines advise asthma teaching at every asthma encounter, including emergency department visits for acute asthma. Formal asthma education programs (AEPs) may improve outcomes for asthmatics in primary care and specialist clinics; the impact on ED patients is unclear.

Study objective: We expected that (1) few Multicenter Asthma Research Collaboration (MARC) sites use AEPs, (2) ED asthma researchers favor using AEPs, but consider only certain components to be practical in the ED, and (3) patients at sites with AEPs would have better outcomes at 2 week follow-up.

Methods: MARC site investigators received a survey on ED-based asthma education at their institutions. Site and patient characteristics (including 2-week telephone follow-up) were obtained from the MARC database of 2,334 ED asthma visits.

Results: Seventy-seven sites (100%) completed surveys; 12 sites (16%; 95% confidence [CI] 8% to 26%) had a formal AEP. Most respondents felt that AEPs should teach proper inhaler technique, "spacer" use, recognition of asthma triggers, and medication rationale. Sites with AEPs were more likely to use guidelines for acute asthma management, but otherwise resembled sites without AEP. In practice, nurses and respiratory therapists (RTs) perform AEP teaching. Registered nurse-based AEP sessions typically take <5 minutes; those using RTs require 6 to 10 minutes. Most AEPs rely on demonstrations (100%; 95% CI 74 to 100) and written handouts (83%; 95% CI 51 to 98). Only 3 sites formally assess AEPs for patients' knowledge or outcomes. Ongoing exacerbations were less common among patients at AEP versus non-AEP sites (15% versus 19%,  $P=.01$ ); adjusting for 10 potential confounders attenuated this benefit (odds ratio=0.8; 95% CI 0.6 to 1.0).

Conclusion: Although national guidelines and emergency asthma researchers agree

that patient education is very important, formal AEPs remain uncommon. In this sample of predominately academic EDs, formal AEPs appear to improve post-ED outcomes.

## 47 COPD Exacerbations in Patients With Traditional High-Risk Criteria for Admission: Is the Critical Decision Unit an Alternative?

Tokarski GF, Klausner H, Kowalenko G, Nowak RM/Henry Ford Hospital, Detroit, MI

Although patients with worsening symptoms of chronic obstructive pulmonary disease (COPD) are candidates for clinical decision unit (CDU) therapy, historical data such as previous need for mechanical ventilation, use of home oxygen, chronic steroid use, use of a home nebulizer, and use of home antibiotics frequently influence the clinician to admit these patients to the hospital for respiratory therapies. It is unknown if patients who possess historical data that place them at high risk for hospital admission (HA) are appropriate CDU candidates.

Objective: To determine whether high-risk historical characteristics in patients with mild/moderate COPD exacerbations are associated with the need for HA versus CDU care.

Methods: We conducted a retrospective chart review of patients with mild/moderate COPD symptoms treated in the ED/CDU at an urban tertiary care center between 1996 and 1998. All patients were required to fit inclusion and exclusion criteria outlined in a CDU pathway for COPD exacerbations. High risk for admission data collected included use of home oxygen therapy, history of intubation (ETI), use of a home nebulizer, long-term oral steroid use, current use of antibiotics, and presence of associated comorbidities (hypertension, coronary artery disease, diabetes mellitus, congestive heart failure). Patients were grouped according to final disposition (HA versus CDU discharge).  $\chi^2$  Tests were used to test for differences between groups.

Results: Two hundred of 227 records were reviewed. There were 108 male and 92 female patients with a mean age of  $65.9 \pm 12$  years and  $67.3 \pm 11.3$  years for the HA and DC groups, respectively ( $P=.42$ ). The Table compares the high risk for admission criteria in the HA and DC groups and reveals that except for hypertension as a comorbidity, there was no statistically significant difference in any other high-risk admission criterion.

Conclusion: With the exception of hypertension, the presence of high-risk historical admission characteristics is not associated with the need for inpatient care of mild/moderate COPD exacerbations. These patients can be successfully managed in the CDU. Prospective studies are needed to verify these results.

Table, abstract 47.

Disposition	Home O <sub>2</sub>	ETI	Home Nebulizer	Steroids	Antibiotics	Hyper- tension	CAD	DM	CHF
<b>Hospital admission</b>									
No.	22/87	17/52	57/87	13/87	14/87	22/87	8/82	10/87	20/87
%	25.3	32.7	65.5	14.9	16.1	25.3	9.8	11.5	23.0
<b>Discharge</b>									
No.	25/104	19/53	52/107	17/108	14/107	20/107	6/93	9/95	6/96
%	24.0	35.9	48.6	15.7	13.1	18.7	6.5	9.5	27.1
Pvalue	>.05	>.05	>.05	>.05	>.05	.018	>.05	>.05	>.05

CAD, Coronary artery disease; DM, diabetes mellitus; CHF, congestive heart failure.

## 48 Use of the Intubating Laryngeal Mask Airway Compared With Laryngoscopic Intubation Among Emergency Department Staff Using Both a Mannequin and Cadaver Model

Lauder CT, Sweeney TA, O'Connor RE/Christiana Care Health System, Newark, DE

Study objective: The intubating laryngeal mask airway (ILMA) is a new airway device that has not been extensively studied in the emergency department. We conducted this study to evaluate the utilization of the ILMA for endotracheal intubation (ETI) by emergency medicine residents and attending physicians.

Methods: Data for this study were collected during 1999 at an ED where more than 500 ETIs are performed yearly. Before the start of the study, participants were instructed on ILMA insertion using an in-service/video. The complete time to intubation on a mannequin model was recorded in seconds. The ILMA was also compared with ETI. Time to bag-valve-mask (BVM), time to ILMA insertion, and time to intubate (ETI) was recorded in a mannequin model. A separate arm of the study looked at

the time to completion on a mannequin model. Statistical analysis included  $\chi^2$ , analysis of variance, and paired *t* test.

**Results:** A total of 29 physicians performed ILMA insertion on mannequin. In 13 cases ILMA was compared with ETI. There were 3 cadaver intubations. The mean time to ETI was 37 seconds (range 18 seconds to 118 seconds), which was significantly less time than the mean time of 69 seconds (range 49 seconds to 101 seconds) required for ILMA ( $P=.0001$ ). The mean time to ILMA insertion was significantly longer in a cadaver model (128 seconds) than when using the mannequin (67 seconds,  $P<.0001$ ). Time to BVM (mean 18 seconds; range 14 seconds to 56 seconds) was significantly shorter than time to ETI and ILMA ( $P<.001$ ). All 13 of the matched ILMA insertions were successful on the first attempt compared with only 11 of 13 ETIs ( $P=0.1$ ).

**Conclusion:** Insertion of the ILMA can be readily taught to resident and attending physicians using an instructional videotape. The mean time to insertion for ILMA was approximately 30 seconds longer than for ETI. Time to insertion for cadaver ILMA was approximately 60 seconds longer than for the airway mannequin. The ILMA was successfully inserted in all cases compared with 85% of ETIs. The ILMA may represent a useful adjunct to airway management in the ED.

## 49 Utility of the Bullard Laryngoscope for Emergency Department Trauma Intubations

Wadbrook P, Pollack CV Jr/Maricopa Medical Center, Phoenix, AZ

**Study objective:** The Bullard laryngoscope is a rigid fiberoptic device that has an anatomic shape allowing its insertion and access to the larynx with limited mouth opening and minimal perturbation of the cervical spine. We hypothesized that these features would make the Bullard particularly useful for intubations in trauma patients who were maintained in cervical spine precautions in a hard cervical collar.

**Methods:** This was a prospective, convenience-randomized study of traumatized patients requiring urgent or emergency endotracheal intubation in an urban Level I tertiary care academic medical center. Intubation with the Bullard laryngoscope was performed by emergency medicine residents under the direct supervision (via video monitor) of an emergency medicine attending physician. Sedation and neuromuscular blockade were used as clinically indicated.

**Results:** To date, 34 trauma victims have undergone Bullard laryngoscopy and 31 were successfully intubated. Lack of success in the other 3 patients was attributed to inadequate blade length (1) or heavy bleeding/secretions (2); they were each intubated with a standard laryngoscope without complication. Of the 34 patients, 27 were given paralytic agents and sedation before laryngoscopy; 2 were sedated only and 5 were trauma code patients who required no medications. No dental, pharyngeal, or neurologic complications of laryngoscopy or intubation were noted.

**Conclusion:** The Bullard laryngoscope is a useful instrument for airway management in trauma victims requiring intubation. Larger studies should be performed to confirm these findings.

## 50 Use of Physical Examination, Pulse Oximetry, and ETCO<sub>2</sub> to Predict Deep Endotracheal Tube Placement

Hale DB, Jewett PD, Harris C/Health Partners-Regions Hospital, St. Paul, MN

**Study objective:** To determine whether physical examination, pulse oximetry, or continuous quantitative end-tidal CO<sub>2</sub> (ETCO<sub>2</sub>) monitoring can predict endotracheal tubes that are placed less than 3 cm above the carina.

**Methods:** The study was a prospective, single-blinded, cohort study involving adult patients presenting to an urban (58,000 visits per year), academic emergency department requiring endotracheal (ET) intubation. The study period was from September 1, 1998, to May 1, 1999, and included all adult patients requiring intubation in the ED except trauma and cardiopulmonary resuscitation patients. Data collected included presence of equal breath sounds, difficulty of ventilation, symmetric chest rise, pulse oximetry values, ETCO<sub>2</sub> values, ET tube adjustments before chest radiograph, and intubating physician's assessment of ET tube placement before chest radiograph. Data were collected at 0, 5, and 10 minutes after intubation with preintubation and postintubation ventilation rates kept constant. One investigator, blinded to data collected and final radiology readings, reviewed all radiographs. Deep intubations were defined as ET tubes less than 3 cm above the carina.

**Results:** Fourteen (17%) of 81 patients had an ET tube that was too deep. Nine ET tubes were in the right mainstem, 1 was in the left mainstem, and 4 were 0 to 3 cm from the carina. Two of 14 patients, both right mainstem intubations, were difficult to ventilate and had asymmetric breath sounds. Seventy-nine of 81 patients had symmetric chest rise, constant ease of ventilation, and equal breath sounds. Initial mean oxy-

gen saturation after intubation was 98.6% (95% confidence interval [CI] 98.1 to 99.2) for the 14 patients with deep intubations and 98.5% (95% CI 98.7 to 99.3) for the 67 patients with correctly placed ET tubes ( $P>.05$ ). There were no significant differences comparing changes in oxygen saturation at 5 and 10 minutes between groups ( $P>.05$ ). Initial ETCO<sub>2</sub> after intubation was 40.8 mm Hg (95% CI 34.3 to 47.2) for the 14 patients with deep intubations and 34.6 mm Hg (95% CI 32.5 to 36.7) for the 67 patients with correctly placed ET tubes ( $P>.05$ ). Eight of 10 mainstem intubations had ETCO<sub>2</sub> drop 8 mm Hg or more 5 minutes after intubation. Ten of 10 mainstem intubations, 4 of 4 ET tubes 0 to 3 cm from the carina, and 2 of 67 correctly placed ET tubes had ETCO<sub>2</sub> drop 6 mm Hg within 10 minutes of intubation. For mainstem intubations, a 6-mm Hg drop in ETCO<sub>2</sub> was 100% sensitive, 97% specific, with an 80% positive and 100% negative predictive value. For all ET tubes that were too deep, a 6-mm Hg drop in ETCO<sub>2</sub> was 100% sensitive, 97% specific with an 86% positive and 100% negative predictive value.

**Conclusion:** Physical examination and pulse oximetry findings are unreliable monitors of ET tube depth. ETCO<sub>2</sub> is an accurate method of determining appropriate ET tube placement.

## 51 2,392 Emergency Department Intubations: First Report of the Ongoing National Emergency Airway Registry Study (NEAR 97)

Walls RM, Barton ED, McAfee AT, on behalf of the NEAR 97 Investigators/Brigham and Women's Hospital, Harvard Medical School, Boston, MA

**Study objective:** To characterize emergency department airway management in the United States, including success and complication rates.

**Methods:** This was a prospective observational study of 2,392 ED intubations in 16 US teaching hospitals recorded in the database during the second phase (August 1997 to October 1998) of the ongoing National Emergency Airway Registry (NEAR 97).

**Results:** A total of 2,392 intubations were registered over this period; of these, 1,756 (73.4%) were adults, 174 (7.2%) children younger than 18 years, 462 (19.3%) age unknown. Rapid sequence intubation (RSI), oral intubation with sedation only (SED), oral intubation without medications (NOM), and nasal intubation (NTI) were the first method in 71%, 5%, 13%, and 9% of intubations. Success rates in all patients in 1,  $\leq 2$ , and  $\leq 3$  attempts were 95%, 99%, 99%, 99% (RSI); 90%, 93%, NA (SED); 89%, 92%, 93% (NOM); and 83%, 84%, 85% (NTI). By discipline, intubations of adults and children were performed by emergency medicine (91%, 79%), pediatrics (0%, 10%), anesthesia (3%, 5%), surgery (5%, 1%), and internal medicine practitioners (3%, 0%). By method, overall success rates of RSI, SED, NOM, and NTI were 99.2%, 92.6%, 92.6%, and 84.4% (each method has  $P<.001$  when compared with RSI). Of the 2,392 intubations, we recorded 309 complications. This 12.9% complication rate is a result of the following:

Technical problem=133 (43%)  
Physiologic alteration=43 (14%)  
Immediate complication=83 (27%)  
Unknown/other=50 (16%)

Only the immediate complications are directly attributable to the intubation.

**Conclusion:** Most ED intubations in these 16 centers were performed by emergency physicians, and most were done using RSI. Success rates vary by method, and are generally superior with RSI. The immediate complication rate is 3.5% (95% confidence interval  $\pm 0.7\%$ ).

## 52 Trauma Airway Management in the Emergency Department: A Comparison of First-Pass Success Rate, Indications, and Cricothyrotomy by Specialty

Kulkarni RG, Gurr DE, Walls RM, on behalf of the NEAR Investigators Pollack CV Jr, Sakles J/Brigham and Women's Hospital, Harvard Medical School, Boston, MA; Maricopa Medical Center, Phoenix, AZ; University of California-Davis, Sacramento, CA

**Objective:** To compare success rates in trauma airway management in US emergency departments using indications and specialty performing the intubation.

**Methods:** This was a prospective observational study of 2,864 ED intubations in 21 major teaching hospitals recorded in the database during the second phase (August 1997 to October 1998) of the ongoing National Emergency Airway Registry (NEAR 97). Data included indication, method, specialty of person performing the intubation, first-pass rate, and "failed" or cricothyrotomy rate.

**Results:** Of the 2,864 intubations registered over this period, 1,303 were trauma

patients. Indications included airway, arrest, burn/inhalation, face/neck, head injury, combativeness, and shock. Indications by specialty were similar and are listed by total number/specialty percentage (Table).

By discipline, first-pass success rates were: Emergency Medicine 94.3%, anesthesia 85.7%, and surgery/other 71.3%. Number of "failed" airways going on to cricothyrotomy by indication were: general 5 (2.4%), face/neck 5 (2.4%), airway 3 (1.3%), head injury 2 (0.4%), shock (3.5%), arrest 1 (1.9%).

Conclusion: Emergency physicians had the highest success rate in trauma intubations of the specialties, with low "failed"/cricothyrotomy rate. Difficult airways were not selected to anesthesia or surgery.

**Table, abstract 52.**

Discipline	Airway No. (%)	General No. (%)	Head Injury No. (%)	Arrest No. (%)	Burn/ Inhalation No. (%)	Face/ neck No. (%)	Other No. (%)	Totals No. (%)
Anesthesia	12 (17)	19 (27)	18 (25)	0	5 (7)	11 (15)	6 (8)	71
Emergency	218 (19)	176 (15)	457 (39)	49 (4)	47 (4)	144 (12)	76 (7)	1,167
Pediatric	0	3 (30)	3 (30)	2 (20)	2 (20)	0	0	10
emergency medicine								
Surgery	4 (14)	5 (18)	8 (27)	0	3 (10)	8 (27)	1 (3)	29
<b>Total</b>	<b>237</b>	<b>208</b>	<b>495</b>	<b>54</b>	<b>58</b>	<b>156</b>	<b>85</b>	<b>1,303</b>
<b>intubations*</b>								

\*Includes other specialties.

## 53 Prehospital Storage Degrades the Physiological Effects of Epinephrine in Human Myocardium

Cairns CB, Cain BS, Honigman B, Bourn M, Heard K/Colorado Emergency Medicine Research Center, University of Colorado Health Sciences Center, Denver, CO

A recent study suggests that administration of epinephrine before countershock improves outcomes from out-of-hospital ventricular fibrillation. Yet, epinephrine is frequently stored in ambulances in conditions outside Food and Drug Administration recommendations for drug storage. Previous reports suggested that epinephrine could be degraded in these settings. The objective of this study was to determine whether physiologically important drug degradation occurs with ambulance storage in out-of-hospital environments.

Methods: Epinephrine storage forms of 1-mg/mL ampule, 1-mg/mL–30-mL multi-dose vial, and 0.1-mg/mL 10-mL injectable syringe were placed on emergency medical services (EMS) units for 6 months at 5 sites: EMS office (CNTL), 2 urban, and 2 rural locations. Data were combined for the 2 rural and urban sites. Temperature recordings were digitally recorded every 10 minutes with drug testing and temperatures analysis every 3 months. Epinephrine levels were assessed by high-performance liquid chromatography (HPLC). Biologic activity was assessed using the contractile response of human atrial trabeculae to 25- $\mu$ mol/L epinephrine samples.

Results: The mean kinetic and low-to-high temperatures for each site were as follows: CNTL (24.5°C; 18.4°C to 29.3°C), urban (23.6°C; –7.6°C to 38.6°C), and rural (20.8°C; 0.4°C to 40.2°C). At the baseline period, the HPLC-recorded levels corresponded with those reported by the manufacturer. Compared with CNTL, there was significant chemical degradation in multidose vial epinephrine at both urban (–14% $\pm$ 1% from baseline,  $P$ <.05 versus CNTL) and rural (–17% $\pm$ 1%,  $P$ <.05 versus CNTL) sites within 6 months. Compared with CNTL, both rural (–39% $\pm$ 8% from baseline,  $P$ <.05 versus CNTL) and urban sites (–33% $\pm$ 9%,  $P$ <.05 versus CNTL) resulted in reduced physiologic activity. Similar chemical and physiologic degradation occurred for both the ampule and syringe storage forms at the urban and rural sites.

Conclusion: (1) Within 6 months of out-of-hospital storage in a variety of settings, there is a significant chemical degradation of epinephrine. (2) This chemical degradation is accompanied by impaired human physiologic responses to epinephrine. (3) The degradation appears to be related to temperature extremes in EMS units. Given the critical role of epinephrine in ACLS, this degradation may influence clinical care outcomes in the out-of-hospital setting.

## 54 Sternal Intraosseous Infusion: Flow Rates and Utility

Tiffany BR, Horwood BT, Pollack CV Jr, Kurbat J, Adams J, Kharrazi R, Diethrich EB/Maricopa Medical Center, Arizona Heart Hospital, Phoenix, AZ

Study objective: Reliable, high-flow vascular access is arguably the single most valuable tool in the resuscitation of the acutely ill patient, but can be difficult to achieve quickly because of vascular collapse and other issues. Tibial intraosseous infusion (IOI) is a widely accepted and useful route of access in the pediatric population, but is not feasible in adults because of the thickness of the tibial cortex. The adult sternum is an appropriate site for IOI because of its relatively thin cortex and highly vascular marrow, and the Food and Drug Administration has recently approved a sternal IOI device, the FAST-1 (Pyng Medical Corp, Vancouver, BC). Because the ability to rapidly infuse large fluid volumes is crucial in hypovolemic shock, and it has proved difficult to get reliable estimates of flow rates in prehospital trials of the device, we undertook a study of the flow rates achieved with sternal IOI under controlled conditions.

Methods: Preoperative informed consent was obtained for patients undergoing their first median sternotomy. The sternal IOI device was inserted according to the manufacturer's directions after the patient was anesthetized but before the opening incision. Volume infused was measured by continuous intravenous bag weights (Shimpo digital force gauge, Kernco, El Paso, TX) and timed with a stopwatch. Flow was measured under gravity (1-m pressure head), pressure bag infusion (300 mm Hg), and syringe infusion using a 50-mL syringe. The device was removed before the opening incision, and the sternum was observed during the median sternotomy to identify the accuracy of device placement. "Real world" flow rates were obtained by using the device in nontraumatic cardiac arrest victims in the emergency department. Patients were eligible if they had either no conventional intravenous access, or their access was deemed inadequate. Time of insertion, gravity flow rates, drugs infused, and complications were all recorded by the inserting physician.

Results: Four of 5 FAST-1 insertion attempts made in patients undergoing median sternotomy were successful. Mean flow rates were 17.9 $\pm$ 9.1 mL/min gravity, 104.1 $\pm$ 46.5 mL/min pressure bag, and 232.5 $\pm$ 131.2 mL/min for the syringe infusion. In all cases, the insertion site was identified in the manubrium, and no extravasation was noted. Eight insertions were attempted in the ED, all of which were successful, with a mean insertion time of 54.3 $\pm$ 24.6 seconds, and an average recorded gravity rate of 34.6 $\pm$ 20 mL/min. All standard code drugs were infused successfully, and in one case a unit of packed red blood cells was infused over 6 minutes. Complications included kinking of the infusion tube (3), difficulty with device removal (3), and poor adhesion of the target patch (3).

Conclusion: Vascular access was achieved in 12 of 13 patients, with adequate flow rates to serve as the primary line for drug and fluid infusion during resuscitation. The FAST-1 appears to be a safe and effective means of gaining rapid intravenous access in cardiac arrest patients where conventional access is unsuccessful or too time-consuming.

## 55 The Role of On-Line Medical Control in Elderly Patients Who Initially Refuse Medical Transport

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Study objective: Patients who call 911 for emergency medical services (EMS) assistance may refuse medical transport (RMT). Although this occurs with some frequency, EMS systems may not require field providers to contact on-line medical control (OLMC) for physician oversight. The objective of this study is to determine the frequency of hospital transport, admission rates, and lengths of stay in elderly patients who initially RMT but subsequently are transported after contact with OLMC.

Methods: Consecutive field provider contacts with OLMC in a large urban EMS system were retrospectively reviewed from September 1, 1997, to January 31, 1998. OLMC contact was required for all patients 65 years and older who initially refused medical transport. Field providers recorded their assessment of the medical necessity for patient transport. Hospital follow-up including admission rate and length of stay (LOS) was obtained on those patients who were subsequently transported to area hospitals.

Results: OLMC was contacted for a total of 3,225 patients age 65 and older who initially refused medical transport. After OLMC contact, 474 of (14.7%) of 3,225 were transported, with a median age of 79 years (range 65 to 99 years), and 329 (69.4%) of 474 were female. Hospital follow-up was obtained on 394 (83.1%) of 474 of transported patients. The hospitalization rate was 147 (37.3%) of 394 with a mean LOS of 10 days (range 1 to 88 days) and median LOS of 6 days (interquartile range 4 to 11). Field provider opinion regarding the medical necessity for transport was available in 402 of 474 cases. Among the patients who were subsequently transported after OLMC intervention,



the field provider had indicated transport was not medically necessary for 167 (41.5%) of 402. Of these patients, 45 (26.9%) of 167 were hospitalized.

Conclusion: Contact with OLMC results in the transportation of 15% of elderly patients who initially RMT. In the absence of contact with OLMC, field providers may not be able to accurately identify patients with medical problems requiring hospitalization. This suggests a role for OLMC in increasing appropriate disposition decisions for elderly patients who initially RMT.

## 56 Do Warning Lights and Sirens Reduce Ambulance Response Times?

Brown LH, Hunt RC, Whitney CL, Hogue T, Addario M/State University of New York Health Science Center at Syracuse, Rural Metro Corporation, Syracuse, NY

Study objective: To determine whether response times for ambulances using lights and sirens (L&S) differ significantly from those of ambulances not using L&S in an urban emergency medical services (EMS) system.

Methods: This prospective study evaluated ambulance response times from the location at time of dispatch to the scene of an emergency. A control group of responses using L&S was compared with an experimental group that did not. An observer was assigned to record actual times for all L&S responses using a digital stopwatch. At a later date, an observer and off-duty paramedic in an identical ambulance retraced the route—at the same time of day on the same day of the week—without using L&S and again recorded the travel time using a digital stopwatch. The times for the 2 groups were compared using paired *t* test.

Results: Thirty-two responses were analyzed. Responses with L&S averaged 105.8 seconds (1 minute, 46 seconds) faster than those without (95% confidence interval 60.2 to 151.5 seconds, *P*=.0001). The time difference ranged from 425 seconds (7 minutes, 5 seconds) faster with L&S to 210 seconds (3 minutes, 30 seconds) slower with L&S.

Conclusion: In this urban EMS system, L&S reduce ambulance response times by an average of 1 minute and 46 seconds. This is a statistically significant time saving. The clinical relevance of these findings remains to be determined.

## 57 EMS Providers and Violence in the Field

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Study objective: Although many studies have investigated the issue of violence in the emergency department, few have addressed this problem in the prehospital setting. The purpose of this study was to evaluate the experience of emergency medical services (EMS) providers with violence in the field.

Methods: This was a descriptive, cross-sectional survey anonymously completed by EMS providers serving Eastern New England (NE) and Los Angeles (LA) areas between September 1996 and July 1997.

Results: Of 1,451 surveys distributed in NE, 1,236 (85%) were completed. Of 1,221 surveys distributed in LA, 988 (81%) were completed. Overall, 1,280 (57%) respondents served primarily urban areas, 727 (33%) suburban, and 217 (10%) rural. In NE, 1,005 (81%) respondents admitted being victims of verbal threats while working in the field, 368 (30%) were threatened with a weapon, 661 (53%) were physically attacked, 124 (10%) were attacked by a weapon, 477 (36%) always/usually report these incidences, and 211 (17%) entered violent scenes before police arrival. To protect their personal safety, 715 (59%) respondents from NE admitted having to compromise or delay patient care, and 165 (13%) admitted hitting a patient out of fear. Moreover, 145 (12%) providers in NE felt that the amount of violence encountered at work has caused them dreams/nightmares, and 325 (26%) felt that violence may shorten their professional longevity. In LA, 923 (93%) respondents admitted being victims of verbal threats while working in the field, 559 (56%) were threatened with a weapon, 557 (56%) were physically attacked, 178 (18%) were attacked by a weapon, 580 (59%) always/usually report these incidences, and 246 (25%) entered violent scenes before police arrival. To protect their personal safety, 875 (89%) respondents from LA admitted having to compromise or delay patient care, and 354 (36%) admitted hitting a patient out of fear. Moreover, 214 (22%) providers in LA felt that the amount of violence encountered at work has caused them dreams/nightmares, and 406 (41%) felt that violence may shorten their professional longevity.

Conclusion: In this study population, the majority of EMS providers both in LA and NE admitted having been threatened and/or attacked while working. These incidences were frequently not reported. Many providers have had to compromise their

personal safety and/or patient care because of violence. Field violence may adversely affect the EMS provider's personal and professional life.

## 58 Prehospital Administration of Reteplase in Patients With Acute Myocardial Infarction

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Previous studies have suggested that prehospital fibrinolysis may expedite treatment, preserve myocardial function, and reduce mortality in patients with acute myocardial infarction (AMI). Reteplase (rPA) was chosen because of its relative ease of administration (double bolus) and low incidence of dosing errors.

Objective: The aim of this study was to test the feasibility and timing of prehospital rPA administration in AMI patients, and to evaluate ST-segment elevation resolution up to 3 hours after field administration of rPA.

Methods: This multicenter, open, pilot trial enrolled 63 patients (39 male, 24 female; mean age 60.8 years) with diagnosed or suspected AMI, confirmed by persistent ST-segment elevation  $\geq 1$  mm in at least 2 of 3 contiguous leads. To be eligible for the study, patients were at least 18 years of age, gave informed consent, and were treated within 6 hours of onset of ischemic chest pain. On arrival, paramedics took patient history, conducted a physical examination, confirmed inclusion/exclusion criteria, and along with 12-lead ECG, transmitted information to the emergency department. On ED physician orders, patients received two 10-U intravenous bolus injections of rPA, given 30 minutes apart. Paramedics administered the first dose in the field. The second dose was administered in the field if 30 minutes elapsed during transport; otherwise it was given in the ED. The time sequence from onset of symptoms to administration of rPA was evaluated, and time to ST-segment resolution was measured by ECG. Twelve-lead ECGs were performed before treatment, at 5 minutes after the first bolus, 5 minutes after second bolus, and at 60 and 90 minutes and 3 hours after treatment.

Results: To date, we have evaluable data for 62 patients. Among these, the mean time from symptom onset to paramedic dispatch was 122.9 minutes. Mean times were 7.5 minutes from dispatch to arrival and 30.5 minutes from arrival to first bolus. For data in-house, resolution of ST-segment elevation occurred in 50 (79.4%) patients: in 4 (6.4%) patients 5 minutes after the first dose, in 3 (4.8%) patients 5 minutes after the second dose, in 14 (22.2%) patients 30 minutes after the second dose, in 7 (11.1%) patients 60 minutes after the second dose, in 3 (4.7%) patients 90 minutes after the second dose, and in 19 (30.2%) patients 3 hours after the second dose. After 30 days, 49 patients were alive, 6 had died (3 died in cardiogenic shock, which was a presenting symptom), and 8 were lost to follow-up. Ten serious adverse events were reported in 8 patients within 30 days. Of these, only one—a death caused by cerebral hemorrhage—was judged to be drug-related.

Conclusion: Field administration of rPA by paramedics is feasible. Its timely administration is effective in stopping or reversing AMI, as evidenced by high rates of ST-segment resolution. These early results suggest at least comparable or improved 30-day morbidity and mortality with prehospital thrombolysis compared with in-hospital thrombolysis.

## 59 Performance Analysis of Semiautomatic Defibrillators Used in the Out-of-Hospital Setting

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This was the first large-scale study reviewing defibrillator performance in the out-of-hospital setting.

Objective: To assess the performance of a semiautomatic external defibrillator (SAED) in detecting and defibrillating unstable cardiac rhythms (ventricular fibrillation [VF], ventricular tachycardia [VT]) in the out-of-hospital setting.

Methods: A retrospective review of SAED performance data was conducted for cardiac arrests occurring between January 1, 1995, and December 31, 1997. During that period, all Boston Emergency Medical Services (EMS) and Boston Fire Department staff used SAEDs to treat cardiac arrest. After every cardiac arrest, data regarding each rhythm analyzed and the subsequent response (to shock or not to shock) were downloaded from the SAED memory module for quality assurance purposes. Both the study paramedic and a single study physician independently reviewed each case and interpreted the cardiac rhythms from the downloaded SAED data. A group of emergency physicians independently resolved any discrepancies in rhythm interpretation. All cases of out-of-hospital cardiac arrest in which an SAED was turned on and a rhythm

analysis occurred were included. The primary endpoint was the correct identification and automatic defibrillation of VF or VT. This endpoint was chosen because it was the most reliable indicator of the SAED's ability to properly manage an unstable cardiac rhythm. Sensitivity, specificity, predictive values, and accuracy with 95% confidence intervals (CIs) were calculated. Interobserver reliability was computed using  $\kappa$  statistics to compare the paramedic and physician interpretations to the consensus rhythm determination.

Results: During the study period, 1,078 cardiac arrests with 3,448 rhythms were interpreted by the SAED. Sensitivity and specificity for appropriate management of a shockable (VF or VT) rhythm by the SAED were 81.02% (95% CI 79.71% to 82.33%) and 99.93% (95% CI 99.84% to 100%), respectively. Positive and negative predictive values were 99.64% (95% CI 99.44% to 99.84%) and 95.50% (95% CI 94.81% to 96.19%), respectively. The accuracy was 96.17% (95% CI 95.53% to 96.81%). Interobserver reliabilities, when compared with consensus rhythm interpretation, were 0.876 (paramedic) and 0.988 (physician).

Conclusion: The SAED had high specificity but only moderately high sensitivity in detecting and defibrillating unstable cardiac rhythms in the out-of-hospital setting. Further study is under way to identify how sensitivity can be improved.

## 60 Time to Recurrent Ventricular Tachycardia or Ventricular Fibrillation After Defibrillation

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Study objectives: Early defibrillation is the cornerstone of prehospital treatment of ventricular fibrillation and pulseless ventricular tachycardia (VF/VT). Current American Heart Association protocols recommend immediate rhythm analysis following defibrillation by semiautomated external defibrillators (SAEDs), with no delay for even a pulse check. If SAED analysis recommends "no shock indicated" after the 5- to 15-second analysis period, personnel proceed to intubation or cardiopulmonary resuscitation, delaying further analysis and defibrillation by 1 to 3 minutes. No study to date has determined the optimal timing of rhythm analysis after defibrillation, given that patients will often show electrical silence or marginally organized electrical activity in the period immediately following defibrillation. The present study looks at the time to recurrent VT/VF after defibrillation in the prehospital setting.

Methods: This is a retrospective analysis of all available rhythm strips from prehospital resuscitation attempts where VF/VT recurred within 3 minutes of defibrillation. A single urban emergency medical services system for a population of 600,000 provided all cases. Two blinded cardiology fellows measured the time to recurrent VF/VT after each defibrillation.

Results: Over the 18-month study period, 223 tapes met the inclusion criteria. Sixteen percent of VF/VT recurred by 5 seconds after defibrillation, 50% by 30.5 seconds, and 75% by 61 seconds.

Conclusion: Eighty-four percent of VF/VT recurred more than 5 seconds after defibrillation and were therefore missed when using current SAED protocols. Prehospital SAED protocols may need to be redesigned taking into account these results.

## 61 Ultrasound Detection of Blunt Hepatic Trauma: Hemoperitoneum and Parenchymal Patterns of Injury

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Study objectives: To determine the accuracy of emergency ultrasound (US) for the detection of blunt hepatic injury (BHI) in patients with abdominal trauma, and to describe parenchymal sonographic patterns of BHI.

Methods: This was a prospective clinical study in which the findings of all patients who had emergency US were recorded on a data sheet by the initial sonographer and interpreting physicians. All patients with hepatic injuries during this period were identified and physical examination, laboratory, computed tomography (CT), and intraoperative findings were compared with the prospective data sheets.

Results: From January 1995 to December 1998, 2,622 emergency US were performed, and in this group a total of 146 patients had BHI. Emergency US detected free fluid in 98 (67%) patients, and parenchymal injury with no free fluid in 7 (5%) patients. There were 41 false-negative results (28%). The most common pattern identified on US was a discrete area of increased echogenicity followed by a diffuse hyperechoic pattern. Seventy-six (52%) patients had concomitant intraabdominal injuries, including spleen (n=46), bowel (n=30), and kidney (n=19). There were 102 exploratory laparotomies performed. Abdominal tenderness or distention was present in 127 patients (87%), and

108 patients had right rib fractures (74%). Based on detection of free fluid and/or parenchymal injury, overall sensitivity of US for the detection of BHI was 72%, but was 98% for grade III or higher injuries.

Conclusion: Emergency US is sensitive for the detection of grade III or higher liver injuries resulting from blunt abdominal trauma. US may also identify BHI on the basis of parenchymal abnormality, with a discrete hyperechoic area the most commonly encountered pattern.

## 62 Serologic Markers in the Evaluation of the Acute Scrotum: An Evaluation of Clinical Utility

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Interleukin-1 (IL-1) and IL-6 have been shown to be elevated in epididymitis (EDM), and the creatine phosphokinase MM subunit (CPK-MM) in testicular torsion (TT) in animal models.

Study objectives: To assess the ability of serologic markers to discriminate between TT and EDM.

Methods: This was a prospective cohort study of patients presenting to the emergency department with acute scrotal pain. TT was confirmed on surgical exploration. EDM was diagnosed by urinalysis, CBC count, and ultrasound. Serum was evaluated for IL-1, IL-6, and CPK-MM levels. There were no cases of missed TT.

Results: Twenty-five patients, 11 with TT and 14 with EDM, were enrolled. The mean age was 19.6±8.0 years and 35.3±17 years in the TT and EDM groups, respectively ( $P=.02$ ). IL-1 was not detectable in either group. Mean CPK-MM was not significantly different in TT and EDM ( $P=.21$ ). Mean IL-6 was significantly elevated in EDM, 23.9 pg/mL compared with TT, 7.4 pg/mL ( $P=.02$ ). Receiver operating characteristic curves for IL-6 were 0.82 for ED and 0.67 for TT. At a cutoff value of IL-6 >1.41 pg/mL, the positive predictive value of IL-6 in diagnosing EDM was 78.6% and the negative predictive value was 100%. The sensitivity and specificity were 100% and 62.5%.

Conclusion: IL-6 is significantly elevated in EDM compared with TT. In contrast to previous studies, CPK-MM and IL-1 levels were not found to be of diagnostic utility. IL-6 is useful in differentiating acute scrotal pain in the ED.

## 63 The Utstein Template and the Effect of In-Hospital Decisions: The Impact of Do-Not-Resuscitate Status on Survival to Discharge Statistics

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Study objective: Variables for reporting outcome of prehospital cardiac arrest have been delineated in the Utstein Style template. The primary outcome statistic is survival to hospital discharge (SHD). The template allows comparisons of prehospital care systems and has been used to determine the benefit of prehospital interventions.

However, in-hospital events that affect SHD are not considered in the template. The purpose of this study was to determine the frequency and timing with which do-not-resuscitate (DNR) status is conferred following resuscitation from prehospital cardiac arrest and to assess the impact of this action on SHD.

Methods: This was a 4-year retrospective descriptive review of all adult patients (age >18 years) successfully resuscitated from nontraumatic prehospital cardiac arrest and admitted to a single municipal teaching hospital (ED census 85,000 per year). Study variables included age, witnessed arrest, bystander cardiopulmonary resuscitation, initial rhythm documented by paramedics, hospital admission rate, frequency and time at which DNR status was conferred, and SHD rate.

Results: Three hundred seventy adult patients experienced prehospital arrest and received standard Advanced Cardiac Life Support (ACLS) interventions during the study period. Seventy-six patients (21%, 95% confidence interval [CI] 17% to 25%) survived to be admitted to the hospital. Fifty-one of these patients (67%, 95% CI 55% to 77%) were subsequently placed in DNR status. Only one of these patients had a living will or advanced directive. In 37 DNR patients (73%, 95% CI 58% to 84%), DNR status was conferred within 24 hours of hospital admission. For patients made DNR within 24 hrs of admission, 38% had a witnessed arrest, 22% had ventricular fibrillation as the first documented arrest rhythm, and 29% received bystander cardiopulmonary resuscitation. When patients made DNR are included in the calculation of SHD rate, the SHD rate for the study period was 5.9% (95% CI 3.8% to 8.9%). If excluded, the SHD was 7.8% (95% CI 5.1% to 11.3%), representing a 30% increase in SHD rate.

Conclusion: In-hospital care and medical decisionmaking are not considered in the Utstein template and can have a significant effect on reported survival statistics. When

assessing the benefit of prehospital interventions, it may be preferable to consider survival to hospital admission as the primary outcome statistic until postresuscitation care is standardized.

## 64 Lactic Acid Clearance in the Emergency Department Prognosticates Multisystem Organ Failure and Death

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Lactic acid (LA) indicates anaerobic metabolism (global tissue hypoxia). Although single LA levels are helpful diagnostically and therapeutically, persistent elevation in LA levels over time (lactate clearance) has better prognostic value in predicting multisystem organ failure (morbidity) and death in the ICU.

**Study objective:** To examine the relationship of Lactate in the ED and the development of multisystem organ failure and death.

**Methods:** This was a prospective case series of critically ill patients presenting to a large urban emergency department in shock (systolic blood pressure <90 mm Hg for 30 minutes after a 40-mL/kg volume challenge) or an LA level >2 mmol/L on arrival. Patients presenting in hemorrhagic shock, trauma, requiring immediate surgery, those with do-not-resuscitate orders, seizures, or end-stage disease not benefiting from ICU care were excluded. Patients were managed by emergency physicians by standard ED management. LA and Multisystem organ dysfunction Scores (MODS) were obtained on ED arrival, at discharge, and every 12 hours for 72 hours. Patients were grouped by the LA clearance during the ED stay: group 1 (no clearance, <0 mmol/L per hour, actual increase in LA), group 2 (intermediate clearance, >0 and <1 mmol/L per hour), and group 3 (high clearance, >1 mmol/L per hour). Student's *t* test and analysis of variance were used to compare the MODS score and LA over time, with Bonferroni correction for multiple comparisons.

**Results:** A total of 142 patients were studied. The mean age was 65.9±17.2 years. The LA clearances for groups 1, 2, and 3 were -0.45±0.55, 0.48±0.48, and 1.44±0.38 mmol/L per hour, respectively (*P*<.0001). The mean MODS scores over 72 hours were 8.63±3.35, 6.16±4.23, 5.12±3.76 for groups 1, 2, and 3, respectively (*P*<.02). The in-hospital mortality was 50%, 23%, and 12% in groups 1, 2, and 3, respectively (*P*<.045).

**Conclusion:** The duration of global tissue hypoxia or decreased LA clearance in the ED is associated with MSOF and death. This pathogenic link suggests that diagnostic and therapeutic intervention should begin immediately in the ED.

## 65 An Effective Educational Program to Decrease Antibiotic Use for Acute Bronchitis

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**Study objectives:** Patients with acute bronchitis commonly present to the emergency department requesting medical treatment. Overuse of antibiotics promotes the spread of antibiotic-resistant organisms. Many emergency physicians prescribe antibiotics for upper respiratory tract illnesses when they are not indicated. The purpose of this study was to determine the effectiveness of a program designed to educate emergency physicians about appropriate treatment regimens for acute bronchitis.

**Methods:** The design of the study was a retrospective chart review conducted to determine the frequency of various treatment modalities for 2 separate cohorts of adult ED patients. Patients were included if they presented to the ED with cough, symptoms of respiratory infection, a negative chest radiograph for pneumonia, and no other conditions requiring antibiotics, such as otitis media, streptococcal pharyngitis, acute sinusitis, or pneumonia. Data obtained from patient charts included comorbid illnesses, physical examination findings, discharge diagnoses, and discharge instructions including medications prescribed. After a baseline data collection, emergency physicians were educated regarding the diagnosis and appropriate treatment of acute bronchitis. Emergency physicians received a didactic presentation (15 minutes), a handout, a laminated card describing appropriate treatment strategies for acute bronchitis, and a pretest and posttest documenting their understanding of treatment for acute bronchitis. The use of antibiotics and other modalities was compared using a *Z* test.

**Results:** In December 1996, before education efforts, 129 consecutive patients were identified meeting these criteria. After a period of physician education, 120 additional consecutive patients were identified in December 1998. Antibiotic use decreased from 60.5% to 30.8% (*P*<.001) after the educational program. Treatment with appropriate alternatives to antibiotics increased for bronchodilators (27.9% versus 43.3%, *P*=.01), cough suppressants (17.8% versus 24.2%, *P*=.2), and decongestants (9.3% versus 13.3%, *P*=.3).

**Conclusion:** Inappropriate use of antibiotics for acute bronchitis decreased significantly

after physicians were provided an educational program dealing with the treatment of acute bronchitis in the ED. The appropriate use of alternatives to antibiotics increased during the study period. The use of antibiotics for acute bronchitis after the educational program was less than in previous studies reported in the literature. These results suggest that an educational program for emergency physicians can be an effective mechanism to decrease the use of antibiotics for acute bronchitis and increase appropriate treatment alternatives such as bronchodilators. Further studies are ongoing to determine the effects on patient outcomes and the duration of these prescribing patterns.

## 66 The Epidemiology of Animal Exposures Presenting to Emergency Departments: Adults Versus Pediatrics

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**Study objective:** To use a new Centers for Disease Control and Prevention (CDC) collaborative network of emergency departments to describe the epidemiology of animal exposures and to compare adult and pediatric cases.

**Methods:** Data were collected prospectively at 11 university-affiliated, geographically diverse, urban US EDs (EMERGENCY ID Net) from July 1996 to September 1998. Patients with a presenting complaint related to exposure to a mammal by bite, scratch, body fluid exposure, handling, or proximity were enrolled in the study. Data collected included demographic, animal and exposure type, location and circumstances, animal behavior, wound characteristics, and treatment.

**Results:** Of 2,037 animal contacts, 1,639 (80.5%) were due to dogs, 268 (13.2%) cats, 90 (4.4%) rodents, 18 (0.9%) raccoons and wild carnivores, 5 (0.2%) bats, and 17 (0.8%) livestock and monkeys. Six hundred ninety-five (34.1%) of the total contacts occurred in children; their injuries more often than those in adults resulted from dogs (88.8% versus 76.2%, odds ratio [OR] 2.50, 95% confidence interval [CI] 1.89 to 3.22). Children seen in the EDs were also more likely than older persons to be wounded on the face, neck, and head (38.3% versus 8.6%, OR 6.55, 95% CI 5.08 to 8.45); 61.4% of these wounds were subcutaneous lacerations or punctures; 12.5% were deep lacerations or punctures. For all wound sites, adults were more likely than children to have a laceration or puncture than no wound or a superficial wound (70.9% versus 64.7%, OR 1.33, CI 1.09 to 1.69) and had a higher proportion of deep wounds (14.2% vs. 10.2%, OR 1.34, CI 0.98 to 1.83) than children. Two hundred ninety-three (42.2%) of the pediatric injuries occurred in a yard, 193 (27.8%) inside a home, and 138 (19.8%) on a public street or park; adult injuries were 370 (27.6%), 346 (25.8%), and 406 (30.2%), respectively. The majority of pediatric incidents in the home occurred while the child was playing or feeding the animal (51.1%); 34.4% of incidents in the yard occurred while playing or feeding the animal. Children were more likely to be playing with the animal than adults at the time of the incident (31.7% versus 14.9%, OR 2.66, CI 2.12 to 3.34); 87 (29.7%) of yard animal contacts resulted from the child entering an animal's territory; 38 (13%) attacks were without any provocation apparent to the family. Thirteen (4.4%) of the children were breaking up an animal fight; 7 were 5 years old or younger. Of all adult contacts, interference with fighting animals accounted for 166 (12.4%) of the circumstances including 3 of 10 contacts with raccoons.

**Conclusion:** Animal exposures are an important source of injury in the ED.

Effective education programs for parents and their children regarding household pets, as well as enforcement of leash laws, are needed to prevent these exposures.

## 67 Clinical Effects of Combined Anti-H<sub>1</sub> and Anti-H<sub>2</sub> Treatment in Patients Presenting With Acute Allergic Syndromes: A Randomized Controlled Trial

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**Study objective:** Adding anti-H<sub>2</sub> receptor blockade to anti-H<sub>1</sub>-receptor blockers has been shown to be useful in reducing the incidence and severity of allergic reactions when given before anesthetic drug and radiocontrast material administration. This strategy, however, has never been shown in controlled studies, to be more efficacious than anti-H<sub>1</sub> treatment alone, in patients with ongoing allergic reactions. In this study, we tested the hypothesis that adding parenteral ranitidine improves clinical parameters and symptoms more than diphenhydramine alone in adults with acute allergic syndromes.

**Methods:** In a randomized, double-blind, placebo-controlled trial, adults with acute allergic syndromes related to food ingestion and/or drug administration (urticaria, ery-

thema, or angioedema with or without other symptoms) were studied over a 1-year period at an urban emergency department. Patients were treated with either 50 mg IV of ranitidine or normal saline (placebo) as well as with 50 mg of diphenhydramine. Primary endpoints were changes in dermal manifestations, heart rate, blood pressure, and symptom scores. These parameters were assessed at baseline and at 1 and 2 hours.

Results: The ranitidine group had significantly fewer urticaria lesions at 2 hours compared with the placebo-treated patients. Five of 49 ranitidine-treated patients had urticaria lesions at 2 hours compared with the 10 of 43 placebo-treated patients. At baseline, urticarial lesions were observed in 26 ranitidine-treated patients and 22 saline-treated patients. Regression models, adjusted for the baseline number of body areas involved with urticaria and for steroid with or without epinephrine administration, showed a significant association between ranitidine administration and having either less or no urticaria at posttreatment times. There was a trend toward a treatment by time effect ( $P=.08$ ), with a lower heart rate at 1 and 2 hours (means 75.6 and 75.6, respectively) relative to baseline (mean 85.6) for the ranitidine group. The baseline, 1-, and 2-hour mean heart rates for the placebo group were 86, 82.1, and 79, respectively. The ranitidine treatment by time effect was significant ( $P<.05$ ), when the effects of epinephrine with or without steroid administration were accounted for. No significant differences in angioedema, erythema, symptoms, or blood pressure were observed for the 2 groups.

Conclusion: These data demonstrate that adding an  $H_2$ -receptor blocker to an anti- $H_1$ -receptor blocker improves certain outcomes in patients with acute allergic syndromes. Future studies should examine further which subsets of patients respond optimally to combined  $H_1$ - and  $H_2$ -receptor blockade.

## 68 The Efficacy of Cyanoacrylate-Derived Surgical Adhesive for Use in the Repair of Lacerations During Competitive Athletics

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Study objectives: Cyanoacrylate derivatives have been used as surgical adhesives for many years outside the United States. Octylcyanoacrylate (Dermabond, Ethicon Inc, Summerville, NJ) has recently been approved by the Food and Drug Administration (FDA) in the United States for laceration closure. Numerous studies have demonstrated the utility of surgical adhesive in simple lacerations and have shown it to be as good or better than standard suture closure for speed of application, patient preference, and both short- and long-term cosmesis. Additionally, no difference in the rate of dehiscence or infection between standard suture repair and surgical adhesive has been shown. We sought to determine the utility of such a product in competitive sports. Specifically, does the product retain its tensile strength, durability, and skin apposition when the injured athlete is allowed to reenter competition following repair, where it could be subject to recurrent stress, moisture, and trauma? We felt that this information would be useful both to physicians who engage in athletic event coverage, and emergency physicians who treat patients with unsure follow-up after emergency department wound repair.

Methods: This observational study was carried out at 2 professional hockey sites where the authors serve as team physicians. Wounds meeting criteria for use were repaired with Dermabond surgical adhesive. Lacerations on the eyelids, lips, feet, perineum, those greater than 6 cm in length, those with tissue loss, and those involving tendon, muscle, or open bone injuries, and lacerations across joints were all excluded, as per FDA indications. Wounds were anesthetized with lidocaine (if needed), irrigated, and debrided. If deeper tissues required approximation, this was done with absorbable suture. The skin was then closed with Dermabond. The adhesive was applied in 3 layers with 30 seconds between each layer to allow for drying, the wound held for 60 seconds, and then a dry dressing applied. The athlete was allowed to immediately return to competition. All wounds were examined at the conclusion of the competition to search for dehiscence, malalignment, or wound breakdown. All wounds were again examined at 7 days. Primary variables recorded were size and location of laceration, and end-of-game and 7-day follow-up wound appearance.

Results: A total of 32 lacerations on 28 players were closed according to protocol. Forty-five lacerations were excluded because they did not meet study requirements, and were closed with a standard suture repair. The mean size of laceration was 2.3 cm (range 0.8 cm to 4.5 cm). The vast majority (95%) of wounds were on the face. Of the 32 lacerations, 31 (97.6%) were deemed to have good results at the conclusion of the game, with one resulting in partial dehiscence. Of the 31 others, all were found to have good results at 7 days after repair.

Conclusion: With proper wound selection, we found that Dermabond surgical adhesive retained its tensile strength, durability, and skin apposition when the injured athlete was allowed to reenter competition following wound repair. In our study

population of professional hockey players, we had 1 instance of minor wound dehiscence following return to play. In both sports medicine and emergency medicine, where proper wound care following repair cannot be assured, we conclude that Dermabond is an effective treatment for superficial lacerations.

## 69 Validity of Urgency of the Emergency Department Visit in the National Hospital Ambulatory Medical Care Survey, 1994 (NHAMCS '94)

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Study objectives: Urgency of the emergency department visit is a useful concept in triage. Policymakers and payers have used urgency to determine appropriateness of the ED visit. However, determination of urgency has been shown to be unreliable, and validity of urgency has not been established. In this study, the National Hospital Ambulatory Medical Care Survey (NHAMCS '94) was used to determine whether categorization of ED visit urgency by hospital staff could be validated by its association with tests, treatments, procedures, and disposition rendered.

Methods: The NHAMCS '94 is a 4-stage probability sample of US ED visits from 1994 ( $N=26,547$ ) and contains information on demographic characteristics of patients, expected source of payment, visit characteristics (eg, reasons for visit, discharge diagnoses, procedures performed, tests and treatments given, and disposition), and hospital characteristics). Up to 3 reasons for visit, 3 diagnoses, 3 procedures not otherwise specified (NOS), 3 diagnostic tests NOS, and 5 prescriptions were listed. These were summed to create variables representing the total number of reasons for visit, diagnoses, procedures NOS, tests NOS, and prescriptions. Associations between urgency and the following variables were examined using  $\chi^2$ : injury, reasons for visit, diagnoses, number of medications, ECG, chest radiograph, extremity radiograph, other imaging, endotracheal intubation, cardiopulmonary resuscitation, wound care, orthopedic care, intravenous fluids, admission, transfer, death, and number of prescriptions. Variables significantly associated with urgency were entered into a logistic regression model, with urgency as the outcome. The least significant variable was serially removed until all remaining variables were significant ( $P<.05$ ). Model fit was examined by the Hosmer-Lemeshow goodness of fit test. Total variance explained by the model was examined by summing the squares of the correlation coefficients between urgency and each variable in the final model.

Results: The following variables were retained in the final model (independent odds ratio [OR], 95% confidence interval [CI]): death (10.7, 4.80 to 23.8), admission (4.20, 3.78 to 4.68), transfer (3.14, 2.54 to 3.89), ECG (1.92, 1.73 to 2.13), any procedure (1.61, 1.51 to 1.69), chest radiograph (1.39, 1.27 to 1.51), intravenous fluids (1.38, 1.24 to 1.53), any test (1.37, 1.25 to 1.47), other imaging (1.27, 1.17 to 1.37), other test NOS (1.17, 1.09 to 1.25), and any medication (1.12, 1.05 to 1.19). The goodness of fit was significant ( $P<.0001$ ). The model correctly classified 65.8% of the cases. However, the model accounted for less than 4% of the total variance in urgency.

Conclusion: Using this model, urgency as defined in the NHAMCS '94 is not sufficiently valid for application. Better categorization of urgency is needed for clinicians, policymakers, and payers. To be truly useful, the categorization should be based on prospectively available information.

## 70 Rapid Process Redesign in a University-Based Emergency Department: Decreasing Waiting Time Intervals and Improving Patient Satisfaction

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Study objectives: Inefficiency and long waits have traditionally been associated with many academic emergency departments. We present a major effort to reduce waiting time intervals at a university-based ED, conceived as a joint effort between the hospital and the academic section of emergency medicine.

Methods: Using a process improvement team approach, all aspects of ED patient flow were evaluated and redesigned. Changes included triage, registration, ancillary departments, emergency medicine resident physician and nonphysician staffing. Time data included triage, registration, room arrival, and disposition. The process and staffing changes were implemented over a 2-month period (May and June 1998). A validated tool was used to identify changes in patient satisfaction.

Results: Data were from January 1 through December 31, 1998 (Table). Major decreases in patients who left without being seen by a physician were noted: January 1998: 250; May 1998: 181; July 1998: 60; December 1998: 21. Dramatic improvement was noted in patient satisfaction comparing April with July: waiting time "poor" response decreased by 65% ( $P<.0001$ ) and "excellent" increased by 69% ( $P<.001$ ). Patients who would "definitely



not" recommend the ED decreased by 74% ( $P<.0001$ ), and those who "definitely would" recommend the ED increased by 65% ( $P<.0001$ ).

Conclusion: Rapid process redesign is possible in an urban, university-based ED with dramatic decreases in waiting time intervals and improvement in patient satisfaction. Major support from top-level hospital administrators and physician leadership in operational, staffing, and budgetary decisionmaking were fundamental prerequisites for success.

**Table, abstract 70.**

Interval	January 1998	May 1998	July 1998	December 1998
<b>ED time intervals (h:min)</b>				
Triage to room (mean/median)	0:57/0:31	0:43/0:22	0:19/0:03	0:10/0:03
Throughput interval (mean/median)	4:40/4:21	4:15/3:52	3:42/3:19	3:18/2:55
<b>Urgent care time intervals (h:min)</b>				
Triage to room (mean/median)	1:06/0:52	1:49/0:38	0:20/0:08	0:14/0:05
Throughput interval (mean/median)	2:17/2:08	1:56/1:44	1:26/1:11	1:19/1:08

## 71 8,874 Critical Decision Unit Admissions: What Are Appropriate Admission and Discharge Rates?

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Clinical decision units (CDUs) have become popular extensions of one third to one half of emergency departments in the United States. These units provide focused and aggressive diagnostic and therapeutic care with the potential for resolution within 12 to 24 hours of ED presentation. Despite aggressive care, the medical literature reports that 10% to 40% of CDU patients will still require hospital admission.

Study objectives: To determine hospital admission (HA) and CDU discharge (DC) rates for the most commonly identified CDU diagnoses and compare with established norms.

Methods: Retrospective observational study using a database of 8,874 CDU admissions at an urban tertiary care hospital occurring between 1996 and 1998. The most commonly used CDU pathways were identified, and HA/DC rates calculated for each. Fisher's exact test was used to determine differences in HA rates.

Results: A total of 7,531 patients (85%) used the 12 most frequent CDU pathways. Disposition data were available for 7,509 (99%). Overall, 26% of patients required HA. Individual HA varied from 22% to 57% as shown in the Table. Sickle cell HA rate was different from all others ( $P<.01$ ). Admission for chronic obstructive pulmonary disease was different from all others except congestive heart failure and pneumonia ( $P<.01$ ). No difference was noted in the HAs of patients with chest pain, dehydration, gastrointestinal bleeding, cellulitis, and pyelonephritis ( $P>.05$ ).

Conclusion: Our overall CDU HA rate of 26% is comparable with currently reported rates, but wide variation exists among protocols. Higher HA rates are seen in pathways involving therapy of chronic diseases; lower HA rates are noted in pathways focused on simplistic therapy and accumulation of data for diagnostic purposes. Ideal HA/DC rates for individual diagnoses are not well studied, especially with regard to cost, patient satisfaction, and CDU effectiveness. Prospective trials to determine optimal CDU management strategies are needed.

**Table, abstract 71.**

	Chest Pain	GI Bleed- ing	Cellu- litis	Asth- ma	Pye- lone- phritis	Abdom- inal Pain	Pneu- monia	COPD	SCA Pain Crisis
<b>Hospital admission</b>									
No.	97	714	70	87	356	59	121	97	104
%	22.7	24.2	26.8	26.6	26.9	30.1	29.7	34.6	43.5
<b>Discharge</b>									
No.	320	2197	185	237	926	135	280	175	149
%	74.9	74.5	70.9	72.5	70.1	68.9	68.8	62.5	56.0

**Dehyd.** Dehydration; **GI**, gastrointestinal; **CHF**, congestive heart failure; **COPD**, chronic obstructive pulmonary disease; **SCA**, sickle cell anemia.

## 72 Urgency, Demographics, Payer, and Location in the Emergency Department: The National Hospital Ambulatory Medical Care Survey, 1994 (NHAMCS '94)

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Study objectives: Urgency of the emergency department visit is a concept that has been used to imply inappropriate utilization. It is likely, however, that populations with poor financial and physical access to health care and higher disease burdens use the ED because of these characteristics. Such utilization might strictly be considered clinically inappropriate, but may be pragmatically appropriate from the patient's perspective. The National Hospital Ambulatory Medical Care Survey 1994 (NHAMCS '94) was used to determine whether patient demographics (PD), expected source of payment (ESP), visit characteristics (VC), and hospital characteristics (HC) are associated with urgency as defined by hospital staff at the time of the ED visit.

Methods: The NHAMCS '94 is a 4-stage probability sample of US ED visits from 1994 ( $N=26,547$ ) and contains information on PD, ESP, VC (eg, reasons for visit, discharge diagnoses, procedures performed, tests and treatments given, and disposition), and HC. Up to 3 reasons for the visit and 3 diagnoses were listed. These were summed to create variables representing the total number of reasons for visit (#REAS) and total number of diagnoses (#DX). Age was recorded as <18 years, 18 to 34 years, 35 to 64 years, and >64 years. Associations between urgency and the following variables were examined using Pearson's  $\chi^2$ : age, gender, race (white or nonwhite), ESP (commercial/private, Medicare, Medicaid, health maintenance organization, patient paid), #REAS, #DX, whether visit is alcohol/drug-related, US region (northeast, Midwest, south, west), metropolitan location, and hospital ownership. Variables significantly associated with urgency were entered into a logistic regression model, with urgency as the outcome variable. The least significant variable was serially removed until all remaining variables were significant ( $P<.05$ ). Independent associations between urgency and the variables of interest are given as odds ratios (OR) with 95% confidence intervals (CI).

Results: The following variables were retained in the final model (independent OR, 95% CI): age >64 years (2.08, 1.85 to 2.33), alcohol/drug-related problem (1.83, 1.62 to 2.07), northeast US region (1.58, 1.46 to 1.70), >1 diagnosis (1.27, 1.20 to 1.33), Medicare (1.22, 1.09 to 1.36), voluntary hospital (1.18, 1.11 to 1.23), male gender (1.12, 1.06 to 1.18), Midwest US region (1.12, 1.04 to 1.19), south US region (1.11, 1.04 to 1.19), white race (1.10, 1.03 to 1.16), Medicaid (1.10, 1.03 to 1.16), and >1 reason for visit (1.07, 1.02 to 1.13). The final model accounted for less than 2% of urgency.

Conclusion: Patient demographic characteristics, source of payment, US region, and markers of morbidity were independently associated with urgency of the ED visit in this study. There is a large component of urgency (as defined) that is not anticipated by this model. Those wishing to assist patients in accessing needed health care should consider these and other unidentified variables that are associated with nonurgent ED use.

## 73 The Implementation of a Forward-Rotating Template Schedule and the Effects Upon Physician Wellness

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Study objectives: Physician scheduling is of paramount importance to emergency physicians. Twenty-four-hour coverage and the realities of shift work have been identified as the leading cause of physician burnout and attrition. In this study, a physician wellness assessment test specifically designed for emergency physicians was administered at a medical university hospital before a physiologically optimal schedule, and again after 6 months of the new template.

Methods: A wellness assessment survey designed with the assistance of the Department of Psychiatry was completed anonymously by staff physicians. The survey consisted of 20 questions that respondents completed using a 1 to 5 scale, 1 meaning strong yes, and 5 meaning strong no. The questions addressed issues of job satisfaction, sleep behavior, depressive symptoms, and activities outside of work. Thirteen of 17 full-time physicians responded to the initial assessment and 13 of 17 to the postimplementation survey. It is unknown if responders represent the same participants. The original schedule was a freehand type that had been constructed on a monthly basis using 8-, 10-, and 12-hour shifts and which provided for 16 hours of double coverage. In this format, overnights were generally blocked together for the month (3 to 5 in a row), and shifts were not necessarily forward rotating. The template schedule was based in prior literature and conformed to the American College of Emergency Physicians policy statement issued in 1994. This included clockwise forward rotation of shifts, isolated night shifts, and the elimination of 10- and 12-hour shifts. For exam-

ple, a typical cycle would progress as follows: 7 AM to 3 PM, 3 PM to 11 PM, 6 PM to 2 AM, 11 PM to 7 AM; 4 days off; then 7 AM to 3 PM, 10 AM to 6 PM, 3 PM to 11 PM, 11 PM to 7 AM). No other major changes took place over this time period that would seem to affect physician assessment of wellness.

Results: Postimplementation wellness scores for the group were compared with the preimplementation scores using a single-tailed *t* test and an  $\alpha$  of  $P < .05$ . A significant improvement in overall wellness was noted by these standards. Only 1 of the 20 questions had a less well score on the posttemplate survey, and this difference did not attain statistical significance. Five questions independently showed significant improvement in wellness regarding improved sleep habits and more positive work attitudes. Of interest, the majority of the group opposed the template before its commencement; however, after 6 months this view had altered significantly ( $P < .05$ ).

Conclusion: Scheduling and wellness issues are of primary importance to the specialty of emergency medicine. This study indicates that overall wellness may be improved by a physiologically friendly schedule even if this is not recognized by physicians before implementation.

## 74 Female Faculty Salaries and Work Hours: Results From the 1998-1999 SAEM Faculty Salary Survey

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Study objective: The Society for Academic Emergency Medicine (SAEM) commissioned an Emergency Medicine Faculty Salary and Benefit Survey for all 1998 Residency Review Committee—Emergency Medicine (RRC-EM) accredited programs using the SAEM fourth-generation survey instrument. Responses were collected by SAEM and blinded from the investigators.

Seventy-one of 120 (59%) accredited programs responded yielding data on 965 full-time faculty among the 4 American Association of Medical Colleges regions.

Methods: Blinded program and individual faculty data were entered into a customized version of Filemaker Pro, a relational database program with a built-in statistical package. Program data were evaluated with regard to gender-specific salaries and work-hours by years of service.

Conclusion: Female faculty at RRC-EM accredited programs earn, in aggregate, ~14.23% less than their male counterparts while working ~7.57% fewer hours. Differences in salaries increase with increasing years of service. Total work hours for men rise with progressive years of service, whereas total work hours for women decrease. Dollars per hour worked increases at a similar rate for both men and women with progressive years of service.

## 75 Physical Diagnosis in the Emergency Department: An Innovative Educational Program for Medical Students

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Study objectives: Physical diagnosis (PD) is one of the most important skills acquired in medical school. Recent studies document a deficiency in the PD skills of practicing physicians. The purpose of this study was to quantify medical students' ability to distinguish between normal and abnormal physical examination findings and to test a novel PD curriculum for second-year students.

Methods: A randomized controlled trial was conducted within a university, tertiary care emergency department. Forty-one second-year medical students were chosen and randomly allocated to the pilot educational program ( $n=21$ ) or control group ( $n=20$ ). Standardized pretests were administered to both groups to assess baseline PD knowledge using a multiple-choice test. Oral communication skills and student confidence levels were measured using a visual analog scale (1 to 5). Interrater reliability for the oral communication rating was first established. The median intraclass correlation for the 6 questions was 0.91 (range 0.77 to 0.97), indicating a high degree of interrater reliability between the 6 emergency medicine attending raters. The 6-week pilot PD program consisted of 6 hours of classroom instruction and 24 hours of ED skills session. The student/emergency physician attending ratio for the skills sessions was 4:1. Videotapes of actual ED patients with abnormal physical findings were used before the hands-on ED skills sessions. Informed written consent was obtained from all participating patients. The class curriculum was organ-system-based and included emergency medicine case discussions. Standardized posttests were given at the conclusion of the course.

Results: Multiple-choice tests and confidence surveys were administered to both the pilot and control groups. Before the study, there was no significant difference ( $P=.359$ ,

paired *t* test) between the mean percentage correct of the pilot (57%,  $n=21$ ); 95% confidence interval (CI) 47% to 66%) versus control group (54%,  $n=20$ ; 95% CI 43% to 66%) on the multiple-choice test. After the completion of the 6-week course, a significant change ( $P < .005$ ) in the pilot (76%; 95% CI 67% to 84%) versus control group (64%; 95% CI 53% to 75%) was seen on the multiple-choice test. A significant change in confidence rating over time was seen for the pilot compared with the control group ( $P < .001$ ). Oral communication ratings for the pilot but not control group showed significant improvement over time ( $P < .001$ ).

Conclusion: The PD in the ED educational program has significantly improved physical diagnosis knowledge, oral communication skills, and confidence levels of second-year medical students.

## 76 Bedside Ultrasound Education in Emergency Medicine Residencies

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Study objective: To assess the status of education and use of emergency department bedside ultrasound (US) in allopathic emergency medicine residency programs.

Methods: Members of the CORD listserv were asked to complete an online survey of the extent of ultrasound use and education at their residency programs. Those programs that did not respond were contacted by phone to complete the survey.

Results: Responses were obtained from 118 of 119 programs (99%). The majority (69%) of the programs used ED bedside US. Trauma ultrasound was the most common application reported (98%), whereas 68% performed endovaginal sonography and only 10% used ED bedside US to test for deep venous thrombosis. Of those using ED bedside US, 85% had a formal teaching program in place for their residents and 33% had a process whereby faculty could become credentialed in ED bedside US. Those programs using ED bedside US characterized their relationship with radiology as cooperative (33%), neutral (30%), hostile (26%), neutral/hostile (7%), or cooperative/neutral (2%). Of those programs not using ED bedside US ( $n=37$ ), 54% plan on using ED bedside US in the near future. The most common reason cited for not using ED bedside US was resistance from radiology ( $n=24$ ).

Conclusion: US is used and taught by the majority of the emergency medicine residencies in the United States. Resistance from the department of radiology is perceived to be the most common impediment to use of ED bedside US by residency programs.

## 77 Elevated CK-MB in the Presence of a Normal Total CK as an Indicator of Myocardial Complication

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Patients who present to the emergency department with suspected myocardial infarction (MI) and have normal total creatine kinase (CK) levels although elevated CK-MB fractions present a special challenge to treating physicians. Many EDs do not even routinely check CK-MB levels in the presence of a normal total CK level and may miss an important diagnostic tool.

Study objective: To determine whether patients with elevated CK-MB levels with a normal total CK level are at high risk for cardiac complications.

Methods: This was a retrospective study of consecutive patients presenting to an urban ED with a diagnosis of suspected MI. A normal CK level was defined as  $<220$  U/L. Normal CK-MB% ( $[\text{CK-MB}/\text{Total CK}] \times 100$ ) was defined as  $<4.0$  ng/mL. The mixed study cases were those with normal total CK and elevated CK-MB%. The control group were those with normal total CK and normal CK-MB%. Exclusion criteria included baseline creatinine level  $>2.0$ , chronic dialysis patients, cardiopulmonary resuscitation during resuscitation, administration of thrombolytics before enzyme levels, and surgery within 2 weeks of presentation. Cardiac complications were defined as death, MI, ischemia by ECG, echocardiographic or catheter data, congestive heart failure, stroke, open heart surgery, admission or ED visits secondary to cardiac symptoms, or recurrent angina. Six-month follow up was done by hospital record review and verified by telephone contact. Data were analyzed using Student's *t* test and  $\chi^2$  analysis.

Results: A total of 176 patients presented with mixed enzyme levels with 94 of these meeting entry criteria. A total of 52 controls were used with 34 meeting entry criteria. The average age of the mixed cases was 72.7 years with 63.4% being female. The average age of the controls was 70.2 years with 72.0% being female. The mixed cases had a higher cardiac complication rate on initial presentation than the controls: 57.0% versus 36.9% ( $P < .05$ ). The mixed cases also had a higher cardiac complication

rate at 6-month follow-up: 29.0% versus 9.10% ( $P<.05$ ). The average length of stay on initial presentation was higher for the mixed cases: 7.5 days versus 4.3 days for the controls ( $P<.05$ ). The mixed cases also incurred higher charges: \$20,990 versus \$9,865 for the controls ( $P<.05$ ).

**Conclusion:** Patients suspected of having an acute coronary syndrome and who present with an elevated CK-MB level despite a normal total CK level have a higher initial cardiac complication rate and higher complication rate at 6 months than patients with normal CK-MB and normal total CK levels. These patients have longer hospital stays and incur higher hospital charges. The measurement of CK-MB levels in all patients suspected of having acute coronary syndrome should be performed to identify patients susceptible of immediate and long-term cardiac complications.

## 78 Association of Acute Cardiac Ischemia Time–Insensitive Predictive Instrument Results With Disease and Test Outcomes in Emergency Department Chest Pain Observation Unit Patients

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Emergency department chest pain observation units (CPOUs) have been shown to improve diagnostic sensitivity while decreasing costs in the evaluation of patients at low to intermediate risk of acute cardiac ischemia (ACI). CPOU protocols would benefit from an objective disease pretest probability assessment to allow better test selection.

**Study objective:** To report Acute Cardiac Ischemia Time Insensitive Predictive Instrument (ACI-TIPI) scores for a CPOU population, and differences in scores between population subgroups.

**Methods:** This is a retrospective study of all patients sent to a high-volume CPOU over 12 consecutive months. The diagnostic chest pain protocol included serial cardiac markers (creatinine kinase isoenzyme MB, myoglobin), ST-segment monitoring, followed by an appropriate stress test. Physicians blinded to outcomes calculated ACI-TIPI scores. ACI was defined as (1) acute myocardial infarction by World Health Organization criteria, (2) unstable angina defined as >50% stenosis on cardiac catheterization (CC), or reversible ECG changes or stress sestimi perfusion defects, or (3) adverse outcomes such as missed myocardial infarction, death, or cardiac arrest within 30 days. ACI-TIPI scores were compared for patients who were positive or negative for the following outcomes: ACI, cardiac catheterization, stress myocardial imaging (MPI) results, and graded exercise stress test results.

**Results:** During the study period, 1,234 patients went to the CPOU. Of these, 100 were excluded because of missing data, and 112 were excluded from ACI-TIPI analysis based on ECG criteria. The 1,022 study patients were 45.6% male, with an average age of 53.1 years ( $\pm 15.0$ ). Study patients had an average ACI-TIPI score of 21.3 ( $\pm 13.2$ ). Patients who were ACI-positive (average 31.97, 95% confidence interval [CI] 27.8 to 35.2), and ACI-negative (average 20.0, 95% CI 19.3 to 20.8) differed ( $P<.001$ ). Catheterization patients scores differed significantly ( $P<.001$ ): positive catheterization 27.3 (95% CI 25.1% to 29.5%) versus negative catheterization 19.6 (95% CI 18.76% to 20.5%). Stress MPI scores differed between normal 20.3 (95% CI 19.2% to 21.5%) and abnormal 27.6 (95% CI 24.5% to 30.6%) ( $P<.001$ ). Graded exercise stress test results differed between normal 19.4 (95% CI 18.5% to 20.4%) and abnormal 29.27 (95% CI 25.6% to 32.9%) ( $P<.001$ ).

**Conclusion:** ACI-TIPI scores discriminated between both patients with and without acute cardiac ischemia and normal and abnormal diagnostic test results in this low to intermediate probability CPOU population. This tool may show utility in the selection of diagnostic tests in a CPOU protocol. Prospective validation is needed.

## 79 A Rapid Rule-Out Protocol for Acute Myocardial Infarction: Serial ECG Monitoring in Conjunction With the 2-Hour $\Delta$ CK-MB

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**Study objective:** To validate the usefulness of automated serial ECG monitoring (SECG) alone and in combination with 2-hour change in creatine kinase isoenzyme MB ( $\Delta$ CK-MB) to identify acute myocardial infarction (AMI) before emergency physician making final patient disposition.

**Methods:** A prospective observational study was performed in 658 chest pain patients whose initial ECG was nondiagnostic for injury and whose initial CK-MB level was less than 2 times the upper limits of normal who underwent our chest pain evaluation protocol, which consists of SECG monitoring in conjunction with the 2-hour  $\Delta$ CK-MB before emergency physician making final disposition decision on whether to admit (ICU versus monitor versus observation), perform immediate nuclear stress testing, or discharge home with no further cardiac workup. Exclusion criteria included patients

presenting with chest pain in the presence of a tachyarrhythmia or pulmonary edema. SECGs were obtained at least every 10 minutes using the ELI-100 ECG machine in conjunction with the Lifenet STM device (Mortara Instruments, Milwaukee, WI). A positive SECG was defined as new injury or new ischemia. CK-MB levels were measured on the Stratus Immunoassay Analyzer (Dade International, Miami, FL).  $\Delta$ CK-MB was defined as the difference between the 2-hour and baseline CK-MB and was considered positive if the value was  $\geq 1.5$  ng/mL. AMI was diagnosed if there was  $\geq 30$  minutes of chest pain and any 1 of the following criteria within 24 hours of ED presentation: a serial rise of CK-MB to  $\geq 2$  times upper limits of normal (ie,  $\geq 12$  ng/mL) and CK-MB index  $\geq 4\%$ ; a serial rise in cardiac troponin I  $\geq 2$  times the upper limits of normal (ie  $\geq 3$  ng/mL); new Q-wave formation in 2 contiguous leads (based on official ECG interpretation); or patient death. Thirty-day adverse outcome (AO) was defined as AMI, life-threatening complications, death, percutaneous transluminal coronary angioplasty, or coronary artery bypass grafting within 30 days of ED presentation. McNemar's  $\chi^2$  was used to compare sensitivities and specificities for AMI and 30-day AO of a positive SECG alone and in combination with a positive  $\Delta$ CK-MB (SECG+ $\Delta$ CK-MB).

**Results:** Of the 658 study patients, 40 patients had a diagnosis of AMI and 91 patients had 30-day AO. After completion of the 2-hour ED rule-out protocol, a total of 336 patients were directly admitted (including 39 of the AMI patients) and 207 directly discharged from the ED. One hundred fifteen patients underwent immediate nuclear stress testing, and of these 83 were dismissed and 32 admitted (1 patient with AMI). The finding of reversible ischemia on immediate nuclear stress testing had a sensitivity and specificity for 30-day AO of 87.5% and 77.6%, respectively. All AMI patients, and 90 (98.9%) of 91 of 30-day AO were admitted to the hospital. The 1 nonadmitted patient with 30-day AO died of pneumonia complicated by septic shock and diabetic ketoacidosis. Thirty patients had diagnostic changes of injury or ischemia during SECG monitoring. Thirteen (43.3%) of these patients were treated with emergency reperfusion therapy. The Table summarizes the sensitivities, specificities, positive likelihood ratio, and negative likelihood ratio of a positive SECG, and positive SECG+ $\Delta$ CK-MB for AMI and 30-day AO.

**Conclusion:** SECG monitoring in conjunction with the 2-hour  $\Delta$ CK-MB allows for early identification and treatment of AMI, and can assist the emergency physician in making appropriate triage decisions on whether to admit, perform immediate stress testing, or discharge with no further workup.

**Table, abstract 79.**

Finding	SECG	SECG+ $\Delta$ CK-MB	P
<b>AMI</b>			
Sensitivity	47.5% (31.5 to 63.9)	90.0% (76.3 to 97.1)	<.0001
Specificity	98.2% (96.8 to 99.1)	93.7% (91.5 to 95.5)	<.0001
Positive likelihood ratio	26.7	14.3	—
Negative likelihood ratio	0.53	0.11	—
<b>30-day AO</b>			
Sensitivity	27.5% (18.6 to 37.8)	53.8% (43.1 to 64.4)	<.0001
Specificity	99.1% (98.0 to 99.7)	95.4% (93.4 to 97.0)	<.0001
Positive likelihood ratio	31.1	11.7	—
Negative likelihood ratio	0.73	0.48	—

## 80 The Comparative Value of an Emergency Diagnostic and Treatment Unit Protocol for Acute Cardiac Ischemia (ACI) in Patients With Cocaine-Associated Chest Pain

Zalenski RJ, Aurora M, McCarren M, Roberts R, Rydman RJ, Kampe L/Wayne State University, Detroit, MI; Cook County Hospital, School of Public Health, University of Illinois at Chicago, Chicago, IL

**Study objective:** To evaluate the performance of an emergency diagnostic protocol using exercise ECGs (ExECG) in patients with cocaine-associated chest pain.

**Methods:** This was a secondary analysis of patients with self-reported cocaine use in a cross-sectional diagnostic study that evaluated the performance of serial creatine kinase isoenzyme MB (CK-MB) levels, ECGs, followed by an ExECG in an inner-city emergency department. Emergency department treatment unit protocol results were

compared with in-hospital diagnoses of acute cardiac ischemia (ACI). Sensitivity and specificity were compared with and without the ExECG-results.

Results: Three hundred nineteen (88.91%) of 359 patients had cocaine data. The cocaine-positive group (n=61) was younger ( $36.8 \pm 7.9$  years versus  $49.1 \pm 9.8$  years) and male (85% versus 44%,  $P < .01$ ); 304 patients with complete protocol data had an ACI prevalence of 9.2%. Protocol sensitivity with ExECG was 90.1 versus 94.1% for patients with and without cocaine, respectively, but specificity was lower (38.8% versus 52.0%, respectively). When ExECG was added to the protocol, sensitivity increased by a comparable 27.3% versus 35.3% ( $P = .2$ ), respectively, for the cocaine versus noncocaine groups, but specificity decreased more for the cocaine group (35.1% compared with the noncocaine group (20.7%,  $P < .03$ ).

Conclusion: ExECG results in higher false-positive rates in patients using cocaine.

## 81 Electrocardiographic ST-Segment Elevation: Correct Identification of AMI and Non-AMI Syndromes by Emergency Physicians—Preliminary Results

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Acute myocardial infarction (AMI) is a less common cause of ST-segment elevation (STE) in chest pain patients; numerous noninfarction syndromes are frequently encountered.

Study objective: To determine the emergency physician's ability to identify the cause of STE.

Methods: Eleven ECGs with STE were given to emergency physicians; the patient in each instance involved a 45-year-old man with a medical history of hypertension and diabetes mellitus with the chief complaint of chest pain. The emergency physician was asked to determine the cause of the STE and, if due to AMI, to decide if thrombolytic therapy (TT) would be administered (the patient had no contraindication to such treatment). Rates of TT administration were determined; appropriate administration was defined as that occurring in an AMI patient, whereas inappropriate TT administration in the non-AMI patient.

Results: Three hundred four emergency physicians completed the electrocardiographic; levels of medical experience included the following: postgraduate 2/3, 193 (63%); and attending 110 (37%). The rates of incorrect diagnosis ranged from 8% (left bundle branch block (LBBB) with and without AMI) to 76% (left ventricular aneurysm [LVA]). The rates of TT administration ranged in AMI patients from 37% with atypical STE to 100% in right bundle branch block (RBBB) and LBBB; the incorrect application of TT occurred in 0% (left ventricular hypertrophy, RBBB, and ventricular paced rhythm) to 42% (LVA). The rates of correct diagnoses and appropriate application of TT did not differ significantly between resident- and attending-level emergency physicians.

Conclusion: Certain ECG syndromes with STE are frequently misdiagnosed with inappropriate TT administered. Emergency physician ECG education must focus on the proper identification of these syndromes so that TT may be appropriately used.

## 82 The Effect of 2-D Echocardiography on Medical Decisionmaking With Emergency Department Patients

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Study objective: Two-dimensional echocardiography (2D-ECHO) represents an important tool for the evaluation of the emergency department patient with suspected cardiovascular (CV) pathology. The present study assesses the effect of 2D-ECHO on diagnostic, treatment, and disposition decisionmaking by physicians in the ED.

Methods: This was a prospective, interventional study conducted in a county teaching ED in 78 ED patients with suspected CV pathology. Physicians were asked questions regarding patient diagnosis, treatment, and disposition before and after 2D-ECHO. Before and after responses were then compared to determine the effect of 2D-ECHO on physician clinical decisionmaking.

Results: Average patient age was  $54.5 \pm 16.8$  years (range 8 to 89 years). Chest pain (44.7%) and shortness of breath (38.5%) were the most common presenting symptoms. Sixty-five (86.7%) of the patients were admitted. There was a change in diagnosis in 41.0% (n=32) of patients, a change in treatment in 26.0% (n=20) of patients, and a change in disposition in 10.4% (n=8) of patients. On a scale of 1 (least) to 5 (most), the certainty of diagnosis (before  $3.6 \pm 1$  versus after  $4.1 \pm 1$ ,  $P = .0001$ ), the certainty of treatment (before  $3.8 \pm 1$  versus after  $4.3 \pm 0.8$ ,  $P = .0001$ ), and certainty of disposition (before  $4.3 \pm 0.9$  versus after  $4.4 \pm 0.9$ ,  $P = .0001$ ) were significantly changed for individual patients after 2D-ECHO.

Conclusion: 2-D ECHO appears to have a clinically significant impact on physician medical decisionmaking in the ED.

## 83 Prevalence and Determinants of QT Dispersion in Patients With Acute Congestive Heart Failure

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Study objective: Risk stratification of patients treated for acute congestive heart failure (CHF) in the emergency department has been problematic. Dispersion of repolarization (QTdisp) has been shown to be a predictor of arrhythmic events and sudden death in these patients. The purpose of this study was to determine the prevalence of significant life-threatening QTdisp in patients with decompensated CHF and to identify which factors are commonly associated with this condition.

Methods: In a retrospective analysis of patients presenting to an urban ED in the acute stages of CHF, a variety of hemodynamic and anthropometric parameters were collected and examined. All subjects chosen had pulmonary edema by chest radiography and the initial 12-lead ECG was used to calculate the QTdisp (corrected for heart rate). Patients were excluded if they had evidence of pneumonia, cardiogenic shock, or acute myocardial necrosis.  $\chi^2$  Statistics and a multiple regression analysis were performed to identify those factors independently associated with QTdisp.

Results: In 59 patients who met the study criteria, 29 (49%) had evidence of significant QTdisp ( $>80$  ms). Of this group, 41% had a history of coronary disease compared with 33% without notable QTdisp (NS). A correlation was found between the age of the patient and the severity of the QTdisp ( $P < .05$ ). However, there were no significant correlations between the degree of QTdisp and any of the other variables examined.

Conclusion: Dispersion of repolarization is thought to be a predictor of life-threatening arrhythmic events in patients with CHF. Although QTdisp appears to be common during acute decompensated CHF, advanced age seems to be the only commonly associated finding.

## 84 Overcrowding in Emergency Departments: California Versus Other States

Derlet RW, Richards JR, Navarro M, Kravitz RL/University of California—Davis Medical Center, Sacramento, CA

Study objective: To determine the extent and factors associated with overcrowding in emergency departments in the United States, and to compare California with the rest of the country.

Methods: Surveys were mailed to a random sample of ED directors of hospitals with greater than 100 inpatient beds in all 50 states. Questions included annual ED census, and magnitude, frequency, and impact of overcrowding. Putative causes of overcrowding were provided, and respondents were asked to rank these on a 5-point scale: 1=not a cause; 3=somewhat of a cause; 5=major cause. Differences in responses were compared using  $\chi^2$  and Mann-Whitney U tests.

Results: Of 320 ED directors surveyed, 235 (73%) responded. Overcrowding was reported in 96% of California EDs, and 86% of non-California (US) EDs ( $P = .13$ ). Overall average annual census for EDs was  $37,657 \pm 22,788$ , and overcrowding was less common in small EDs (volume  $\leq 12,000$ ) 84%, than large EDs 96% ( $P = .005$ ). Frequency of overcrowding (California versus US EDs) was: once per week: 7% versus 10%; several times per week: 64% versus 52%; daily: 29% versus 38% ( $P = .2$ ). Major contributing factors of overcrowding reported as mean  $\pm$  SD > (median) of responses were: hospital bed shortage:  $4.1 \pm 1.2$  (4); inadequate ED space:  $3.4 \pm 1.4$  (3); nursing shortage:  $3.2 \pm 1.2$  (3); consultant delay:  $2.9 \pm 1.3$  (3); laboratory delay:  $3.4 \pm 1.2$  (3); radiology delay:  $3.4 \pm 1.1$  (3). Significant differences in responses between California and US EDs included hospital bed shortage:  $3.6 \pm 1.1$  versus  $4.3 \pm 1.0$  (4) versus (5) ( $P < .001$ ), and managed care authorization delays:  $2.3 \pm 1.3$  versus  $1.9 \pm 1.2$  (2) versus (1) ( $P = .02$ ). Overcrowding resulted in long waiting times to be seen in 100% of overcrowded EDs, and delays in diagnosis and treatment in 98%. Sixty-seven percent of respondents reported potential risk of poor patient outcome during periods of overcrowding, and 33% reported actual poor outcome during overcrowding.

Conclusion: In this study, ED overcrowding was pervasive. Many contributing factors relate to issues beyond the control of EDs. Overcrowding results in long waiting times and increases risk for adverse outcomes.

## 85 Communication of Preexisting Advanced Directives: Impact on Patient Care in the Emergency Department

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Study objectives: The purpose of this study was to determine the prevalence of adequately documented and communicated advanced directives (AD) and its impact on



prehospital and emergency department care of nursing home and adult long-term care facility patients. In addition, we attempted to identify the frequency of patients arriving with the Massachusetts "Comfort Care" AD documentation.

**Methods:** Study design was a cross-sectional study of consecutive institutionalized patients over a 60-day period. All individuals 18 years or older who were nursing home or long-term care facility patients transferred by ambulance to the ED were included. Physicians evaluated AD status by transfer chart review or verbal request of the family on patient arrival to the ED. Physician/nursing personnel voluntarily completed study questionnaires addressing the patient's medical condition, immediate availability AD status, and impact on patient care as defined by prehospital and/or ED Advanced Cardiac Life Support (ACLS) intervention. The authors reviewed all adult ED charts during the study period to maximize capture of eligible patients. The authors subsequently conducted a chart review for evidence of preexisting AD on previous admissions.

**Results:** There were a total of 176 encounters representing 137 patients; 26 patients had multiple ED visits. One hundred forty-six (83%) ED encounters had no AD, whereas 30 (17%) ED encounters had unambiguous AD at time of ED arrival. We found 23 (13.1%) more ED encounters representing 17 patients with AD of "Do not resuscitate/Do not intubate" (DNR/DNI) and 17 (9.7%) ED encounters representing 16 patients with AD of "Full code," only on retrospective chart review of inpatient record. Of the 23 (13%) ED encounters that had previously documented AD of DNR/DNI but no AD at ED arrival, 12 (6.8%) had a clinical presentation that raised the issue of AD status. One of these patients received chest compressions, intubation, and ACLS intervention. There were a total of 59 (33.5%) encounters in which the issue of AD status was raised and 29 (16.5%) encounters representing 29 patients for whom AD status was directly relevant to their care. Of these 29 patients, 20 arrived with no formal AD, whereas 9 arrived with AD of DNR/DNI. One patient with documented DNR/DNI status on transfer records received prehospital chest compressions. No patients presented with "Comfort Care" documentation during the study period.

**Conclusion:** A large majority of patients in our study arrived at the ED without AD documentation. Two of these patients received ACLS interventions despite previous AD of DNR/DNI. Institutionalized individuals represent a potential group of patients in whom unambiguous AD could be relatively easily resolved by systematic documentation and interinstitutional communication.

## 86 A Comparison of Emergency Medicine Ultrasound Training With Guidelines of the Society for Academic Emergency Medicine

Witting MD, Euerle BD, Kenneth H, Butler KH/University of Maryland Medical Center, Baltimore, MD

**Study objectives:** To compare the current state of emergency medicine residency ultrasound training with guidelines for that training from the Society for Academic Emergency Medicine (SAEM).

**Methods:** A brief questionnaire was sent to program directors from 119 emergency medicine residency programs in the United States. Responses were compared with the SAEM guidelines for clinical experience (150 total ultrasounds) and didactic experience (40 hours of didactic instruction).

**Results:** Overall response rate was 92%. Seventy-six programs (69%) own an ultrasound machine (ownership meaning 24-hour availability and complete discretion over use). Of these, 12 (16%) indicated that their average 1998 graduate had done 150 or more total ultrasounds during residency, although none had average numbers that exceeded the minimum guidelines for all 4 procedure categories. Information on didactic curriculum was available from 74 ultrasound-owning programs: the duration was 0 to 20 hours in 49 (66%), 20 to 40 hours in 19 (26%), and 40 to 100 hours in 6 (8%). If one considers programs with at least 20 to 40 hours of instruction covering at least 80% of the SAEM curriculum as meeting the didactic guideline, 13 programs (18%) would meet this standard. Overall, the average 1998 graduate from a maximum of 4 programs would be "trained in ultrasound" according to SAEM guidelines.

**Conclusion:** Most programs own ultrasound equipment, but few currently meet SAEM training guidelines.

## 87 Effective Communication With Deaf Patients and Awareness of the Americans With Disabilities Act Among Emergency Department Personnel: A Nationwide Survey

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**Study objective:** Recently, there have been a number of lawsuits brought against hospitals that were not in compliance with the Americans With Disabilities Act (ADA) in regard to deaf patients. Apparently, many deaf patients are not being furnished with

qualified sign language interpreters. This leads to the potential of inappropriate medical care and lawsuits being filed. Emergency departments have not been immune to this. Rather than an intentional disregard of this federal law, it is the authors' belief that it is a lack of awareness of the federal requirements brought about by the ADA and misconceptions about the needs of deaf patients. The objective of this study is to investigate the magnitude of deaf patients being seen in an ED setting, the means of communication being used with deaf patients, the formal education of hospital personnel regarding communication with deaf patients, the hospital personnel's awareness of policies and regulations regarding this population, and the accessibility of sign language interpreters in EDs.

**Methods:** Questionnaires pertaining to the above objectives were distributed to all 121 emergency medicine residency programs approved by the Accreditation Council for Graduate Medical Education (ACGME). Each packet included surveys for all emergency medicine residents, 10 attending physicians, and 10 nurses.

**Results:** One hundred five of the 121 (86.8%) programs responded by returning at least 1 survey. Overall, 2,009 of the 6,097 (33.0%) of the surveys were returned. Of the 2,009 physicians and nurses responding, 1,623 (80.8%) had been personally involved in the care of deaf patients. The results indicate that physicians and nurses see an average of 3 to 4 deaf patients annually. Three hundred twenty-eight (21.7%) indicated the use of sign language interpreters as their primary mode of communication. Formal medical education included communication with deaf patients in 6.1% of those responding. Although 22.4% indicated they were aware of legal obligations regarding deaf patients, only 2.6% of those surveyed indicated awareness of the ADA. When asked whether access to sign language interpreters was available, 41.0% answered that they did not know.

**Conclusion:** In spite of the heightened number of ADA lawsuits specific to deaf patients, there continues to be a lack of awareness pertaining to this particular problem among emergency physicians and nurses.

## 88 Patient Satisfaction Scores With or Without Resident Involvement

Shih RD, Cochrane DG, Mandell M/Morristown Memorial Hospital, Morristown, NJ

Patient satisfaction surveys are becoming benchmarks for evaluating emergency physician care by hospital administrators. Different survey methodologies are used with inherent limitations. The effects of resident participation in patient care has been poorly evaluated in the past.

**Study objective:** The objective of this study is to evaluate the effect of patient satisfaction scores when residents are involved in emergency department patient care with one of the commonly used survey instruments, the Press, Ganey ED survey.

**Methods:** A retrospective study design was used at a tertiary referral community hospital. Patient satisfaction survey results were obtained for a 6-month period. Cases were grouped by whether the patient was primarily managed by an ED attending or resident physician. Data were collected for a number of satisfaction variables (such as overall satisfaction and satisfaction with physician care), patient demographics, and final diagnosis. Satisfaction categories were compared between groups using Student *t* test and  $\chi^2$  tests where appropriate.

**Results:** Five hundred five surveys were available for analysis of 3,607 that were sent to patients (14% response rate). Overall mean satisfaction scores with the ED visit did not differ between groups (attending 80.1, resident 81.4;  $P > .05$ ). However, satisfaction with physician care was significantly elevated in the resident group (attending 66.0, resident 71.6;  $P < .05$ ). No differences were found with respect to patient demographics or diagnosis.

**Conclusion:** Resident involvement in patient care appears to improve patient satisfaction scores using Press, Ganey survey methodology. Further study to elucidate the reasons for these findings are needed.

## 89 A Comparison of Provider Self-Adjudication of Outpatient Emergency Department Claims Using a Symptom-Based System With an MCO Claims Review Process That Uses a Diagnosis-Based Methodology

Shesser R, Holtermann K, Smith J, Braun J/George Washington University, Washington, DC

**Study objectives:** To determine the performance of a provider "self-adjudicating" outpatient ED claims using a "presenting symptom-based" system compared with the managed care organization (MCO) reviewing and adjudicating the claims using a "final diagnosis-based" system.

**Methods:** All outpatient visits from 1 MCO to an urban, university hospital emergency department between September 1, 1998, and February 28, 1999, were included.

Each record was reviewed using 2 different techniques to determine whether or not the claim should be paid by insurance. Under the "symptom-based" system, all visits with nursing triage levels of Immediate/Emergent were approved automatically. Those with triage levels of Delayed/Nonurgent were reviewed by an emergency physician and approved if they were considered an emergency under the state's Access to Emergency Services Act. A second claims adjudication, independent of these initial results, was then performed using a "diagnosis-based" technique that divided the records into "pay," "deny," and "review" categories using a list of *International Classification of Diseases—ninth revision* codes currently used by the MCO. The results of the 2 techniques were compared.

Results: A total of 1,830 records were reviewed; 836 (46%) were triaged Immediate/Emergent, and 994 (54%) as Delayed/Nonurgent. Of these 994 records, physician review determined that 607 (61%) met the prudent layperson standard and 387 (39%) did not. The symptom-based system determined that 1,443 (78.8%) of 1,830 of the visits should be approved for insurance coverage. The diagnosis-based system placed 966 (53%) on the "approve" list, 335 (18%) on the "deny" list, and 529 (29%) on neither list. The Table compares the performance of the 2 systems. For the 1,301 claims that immediate performance of the 2 systems can be compared, the symptom-based method had a sensitivity of 87%, specificity of 37%, positive predictive value of 80%, and negative predictive value of 48%. A symptom-based system resulted in the immediate approval of 1,443 (77.8%) visits compared with 966 (52.7%) by a diagnosis-based system ( $P<.001$ ).

Conclusion: Provider self-adjudication of ED claims using a symptom-based system avoids rejection of many emergency ED visits, as well as identifying many nonemergent visits that mistakenly appear to be emergencies. The possibility of providers and MCOs working together to adjudicate outpatient ED claims needs to be explored further.

**Table, abstract 89.**

Symptom-Based Categories	Diagnosis-Based Categories		
	Pay	Deny	Review
Triaged as Immediate/Emergent (n=836)	466	128	242
Triaged as Delayed/Nonurgent—meets PLS (n=608)	372	83	153
Triaged as Delayed/Nonurgent—does not meet PLS (387)	128	125	134
<b>Total</b>	<b>966</b>	<b>335</b>	<b>529</b>

## 90 Personality Types and Preferences of Emergency Medicine Residents: Correlation With Clinical Performance Evaluations

Risucci D, LaMantia J, Ryan J/North Shore University Hospital, Manhasset, NY

Study objective: To describe personality types and preferences of emergency medicine residents and to examine their association with faculty evaluations of clinical performance.

Methods: This was a prospective, correlational study of an emergency medicine residency program at a tertiary care university hospital. The Myers-Briggs Type Indicator (MBTI) was administered to 22 emergency medicine residents (n=8 emergency medicine-1, 9 emergency medicine-2, 7 emergency medicine-3) in 1997-1998, and to 7 emergency medicine-1 residents who entered the program in 1998-1999. The MBTI is a 126-item self-administered questionnaire that measures 4 bipolar dimensions of personality: Extroversion/Introversion (EI), Sensing/Intuition (SN), Thinking/Feeling (TF), and Judging/Perceiving (JP) and places an individual into 1 of 16 possible personality types that reflect the combination of preferences across the 4 dimensions. Each resident's clinical performance was evaluated independently by 20 emergency medicine faculty on a form that required ratings on a 5-point scale for each of 13 areas of clinical performance. Ratings in each area were scaled with respect to perceived level of functioning such that 1=a senior medical student, 2=emergency medicine-1 resident, 3=emergency medicine-2, 4=emergency medicine-3, and 5=emergency medicine attending. For each resident, an overall rating of clinical performance was computed as the mean of all ratings from all faculty.

Results: Twelve of the 16 possible personality types were represented among the 29 residents. The most prevalent type, INTP, was observed in 28% (n=8) of the residents. The EI

score correlated significantly ( $r=-0.42$ ,  $P=.02$ ) with overall clinical performance. None of the remaining MBTI scores correlated significantly with overall clinical performance.

Conclusion: Stronger preferences for extroversion among residents may be associated with more positive faculty evaluations of their clinical performance. The relatively high prevalence of INTP types replicates results from a previous study of emergency medicine residents and supports previous studies that have found that INTPs generally tend to be quick to determine possibilities in a situation, coolly logical under stressful circumstances, and well-suited to dealing with unexpected emergencies. The correlation between extroversion and clinical performance evaluations replicates results of a previous study of pediatric residents and points to the need for further research to determine whether this reflects a bias in the evaluation process and/or a true advantage of extroversion in the context of residency training.

## 91 Frequency and Costs Associated With Laboratory Test Repetition in Trauma Patients Undergoing Interfacility Air EMS Transport

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Study objectives: In trauma patients undergoing interfacility transfer, laboratory tests are often repeated at receiving centers despite their having been done at referring hospitals. Although some laboratory test repetition is appropriate, laboratory test duplication represents an area of potential cost reduction. This study's objective was to quantify the frequency and costs of laboratory test repetition.

Methods: This was a prospective study of a consecutive series of 104 interfacility adult trauma transports by a registered nurse/emergency medical technician-paramedic air emergency medical services program. All patients were transported to an urban Level I trauma center during 1998. On arrival at referring hospitals, flight crew recorded whether the following laboratory tests were done at referring hospitals: CBC count, electrolytes (standard and extended panels), coagulation studies, toxicology screens, creatine phosphokinase, liver functions, urinalysis, and pregnancy tests. Crew also recorded which test results were sent to the trauma center. Study personnel then noted which tests were repeated within an hour of trauma center arrival. Patient charges for tests were obtained from the receiving trauma center. Analysis was descriptive, entailing delineation of costs of test repetition, and also categorical ( $\chi^2$ ,  $\alpha=.05$ ).

Results: In 104 patients, 283 laboratory tests were done at referring centers with 246 (86.9%) repeated on trauma center arrival. Of 246 repeated tests, results from initial tests at referring institutions had been sent in 171 (69.5%) cases. For the 283 laboratory tests done at referring hospitals, repetition of laboratory tests at the receiving hospital was frequent regardless of whether initial results were sent (87.7% repeat rate) or not sent (85.2% repeat rate) from referring hospitals; risk ratio for laboratory test repetition for sent/unsent status was 1.03 (95% confidence interval 0.93 to 1.1). For this relatively small group of 104 patients, the receiving hospital charged \$16,620 for repetition of laboratory tests that were done at referring facilities.

Conclusion: Laboratory test repetition in interfacility transport trauma patients accounts for significant expense. Further study is warranted to address laboratory test repetition, with focus on understanding why repetition is so frequent and whether some testing at referring or receiving hospitals can safely be eliminated.

## 92 The Prediction of a 19-Lead ECG From 3 Lead Vectors Using Factor Analysis

Schreck DM, Tricarico VJ, Brotea C, Viscito MS/Muhlenberg Regional Medical Center, Plainfield, NJ; Robert Wood Johnson Medical School Stevens Institute of Technology, University of Medical and Dentistry New Jersey, Newark, NJ

The ECG and vectorcardiogram (VCG) are lead-vector systems that model the dipolar and multipolar electrical activity of the heart. Controversy exists in defining the number of ECG leads needed to adequately describe cardiac electrical activity. For example, placement of right chest leads is currently recommended to supplement the standard 12-lead ECG for patients with acute inferior wall infarction. Factor analysis (FA) is a computer-aided statistical technique that identifies a minimum number of factors accounting for variance in observed data.

Study objective: To derive the 12-lead ECG, 3-lead Frank VCG, and the right chest leads  $V_3R$ ,  $V_4R$ ,  $V_5R$ , and  $V_6R$  from a minimum number of lead vectors identified by FA. This was a retrospective ECG and VCG analysis conducted in a suburban community teaching hospital.

Methods: Twenty-seven standard 12-lead ECGs, with the corresponding 4 right heart ECG leads, and Frank VCGs were obtained from 19 men and 8 women. Each resultant 16-lead ECG and 3-lead VCG were acquired and directly digitized yielding a

19x300 voltage-time data array for each patient. Each matrix was factor analyzed to identify transformation coefficients and a minimum number of lead vectors spanning the entire 19-lead ECG and VCG data space.

Results: FA revealed 3 lead vectors accounted for  $98.86\pm0.57\%$  of the variance of the voltage-time data for all 19 leads in this 27-patient data set. No statistically significant differences were noted between men ( $98.91\pm0.57\%$ ) and women ( $98.72\pm0.57\%$ ) at  $P<.434$  by analysis of variance testing. The 3 lead vectors spanning the data space were plotted to yield 3-dimensional spatial variable curved surfaces defining the cardiac electrical activity for each patient.

Conclusion: A 3-lead-vector dipolar system is the major contribution to cardiac electrical activity. Both the 16-lead scalar ECG and 3-lead VCG may be derived from only 3 measured ECG leads. The information content of all 19 leads may be represented by a 3-dimensional spatial ECG. This type of data processing may lead to instantaneous acquisition of the ECG and VCG from telemetry equipment. Further studies are warranted for process validation.

## 93 Intraoral Sonography of Peritonsillar Abscesses: Feasibility and Sonographic Appearance

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Study objective: To determine the feasibility of using intraoral ultrasonography (IOU) for detecting peritonsillar abscesses (PTA) in an emergency department setting. The sonographic appearance of confirmed abscesses was examined for characteristics that may aid in the differentiation between PTA and peritonsillar cellulitis.

Methods: A convenience sample of stable patients presenting to a university-based tertiary care ED with clinical evidence of PTA. Patients received topical anesthetic spray to the oropharynx and were imaged in a sitting position with a 6.5-MHz intracavitary probe (Siemens, Sonoline Prima) covered with a sterile condom. Patients were not excluded by the presence of trismus. Emergency physicians performed all IOU studies. Verbal consent was obtained and data collected during the clinical evaluation of the patient. Subsequently, computed tomography (CT), fine-needle aspiration (FNA), and/or surgical drainage obtained confirmation of PTA.

Results: Intraoral sonograms were performed in 15 patients. Nine patients had confirmed abscesses. Six abscesses were confirmed by FNA alone. Two cases were demonstrated by surgical drainage after FNA with the remaining case by surgical drainage after CT. Hard copy video photographs were reviewed by a registered diagnostic medical sonographer with PTA categorized as homogeneous or cystic in appearance. In addition, the presence or absence of posterior acoustic enhancement (PAE) was determined. Six of the 9 confirmed abscesses were described as cystic with the remaining 3 being homogenous in appearance. PAE was the most common feature noted in all confirmed abscesses (9/9).

Conclusion: Intraoral sonography of PTA is feasible to perform in an ED setting. IOU is easily accessible, noninvasive, and well-tolerated by all subjects despite trismus. PAE is an important sonographic feature of PTA being present in all confirmed PTA. In addition, not all the confirmed abscesses were cystic in appearance. Further study is merited in use of this imaging modality as it may provide clinically useful information especially in screening peritonsillar cellulitis versus PTA by the presence or absence of PAE.

## 94 A Prospective Study of the Accuracy and Reliability of Urine Dipsticks

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Study objective: To assess the accuracy and reliability of the emergency department visual urine dipstick, an ED machine-read colorimeter device, and laboratory analysis in detecting urinary infection in comparison with urine culture.

Methods: A prospective study of ED patients who had urine testing done during a 10-month period was conducted. Excluded were those younger than 18 years, prisoners, those currently being treated for urinary tract infection, and those who could not consent to participation. Urine samples were collected by random, clean catch, or catheterization. The samples were then analyzed by ED visual dipstick, ED use of the Bayer Clinitek 50, laboratory Clinitek 200 dipstick reading, laboratory microanalysis, and bacteriology urine cultures. Dipstick and Clinitek results were considered positive if any of the following were present: leukocyte esterase, nitrites, RBCs, or protein. The microanalysis was considered positive if more than 5 WBCs were present. The urine culture was considered positive if  $10^3$  colony-forming units of any organism were present. The culture was considered contaminated if 3 or more organisms were grown from the sample. Sensitivity and specificity calculations along with negative predictive value calculations were made using the bacteriology urine culture as the gold standard.

Results: One hundred forty-two patients were enrolled in the study; of these 119 patients had complete data. Compared with the urine culture, the ED visual dipstick had a sensitivity of 91% (95% confidence interval [CI] 86% to 96%), specificity of 26% (95% CI 18% to 34%), and negative predictive value of 83% (95% CI 76% to 90%); the ED Clinitek 50 had a sensitivity of 91% (95% CI 86% to 96%), specificity of 24% (95% CI 16% to 32%), and negative predictive value of 81% (95% CI 74% to 88%); the laboratory Clinitek dipstick had a sensitivity of 79% (95% CI 72% to 86%), a specificity of 33% (95% CI 24% to 42%), and a negative predictive value of 71% (95% CI 63% to 79%); the laboratory microanalysis had a sensitivity of 60% (95% CI 51% to 69%), a specificity of 68% (95% CI 59% to 77%), and a negative predictive value of 72% (95% CI 64% to 80%).

Conclusion: The ED visual dipstick had the highest sensitivity and negative predictive values when compared with the urine culture of all 4 methods measured, making the ED visual dipstick the best screening test for urinary infection.

## 95 Criteria for Analyzing Flexion/Extension Radiographs of the Cervical Spine

Parker JS, Tashjian J, Knopp RK, Ganz W/Regions Hospital, St. Paul, MN

White's classic 1975 study suggested that 3.5 mm of intervertebral subluxation (SL) and/or  $\geq 11$  degrees of angulation indicated cervical spine instability. These values were derived from cadaveric models of cervical spine instability. These criteria have not been validated in a clinical setting.

Study objective: To determine the range of SL, vertebral angulation (VA), and interspinous distance (ISD) in flexion and extension as compared with neutral position (NP) in normal volunteers and to establish a reference standard to use in evaluation of flexion/extension views of the cervical spine.

Methods: We performed 3 view standardized NP, flexion, and extension cervical spine radiographs on healthy male volunteers ages 18 to 40 to determine ISD and SL at each level from C3-C4 to C6-C7. VA between C3 and C7 was also measured.

Results: One hundred volunteers were enrolled in the study. SL during flexion was greater than 2 mm in none of the 100 participants at each intervertebral level from C3 to C7 (95% confidence interval [CI] 0 to 3.62); SL in extension was greater than 2 mm in 1 of 100 participants at 1 level (C3-C4, 95% confidence interval [CI] 0 to 5.45) and none of 100 at each of the remaining 3 levels C4-C7 (95% CI 0 to 3.62). ISD and VA were also analyzed.

Conclusion: Among the 3 variables—SL, ISD, and VA—SL appears to hold the most promise for being a useful reference standard in the clinical setting. Our results indicate that a finding of up to 2 mm of subluxation on flexion-extension radiographs may be found in a normal population. Further clinical studies are needed on patients with pain or suspected cervical injury to see if a finding of  $\geq 2$  mm subluxation correlates with cervical spine instability. In our study, the variation in vertebral angulation and interspinous distance in a normal population was too great to define normal criteria.

## 96 Can Venous Blood Gas Measurements Be Used in Place of Arterial Blood Gas Determinations in Emergency Department Patients?

Sexton JD, Ravanzo J/St. Luke's Hospital, Emergency Medicine Residency of the Lehigh Valley, Bethlehem, PA

Study objective: The correlation between arterial and venous blood gas (VBG) measurements has not been investigated in ED patients. Our ultimate objective is to determine the utility of VBG measurements in ED patients with exacerbation of chronic obstructive pulmonary disease; this preliminary study attempted to establish the correlation of arterial blood gas (ABG) and VBG values as measured in our community hospital.

Methods: We retrospectively compared ABG and VBG values obtained in unselected ICU patients who had venous and arterial samples drawn simultaneously. All venous blood samples were from peripheral sites as were all arterial samples. All standard ABG parameters ( $P_{O_2}$ , pH,  $P_{CO_2}$ , and  $PHCO_3$ ) were analyzed using the Pearson method.

Results: For the entire group ( $n=72$ ), the correlation between venous and arterial  $P_{CO_2}$ , pH, and  $PHCO_3$  were  $r^2=0.96$ , 0.97, and 0.97, respectively ( $P<.05$ ). Correlation with  $P_{O_2}$  was poor ( $r^2<0.18$ ,  $P>.5$ ). Data from patients in the following subgroups were analyzed: (1)  $P_{aO_2}<100$  ( $n=46$ ); (2)  $P_{aO_2}<70$  ( $n=25$ ); (3)  $P_{vO_2}<35$  ( $n=41$ ); (4)  $P_{CO_2}>35$  ( $n=35$ ), and (5)  $P_{CO_2}>50$  ( $n=6$ ). Correlation for all measurements was high with  $r^2>0.95$  ( $P<.05$ ), with the exception of  $P_{O_2}$  ( $r^2<0.90$ ).

Conclusion: ABG measurements of  $P_{CO_2}$ , pH, and  $PHCO_3$  (but not  $P_{O_2}$ ) can be accurately predicted from peripheral VBG studies in ICU patients with widely varying levels of  $P_{aO_2}$  and  $P_{aCO_2}$ . Applicability of this finding to selected patients in the ED would have considerable clinical utility but requires confirmation.

## 97 Hematuria in the Evaluation of Renal Colic: Is It Helpful?

Jones JB, Giles BK, Haley L, Cordell WH/Indiana University School of Medicine-Methodist Hospital, Indianapolis, IN

**Study objective:** To determine the likelihood ratio (LR) for hematuria in the evaluation of patients with a suspected renal calculi.

**Methods:** A retrospective review of 356 charts was conducted over a 12-month period at an inner-city tertiary care teaching hospital with an annual census of 85,000 visits. Patients were identified by *International Classification of Diseases—ninth revision* codes and the renal colic database of patients who presented to our emergency department with suspected renal colic. Inclusion criteria included all patients given a diagnosis of kidney stone, nephrolithiasis, or ureteral colic. Patients were excluded if their chart was unavailable for review or did not have a confirmatory test performed to document the presence or absence of a renal calculi. If patients did not have the urinalysis results documented, it was assumed to be negative for statistical evaluation. The presence of hematuria was determined by a standard urinalysis. A Fisher's exact test was performed to determine the strength of association between the test (a urinalysis) and the disease state (renal calculi). The LR for a positive (LR+) and negative (LR-) test were calculated.

**Results:** Three hundred fifty-six charts were identified with 345 available for review. A 2x2 contingency table was constructed and LRs were calculated. Two hundred fifty-two of the 345 (73%) had confirmed renal calculi. Of these, 208 (83%) had a positive urinalysis, whereas 44 (17%) had a negative urinalysis for blood. The LRs for a positive and negative test were calculated to be 1.097 and 0.706, respectively. A 2-sided Fisher's exact test did not show a significant association ( $P=.1668$ ) between the presence of hematuria and the presence of a renal calculi.

**Conclusion:** The LRs indicate that the presence or absence of hematuria has a negligible impact in the evaluation of renal colic.

## 98 Respiratory Isolation Precautions in HIV-Infection Patients With Pneumonia—A Preliminary Analysis

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**Study objectives:** To assess factors that determine respiratory isolation precautions usage and the risk of tuberculosis (TB) in HIV-infected patients presenting with pneumonia in the emergency department.

**Methods:** From an ongoing study since July 1997, data were prospectively collected on patients who are 18 years or older who were admitted to the hospital with suspected pneumonia or tuberculosis at 11 university-affiliated EDs located throughout the United States. Data were selected from known HIV-infected patients.

**Results:** Of the 3,775 patients admitted for pneumonia, 852 (22.6%) were known to be HIV-infected. Of the 852 HIV-infected patients, 213 (25.0%) were initially placed into true respiratory isolation in the ED and 621 (72.9%) were admitted to isolation rooms. The emergency physician's assessment of the risk of TB in these patients were 3.2% very unlikely, 31.6% unlikely, 53.5% possible, 6.9% probable, and 4.8% highly probable. The final discharge diagnoses on these HIV-infected patients were 425 (49.9%) pneumonia, 299 (35.2%) *Pneumocystis carinii* pneumonia, 101 (11.9%) TB, and 6 (0.7%) other diagnoses. Seventy patients (69.3%) with TB were not initially placed into a respiratory isolation room in the ED and 3 (3.0%) were not admitted to isolation rooms. Important reasons for admitting to isolation rooms included chest radiographic findings (57%), HIV risk (53%), symptoms (50%), TB or purified protein derivative history (47%), epidemiologic risk factors (47%), and acid-fast bacillus results (19%).

**Conclusion:** A substantial proportion of HIV-infected patients with TB pneumonia were not placed in ED respiratory isolation rooms. However, the actual percentage of patients with tuberculosis is very small. The most commonly cited factors for respiratory isolation were chest radiography findings and HIV risk. The development of better criteria for respiratory isolation precautions will be necessary to improve the utilization of the isolation rooms.

## 99 An Emergency Department–Based Pneumococcal Vaccination Call-Back Program

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**Study objectives:** Pneumococcal vaccination (PV) is poorly used in the United States. Emergency departments present an opportunity to vaccinate patients at high risk for pneumococcal disease. Previous studies have verified that PV can be successfully given

in the ED. The purpose of this study was to increase the utilization of PV by contacting patients by phone who were recently seen in the ED with indications for PV.

**Methods:** The study was a retrospective review of all charts of adult patients evaluated in the ED over a 50-day period. Patients with PV indications were identified from the chart reviews. These patients were then surveyed prospectively by phone or in person (hospitalized patients) within 72 hours of their ED visit. Data recorded prospectively included the following: previous PV within 5 years, specific indications for PV and whether the patient was willing to return to the ED to receive PV, or if they preferred to receive PV from their primary physician (PMD). Patients returning to the ED were given PVs according to standing orders. Patients admitted through the ED were given PVs by their physicians. A follow-up survey was conducted for patients who reported they would receive the vaccine elsewhere.

**Results:** A total of 6,810 charts were reviewed; 1,156 (17%) of the total had Centers for Disease Control and Prevention (CDC) indications for PV. Of those patients with CDC indications, 334 patient charts were excluded because they were nursing home residents, lived more than 1 hour from the ED, had no phone, or had multiple ED visits. Of the remaining 812 patients, 580 patients were successfully contacted by phone and 232 could not be reached despite 3 attempts. More than 47% (275/580) of these eligible patients who were contacted by phone or in person had previously received PV. Nearly 79% (241/305) of the eligible patients not previously immunized agreed to receive the PV. A total of 69 patients (23% of those not previously immunized) were vaccinated during the program. Thirty-one (45%) received PV during their admission, 35 (51%) returned to the ED for PV, and 3 patients (4%) received PV during their initial ED visit. Seventy-eight (26% of 305) patients said they would receive PV from their PMDs. Of these patients, 42 were contacted for follow-up and 20 or nearly half reported receiving PV from their PMDs.

**Conclusion:** The study found a higher than expected number of previously immunized patients (47% versus 5% to 20% in previous studies). Of those who reported that they were not vaccinated, most (79%) said they would now receive PV either in the ED or from their PMDs. As a result of the call-back program, a significant number of patients received PV either by returning to the ED, from their physician in the hospital, or from their PMD. Although labor-intensive, this program further demonstrates that eligible ED patients are willing to receive PV in the ED or they can be educated to request PV from their PMDs.

## 100 The Misdiagnosis of Liver Abscess in the Emergency Department

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**Study objective:** The purpose of this study was to find the misdiagnosis of liver abscess in the emergency department to delineate the appropriate indications of ultrasonography (US) and computed tomography (CT).

**Methods:** We retrospectively reviewed the cases of liver abscesses, identified by *International Classification of Diseases—ninth revision* codes, treated at a tertiary care hospital in Taipei, the capital of Taiwan, from January 1995 to January 1999. All enrolled cases were newly diagnosed at our ED or after admission to our wards through the ED. Cases diagnosed at other hospitals were excluded from our study. We tried to explore the possible cause(s) of misdiagnoses through literature review and our clinical judgment and experience. The following parameters, such as fever without a definite origin lasting more than 3 days, the presence of sepsis, WBC count  $>20,000/\text{mm}^3$  or band form  $>6\%$ , the presence of abnormal liver function tests (especially alkaline phosphatase), the presence of epigastric or right upper quadrant pain or tenderness, and the presence flank pain or flank knocking pain, were indicators for a further examination for possible presence of liver abscess. In our hospital, every emergency physician should receive a 3-month full-time training in US before getting an attending emergency physician position.

**Results:** In this period, we collected 160 cases in total and found 83 (51.9%) cases with initial misdiagnoses. Surprisingly, at least 94 (58.8%) patients had visited other clinics and hospitals before coming to our ED, with misdiagnoses ranging from upper respiratory tract infection or abdominal pain to fever of unknown origin, sepsis, or meningitis. Among the 83 cases with misdiagnoses, 3 (3.6%) were related to atypical presentations, 5 (6%) to inadequate laboratory examinations, 41 (49.4%) to failure to perform US in the ED, 33 (39.8%) to US failure to identify the lesions, and 6 (7.2%) to the unavailability of US at midnight. The possible causes of US failure to identify a lesion in 33 cases were explored: 12 (36.4%) cases had small lesions, 8 (24.2%) early lesions, 10 (30.3%) intrahepatic duct stone or dilation, 9 (27.3%) presence of other



diseases (acute cholecystitis, biliary tract infection, or pancreatitis), 6 (18.2%) peripheral lesions, 12 (36.4%) fatty liver or coarsening of liver, 4 (12.1%) air within abscess or ileus, and 1 rapid breathing. Five (15.2%) cases were primarily related to physicians' factors (4 reading error and 1 technical error). However, no causes of US failure could be identified in 4 cases. Furthermore, the immediately diagnosed and initially undiagnosed groups seemed to have no statistical differences in age, the presence of diabetes mellitus, and clinical parameters.

**Conclusion:** In Taiwan, liver abscess is not a rare disease. In this study, misdiagnoses occurred in a high portion of cases, and most cases were the result of failure to order or perform a US examination and failure of US to find a lesion in the ED, not because of the different clinical presentations. A diagnosis protocol of liver abscess will be presented. Emergency physicians should understand the indications of ordering the appropriate laboratory examinations (liver function tests) and US in patients with fever of unknown origin or prolonged fever and abdominal pain (especially right upper quadrant pain). From our study, there were many reasons for negative US examinations in liver abscess, so CT may be necessary for cases with prominent PE or laboratory abnormalities of some clinical conditions.

## 101 Antibiotics Are Rarely Required Following Rattlesnake Envenomation

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**Study objectives:** To record the incidence of patients with rattlesnake bites (RSBs) who require antibiotics or develop a wound infection.

**Methods:** This prospective observational study was conducted at a tertiary care teaching hospital with an affiliated poison center. Participants were all patients treated at our institution with RSBs during a consecutive 18-month period. Median age was 32.8 years (range 4 to 67 years). Inclusion criteria were as follows: RSBs  $\leq 24$  hours old and completion of follow-up (phone or letter or toxicologist or private physician consultation) at 7 to 10 days with documentation of infection or requirement for antibiotics.

**Results:** Fifty-six patients were enrolled. One patient was excluded because of presentation 38 hours after envenomation, and 2 patients failed to complete the required follow-up. One patient received a dose of "prophylactic" antibiotics (cephalexin) before transfer and was discontinued on arrival. Thirty-two (60%) RSBs involved the upper extremity and 21 (40%) involved the torso. Six (11%) of the patients applied ice, and 2 (4%) used a tourniquet before evaluation. The mean arrival time was 2.7 hours (range <1 to 24 hours). Forty-three (81%) patients received antivenin. Fifty-three (100%) patients had extremity swelling, and 38 (72%) patients had tender proximal lymph nodes. Thirty-seven (70%) patients had an elevated prothrombin time ( $>13$  seconds), 31 (58%) patients had a decreased fibrinogen level ( $<150$  mg/dL), and 35 (66%) patients had low platelet counts ( $<150,000/\text{mm}^3$ ). Of the 53 patients whom completed the study, 3 (6%) received antibiotics from their primary care physician at 7-to 10-day follow-up, with no cases (0%) of documented infection. No correlation could be made between age, medical history, hematologic changes, time of presentation, prehospital treatment, use of antivenin, presence of extremity swelling, or lymph node tenderness.

**Conclusion:** Antibiotics are rarely indicated in patients with RSBs.

## 102 Abscess Location and Wound Culture Results: A Comparison Between Intravenous Drug Users and Nonusers With Extremity Abscesses

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**Study objective:** To compare the location and wound culture organism type found in extremity abscesses in intravenous drug users (IVDUs) and non-IVDUs emergency department patients.

**Methods:** This was a retrospective analysis of all adult patients who presented to our urban ED from July 1997 to May 1998 with an *International Classification of Diseases—ninth revision*, code of cellulitis. Patients were eligible for inclusion if they had an abscess that underwent incision and drainage and a wound culture was obtained. History of IVU was obtained by self-report.  $\chi^2$  Testing was used to compare organisms, location, and gender between IVDUs and non-IVDUs. A *P* value of  $<.05$  was determined to be statistically significant.

**Results:** During the study period, 104 patients had abscesses and wound culture obtained. IVU was reported in 51 (49%) of the patients. There was no significant gender difference in the IVU and non-IVU group ( $P=.523$ ). Abscesses occurred significantly more often in the upper extremity in the IVU group (68.6%) than the non-

IVU group (31.4%,  $P=.005$ ). Wound culture revealed no growth in 13 patients (5 IVDUs and 8 non-IVDUs). In the remaining 91 patients, a total of 13 organisms were identified. The most commonly identified organisms were *Staphylococcus aureus* (48.4%; (44/91), *Streptococcus viridans* (35.2%; 32/91), *Prevotella* spp (15.4%; 14/91), and *S. pyogenes* (14.3%; 13/91). The IVU group was significantly more likely to have wound cultures positive for *S. viridans* than non-IVDUs, with a relative risk of 2.66 (95% confidence interval 1.36 to 5.18). There were no significant differences in the number of wound cultures positive for *S. aureus*, *Prevotella*, and *S. pyogenes* between the 2 groups.

**Conclusion:** The IVU group had significantly more upper extremity abscesses and more wound cultures positive for *S. viridans* than the non-IVU group. This may affect choice and use of antibiotics in the IVDUs.

## 103 Initiating Antibiotic Therapy in the Emergency Department Decreases Length of Stay for Patients With the Diagnosis of Community-Acquired Pneumonia

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**Study objectives:** The administration of antibiotics in the emergency department to patients diagnosed with community-acquired pneumonia (CAP) decreases the length of stay in the hospital for these patients compared with patients receiving their first dose of antibiotic on admission to the medical floor.

**Methods:** This was a retrospective chart review of 100 cases of CAP admitted during 1998 from the ED. The setting is an urban, university-affiliated hospital with an emergency medicine residency program. Univariate analysis as well as multivariate regression analysis was performed.

**Results:** Nine cases were excluded for either not meeting standard clinical definition of CAP or the hospital course was significantly prolonged for reasons unrelated to the CAP admission (ie, awaiting placement). Although the study population was primarily an older population (mean age 49.6 years) with significant co-morbidity (40%), the overall mortality rate was 0%. A univariate analysis was performed to determine which clinical or process variables predicted longer length of stay. Age, chronic obstructive pulmonary disease, and time to administration of antibiotic ("door to needle" time) were the 3 variables associated with a longer length of stay. Sixty-two percent of patients received their initial antibiotics in the ED. ED administration of antibiotics led to a statistically significant decrease in "door to needle" time (189.9 minutes versus 615.5 minutes;  $P<.001$ ). Initiation of antibiotics in the ED was associated with a significant shorter length of stay (4.8 days versus 8.5 days;  $P=.001$ ).

**Conclusion:** Initiation of antibiotic therapy in the ED will decrease the length of stay in the hospital for patients admitted with the diagnosis of CAP. Decreasing the length of stay will lead to significant cost savings for the hospital. ED therapy can have significant impact on the future hospital course of the patient, as well as produce cost savings to the hospital.

## 104 Chagas' Disease in a Chest Pain Unit

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Chagas' disease (CD) is an important public health problem in Latin and South America and it is known to cause nonischemic chest pain. In the United States, most identified cases of CD are end-stage cardiac presentations. Early identification of CD in the United States has never been attempted. Because anti-trypanosomal medications are showing new potential for the treatment of early CD and the prevention of late sequelae, early identification is important.

**Study objective:** To identify new cases of CD presenting as ischemic mimics in a chest pain unit (CPU).

**Methods:** CPU patients at risk for CD were identified by a history of Mexican, Central, or South American habitation. Serum titers for CD were sent on these patients in the CPU. A retrospective chart review of serology-proven CD from November 1, 1997, to February 17, 1999 (15 months) was performed.

**Results:** Two thousand seventy-seven patients were seen in the CPU; among these, 1,161 Chagas' titers (56%) were performed. Sixteen positive serologic findings were identified, revealing a 1.4% incidence rate of CD in our "at-risk" CPU population. Eight (50%) of the 16 patients had no evidence of chronic Chagas' cardiomyopathy (congestive heart failure, cardiomegaly, or conduction abnormalities). Eleven (69%) of 16 patients had no identifiable cardiac origin of their chest pain, such as myocardial ischemia or infarction, coronary artery disease (CAD), congestive heart failure (CHF), or arrhythmias.

The remaining 5 of 16 patients had alternate diagnoses emerge from their CPU admission (2 CHF, 2 ischemic changes during stress testing, 1 CAD treated with angioplasty).

Conclusion: Because of immigration patterns, CD is prevalent in Los Angeles. We found CD in 1.4% of patients in our CPU who have lived in an endemic area; 50% of these patients had no evidence of current cardiac involvement and may be suitable for treatment with anti-trypanosomal medications. Early identification of CD at a stage where treatment potential exists can be accomplished in a CPU. Anti-trypanosomal treatment protocols are planned for the future at our institution. These results may apply to other areas of the United States with similar immigration patterns (Table).

**Table, abstract 104.**

**Immigration patterns in endemic areas.**

City	% Total Hispanic Population	% Mexican Population	% Central American Population	% South American Population
Miami	62	1	12.0	3.5
Los Angeles	40	27	9	1.2
Albuquerque	34	18	0.2	0.2
Houston	28	22	2.8	0.8
New York City	24	1	1.4	3.0
Denver	23	16	0.1	0.2
Dallas	21	18	0.8	0.3
San Diego	21	17	0.4	0.4
Phoenix	20	18	0.3	0.2
Chicago	20	13	0.8	0.6

Source: US Census Bureau 1990.

## 105 Frequency of Adverse Reactions to Prochlorperazine in the Emergency Department

Olsen JC, Clark JA, Keng JA/Lutheran General Hospital, Park Ridge, IL, University of Chicago Hospitals, Chicago, IL

Study objective: Prochlorperazine (PCZ) is a commonly used medication in the emergency department. We sought to determine the frequency of adverse reactions to the use of PCZ in this setting.

Methods: A prospective, descriptive study was performed at a suburban, community teaching hospital. Consecutive ED patients age  $\geq 18$  years who received PCZ for any indication and by any route of administration were included. The physician caring for the patient then completed a data collection form documenting any adverse reactions that developed in the ED related to the medication. The patients were then contacted by phone within 2 weeks of their ED presentation to inquire about delayed adverse reactions to the medication.

Results: Two hundred twenty-nine patients were enrolled in the ED and 192 (84%) were contacted in follow-up. The age range was 18 to 88 years (mean 46 years); 77% were female and 23% male; route of administration was 94% intravenous and 6% intramuscular; 61% received 10-mg and 39% received 5-mg dosages; 75% received the medication for nausea/vomiting and 25% for headache. Akathisia occurred in 36 (16%) patients (25 in the ED, 11 after ED discharge). Dystonia occurred in 9 (3.9%) patients (4 in the ED, 5 after ED discharge).

Conclusion: Use of PCZ in the ED precipitated akathisia in 16% of patients and dystonia in 3.9% of patients. Many of these reactions occurred after discharge from the ED. Clinicians and patients need to be aware of these potential adverse reactions to the use of PCZ in the ED.

## 106 Geriatric Trauma in the State of Illinois: Substance Use and Injury Patterns

Coker SB Jr, Zautcke JL, Morris RW, Stein-Spencer LS/University of Illinois at Chicago, Illinois Department of Public Health, Chicago, IL

Study objective: To determine the incidence of alcohol and illicit drug use in association with the mechanism of injury in elder trauma patients presenting to Level I and II trauma centers in the State of Illinois from 1993 to 1995.

Methods: A retrospective analysis was performed on 3 years of data (January 1, 1993, to December 31, 1995) provided by the Illinois Department of Public Health as the Illinois Trauma Registry, which describes consecutive trauma patients presenting to Level I and level II trauma facilities in the State of Illinois.

Results: During the study period, there were a total of 134,846 trauma patient entries. Of these, 32,382 (24.0%) were 65 years of age or older. In these patients 65 years and older, 1,699 (5.2%) were tested for alcohol and 845 (49.7%) had positive alcohol tests. Of elder patients who tested positive for alcohol, 71.8% were considered legally intoxicated. Urine toxicology screens were performed on 1,785 (5.5%) of elderly trauma victims and 208 (11.6%) were positive. In addition to alcohol, benzodiazepines and opiates were the most frequently detected drugs in elder trauma patients. For elders under the influence of alcohol, falls (49.1%) and motor vehicle crashes (36.4%) were the most common mechanism of injury. For elders testing negative for alcohol, motor vehicle crashes were a much more common mechanism of injury than falls (64.8% versus 24.9%).

Conclusion: Alcohol and substance abuse is a factor in elderly trauma. Although only 5% of elder trauma patients were tested for alcohol, nearly half had alcohol present on presentation to a trauma center and the majority of these patients were considered legally intoxicated. Furthermore, falls were a much more common cause of trauma in elderly patients using alcohol than in elder patients not using alcohol. As life expectancy increases and elders lead more active lifestyles, threats of exposure to injury multiply. Therefore, greater efforts are needed in the areas of geriatric substance abuse and injury prevention.

## 107 Tracking Iatrogenic Poisoning Fatalities Using the American Association of Poison Control Centers Toxic Exposure Surveillance System

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Study objectives: Studies have shown that drugs are the most common cause of iatrogenic disease in hospitalized patients. A small, but significant percentage of these errors lead to death. The purpose of the study is to describe the iatrogenic fatalities related to drugs and toxins that are reported to the American Association of Poison Control Centers (AAPCC) Toxic Exposure Surveillance System (TESS).

Methods: A retrospective review of all published abstracts of fatalities reported by the AAPCC TESS from 1985 through 1997 was performed by 2 investigators. These abstracts are published annually in a peer-reviewed emergency medicine journal. Fatalities that were thought to be most likely the result of iatrogenic causes were identified. Interobserver agreement was required to categorize the fatality as iatrogenic. Iatrogenic deaths were described by specific drug or toxin, type of error, location of error, and sex and age of the patient.

Results: Between 1985 and 1997, 7975 fatalities were reported to TESS. Of these fatalities, 996 abstracts were published. Forty-one (4.1%) of these abstracted fatalities were most likely related to iatrogenic causes. Cardiac medications were the most common type of agent involved (18% of cases) followed by antiseptic agents (12%). Two of the most commonly implicated medications that are commonly used in the emergency department were lidocaine and activated charcoal. Overall, the most common type of error was incorrect dose (41%) followed by incorrect route (21%) and incorrect medication (21%); 94% of the fatal errors occurred in the hospital including the ED.

Conclusion: According to AAPCC TESS abstracted data, iatrogenic causes are responsible for about 1 in 25 poisoning deaths. An understanding of the agents involved and the circumstances of these tragic deaths may help to prevent further iatrogenic disasters in the future. Reporting poisonings including therapeutic misadventures to the AAPCC TESS is encouraged to optimize tracking of these unexpected incidents.

## 108 The Use of Herbal Medications Among the Pediatric Population at a Large Urban Community Hospital

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Study objective: The purpose of our study was to survey the prevalence of the use of herbal medicine in pediatric patients presenting to the emergency department at New York Methodist Hospital, and to compare the use of herbal medicine among different demographic subgroups.

Methods: We performed a cross-sectional survey from the pediatric ED of an urban, university-affiliated hospital. After informed consent, data were obtained through a survey instrument administered to all patients and their caretakers on presentation to the department. Demographic information and pattern of herbal medication usage were determined.

Results: A convenience sample of 84 surveys was evaluated. They were distributed

to the pediatric patients over a 3-month period. Of the 84 patients, 14 (17%) patients had used some form of herbal medicine, either self-prescribed or given to them by their caretaker. Average age of the herbal medication user was 9.4 years old versus 6.5 years old for the nonusers. Fifty-seven percent of the users were male, and 50% of the nonusers were male. Twenty-four percent of the African American patients who came to the pediatric ED were users of herbal medications; 18% of the Hispanic patients were users; 12% of patients of Caribbean origin were users; 11% of the Caucasian patients were users. No Asian patients in our sample were users of herbal medications.

Conclusion: Herbal medications are being used in the pediatric patient population. It is more prevalent among minorities, especially among the African American population. Health practitioners should be aware of the frequent use of herbal medications among patients presenting to the pediatric ED.

## 109 A Survey on the Use of Alternative Therapy in Children by Adult Caregivers

Jacobson S, Majeed S, Wilets I/Mount Sinai School of Medicine, New York, NY

Study objective: To determine the prevalence of alternative therapy usage in children younger than 18 years.

Methods: This prospective study surveyed a convenience sample of 476 patients and visitors encountered in both adult and pediatric emergency department waiting rooms in a metropolitan medical center. After obtaining informed consent, a questionnaire was administered which asked study participants about their use of alternative therapies for themselves and, if applicable, for their children. Of the 476 study participants, 246 (52%) indicated they were a caregiver (ie, parent or guardian) to a child younger than 18 years. The following data are specific to this subgroup of survey participants.

Demographic data were collected along with questions on the use of alternative therapy in children. Study investigators distinguished alternative therapy from Western medical care. It was defined as either self-administered care, or care provided by chiropractors, natural healers, herbalists, or homeopaths that does not involve the use of prescription medication. Survey participants were read a list of common alternative therapies such as relaxation techniques, massage, imagery, spiritual healing, herbal and folk medicine, homeopathy, and acupuncture. For each type of therapy, they were asked whether it was used for their children, and if so, the reason for use, who advised the use of therapy, recency of use, and cost.

Results: Herbal medicine was the most commonly used therapy within the pediatric population (10%), followed by folk remedies (8%), massage (6%), and relaxation techniques (4%). The age, gender, racial ethnic group, level of education, and country of origin of the caregiver did not correlate with use of therapy in the child. Bivariate analyses indicated that insurance type correlated with pediatric use of alternative therapy ( $P=.002$ ). Additionally, use of therapy by caregivers correlated with use of the same therapy in the child ( $P<.001$ ). A logistic regression model revealed that caregivers with Medicaid were significantly less likely to use alternative therapy in children than those with private insurance (odds ratio [OR]=0.32, 95% confidence interval [CI]=0.13 to 0.79). Caregivers who used alternative therapy for themselves were 14 times more likely to use it for their child (OR=14.1, 95% CI=4.6 to 43.3).

Conclusion: Approximately 10% of surveyed adults used folk remedies, massage, and relaxation techniques in their children. Pediatric use of complementary medicine was related to caregiver use and payer class. Providers for both children and adults should routinely inquire about the use of alternative therapies, especially given recent intensive marketing by the pharmaceutical industry and increasing public acceptability.

## 110 Body Weight Gain and Food Intake Following Recurrent Methcathinone Intoxication

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Study objective: The designer drug, methcathinone (CAT), has recently been recognized as a drug with abuse potential that causes significant human intoxication. The psychomotor stimulus imparted by CAT has been shown to be similar to those of cocaine and methamphetamine. Furthermore, these sympathomimetic drugs are powerful anorectic agents, a characteristic to which tolerance rapidly develops. In this study we attempt to determine whether CAT possesses similar properties and if subsequent tolerance will develop to this action.

Methods: Conscious rats were given twice daily injections for 28 days before feeding. The first injection, 30 minutes before food presentation, consisted of either normal saline (1 mL/kg) or dextrophan (25 mg/kg), a noncompetitive glutamate receptor antagonist that has been shown to mitigate cardiovascular, hyperthermic, convulsive,

and lethal responses to CAT. The second injection, 15 minutes before food presentation, consisted of either normal saline (1 mL/kg) or racemic CAT HCl (2 mg/kg).

Twice daily body weight measurements, water, and food intake (during a 4-hour daily feeding) were recorded (approved by Animal Care Committee).

Results: CAT-treated rats increased body mass less (+34.3 g;  $n=10$ ) than did control rats (+47.1 g;  $n=9$ ). However, CAT caused an increase in food intake (+13.7 g;  $n=10$ ) over control (-2.04 g;  $n=9$ ). Dextrophan pretreatment did not alter the rate of increase in body mass in CAT-treated rats (+33 g;  $n=11$ ) over control (+36 g;  $n=10$ ). Dextrophan pretreatment of CAT-treated rats did not alter the increase in food intake (+29.5 g;  $n=11$ ) over control (+13.1 g;  $n=10$ ).

Conclusion: CAT causes weight loss despite a paradoxical increase in food intake. Dextrophan pretreatment did not alter these responses, suggesting that glutaminergic receptors do not mediate CAT-induced weight loss and food intake. Our data suggest that tolerance to the effect of CAT-induced body mass loss develops rapidly.

## 111 Combined Evidence-Based, Consensus Guidelines for the Stocking of Emergency Antidotes

Dart RC, Goldfrank L, Chyka PA, Lotzer D, Woolf AD, McNally J, Olson KR, Scharman E, Snodgrass WR, Geller RJ, Spyker D, Kraft M, Lipsey R/Rocky Mountain Poison and Drug Center, University of Colorado Health Sciences Center, Denver, CO; Bellevue Hospital Center, New York University Medical Center, New York, NY; Southern Poison Center, University of Tennessee, Memphis, TN; University of Wisconsin Hospital Poison Center, Madison, WI; Massachusetts Poison Control Center, Harvard Medical School, Children's Hospital, Boston, MA; Arizona Poison and Drug Information Center, University of Arizona, Intergroup of AZ, Tucson, AZ; California Poison Control System, San Francisco, CA; West Virginia Poison Center, Charleston, WV; Southeast Texas Poison Center, University of Texas Medical Branch, Galveston, TX; Georgia Poison Center, Emory University School of Medicine, Atlanta, GA; Food and Drug Administration, Washington, DC

Study objectives: Practice guidelines are becoming common in emergency medicine. This project documented the process of a combined evidence-based medicine (EBM) and consensus approach to guideline development for stocking of emergency antidotes.

Methods: This study used a combined EBM and consensus process. Systematic, defined information collection was performed and strict EBM recommendations for 4 predefined questions were presented to a consensus panel (12 diverse provider groups: clinical pharmacology, critical care, clinical pharmacy, emergency medicine, hospital pharmacy, internal medicine, managed care, clinical toxicology, pediatrics, poison control, pulmonary medicine, regulatory medicine). Consensus was formed by electronic iterative presentation to each panel member using a modified Delphi method.

Results: More than 2,000 articles were considered; 580 were included in the EBM procedure. All panelists participated in all 5 rounds of analysis. The panel generated a total of 355 comments and recommended addition of 24 articles. Of 20 antidotes considered, 16 antidotes and stocking amounts were recommended (N-acetylcysteine, crotaled antivenin, atropine, calcium, cyanide kit, deferoxamine, digoxin Fab, dimercaprol, ethanol or fomepizole, glucagon, methylene blue, naloxone, pralidoxime, pyridoxine, NaHCO<sub>3</sub>). Stocking was not recommended for 2 antidotes (black widow antivenin, ethylene diaminetetraacetic acid), and consensus was not reached for 2 others (flumazenil, physostigmine). The median time to consensus was 1 round (range 1 to 4) to determine if an antidote was needed and 2 rounds to recommend the dose of antidote (range 2 to 5). In addition, the consensus process identified numerous related issues.

Conclusion: A combined EBM-consensus exercise was effective in forming consensus. Consensus formation followed a biphasic pattern. These guidelines may be used by hospitals to create and revise their policies regarding antidote stocking.

## 112 Factors Associated With Head and Neck Injury in Air Bag-Deployed Crashes

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Study objective: To describe the factors associated with the occurrence of head and neck injuries in serious and fatal car crashes in which air bags are deployed.

Methods: This study was a retrospective review of data contained in the National Highway Traffic Safety Administration (NHTSA) Special Crash Investigation Program database. The database includes information about serious and fatal car crashes in which air bags were deployed, including patient information, seatbelt usage, the change in velocity experience during the crash ( $\Delta V$ ), and injury pattern(s). We compared the frequency of head and neck injuries among patients wearing and not wearing seatbelts, as well as for drivers and passengers, using  $\chi^2$  analysis or Fisher's exact test. We also compared the mean  $\Delta V$  for crashes resulting in head and neck injury and those that did not use  $t$  test.

Results: The database included 62 serious or fatal crashes occurring over a 9-year

period—56 (90.3%) resulting in a fatality and 6 (9.7%) resulting in serious injury. Fifty-five (89%) of the victims were drivers. The frequency of head and neck injury did not differ for victims wearing and not wearing seatbelts (57% versus 45%,  $\chi^2$   $P=.378$ ). The  $\Delta V$  did not differ for victims with and without head and neck injury either (12.3 mph versus 12.6 mph,  $t$  test  $P=.795$ ). Passengers were more likely to suffer head and neck injury than drivers (100% versus 42.9%, Fisher's exact test  $P=.0048$ ).

Conclusion: Passengers in serious or fatal car crashes in which an air bag deploys are more likely than drivers to suffer head and neck injuries. Seatbelt usage and the  $\Delta V$  do not appear to be related to the occurrence of head and neck injury in such crashes.

## 113 The Effect of Bretylium Tosylate on ECG-Guided Pericardiocentesis

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Emergency ECG-guided pericardiocentesis is an important diagnostic and therapeutic maneuver when cardiac tamponade is suspected. It may be complicated by ventricular fibrillation and cardiac arrest. With ECG-guided pericardiocentesis, a current of injury or ectopy is evidence that the tip of the advancing needle has irritated the myocardium. This ECG clue allows the operator to slightly withdraw the needle from the myocardium back into the pericardium. Bretylium may be used when life-threatening arrhythmias are refractory to treatment with lidocaine. The effect of bretylium on the current of injury or ectopy induced by the ECG-guided pericardiocentesis is unknown.

Study objectives: To investigate the effect of bretylium on the current of injury or ectopy induced during ECG-guided pericardiocentesis.

Methods: A convenience sample of Yorkshire-Vermont pigs were used in both control and study groups. All pigs were intubated and anesthetized with inhaled isoflurane. An 18-gauge spinal needle was inserted into the pericardium and advanced toward the myocardium in controls. The development of a current of injury, ectopy, or blood aspirated from the ventricle into the needle was recorded. In the study group, bretylium 5 mg/kg IV followed by a 10-mg/kg dose was administered before the ECG-guided pericardiocentesis.

Results: Thirty-eight (92%) of the 41 controls developed either a current of injury or ectopy when myocardium was irritated. Two (4.8%) of 41 showed no change in cardiac rhythm when the needle aspirated ventricular blood. One animal developed irreversible ventricular fibrillation. In the study group, 2 (33%) of 6 developed either a current of injury or ectopy when the myocardium was irritated; 4 (66%) of 6 showed no change in the cardiac rhythm when the needle aspirated ventricular blood.

Conclusion: Bretylium suppresses the current of injury and associated ectopy during ECG-guided pericardiocentesis in swine pretreated with bretylium. Limitations of this study are that work was completed in swine in a small study sample.

## 114 Review of the Compliance With Advanced Trauma Life Support Protocol Among Patients Referred to a Level I Trauma Centre

Lewell M, McCauley W, Anderson S, Lee A/London Health Sciences Centre, University of Western Ontario, London, Ontario, Canada

Study objective: The purpose of this study was to review the compliance with Advanced Trauma Life Support (ATLS) protocol among trauma patients referred to the London Health Science Centre (LHSC) and to recommend strategies for improvement of trauma care. The study was conducted at a Level I regional trauma centre teaching hospital with university affiliation.

Methods: This was a retrospective chart review of all trauma patients with an Injury Severity Score (ISS)  $>12$  referred to LHSC between May 1995 and April 1996.

Results: A total of 170 patients were reviewed; complete data were available for 129 in the trauma team activated (TTA) group and 29 in the trauma team not activated group (TTNA). Deviations from ATLS protocol were defined as follows: minor (no effect on morbidity or mortality), moderate (possible but no immediate effect on morbidity and mortality), and severe (life- or limb-threatening consequences). In the TTA group, there were a total of 217 deviations (136 minor, 55 moderate, and 26 severe). In the TTNA group, there were a total of 69 deviations (48 minor, 16 moderate, and 5 severe). The mean number of deviations from protocol per patient was 1.5 in the TTA group versus 2.4 in the TTNA group ( $P=.002$ ). The mean ISSs were 28.3 for TTA and 19.6 for TTNA ( $P=.02$ ).

Conclusion: In our population of referred patients with an ISS  $>12$ , 17% do not have TTA. In the TTA group, there was a mean of 1.5 deviations from ATLS protocol per patient and 2.4 in the TTNA group. This occurred despite the fact that the mean ISS was significantly lower in the TTNA group. ATLS education among referring hos-

pitals should be enhanced in an effort to lower the total number of deviations from protocol. Early trauma team activation must be emphasized.

## 115 The Utility of the Lateral Chest Radiograph in Trauma Patients

Chang AK, Legome EL, Bell TV, Lawrason JN, Rao P/Massachusetts General Hospital, Boston, MA

Study objective: We hypothesized that the addition of the lateral chest radiograph does not add clinically important information about chest pathology to the posterior-anterior (PA) chest radiograph in trauma patients.

Methods: The radiology database of an urban Level I trauma center was queried for all trauma patients who sustained potential chest injury from January 1, 1996, through December 31, 1998. Seventy-four pairs of PA and lateral chest radiographs that were identified as abnormal because of trauma were randomly mixed with 74 radiographs from the same database that had been formally interpreted as not having any acute abnormality. A dedicated emergency radiologist (JNL) and a fellow in emergency radiology (TVB), who were blinded to the previous readings, prospectively reviewed the films. While reading the randomized study and control films, they were asked if the lateral radiograph added any information not seen on the PA radiograph. The data were then reviewed for clinical significance.

Results: A total of 148 film pairs (74 study, 74 control) were independently reviewed by each radiologist. Of the study group, differences in interpretations among the radiologists were found in 18 (24%) of 74 ( $\kappa=.037$ ). Eight (11%) of 74 (95% confidence interval [CI] 3% to 19%) had subtle findings missed by both radiologists. JNL found 25 lateral radiographs, whereas TVB found 10 lateral radiographs to have additional information not seen on the PA radiograph. Combined, 27 (36%) of 74 (95% CI 25% to 47%) films had lateral radiographs that provided additional information not available on the PA radiograph alone. Of these 27 films, 15 (56%, 95% CI 37% to 75%) had abnormalities related to trauma. Nine (60%) of 15 were thoracic or lumbar spinal fractures, 3 (20%) of 15 were rib fractures, 2 (13%) of 15 were sternal fractures, and 1 (4%) showed better localization of a bullet. None of the remaining 12 films that had abnormalities related to medical conditions (ie, atelectasis, pectus) had significant clinical importance.

Conclusion: The lateral chest radiograph rarely adds clinically significant pathologic findings to the PA chest radiograph in trauma patients. Surprisingly, it was common to find additional information, but rarely did this change clinical management or disposition. Although vertebral fractures on the lateral radiograph were commonly found, physical examination findings or mechanism of injury should lead one to order spinal films to specifically exclude vertebral fractures in this relatively stable group of patients who are able to undergo PA and lateral radiographs. When clinically indicated, a lateral radiograph should be obtained to rule out a sternal fracture. Nondisplaced rib fractures were uncommonly (11%) revealed on the lateral chest radiograph when not seen on the PA radiograph.

## 116 Efficacy of Anterior Versus Lateral Chest Compressions: A Cadaver Study

Allegra PC, Allegra JR, Schock RB, Lucas J/Morristown Memorial Residency in Emergency Medicine, Morristown, NJ; Data Scope Corp, Fairfield, NJ

The thoracic pump theory is a popular theory of blood flow during cardiopulmonary resuscitation (CPR). In this model, peripheral blood flow during CPR is thought to result from intrathoracic pressure changes generated during chest compressions. The pressure changes are believed to be a result of changes in the volume of the chest cavity. It seems reasonable that a compression technique that has the potential to maximize cross-sectional area changes of the chest would result in greater reduction of chest volume and hence greater blood flow.

Study objective: Our goal was to determine whether lateral chest compressions would produce greater cross-sectional area changes than anterior chest compressions.

Methods: Chest compressions were performed on a 4-hour postmortem cadaver by displacing the anterior chest wall 1.5 in and displacing each lateral side 0.75 in for a total of 1.5 in laterally. Malleable metal stripping was attached to the chest cavity while the body was compressed and uncompressed to capture the axial cross-sectional areas. We then measured the percent changes in cross-sectional area for anterior and lateral chest compressions by measuring the area enclosed by the malleable strips.

Results: Anterior compressions produce a cross-sectional area change 1.7 times larger than the lateral compressions. The percent decrease in cross-sectional area for standard CPR was 10.7%, whereas lateral compressions produced a decrease of 6.2%.

Conclusion: Greater axial cross-sectional area changes occurred with anterior chest



compressions. Based on the popular theory of CPR, one would expect less effective chest compressions with the lateral compression technique.

## 117 Pattern of Injuries in Helmeted Motorcyclists in Singapore

Tham K-Y, Seow E, Wong HP/Tan Tock Seng Hospital, Singapore

The law in Singapore mandates that motorcyclists must wear helmets when riding their vehicles. This is strictly enforced and compliance by locals and foreigners is close to 100%.

**Study objective:** To determine the injuries sustained by helmeted motorcyclists seen in the emergency department.

**Methods:** Data of motorcyclists with vehicular accident injuries were extracted from a database of all consecutive patients older than 15 years who presented to the ED of an urban public hospital in Singapore with trauma-related complaints. Interviews were conducted with a closed-ended questionnaire from December 1, 1998, to March 31, 1999. Data collected were those of demographic, nature of injury, ambulance care, ED care, and disposal.

**Results:** There were 768 motorcyclists, contributing to 50.5% of all motor vehicle accident (MVA) victims, 9.5% of all trauma patients and 2.2% of total ED attendance. An overwhelming majority was men (97%). The mean age of motorcyclists was 32.4 years (95% confidence interval [CI] 31.5 to 33.3), which was significantly different ( $P<.0001$ ) from the mean age of 36.2 years (95% CI 35.1 to 37.4) of other MVA victims. Only 0.8% (95% CI 0.3% to 1.7%) of motorcyclists had clinical signs of recent alcohol consumption, which was not significantly different from the 0.5% (95% CI 0.1% to 1.3%) of other MVA victims. The mean interval between injury and presentation to the ED was 0.33 day (95% CI 0.24 to 0.42). Motorcyclists skidding and sustaining injuries were 46.9%, whereas collision with a car was 35.4%, collision with a heavy vehicle 6.8%, collision with another motorcycle 4.3%, collision with a stationary object 2%, and collision with a pedestrian or cyclist 1.7%. There was 1 death among motorcyclists and 1 death among other MVA victims. The proportion of motorcyclists with serious head injury was 4.6% (95% CI 2% to 8.9%), which was not significantly different from the 2.4% (95% CI 0.7% to 6%) of other MVA victims. Motorcyclists requiring admissions were 22.6% (95% CI 19.6% to 25.6%), which was not significantly different from the 21.9% (95% CI 19% to 24.8%) of admissions among other MVA victims. Of the motorcyclists discharged from the ED after treatment, 47.5% sustained only abrasions, 27.1% had contusions, 15.5% had fractures and/or dislocations of the limbs, 7% had open wounds, and 1% minor head injury. The proportion of motorcyclists sustaining fractures and/or dislocations of the limbs was 15.5% (95% CI 12.6% to 18.5%), which was significantly higher ( $P<.0001$ ) than the 5.9% (95% CI 4.2% to 8.1%) of other MVA victims.

**Conclusion:** Helmets protect motorcyclists from serious head injuries. Motorcyclists are at higher risks of sustaining serious limb injuries compared with other MVA victims. Education of motorcyclists to prevent skidding and to protect their limbs is needed.

## 118 Confirmation of Endotracheal Tube Placement: Analysis of 2,392 Emergency Department Intubations

Walls RM, Barton ED, on behalf of the NEAR 97 Investigators/Brigham and Women's Hospital, Harvard Medical School, Boston, MA

**Study objective:** Physical examination methods of endotracheal tube placement confirmation have been proved to be less reliable than newer methods, such as end-tidal  $\text{CO}_2$  detection and aspiration. This study sought to determine whether newer objective methods to confirm tracheal placement of endotracheal tubes placed in the ED are used to sufficient extent to be considered a standard of care.

**Methods:** This was a prospective, observational study of 2,392 ED intubations in 16 US teaching hospitals during the second phase (August 1997 to November 1998) of the ongoing National Emergency Airway Registry (NEAR 97).

**Results:** A total of 2,392 intubations were registered over this period; 1,756 were in adults, 174 in children <18 years, 462 age unknown. Rapid sequence intubation (RSI), oral intubation with sedation only (SED), oral intubation without medications (NOM), and nasal intubation (NTI) were the first method in 71%, 5%, 14%, and 9%. By method, detected esophageal intubations were reported in RSI 3.6%, NOM 2.3%, NTI 1.8%, and other 5.6%. Most common methods used for tube placement confirmation included auscultation (84%), end-tidal  $\text{CO}_2$  determination (66%), chest radiography (38%), and tube condensation (39%).

**Conclusion:** In these 16 centers, physical examination is supplemented by end-tidal  $\text{CO}_2$  detection in 66% of the cases to confirm tube placement. Aspiration and direct visualization methods are infrequently used (6% and 3% of cases), respectively. Ready availability and widespread use of end-tidal  $\text{CO}_2$  indicates that it is becoming a standard of care for ED intubations, as it is in the operating room.

## 119 The Use of Analgesia by Physicians and Physician Assistants: Who Will Get Me Relief?

Kozlowski MJ, Jackson RE, Wiater JG, Swor RA, Pascual RG/William Beaumont Hospital, Royal Oak, MI

**Study objectives:** Our objective was to compare the use of analgesia by physicians versus physician assistants (PAs) in patients with an isolated lower extremity injury.

**Methods:** Included in the study were all adult patients who presented to a busy suburban teaching hospital with an isolated lower extremity injury and had a radiograph of the ankle or foot over a 9-week period. Patients without trauma, those with multiple trauma, patients admitted to the hospital, and patients seen by a study investigator were excluded. Practitioners were blinded to study objectives. A single investigator contacted patients using a standardized questionnaire. She inquired about their perceived level of pain on emergency department arrival using a 0 to 10 verbal analog scale, about the analgesia they took before arrival, and analgesics they received both in the ED and in prescription form at discharge.  $\chi^2$  and Mann-Whitney  $U$  tests were used for analysis.

**Results:** Of 516 consecutive patients who had radiographs of the ankle or foot, 111 met exclusion criteria and 3 had incomplete data. Of the remaining 403, we contacted 382 (95%) an average of  $2.95 \pm 1.1$  days after injury. Of these, 128 (34%) had a fracture and the remaining were nonfracture injuries. Initial mean pain scores were not statistically different for patients with ( $6.6 \pm 2.4$ ) and without fractures ( $6.8 \pm 2.1$ ), or for whether they were treated by a physician ( $7.1 \pm 2.3$ ) or a PA ( $6.4 \pm 2.1$ ). Fractures were present in 36% of the patients seen by PAs and 29% of those seen by physicians ( $P=NS$ ). Physicians and PAs gave ED analgesia to 29% and 10% of patients, respectively ( $P<.001$ ). Physicians provided a prescription to 44% of patients versus 21% of patients seen by PAs ( $P<.001$ ). Of patients seen by a physician, 53% received a medication or a prescription, whereas this was reported in 24% of patients seen by PAs ( $P<.001$ ).

**Conclusion:** Most patients who have radiographs of the foot or ankle after traumatic injuries receive no pain medication in the ED. Physicians prescribe analgesics more frequently both in the ED and on discharge than PAs.

## 120 Documentation of Pelvic Examination Findings in Adult Women With History of Consensual Sexual Intercourse and Without History of Nonconsensual Sexual Intercourse

Jackson MC, Groleau G, Kimmel C, Teague H, Tso E/University of Maryland School of Medicine, Mercy Hospital, Baltimore, MD

**Study objective:** This was a pilot study to collect information on the pelvic examination findings of adult women who have had consensual sexual intercourse within the last 3 days to document the difference in findings from the adult women victims of sexual assault. This is important in the defense of female victims who have been sexually assaulted, as frequently defense attorneys will try to say that the trauma that is documented from a sexual assault occurred with consensual intercourse.

**Methods:** This study was a prospective study conducted in an urban teaching hospital, community emergency departments, and outpatient settings. Any women age 18 years and older presenting to the ED or a primary care provider with a history of abdominal pain and requiring a pelvic examination as part of their general evaluation was eligible for the study. Unnecessary pelvic examinations were not performed. The care provider asked the patient questions regarding recent history of surgery, trauma, and/or sexual assault. Patients were also screened for a history of other pelvic examinations, use of tampons, and sexual activity within 72 hours. The care provider documented findings on the gross pelvic examination (noting presence or absence of ecchymosis, petechial hemorrhages, hematoma, tears, or other evidence of trauma). A diagram was provided to document the location of positive findings.

**Results:** Of 102 patients evaluated, 55 patients admitted to consensual sexual intercourse within 72 hours. None of the 55 patients had a history of nonconsensual sexual intercourse. Of the 55 patients, only 1 patient had evidence of trauma noted on the gross pelvic examination. This patient denied instrumentation and noted she had on tight pants as a cause. She could not relate the finding to her consensual intercourse.

**Conclusion:** Patients presenting within 72 hours of consensual intercourse rarely have evidence of genital trauma noted by gross visualization.

## 121 A Brief Video Improves Antibiotic Compliance in Emergency Patients

Pregerson B, Pregerson HA/Los Angeles County Medical Center—University of Southern California, Los Angeles, CA

**Study objective:** To improve patient education and antibiotic compliance in emergency department patients.

**Methods:** This was a prospective, randomized, experimenter-blinded, interventional study in an urban ED with a 37,000 annual census; the study was conducted from January 11, 1996, to February 29, 1996. Participants were a convenience sample of patients sent home from the ED with a prescription for oral antibiotics. Video group subjects, in addition to receiving regular discharge instructions, viewed a 3.5-minute educational video and received a 1-page video summary. Control subjects received the ED's regular computer-generated discharge instructions.

**Results:** One hundred fifty-seven subjects were enrolled; follow-up was completed in 59 who saw the video and 64 controls, a 78% follow-up rate. Patient compliance was measured by telephone survey within 48 hours of end of treatment. Compliance, defined as having <25% of medication remaining at follow-up, was statistically better in the video than in the control group (88% versus 72%,  $P<.05$  by Yates'  $\chi^2$ ).

**Conclusion:** A 1-time, brief video intervention can be effective in improving outpatient compliance with antibiotics prescribed from the ED. EDs should consider implementing video education as either part of discharge instructions or waiting room facilities.

## 122 Lower Mortality Rates Among Patients Treated in the Emergency Department for Bacterial Meningitis

Miner JR, Heegaard W, Mapes A, Biras M/Hennepin County Medical Center, Minneapolis, MN

**Study objective:** To analyze factors affecting mortality rates of patients with bacterial meningitis.

**Methods:** A retrospective chart review was done of patients hospitalized for bacterial meningitis between June 1, 1987, and June 1, 1997. Data concerning patient demographics, signs and symptoms, pathogens, and treatments have been previously reported. At that time, a mortality rate of 12% was noted (lower than previous reports). Our study analyzed these data to further evaluate factors contributing to the low mortality rate we observed.

**Results:** One hundred sixty-five charts were reviewed; 118 of the cases were community acquired, and 47 were nosocomial. In community-acquired cases in patients older than age 60 years ( $n=15$ ), the mortality rate was 33%. In patients aged 16 to 59 years ( $n=40$ ), it was 8.5%. In children ( $n=43$ ), the mortality rate was 1.6%. Significant morbidity was seen in 16% of adults and 14% of children. Of the community-acquired cases, 76 (64%) received antibiotics in the ED (38 adults and 36 pediatric cases); the rest received antibiotics in clinics or as inpatients (17 adults and 7 pediatric cases). Mean time to ED antibiotics was 1:08 hours $\pm$ 13 minutes (range 8 minutes to 6 hours). Mean time to inpatient antibiotic receipt was 6 $\pm$ 9 hours (range 1 hour to 2 days). The mortality rate for adult patients receiving antibiotics in the ED was 7.9%. For those receiving antibiotics as inpatients, it was 29%. The one pediatric death was in a child who received antibiotics as an inpatient.

**Conclusion:** We found a much lower mortality rate among patients treated with antibiotics in the ED than those treated as inpatients. ED antibiotics therapy appears to account for the lower mortality rate for patients with bacterial meningitis previously described at our hospital.

## 123 A Breast Knowledge Survey in an Urban Emergency Medicine Department

Takakuwa KM, Ernst AA, Weiss SJ/University of California—Davis Medical Center, Sacramento, CA

**Study objective:** We are unaware of any educational programs on breast knowledge based in emergency departments, and only one study performed breast cancer screening in an ED. In this study, we wanted to determine the knowledge base about screening mammography and breast self-examination (BSE) of women who present to our ED. The null hypothesis is that knowledge will be the same across age, race, income, and insurance type.

**Methods:** Between February and April 1999, we administered a 1-page convenience sampling of women aged 18 and older in the ED treatment and waiting areas at the University of California Davis Medical Center. Participation was strictly voluntary. During this period, 200 surveys were collected. We examined knowledge about age of first mammography and the frequency of BSE by age, race, income, and type of insurance.

**Results:** Among this group, 49.5% of women correctly knew the age at which they should get their first mammogram. Women with a lower income (<\$20,000 per year)

were significantly less likely to know the age at which they should get their first mammogram than their higher income (>\$20,000 per year) counterparts ( $P<.05$ ). There was a tendency for this to be true for black women compared with white and Hispanic women ( $P=.055$ ). There were no significant differences by age or type of insurance; 52.0% of women correctly knew the frequency at which they should perform BSE. Lower-income and black women were significantly less likely to know this than higher-income ( $P<.05$ ), white, and Hispanic women ( $P<.01$ ). There were no significant differences by age or type of insurance.

**Conclusion:** The knowledge base of BSE and mammography was low in this ED population of women. Lower income and race may be additional factors. We believe the ED may be an appropriate place to educate women about breast knowledge, especially lower-income and black women.

## 124 Emergency Department Profile of Domestic Violence Victims in Singapore

Sathiaseelan S, Tham K-Y, Seow E, Wong HP/Tan Tock Seng Hospital, Singapore

**Study objective:** To determine the epidemiology of victims of violence at home presenting to the emergency department.

**Methods:** Data of patients with domestic violence injuries were extracted from a database of all consecutive patients older than 15 years who presented to the ED of an urban public hospital in Singapore with trauma-related complaints. Interviews were conducted with a closed-ended questionnaire from December 1, 1998, to March 31, 1999. Data collected were those of demographic, nature of injury, ambulance care, ED care, and disposal.

**Results:** A total of 161 patients were seen for injuries related to domestic violence, giving an average of 1.33 cases per day. They contributed to 0.45% of total ED attendance and 2% of all trauma cases. Most of them (77.6%) were women. The overall mean age was 36.4 years (95% confidence interval [CI] 34.6 to 38.2). The mean age for women was 35.9 years (95% CI 33.9 to 38) and that for men was 38 years (95% CI 33.8 to 42.3). Most of the patients (73.2%) were between the ages of 21 and 45 years, with 9 patients younger than age 21 and 31 patients older than age 45. The ethnic group breakdown was 57.8% Chinese, 23.6% Indians, 10.6% Malays, and 8.1% others. The mean interval between injury and presentation to the ED was 0.57 day (95% CI 0.35 to 0.79). Only 11.8% arrived by ambulance. The majority (94.4%) had blunt injuries, whereas 5% had penetrating injuries. Contusions accounted for 70.3% of injuries, abrasions 10.6%, open wounds 13.6%, and minor head injury 1.2%. Two fifths (40.5%) of the violence occurred between 6:01 PM and midnight, and 26.4% occurred between midnight and 8 AM. Most (89.4%) were discharged after treatment in the ED, of whom 73.9% required no follow-up, 8.1% were referred to primary health care doctors, 1.9% were referred to the orthopedic outpatient clinic, and 5.6% to other specialist outpatient clinics.

**Conclusion:** A high proportion of domestic violence occurred during the evening hours with a smaller proportion after midnight. There is an overrepresentation of Indians in our study compared with the general population of Indians in Singapore. The younger patients are probably victims of parental abuse, whereas the middle-aged patients are likely to be victims of spousal abuse. Although still a minority, male victims are coming forward to seek treatment. Although the injuries are not life-threatening, it is probably the psychological trauma that has the greater impact on these victims of domestic violence.

## 125 Health Risk Behaviors by Domestic Violence Status in a Random, Emergency Department Sample

Larkin GL, Hyman KB/Mercy Hospital of Pittsburgh, University of Pittsburgh, Pittsburgh, PA

**Study objective:** To examine differences in health risk behaviors (ie, smoking, seat-belt use, number of sexual partners, firearms in residence, condom use) between female patients currently exposed to domestic violence (DV), those exposed to DV in the remote past, and those never exposed to DV.

**Methods:** This was a prospective, cross-sectional, random sample of female emergency department patients stratified by DV status and interviewed by trained researchers. The study was conducted in an urban, Level I trauma and burn center with an annual ED census of 43,000 visits. One hundred fifty-five women, ages 18 to 65 years, were classified into 3 groups: currently experiencing DV (<3 months; current), experienced DV in the past (>1 year; past), and never experienced DV (control). Data were analyzed using univariate and multivariate logistic regression of risk behaviors as a function of DV group while controlling for age, race, marital status, income, and children (yes/no).

**Results:** The average age of the sample was 31.4 $\pm$ 10.2 years with relatively equal

numbers of Caucasian and African Americans (49.7% versus 49.0%, respectively). Annual income was less than \$10,000 for 53%, between \$10,000 and 30,000 for 28%, and >\$30,000 for 19% of the sample. The presence of household firearms, condom use, and driver seatbelt use was not significantly different between DV groups. However, compared with past DV victims and controls, the current victims were significantly less likely to use passenger seat belts (odds ratio [OR]=0.32; 0.14, 0.74) and significantly more likely to smoke (OR= 3.6; 1.4, 10.5) and have 1 or more sexual partners in the prior 3 months (OR=12.5; 2.7, 58).

Conclusion: DV may potentiate other health risk behaviors; however, these associated risks do not persist in those past victims no longer exposed to DV.

## 126 Who Are the Young Victims of Interpersonal Violence?

Zun L, Rosen J, Kushner A/Mount Sinai Medical Center, Boys and Girls Club of Chicago, IL

Study objectives: The number of young victims of interpersonal violence has been growing in the United States, most prominent in the inner-city minority youth population. There is little information in the literature concerning the makeup of these young people who are commonly cared for in emergency departments. This study describes the characteristics of victims of interpersonal violence.

Methods: Patients ages 10 to 24 years who were victims of interpersonal violence (excluding child abuse, sexual assault, and domestic violence) were interviewed using a psychosocial evaluation tool to determine their personal characteristics. The tool is an extensive evaluation questionnaire containing the following determinates: background information, stress and coping questions, parental involvement, peers, delinquency, peer delinquency, stress levels, and future plans. The study was approved by the institutional review board. The study site is a community, teaching Level I trauma center. The evaluation tool was administered on all consenting consecutive victims of interpersonal violence who were 10 to 24 years old in 1998-1999. A statistical analysis was performed on the data to determine frequency, percentage, and ages at first use or exposure to delinquency.

Results: One hundred six victims of interpersonal violence were interviewed; 86.1% were male, 65.3% African Americans, and 31.9% Hispanic. Method of injury was 76.4% shot, 12.5% stabbed, and 11.1% assaulted; 52.3% have carried a hidden weapon in the past, most within the last year (31.1%); and 62.3% have witnessed someone shot or killed in the last year. Most of these were friends or relatives in the last year (90.9%). Of the victims, 53.8% have been a member of a gang and 43.3% were arrested or detained in the last year; 53.8% obtain at least some emotional support from a mother/mother figure and 29.2% obtain emotional support from a father/father figure; and 69.2% have used marijuana or hashish and 11.3% used cocaine or coke in the last year.

Conclusion: Persons aged 10 to 24 years who are victims of interpersonal violence have a high rate of peer delinquency, gang involvement, gun accessibility, and family problems compared with the general youth population. Patients presenting with these injuries have a significant need for psychological, substance abuse, social, and legal services.

## 127 The Relationship Between Clinical Symptoms and Laboratory Measures of Dehydration in Children With Dehydration

Ryan JG, Blumenreich R, Hormozdi S, Ward MF, Roit Z, Sama AE/North Shore University Hospital, Manhasset, NY

Study objective: To determine the relationship between laboratory measures of dehydration and clinical symptoms in children.

Methods: This study was a retrospective chart review, performed at an academic emergency department, seeing approximately 50,000 patients per year. The hospital database was queried to find patients between 6 and 60 months of age with a diagnosis of dehydration, over a 16-month period. All patients who had electrolytes, blood urea nitrogen (BUN), and creatinine levels obtained as part of the ED evaluation were included in this study. Patient charts were reviewed for serum electrolytes with BUN, as well as clinical symptoms including vomiting and diarrhea.

Results: During the period of this study, 197 patients were enrolled. The mean age of these patients was 26.6 months (SD=14.6) with a range of 6 to 61 months. The patients with diarrhea had a significantly lower serum  $\text{CO}_2$  than the patients without diarrhea (15.2 $\pm$ 3.5 versus 17.3 $\pm$ 3.7,  $P=.0005$ ) but no significant difference in BUN or anion gap. The patients with vomiting had significantly higher anion gaps (18.9 $\pm$ 4.2 versus 15.9 $\pm$ 3.3,  $P=.02$ ), as well as trends toward higher BUN and lower serum  $\text{CO}_2$  results than those patients without vomiting.

Conclusion: The laboratory abnormalities in children with dehydration varies with their presenting symptoms. Patients with diarrhea have a metabolic acidosis with decreased serum  $\text{CO}_2$  levels but a normal anion gap. Patients who present with vomiting have an elevated anion gap and may have a decreased  $\text{CO}_2$ . Further research is needed to more clearly delineate this relationship.

## 128 Cerebrospinal Fluid (CSF) in a Pediatric Emergency Unit: Indications and Positiveness Related With the Patient's Age

dos Reis MC, Fraga A, Nogueira R, Sperotto G, Baracat E/State University of Campinas, State of São Paulo, Brazil

Study objectives: To analyze the cerebrospinal fluid (CSF) collection done in the pediatric emergency department, its results, and distribution related with the patient's age group.

Methods: This was a retrospective study, using the database of all CSF samples submitted to analysis by our pediatric ED between January 1, 1994, and December 31, 1997.

Results: Between January 1, 1994, and December 31, 1997, 120,616 patients were seen at our pediatric ED. A total of 1,224 CSF samples were analyzed during this period; 208 were considered to have an error in the procedure (RBCs >500/mm<sup>3</sup>), and had their results corrected by subtracting 1 WBC for each 500 RBCs/mm<sup>3</sup>. In the age group <3 months, 274 samples were collected; 222 were normal and 52 altered (median of the number of leukocytes=257.5 cells/mm<sup>3</sup>), showing a relation of 1 altered CSF lumbar puncture to 4.3 normal. Between 3 months and 1 year, 267 CSF samples were analyzed, with 57 altered and 210 normal (median=32 leukocytes/mm<sup>3</sup>) (rate 1 altered to 3.7 normal). In the group of patients with ages between 1 and 2 years, 181 samples were collected with 30 altered (median=37 cells/mm<sup>3</sup>) (rate 1 CSF altered for 5.0 normal). Between 2 years and 5 years, 236 samples were collected; 78 were altered (rate 1:2; leukocytes median=39.5 cells/mm<sup>3</sup>). In the group older than 5 years and younger than 10 years of age, the rate was 1 CSF altered to 1.4 normal, with 165 CSF lumbar punctures done, with 67 altered (median=79 cells/mm<sup>3</sup>). Among the children older than 10 years, the relation was 1 CSF altered to 0.8 normal, with 101 CSF samples collected and 55 considered altered (median=82 cells/mm<sup>3</sup>).

Conclusion: As age increases, the indications for the spinal lumbar puncture to collect CSF are based on clinical findings that are more compatible with an inflammatory process of the central nervous system and are easier and more reliable detectable. In the younger age groups, mainly in the children younger than 2 years of age, the indication for a lumbar puncture is related to unspecific findings of altered signs and symptoms of the physical examination and is used more widely in searching for the infectious focus.

## 129 Trauma Care in Latin America: A Survey to Determine Available Resources and Needs Assessment

Milzman D, Janchar T, Rubin S, Rodriguez A, Zlidenny A/Providence Hospital, Emergency Medicine Research Center, Washington, DC

Study objective: A survey of health departments and trauma directors was undertaken to identify trauma resources and deficiencies in Latin America. A descriptive survey was developed and sent to all Latin American Ministries of Health and identifiable major Latin American trauma centers (LATC) in Spanish and English; repeat attempts at survey return were made as needed.

Methods: Descriptive statistics and Student's *t* test made comparisons between Latin Centers with  $P<.05$ . A 10-cm visual analog scale was used to record performance-based answers.

Results: Sixty-nine (59%) of 118 surveys were returned from 17 Latin countries. Seventy-two percent of Latin emergency medical services give intravenous fluids, and 42% intubate. All (100%) LATC had ground transport units; 83% operated helicopters, 68% fixed-wing aircraft, and 72% had watercraft. The majority (95%) of receiving institutions were urban; 46% admitted >2,500 trauma victims annually. There was no difference in rates of blunt (50% $\pm$ 21%) versus penetrating injuries (49% $\pm$ 29%,  $P=NS$ ). Intentional causes accounted for 49.5% $\pm$ 29.6% of injuries and 36% $\pm$ 21% resulted from vehicular crashes. Forty-one percent of patients required immediate operative intervention. Mean patient age was 29.7 $\pm$ 16.2 years with a 3:1 male/female ratio. Trauma centers reported a 7.7% mortality rate and mean hospital stays of 9.2 $\pm$ 6.2 days. LATCs had the following resources available: 98% routine radiographs, 97% ultrasound, and 72% computed tomography. Trauma directors rated overall care as follows: 7.3 $\pm$ 1.6 on 10-cm visual analog scale, and identified the following as necessary improvements to their systems: financial deficiencies (59%), manpower (22%), equipment (13%), and education/training (6.3%).

Conclusion: LATCs produce adequate survival numbers, despite more severe injuries and higher rates of penetrating trauma resulting in greater numbers of operations and patients than comparable US rates. Any changes should undergo cost-benefit analysis before the surprisingly effective, existing system is altered.

### 130 Arterial Serum Adenosine Levels in Patients Undergoing Coronary Artery Angioplasty

Dickson E, Wholey R, Alexander J, Mangolds G, Renzi F/University of Massachusetts Medical School, Worcester, MA

Differentiation of cardiac from noncardiac causes of chest pain is a common and important diagnostic challenge for emergency physicians. Unfortunately, history, physical examination, and currently available diagnostic tests are unable to distinguish between these patients on initial presentation. Thus, the diagnosis of acute myocardial ischemia and infarction is often delayed, leading to increased morbidity and mortality. Adenosine is a purine nucleoside released from ischemia myocardium. Previous studies have revealed up to an eightfold elevation in coronary sinus adenosine concentrations during coronary angioplasty (CA).

Study objectives: This investigation was undertaken as an initial step in the evaluation of adenosine as a marker of myocardial ischemia. Arterial levels of adenosine were measured to determine if the increased levels in the coronary sinus could also be detected in arterial samples.

Methods: Patients undergoing elective CA had 3 samples of blood drawn from the arterial sheath at baseline, at 2 minutes of coronary occlusion, and at 2 minutes reperfusion. Care was taken to remove an adequate waste volume to ensure a true arterial sample. The blood was then immediately placed in a vial containing an adenosine degradation-stopping solution (dipyridamole and ENHA). Adenosine concentration was determined by standard high-performance liquid chromatography methods.

Results: Mean adenosine concentrations were as follows: baseline  $0.1 \pm 0.06 \mu\text{M}$ , 2-min occlusion  $0.1 \pm 0.1 \mu\text{M}$ , and 2-minute reperfusion  $0.06 \pm 0.06 \mu\text{M}$ .

Conclusion: No significant elevation in arterial adenosine concentration was seen; this likely represents rapid degradation and dilution of adenosine released from the ischemic myocardium.

### 131 Pediatric Emergency Medicine in Vietnam's Largest City, Ho Chi Minh

Lewis RE, Hutson HR, Nguyen M-HT/Brigham and Women's Hospital, Boston, MA; Louisiana State University Medical Center, New Orleans, LA

Study objective: To describe the status of pediatric emergency medicine in Vietnam through the experience in Ho Chi Minh City's largest pediatric hospital and referral center. This observational study used the 1997 Activity Report of the emergency department of the Nhi Dong 1 (Pediatric Hospital No. 1), clinical experience and hospital staff interviews in the Nhi Dong 1 ED in Ho Chi Minh City (HCMC), Socialist Republic of Vietnam. ED staff and pediatric patients aged 1 day to 15 years were the study participants.

Results: According to the 1997 United Nations Human Development Report, Vietnam is a "medium human development" country ranking 121 out of 175 countries. Almost 50% of children <5 years are considered underweight. Pediatric emergency medicine is not recognized as a pediatric specialty, nor is there formalized training available. Although the Ministry of Health in Hanoi has published "Emergencies for Pediatrics," there was no such manual in the ED. At Nhi Dong 1, critical care specialists run the ED as well as the critical care units (neonatal and pediatric). Three attending pediatricians cover the daytime (7 AM to 4 PM shift) and one attending physician covers the 4 PM to 7 AM shift in both the ED and the pediatric ICU. Patients and families present to the open ward-style ED where physicians evaluate and expedite transfer onto 1 of 6 ED beds or to an outpatient specialty clinic for noncritical patients. Care is provided irrespective of the family's ability to pay, and waiting time is less than 5 minutes. For 1997, the most common presenting complaint was febrile seizure followed by pneumonia, dengue hemorrhagic fever, and toxic ingestion. A basic emergency medical services (EMS) model is currently being implemented throughout HCMC, but is far from comprehensive with 1 ambulance per 280,000 population. The centralized EMS calling number is 115 but is not often used given the correct public perception that transport time is quicker by foot or motorbike taxi. In addition, Nhi Dong 1 is not in direct contact with the EMS so that ambulances mostly arrive unannounced. Pediatric traumas are triaged to one of HCMC's trauma hospitals.

Conclusion: The Ministry of Health in HCMC is committing itself to continued development of a centralized EMS system. Pediatricians working in Vietnam's busy regional referral hospitals such as Nhi Dong 1 will ultimately benefit from an emer-

gency medicine-focused training as Vietnam's market-based economy drives the country's status from a developing to a developed country.

### 132 Cardiopulmonary Effects of the Spit Buster Mask in Pulmonary Diseased Patients

Broderick KB, Geddes R, Bernard J, Lerner EB, Ibrahim Z/State University of New York-Buffalo, Buffalo, NY

Study objectives: To determine if the Spit Buster Mask (a tubular fine-mesh net headpiece fashioned with a clear plastic eye shield used to inhibit spit transmission) can be used without causing any significant cardiopulmonary effects in a population of patients with pulmonary disease.

Methods: Thirty volunteers >18 years with pulmonary disease (eg, chronic obstructive pulmonary disease, asthma) were recruited to wear the spit buster mask for 30 minutes. The participants each served as their own controls. The study had 2 phases: resting with the mask and resting without the mask. Participants' heart rate, blood pressure, respiratory rate, pulse oximetry, and transcutaneous  $\text{CO}_2$  were measured at 15 and 30 minutes during each phase. A 2-tailed paired *t* test was used to evaluate the mean difference in each vital sign parameter with and without the mask ( $\alpha=.004$  with Bonferroni correction).

Results: There was no statistically significant difference between any of the parameters at 15 or 30 minutes (Table).

Conclusion: This study demonstrates that the Spit Buster Mask does not have significant cardiopulmonary effects in patients with pulmonary disease.

Table, abstract 132.

Difference in participant vital signs with and without the Spit Buster Mask

Vital Sign	Difference at 15 Minutes	95% Confidence Interval	P	Difference at 30 Minutes	95% Confidence Interval	P
Pulse	2.3	0.7 to 3.9	.006	-0.9	-2.6 to 0.8	.310
Respiratory rate	0.9	-.01 to 1.9	.053	0.1	-1.1 to 1.2	.906
Systolic blood pressure	3.8	-8.2 to 0.6	.087	1.9	-1.1 to 4.9	.196
Diastolic blood pressure	-1.2	-6.9 to 4.5	.670	1.9	-2.7 to 6.5	.401
SaO <sub>2</sub>	-0.2	-0.9 to 0.5	.576	-0.2	-0.8 to 0.4	.582
TcCO <sub>2</sub>	0.5	-0.4 to 1.4	.235	0.0	-0.8 to 0.8	.934

### 133 Age-Related Differences of Pediatric Trauma Patients in the Emergency Department

Kim KH, Kim WY, Ryu SY, Kim H-Y/Inje University, Sanggye Paik Hospital, Seoul, Korea

Study objective: The purpose of this study was to determine the most common diagnosis and age-related risk of pediatric trauma patients in the emergency department.

Methods: We retrospectively studied 6,058 pediatric trauma patients who visited Sanggye Paik Hospital ED during the year of 1997. The most common diagnoses of pediatric trauma patients in the ED were compared among 4 age subgroups: birth to 1 year (infancy), 2 to 6 years (preschool), 7 to 12 years (elementary school), and 13- to 15-year-olds (middle school). We stratified the traumatic body areas by Core Content for Emergency Medicine guides from the American College of Emergency Physicians and also stratified the patients by the presumed diagnosis at ED. The relative risk is the percent occurrence of the diagnosis in the age subgroup divided by the percent occurrence of the diagnosis in the middle school subgroup. Thus, the relative risk for each diagnosis in the middle school subgroup was 1.

Results: The face was the most common injured body site followed by the upper extremity, head, and lower extremity. Laceration was the most common diagnosis, followed by contusion, fracture, and foreign body. The relative risk in facial soft tissue injury was 2.8 in preschool, 2.2 in infancy and elementary school, and 1.0 in middle school subgroups in descending order. The relative risk in laceration was 1.5 in preschool, 1.3 in elementary school, 1.1 in infancy, and 1.0 in middle school subgroups in descend-



ing order. Thus, our study found significant differences in diagnosis and relative risk among 4 age subgroups presenting to the ED.

Conclusion: Although the data presented here may not be representative of all hospital EDs, it is believed that the data from this study provide a valuable insight into the age-related diagnostic differences among pediatric trauma patients seen in the ED. The information from this study can be used to plan services, such as follow-up, referral, and social services and staffing, to best address the needs of pediatric trauma patients in the ED. The information can also be used to improve the training of emergency medicine.

## 134 Survival Inversely Related to Time to Laparotomy or Thoracotomy in Trauma Patients

Porter RS, Lane PL, Zhao N/Albert Einstein Medical Center, Philadelphia, PA

Study objectives: It has long been assumed that decreasing the time to operative intervention in trauma patients improves survival. This has been a major reason for the creation of trauma systems. We evaluated the effect of time to surgery on mortality in trauma patients who underwent laparotomy or thoracotomy within 24 hours of arrival, controlling for injury severity and mechanism.

Methods: We retrospectively reviewed data collected by the Pennsylvania Trauma Systems Foundation on all trauma patients  $\geq 16$  years who had either laparotomy or thoracotomy within 24 hours of arrival at any of the 24 trauma centers in Pennsylvania during 1996 and 1997. Exclusion criteria were field time  $>6$  hours, blood pressure and heart rate of 0 in the emergency department, and incomplete data. We excluded patients with a blood pressure and heart rate of 0 in the ED because their very poor survival would be expected to skew the results toward poor outcome with early surgery. We performed regression analysis of mortality on time to surgery, using the Trauma and Injury Severity Score (TRISS) to control for anatomic and physiologic injury and blunt/penetrating mechanism. A subgroup with ED blood pressure  $\leq 90$  mm Hg was also analyzed controlling for Injury Severity Score and blunt/penetrating mechanism.

Results: Nine hundred fifteen patients from 24 trauma centers in Pennsylvania met criteria and had complete data. Mechanism of injury was as follows: blunt 432 (47.2%), penetrating 483 (52.8%). Time to surgery was a mean 1 hour 59 minutes  $\pm$  2 hours 37 minutes (median 1 hour 7 minutes). Total fatalities numbered 121 (13.2%). The TRISS score was highly related to mortality ( $\beta = .48$ ,  $P < .001$ ; lower TRISS score is more seriously injured). Time to surgery was inversely related to mortality ( $\beta = -.06$ ,  $P = .025$ ), indicating that a longer time to surgery was associated with decreased mortality for a given level of injury severity. The subgroup with ED blood pressure  $\leq 90$  mm Hg ( $n = 210$ ) also demonstrated an inverse relationship between time to surgery and mortality ( $\beta = -.17$ ,  $P = .012$ ).

Conclusion: Surprisingly, shorter times to surgery were associated with worse outcomes, despite controlling for injury severity. This may illustrate a beneficial effect of longer stabilization or a failure to completely account for injury severity in the model. Further analysis should be performed using other outcome measures.

## 135 Serum Glucose Levels in Elderly Trauma Victims

Ernst AA, Casaletto JJ, Nick TG, Weiss SJ/University of California–Davis Medical Center, Sacramento, CA

Study objective: To study the relationship of serum glucose levels and extent of injury to age.

Methods: This is a retrospective, case-control study of all nondiabetic elderly trauma victims presenting to a university emergency department in 1996. A control group of randomly selected subjects aged 18 to 45 years was used for comparison. Injury Severity Scores (ISS), glucose, and blood urea nitrogen (BUN) levels were compared between the 2 groups.

Results: There were 114 elderly patients and a cohort of 101 younger trauma victims. Mean glucose concentration was 133 mg/dL in the elderly group and 115 mg/dL in the control group ( $P \leq .001$ ). Significantly more elderly patients were hyperglycemic than controls ( $P = .02$ ). The mean ISS was 13 in the elderly and 9 in the control group ( $P \leq .01$ ). Using a multivariable regression model, there was a positive relationship between age and glucose ( $P = .01$ ) and ISS and glucose ( $P = .01$ ). BUN level and gender were not associated with ISS or glucose (Spearman correlations  $\leq 0.20$ ).

Conclusion: Glucose and ISS positively correlated in both elderly and control subjects with elderly patients having significantly higher glucose levels. Initial glucose concentration may help predict ISS.

## 136 Relationship of Injury Severity to Timing of Surgery and Mortality in Trauma Patients

Lane PL, Porter RS, Zhao N/Albert Einstein Medical Center, Philadelphia, PA

Study objective: Trauma centers exist to improve the outcome of severely injured patients, in part by expediting surgical care. It is widely assumed that the more severely injured patients will go more quickly to the operating room. We evaluated the relationship between injury severity and time to surgery (emergency department arrival to operating room) in those patients requiring laparotomy or thoracotomy.

Methods: We retrospectively reviewed data collected by the state trauma registry on all trauma patients  $\geq 16$  years old having either laparotomy or thoracotomy within 24 hours of arrival at any of the 24 trauma centers in the state during 1996 and 1997. Exclusion criteria were field time  $>6$  hours, incomplete data, and blood pressure/heart rate = 0 in the ED. We performed regression analyses of time to surgery (ED to operating room) and of mortality versus injury severity as measured by TRISS (Trauma Injury Severity Score) B value, and the TRISS components of Injury Severity Score (ISS), Revised Trauma Score (RTS), and blunt versus penetrating trauma. Univariate analysis showed both blunt versus penetrating, and blood pressure  $>90$  mm Hg or blood pressure  $\leq 90$  mm Hg in the ED to relate to time to surgery.

Results: Nine hundred fifteen patients met criteria and had complete data. Mechanism of injury was blunt in 432 (47%) cases, and penetrating in 483 (53%). Mean ISS was  $22.1 \pm 15.5$  (median ISS 19). Mean time to surgery was 1:59 hours  $\pm 2:37$  (median 1:07 hours). Regression analysis showed that the TRISS B value was related to time to surgery ( $P = .0005$ ). In addition, TRISS B values were strongly related to mortality ( $P < .0001$ ). Both ISS and RTS also showed strongly significant relationships to mortality (each  $P < .0001$ ).

Conclusion: Trauma patients with more severe injuries tend to be operated on sooner than those with less severe injuries. This remains true, whether anatomic methods (ISS), physiologic measures (RTS), or a combination (TRISS) measures severity.

## 137 Intubating Laryngeal Mask Airway: A Novel Approach to Emergency Department Airway Management

Linder JJ, McHale P, Pollack CV/Maricopa Medical Center, Phoenix, AZ

Study objective: The Intubating Laryngeal Mask Airway (ILMA, Fastrach) is a new airway tool for achieving endotracheal intubation. This observational study examines the efficacy of this device within an emergency department as a blind intubation guide as well as a ventilation device.

Methods: A convenience sample of patients needing emergency airway control was investigated. Eligible patients included adults with nontraumatic related respiratory arrest and/or ventilatory failure. Patients of any type who had failed direct laryngoscopy subsequently became eligible for ILMA intubation. Emergency medicine residents (PG-Y II, III, IV) received training on device use in a departmental in-service training session. Standard rapid sequence induction with paralytic medications was given. Bag-valve-mask ventilation was replaced as needed by ventilation through the ILMA. If initial passage failed, one of several adjusting maneuvers was used. Objective endpoints were endotracheal intubation and ability to ventilate. Confirmation of tube placement was through end-tidal  $\text{CO}_2$  monitor, pulse oximetry, and chest radiographs. At all times, direct laryngoscopy was available for failed attempts.

Results: Electively enrolled patients were endotracheally intubated in 10 (91%) of 11 attempts. Both (2/2, 100%) of the emergently enrolled patients (failed direct laryngoscopy) were intubated successfully. The ILMA was successful in 8 (100%) of 8 cases requiring ventilation (Table).

Conclusion: Previous use of a standard laryngeal mask in the ED has been limited to a role of a ventilatory rescue device. Endotracheal intubation through it was difficult at best. This new apparatus allows the benefit of ability to ventilate with the same tool that facilitates endotracheal intubation. There is no movement of the cervical spine required. Our current series of patients supports the use of the ILMA in patients in need of emergency airway control. A variety of operators used the tool during this study with good first-time success. Further enrollment in our study is planned. Our current experience suggests this device can be used effectively by ED personnel after adequate training by qualified staff. We conclude that the ILMA is an effective endotracheal intubation guide within the ED, as well as a valuable airway adjunct device in the setting of a "cannot intubate, cannot ventilate" patient.

Table, abstract 137.

Age/ Sex	Medical Condition	No. of ILMA Attempts	Confirmation	Successful Ventilation	Successful Intubation
31/M	Heroin overdose	1*	SaO <sub>2</sub> , auscultation	Yes	Yes
77/F	Trauma†	1	ETCO <sub>2</sub> , CXR	Yes	Yes
55/M	Respiratory distress	1	SaO <sub>2</sub> , CXR	Yes	Yes
46/M	AAA versus AMI†	1*	ETCO <sub>2</sub> , CXR	Yes	Yes
38/M	Respiratory failure	2	Auscultation, SaO <sub>2</sub>	NA	No
45/M	Pneumonia	1	SaO <sub>2</sub> , CXR	Yes	Yes
65/M	Respiratory failure	1*	ETCO <sub>2</sub> , CXR	NA	Yes
47/M	Shock	1	ETCO <sub>2</sub> , CXR	NA	Yes
66/M	Coma	1	ETCO <sub>2</sub> , CXR	NA	Yes
74/F	Coma	1*	SaO <sub>2</sub> , auscultation	Yes	Yes
63/F	Congestive heart failure	2	ETCO <sub>2</sub>	NA	Yes
71/F	Coma, subdural hematoma	1*	ETCO <sub>2</sub> , CXR, SaO <sub>2</sub>	Yes	Yes
26/F	Coma, overdose	2	ETCO <sub>2</sub> , CXR, SaO <sub>2</sub>	Yes	Yes

CXR, Chest radiograph; AAA, abdominal aortic aneurysm; AMI, acute myocardial infarction; NA, no desaturation, ventilation not required.

SaO<sub>2</sub> determined by pulse oximetry; ETCO<sub>2</sub> by monitor.

\*Adjusting maneuver used to facilitate intubation.

†Failed direct laryngoscopy, ILMA rescue.

## 138 Distracting Injuries in Blunt Trauma Patients Requiring Cervical Radiography

Ullrich AN, Mower WR, Adame N, Hoffman JR/University of California—Los Angeles, Los Angeles, CA; University of Texas Health Sciences Center, Hermann Hospital, Houston, TX

Study objective: To identify the types and frequency of distracting painful injuries (DPI) found in blunt trauma patients requiring cervical spine radiography.

Methods: This was a prospective observational study of consecutive blunt trauma victims presenting to an urban Level 1 regional trauma center between April 1, 1998, and September 30, 1998. Before cervical spine radiography, treating physicians evaluated each patient to determine whether a distracting painful injury was present or absent and, if present, what type of injury was sustained. Injuries were categorized as fractures, soft tissue injuries and lacerations, burns, visceral injuries, crush injuries, or other injuries. The site institution's review board approved this study.

Results: Data were collected on a total of 774 patients ranging from age 1 month to 98 years old. Four hundred seventy-two (61%) had no DPI, 255 (33%) were found to have DPI, and physicians were unable to ascertain injury status in 47 (6%). The most common injuries were fractures, found in 145 (56%) of DPI victims, followed by soft tissue injury and lacerations in 41 (16%). Eighty-six patients (34%) of patients had other distracting injuries including visceral, crush, burn, or other miscellaneous injuries. Thirty-six (5%) of the 774 patients had acute cervical spine injuries; of these, 15 (42%) had DPI. Four (11%) of fracture victims had DPI as their only other confounding reason to obtain cervical radiography.

Conclusion: A significant number of patients presenting as trauma victims with potential for cervical spine injury have painful or other distracting injuries.

## 139 The Use of Head Computed Tomography in Elderly Patients Sustaining Minor Head Trauma

Mack LR, Hogan TM, Silva JC/Resurrection Medical Center, Chicago, IL

Study objectives: (1) To ascertain whether historical and/or clinical criteria exist that differentiate elderly patients with minor head trauma (MHT) who sustain intracranial injury (ICI) from those who escape injury; (2) to determine whether current indications for head computed tomography (CT) within the general population are applicable to geriatric patients.

Methods: We conducted a retrospective chart review over the 12-month period before January 1, 1998, in a community hospital located in a large metropolitan area with 34,000 annual patient visits. Patients were >65 years old who had sustained MHT (Glasgow Coma Scale [GCS] score 13 to 15) and who had a CT scan performed while in the ED or during the same hospital stay. Data were tabulated into demo-

graphic, historical, and clinical categories that included age, sex, mechanism of injury, symptoms, signs, GCS score, anticoagulation use, history of recent alcohol or other drug ingestion, result of head CT scan (positive or negative), diagnosis, and outcome/intervention(s).

Results: The total number of patients in this study was 148 with 20 (13.5%) suffering ICI, 2.7% of which required neurosurgery. Analysis of the collected data showed no statistically significant correlation between historical or clinical parameters with ICI.

Conclusion: There are no independent predictors of ICI in elderly patients with MHT. Therefore, a protocol for obtaining a head CT scan in this population cannot exist, and a head CT scan in all elderly patients with MHT is warranted.

## 140 Prehospital Provider Stroke Knowledge Base Assessment

Bruns J, Nasissi D, Jagoda A, Bauml K/Mount Sinai Medical Center, New York, NY

Study objectives: To assess the stroke knowledge base of prehospital providers (PHPs), and to determine their management and transport practices for these patients.

Methods: An electronic survey was administered to 14 emergency medical technicians (EMTs) and 48 paramedics (EMT-Ps) during a 1-day educational symposium on brain injury. A computer-driven interactive system allowed for 100% audience participation to questions presented before lectures.

Results: Thirty-one percent of EMTs and 18% of EMT-Ps reported that they are uncomfortable performing a neurologic examination. Forty-two percent of EMTs and 17% of EMT-Ps were unaware of the 3-hour thrombolytic therapeutic window. Only 65% of PHPs transport stroke patients with lights and sirens, and 64% of PHPs prenotify the receiving hospital. Twenty-nine percent of EMT-Ps and 64% of EMTs transport stroke patients to the nearest ED, regardless of the hospital's capabilities. Forty-six percent of EMTs and 45% of EMT-Ps failed to recognize blindness or dizziness as possible stroke symptoms. Forty-three percent of paramedics did not know the indications for glucose administration in stroke patients with altered mental status. Given a blood pressure of 200/110 mm Hg in a stroke patient, 33% of EMT-Ps were uncertain of management, and 20% would actually have given a detrimental therapy.

Conclusion: Deficits exist in the ability of prehospital providers to perform a neurologic examination and to recognize acute stroke. Understanding of appropriate transport practices and therapeutic interventions is variable among prehospital providers. Enhanced education for PHPs on stroke recognition and management is needed in this new era of stroke management.

## 141 EMT Knowledge About Domestic Violence and the Effectiveness of Training

Weiss SJ, Ernst AA, Blanton D, Sewell D, Nick TG/Nashville Fire-EMS, Nashville, TN; University of Mississippi Medical Center, Jackson, MS; University of California—Davis, Sacramento, CA

Study objective: To determine levels of knowledge regarding domestic violence (DV) and the effectiveness of formal instruction about DV.

Methods: A general knowledge survey of DV was given before and approximately 4 to 6 months after 3 hours of instruction given by emergency medicine and law enforcement faculty. Participants were members of a 73% paramedic-level emergency medical technician (EMT) service in a metropolitan urban/suburban emergency medical service. The main outcome measure was differences in DV knowledge before and after the instruction.

Results: In the preinstruction series, 46 EMTs participated. After the instruction 19 (42%) EMTs participated. Thirty-five percent of EMTs before instruction and 37% after instruction correctly identified the prevalence of DV against women as 15% to 30%. Thirty-five percent of EMTs before instruction and 63% after instruction ( $P<.05$ ) correctly identified the prevalence of DV against males as 0% to 15%. Before instruction, 54% knew that DV is equal among races, and 79% after instruction ( $P<.05$ ). Before instruction, 37% of EMTs knew that DV is equal in different socioeconomic groups and 68% after instruction ( $P<.05$ ). The percent of EMTs who knew that the victim is not responsible for the abuse was 50% before instruction and 89% after instruction ( $P<.05$ ).

Conclusion: Before instruction, the results on a DV knowledge questionnaire were 59% correct; after instruction, results improved to 70% correct. Improvement in understanding of DV was demonstrated for 4 of 11 questions after 3 hours of instruction. These results indicate the need for more instruction on DV for EMTs.

## 142 Gender Differences in Statewide EMS Transports

Weiss SJ, Ernst AA, Phillips J, Hill B/University of California–Davis Medical Center, Sacramento, CA; State of Tennessee Division of EMS, Nashville, TN

**Study objective:** To evaluate gender differences in emergency medical services (EMS) transports.

**Methods:** Data were extracted from the EMS State Ambulance Transport database. This database exists because of a legal requirement that all EMS transports generated by 911 calls and all interhospital transports be reported to the State EMS Bureau. All ambulance transports reported to the State EMS Division during 1995 were evaluated. Overall illnesses and injuries were evaluated. Gender-related treatment differences were determined for problems for which EMTs have specific treatment options. These were cardiac arrest, chest pain, allergic reactions, and extremity fractures. Results were compared using a 2-tailed  $\chi^2$  or Fisher's exact test with significance at  $P < .05$ . Odds ratios (OR) and 95% confidence intervals (CIs) were calculated.

**Results:** There were a total of 164,595 ambulance transports reported to the State EMS Division. Of these, 76,074 (46%) were male patients and 88,521 (54%) were female; 34% of males and 30% of females were transported for injuries. Thirty-six percent of males and 39% of females were transported for illnesses. Males were significantly more likely than females to have injuries related to all-terrain vehicle accidents, motorcycle accidents, recreational vehicle accidents, burns, gunshot wounds, and stab wounds. Males were significantly more likely than females to have illnesses related to cardiac arrest, dead-on-arrival cases, drowning, and smoke inhalation. For cardiac arrest transports, significantly more male patients presented with ventricular fibrillation, more males received defibrillation, lidocaine, and bicarbonate, but more females received atropine. Male chest pain patients were more likely to receive oxygen and morphine and less likely to receive nitroglycerin. Male allergic reaction patients were more likely to receive intravenous and subcutaneous epinephrine. Male extremity fracture patients were more likely to get an intravenous line, but there was no difference in morphine use or splinting.

**Conclusion:** There are numerous disease-specific gender differences in the demographics of illness and injury transported by EMS. The use of various medications and procedures may also be related to gender. Understanding these differences may help in preparing EMS professionals for patient management.

## 143 A Retrospective Evaluation of the Performance of Prehospital Advanced Life Support Providers During Cardiac Arrest

Lewell M, Dreyer J/London Health Sciences Centre, University of Western Ontario, London, Ontario, Canada

**Study objective:** To evaluate the performance of newly trained advanced life support (ALS) providers during cardiac arrests.

**Methods:** A retrospective chart review was conducted of all cardiac arrests with ALS response from July 1, 1997, to June 30, 1998.

**Results:** Two hundred twenty-two charts were reviewed. Six were excluded from procedures analysis because only basic life support (BLS) response was provided; however, they were included in outcomes analysis. The mean age was 65.2 years; 88% of patients with cardiac arrests received ALS on scene within 11 minutes (7.3 minutes mean). Of the arrests terminated at the scene, mean resuscitation time was 19.4 minutes. If transported, mean scene time was 24.3 minutes. Transport time averaged 6.7 minutes. Bystander cardiopulmonary resuscitation occurred 18.7% of the time. Fire department responded to 62% of cases. BLS crews were first responders to 25% of cases. A second crew was present in 50% of arrests (30% ALS). Presenting rhythms were asystole (49.2%), pulseless electrical activity (26.4%), ventricular fibrillation (21.2%), and ventricular tachycardia (3.2%); 4.3% of patients were conscious on ALS arrival. Initial rhythms were misinterpreted in 9.5% of cases. Mean time to defibrillation (if immediately indicated) was 4 minutes. Time to endotracheal intubation (ETT) (if immediately indicated) was 6.4 minutes. Mean time to intravenous cannulation was 9.8 minutes. Success rates at ETT and intravenous access were 76.4% and 58.5%, respectively; 2.6% and 12.4% of all cardiac arrests failed to ever have successful ETT or intravenous line placement. Fourteen patients (7.4%) were discharged from hospital. Ten patients, including 4 of the survivors, were conscious for a mean of 22.9 minutes at the scene before arrest. Two more survivors had only BLS response.

**Conclusion:** In the setting of recently trained ALS providers, problems arose with rhythm interpretation and the timeliness and successful completion of ETT and intravenous line placement. Outcomes from cardiac arrest remain universally poor.

## 144 Top Five Lessons Learned in Disaster Medicine

Sapira A, Oster NS/Mount Sinai Medical Center, New York, NY; Elmhurst Medical Center, Queens, NY

**Study objective:** Disaster medicine is an ever-changing and developing subspecialty of emergency medicine. In recent years, there have been an increasing number of manmade and natural disasters that have come to the forefront of national interest. The goal of this survey is to inquire about the experience of emergency medical services (EMS) medical directors, from all 50 states and learn, "What were the top 5 lessons learned in disasters." The information obtained from this survey will be paramount in not only increasing our knowledge of disaster medicine but also help plan and prepare for these inevitable occurrences.

**Methods:** Two hundred forty-three surveys were distributed to EMS medical directors in all 50 states. The surveys contained questions about disaster experiences, types of disasters encountered, community demographics, disaster preparedness, type of support systems, and individual backgrounds. A master mailing list was obtained from the American College of Emergency Physicians EMS division and supplemented by individual state phone directory. The research design calls for a total of 3 mailings followed by phone calls to nonresponders.

**Results:** The following results are preliminary and are based on 2 completed mailings. Thirty-three (66%) of 50 states are represented by 102 (42%) of 243 surveys returned. Of the responders, 74% of the medical directors are emergency medicine-trained and board-certified. The populations served range from 100,000 to 3.7 million with a median of 500,000 and staffs ranging in size from 30 to 3,100 median of 248. Of the 10 possible most important issues highlighted by the survey, only 4 were found to have a concordance of  $\geq 70\%$ : communication, triage, manpower, and transportation. In general, the EMS systems are very prepared for mass casualties and somewhat prepared for large-scale disasters. The most common identified disasters were fires and violent crimes.

**Conclusion:** It is interesting that only 4 items (communication, triage, manpower, and transportation) were identified as important by more than 70% of the responders. Each state has its own unique logistical problem that may account for these results. The preliminary data suggest that preparation and concentration of resources in the 4 above-mentioned areas may lead to greater success when dealing with disasters. Each state can then additionally modify and prepare for its individual situation.

## 145 Helicopter Transport of Acute Stroke Patients

Duldner JE Jr, Kiomento DJ, Barile AM, Kovach B, Fallon WJ/Akron General Medical Center, Akron, OH; MetroHealth Medical Center, Metro LIFEFLIGHT, Case Western Reserve University, Cincinnati, OH

**Study objectives:** Despite demonstrated benefits and safety of helicopter transport (HT) in trauma patients and patients with myocardial infarction, the role of HT in patients with an acute stroke has not been addressed. We evaluated aspects of stroke management related to HT.

**Methods:** This was a retrospective review of ischemic stroke (ISCH) and hemorrhagic stroke (HEM) patients transported by helicopter during an 18-month period. HEM patients included nontraumatic intracerebral (sICH), subarachnoid (SAH), and subdural hemorrhage (SDH). Selected clinical parameters are presented.

**Results:** Of 311 patients transported, 40% (124) had ISCH strokes. Mean age was 61.5 years (range, 19 to 88 years); 45.7% (142) were female. Mean time to helicopter arrival after symptom onset was 197 minutes (3 hours, 17 minutes), with no difference in arrival time related to stroke type. Average helicopter transport flight time was 11.8 minutes, and average number of vital signs obtained per flight was 4.6. Mean systolic blood pressure (BP) was not significantly different between ISCH and HEM patients ( $165 \pm 29.83$  mm Hg versus  $161 \pm 33.31$  mm Hg, respectively;  $P = .41$ ). Diastolic BP values were also similar between HEM and ISCH groups. Eighty-eight patients had documented cardiac dysrhythmia, most often sinus tachycardia, followed by atrial fibrillation. Patients with sICH had lower initial Glasgow Coma Scale scores (8.3 versus 11.5,  $P < .05$ ) and were intubated more frequently than patients with ISCH (53 versus 17;  $P < .05$ ); 88% of sICH and 68% of ISCH were intubated before transport. Only 6% were intubated by the HT team. Fifty percent of patients were medicated by the HT team, most often with midazolam, followed by antihypertensives and paralytic agents. The most common antihypertensive was sodium nitroprusside.

**Conclusion:** Stroke patients requiring HT represent a critically ill population need-

ing specialized care. HT can provide rapid, safe, and effective care to stroke victims during transport.

## 146 Emergency Department Staff Evaluation of EMS Provider Performance

Carroll RF, Drescher MJ/University of Connecticut School of Medicine, Farmington, CT

**Study objective:** We recently reported problematic areas of the emergency department and emergency medical services (EMS) interface from the perspective of the EMS provider. We undertook this study to identify areas of satisfaction or dissatisfaction with key aspects of EMS performance from the ED staff's perspective.

**Methods:** During a 2-month period, we conducted a survey of 85 ED staff, consisting of registered nurses, emergency medicine residents, and emergency medicine attending physicians. To date, a total of 63 responses were received (21 registered nurses, 21 residents, and 21 attending physicians). The study was multicentered, involving 3 teaching hospitals affiliated with an emergency medicine residency program. All 3 hospitals share the same EMS system. The survey addressed 2 major areas: (1) radio and communications, and (2) ED/EMS interactions with regard to patient care. The respondents quantified their satisfaction in these areas using a 5-point Likert scale to evaluate the completion of duties. The scale used was as follows: 1=almost never, 2=not usually, 3=sometimes, 4=usually, and 5=almost always. We interpreted scores  $\geq 4$  as good and scores  $< 4$  as inferior.

**Results:** Our survey evaluated 15 aspects of the EMS provider's role. We identified 2 areas for which EMS satisfaction was high, based on scores consistently above 4. These aspects are (1) accurate and pertinent verbal report presented by EMS (mean satisfaction [MS] 4.15; confidence interval [CI] 4.01 to 4.30,  $n=63$ ); (2) verbal reports by EMS given in a professional manner (MS 4.22; CI 4.07 to 4.38;  $n=63$ ). We have identified 5 areas that scored consistently below 4. These areas of dissatisfaction with EMS performance are (1) organization and efficiency of radio reports (MS 3.57; CI 3.36 to 3.78;  $n=63$ ); (2) appropriateness of EMS request for medication administration (MS 2.87; CI 2.43 to 3.32;  $n=63$ ); (3) patients arrive via EMS with the proper medical histories and medication lists (MS 3.65; CI 3.43 to 3.87;  $n=63$ ); (4) EMS remains available in the ED for questions (MS 3.48; CI 3.27 to 3.68;  $n=63$ ); and (5) EMS ability to recognize and identify major disease processes (MS 3.81; CI 3.64 to 3.98;  $n=63$ ).

**Conclusion:** There are several areas of the EMS provider's responsibilities that show room for improvement from the perspective of the ED staff. We believe that many of the problems we identified can be corrected by further educating the EMS providers based on the evaluations of the ED personnel. Further research is needed to determine which interventions will be most effective to this end. This study is limited to our local EMS system, and whether the data can be generalized to other settings needs to be evaluated.

## 147 Air Versus Ground: Which Method of Transport Is Better for Short- and Intermediate-Range Interfacility Transport?

Huertas L, O'Connor RE, Tinkoff GH/Christiana Care Health System, Newark, DE

**Study objective:** Physicians must often determine whether air or ground transport is more appropriate for interfacility patient transport. Air transport is perceived as being much quicker, but it is also more expensive. We conducted this study to determine the best mode of transport based on time and distance considerations.

**Methods:** This prospective observational study was conducted at a tertiary care facility. Members of the team responsible for interfacility transports collected data. Only incoming transports cared for by this team were included. The transport team was dispatched from the receiving hospital to pick up the patient from the sending hospital. Sampling was consecutive. The sending and receiving physicians determined whether air or ground transport was used. Ground transport was stationed at the receiving hospital and air transport was stationed elsewhere. Transport distances were classified as being either greater or less than 100 miles. Statistical analysis was performed using the  $t$  test corrected for multiple comparisons and  $\chi^2$ .

**Results:** A total of 243 transports were studied: 11 by air and 232 by ground. Forty-eight transports were more than 100 miles: 8 by air and 40 by ground. The time from activation to departure of the transport team was 19 minutes by air and 1.8 minutes by ground ( $P=.001$ ). Time interval to the sending facility was 41 minutes by ground and 27 by air ( $P=.01$ ). For distances more than 100 miles, time to (29 versus 72 minutes) and from (29 versus 57 minutes) the receiving facility was shorter by air ( $P=.01$ ). Overall time from dispatch to arrival at the receiving hospital was 122 minutes by ground and 112 minutes by air ( $P=NS$ ).

**Conclusion:** Overall transport times were similar for air versus ground. Air transport minimizes the time spent in transport.

## 148 Practice Variation in the Diagnosis and Treatment of Deep Vein Thrombosis Presenting to the Emergency Department: A Call for Practice Guidelines

Rowe BH, Kelly KD, Ewanchuk M, Edmonds ML, Voaklander DC, Holroyd BR/University of Alberta, Alberta Centre for Injury Control and Research, Edmonton, Alberta, Canada

**Study objectives:** To examine the diagnostic and treatment approaches of patients with proven deep vein thrombosis (DVT) presenting to emergency departments.

**Methods:** Computerized records of all patients presenting to all 5 EDs in one regional health authority were searched to identify DVTs (*International Classification of Diseases—ninth revision*, code 451). Data were abstracted from charts by a single coder using a standardized form; physicians were unaware of the study at the time of patient presentation.

**Results:** A total of 607 records were identified during the 2 years (1996-1997); 439 (72%) were proven DVTs. Gender ratio was 1:1; mean age was 58.1 years. Most patients (56%) presented primarily to the ED for assessment of leg symptoms. DVTs were located primarily in proximal veins (74%); isolated distal (25%) and isolated iliac (1%) vein DVTs were less common. Of 428 patients who had diagnostic testing performed, the use of venography was high (overall 70%). Considerable diagnostic variation existed; initial ED investigation was more commonly venography (62%; range among the 5 sites: 33% to 82%) than ultrasound (38%; site range 18% to 67%). Testing using D-dimers (overall 3%; range 0 to 5%) was rare. Using multivariate analyses, hospital site, past history of pulmonary embolism, diabetes, and presence of calf edema were significant predictors of venogram use. All patients were hospitalized and most (78%; site range 62% to 92%) received intravenous heparin; low molecular weight heparin was rarely used (5%).

**Conclusion:** Compliance with current diagnostic and treatment recommendations for DVT are low. Prospective, multicentered studies are required to confirm this finding and guidelines may be required to reduce practice variation. In addition to improving care, the potential for resource savings exists.

## 149 Documentation of the Emergency Evaluation of the Adult Sexual Assault Victim

Plewa MC, Dubich EM/Medical College of Ohio, St. Vincent Mercy Medical Center, Toledo, OH

**Study objectives:** To assess the completeness of documentation for historical, examination, and treatment elements in the evaluation of adult female sexual assault victims before and after implementation of the sexual assault nurse examiner (SANE) program.

**Methods:** Retrospective chart review of adult female sexual assault victims treated in an urban community teaching hospital emergency department 2 years before and 1 year after the SANE program. Measurements included SANE or physician documentation of 47 elements. Groups were compared with 95% confidence intervals.

**Results:** Documentation was greater in SANE (31) than physician (57) charts for tetanus status (61% [42% to 78%] versus 23% [13% to 36%]), recent coitus (81% [63% to 93%] versus 46% [32% to 59%]), clothing change (94% [79% to 99%] versus 61% [48% to 74%]), bathing (97% [83% to 100%] versus 70% [57% to 82%]), voiding (94% [79% to 99%] versus 47% [34% to 61%]), ingestion (87% [70% to 96%] versus 30% [18% to 43%]), anal penetration (97% [83% to 100%] versus 74% [60% to 84%]), penetration with object (94% [70% to 96%] versus 16% [7% to 28%]), ejaculation (90% [74% to 98%] versus 68% [55% to 80%]), condom use (94% [79% to 99%] versus 46% [32% to 59%]), other barrier (foam, spermicide, or tampon: 90% [74% to 98%] versus 14% [6% to 26%]), menstrual bleeding (90% [73% to 98%] versus 19% [9% to 32%]), debris (70% [51% to 85%] versus 15% [7% to 28%]), blood (87% [69% to 96%] versus 51% [37% to 65%]), semen (67% [47% to 83%] versus 34% [22% to 48%]), wounds (93% [78% to 99%] versus 66% [52% to 78%]), wet prep for sperm (58% [39% to 75%] versus 28% [17% to 42%]), and HIV testing (58% [39% to 75%] versus 25% [14% to 38%]). Documentation was less in SANE than physician charts for drug/alcohol use (23% [10% to 41%] versus 60% [46% to 72%]), prior pregnancy (16% [5% to 34%] versus 53% [39% to 66%]), and use of restraints (0 versus 51% [37% to 64%]). Documentation was poor ( $<50\%$ ) in both groups for present treatment of sexually transmitted disease (0 versus 26% [16% to 40%]), birth control (35% [19% to 55%] versus 37% [24% to 50%]), loss of consciousness (48% [30% to 67%] versus 44% [31% to 58%]), fondling (0 versus 14% [6% to 26%]), kissing (0 versus 12% [5% to 24%]), and weapon use (26% [12% to 45%] versus 40% [28% to 54%]).

**Conclusion:** Implementation of the SANE program resulted in improved medical record



documentation of 19 elements, worsened documentation in 3 elements, and persistently poor documentation in 5 elements in the evaluation of adult female sexual assault victims.

## 150 Use of Percussion as a Screening Tool in the Diagnosis of Occult Hip Fractures

Mohan T, Goh SH, Low BY/Changi General Hospital, Singapore, Republic of Singapore

**Study objective:** We sought to determine the reliability of using percussion as a screening tool for the diagnosis of radiologically occult Garden's type I neck of femur fractures.

**Methods:** A prospective, single-blinded study was performed in the Accident & Emergency Department of an urban teaching hospital over the period of 13 months. A convenience sample of 290 patients with suspected occult femoral neck fractures were enrolled. The investigators were blinded to the side of pain or suspected fracture. The test was performed by percussing the patella and simultaneously auscultating with the bell of the stethoscope over the pubic symphysis. The percussion note was then compared over the contralateral side in a similar fashion. A positive test was one that resulted in diminished percussion note on the side of pain felt. All patients were admitted for further investigation by repeat radiography, bone scintigraphy, computed tomography, or magnetic resonance imaging.

**Results:** Two hundred ninety patients were admitted for further investigation of suspected occult neck of femur fractures. Of these, 84.5% (n=245) had a positive percussion test and 3.4% (n=10) had a negative test in which a subsequent fracture was demonstrated. In contrast, 10.3% (n=30) had a negative percussion test, whereas 1.7% (n=5) had a positive test when further investigation failed to reveal any fracture of the femoral neck. On further analysis, this translated into a sensitivity of 0.96 (95% confidence interval [CI] 0.87 to 0.99), and specificity of 0.86 (95% CI 0.49 to 0.98) with a positive predictive value of 0.98 and a negative predictive value of 0.75. The likelihood ratio for a positive test was 6.73 and that for a negative test was 0.75.

**Conclusion:** The use of this simple test of percussion and auscultation to screen patients with occult hip fractures is a useful tool in the emergency department in aiding the physician to risk stratify, before subjecting patients to more expensive and invasive investigations.

## 151 Emergency Department Evaluation of Male Victims of Sexual Assault

Ernst AA, Green E, Ferguson MT, Weiss SJ, Green W/University of California–Davis Medical Center, Sacramento, CA

**Study objective:** To characterize demographics in male victims of sexual assault and to compare use of anoscopy and colposcopy.

**Methods:** This is a case series of 67 male victims of sexual assault evaluated over an 8-year period by the Sexual Assault Forensic Examination Team (SAFE). The setting is a university-based ED serving as the primary site for examination of sexual assault victims by trained nurse practitioners and physician assistants. Anoscopy was done routinely over the entire study period in all those with any anal penetration or involvement. Colposcopy use started in 1994.

**Results:** Sixty-seven males were evaluated between 1991 and 1998; 55 were from the community, whereas 12 were prisoners. Mean age was 26 years. There were 42 white, 6 Hispanic, and 19 black victims. Eighteen reported a loss of consciousness, 8 threatened the use of a knife, 3 threatened to use a gun, 23 abuse by hands and/or fist, 1 a bottle, and 6 other makeshift weapons. Wood lamp examinations were done in 33 cases, with 12 (36%) positive and 21 (64%) negative. Anoscopy was performed in 61 patients. Of these, 20 (33%) had anoscopic findings in addition to gross examination. Colposcopy was performed in 38 patients. Of these, 3 (8%) had additional findings to gross examination. In the 36 with both anoscopy and colposcopy performed, additional findings to gross visual examination were found in 3 (8%) by colposcopy and 17 (47%) by anoscopy ( $P<.01$  using  $\chi^2$  with Yates' correction; difference=39%; 95% confidence interval 20% to 58%).

**Conclusion:** In male sexual assault victims with anal penetration, anoscopy is a valuable addition to colposcopy for gathering additional evidence of damage.

## 152 Comparison of Quality of Medical Documentation for Findings Related to Sexual Assault Prior and Post the Development of a Sexual Assault Forensic Examination Program

Jackson MC, Groleau G, Kimmel C/University of Maryland School of Medicine, Mercy Hospital, Baltimore, MD

**Study objective:** Comparison of medical documentation for findings related to sexual assault before and after the development of a sexual assault forensic examination

(SAFE) program. Proper documentation is mandatory for effective legal defense for the victim of sexual assault.

**Methods:** This was a retrospective study in an urban teaching hospital. Medical records of 150 sexual assault victims evaluated in the emergency department by multiple health care providers during 1992-1993 (before the SAFE program) were compared with medical records of 150 sexual assault victims evaluated by specially trained SAFE program nurses during 1996-1999. Medical charts were reviewed for appropriate documentation of type of offense, date/time of the examination, narrative content, patient condition, physical and anogenital trauma, diagrams, photographs, evidence collection, and chain of custody.

**Results:** Before the SAFE program, adequate legal documentation occurred in 67% of cases; after the SAFE program adequate documentation was 100%. The patient's condition was documented adequately before the SAFE program in only 5% of the cases, after the SAFE program in 97.5%. Documentation of physical trauma was adequate before the SAFE program in 82.5% of cases, after the SAFE program in 96%. Documentation of anogenital trauma was adequate before the SAFE program in 55% of cases, after the SAFE program in 94%. Indicated diagrams were charted before the SAFE program in 57% of cases, after the SAFE program in 100%. Indicated photographs were not done before the establishment of the SAFE program. For the cases evaluated by the SAFE program, indicated photographs were done in 98.7% of cases. Documentation of the chain of custody for evidence was found in 8.5% of cases evaluated before the SAFE program and in 100% of cases reviewed after the SAFE program.

**Conclusion:** Appropriate documentation improved after the establishment of the SAFE program.

## 153 An Evaluation of an Evidence-Based Renal Colic Algorithm: Implications for Codifying Physician Ordering and Improving Efficiency

MacKenzie R, Worriow C, Richardson D, Nester B/Lehigh Valley Hospital and Healthcare Network, Allentown, PA

**Study objectives:** Evidence-based (EB), consensus-driven modifications in clinical practice are difficult to achieve. The challenge for EB medicine is in its applicability to community practice, which has not been well studied. This study sought to characterize physician ordering patterns and to identify efficiency improvements in response to an EB renal colic (RC) algorithm.

**Methods:** All emergency department patient encounters at a community, tertiary medical center with the diagnosis of RC or renal lithiasis were retrospectively reviewed. The 1997 group (pre-algorithm) represented the control group for established RC practice by emergency physicians. The year 1998 (post) represented the group treated under the EB algorithm that limited the ordering of "routine" imaging and laboratory studies, and supported helical computed tomography (CT) as the imaging study of choice. Primary outcome measures included utilization of routine laboratory tests, urine analysis, intravenous pyelography, radiographs of the kidney, ureter, and bladder, spiral CT, and ultrasound. Length of stay in the ED was a secondary measure.

**Results:** Physician ordering patterns changed dramatically after the initiation of the new algorithm. Orders for routine laboratory tests decreased from 80% (pre) to 32% (post) ( $P<.05$ ). Likewise, orders for urinalysis decreased from 73% to 39% ( $P<.05$ ), respectively. Regarding diagnostic imaging, emergency physicians ordered 20% fewer studies in the postalgorithm period. When a study was indicated, spiral CT was selected in 93% of cases (up from 7% in the pre-algorithm period). The average ED length of stay was also observed to decrease from 4 hours 22 minutes (pre, n=106) to 3 hours 34 minutes (post, n=93) ( $P<.05$ ).

**Conclusion:** An EB RC algorithm can be implemented and embraced in the ED environment. This EB algorithm significantly reduced utilization of "routine" studies and codified the process for RC evaluations. This reduction in physician practice variation sped the disposition of RC patients in our ED.

## 154 Hyponatremia in Marathon Runners: Experience With the Inaugural Rock 'n' Roll Marathon

Davis D, Marino A, Vilke G, Dunford J, Videen J/University of California–San Diego, San Diego, CA

Exercise-induced hyponatremia has been described after extreme events, such as extreme hiking and Ironman triathlons, but our understanding of the pathophysiology and treatment of this disease is incomplete.

**Study objectives:** To better define the pathophysiology of exercise-induced hyponatremia in a group of marathon runners presenting to local emergency departments and to derive treatment guidelines for emergency physicians.

**Methods:** This study was a retrospective chart review. All participants in the inaugural San Diego Rock 'n' Roll Marathon (June 1998) presenting to 1 of the 12 local EDs were included in the study. Medical records were used to obtain demographic information, presenting complaints, vital signs, physical examination findings, laboratory data, and hospital course. Marathon times were obtained from the Rock 'n' Roll Marathon Web site. Serum sodium values were plotted over time to identify any trends during sodium correction for patients with initial serum sodium values <130 mEq/L. The mean times to race completion for patients with initial serum sodium values <125 mEq/L were compared with the mean times for a random sampling of 100 runners who completed the race. Linear regression was used to evaluate initial serum sodium versus postrace time in all patients in whom serum chemistries were obtained.

**Results:** A total of approximately 20,000 runners participated in the event; nearly 50% percent were female, more than for any previous marathon of this size. A total of 74 runners presented to 1 of the 12 EDs; 31 of these were transported by ambulance. Laboratory evaluation was performed in approximately 50% of these patients; nearly half of these were hyponatremic (<135 mEq/L). Nine patients presented with "severe" hyponatremia (<125 mEq/L); 8 of these were female. There was no significant difference between race times for runners with severe hyponatremia (5:24) versus a random sampling of runners (4:54). A statistically significant correlation between postrace time and serum sodium was observed ( $r=-0.73$ ,  $P<.05$ ), with later presentations predicting lower serum sodium values. Difficulty in correcting hyponatremia was observed in patients with initial serum sodium values <125 mEq/L. In several patients, a decrease in serum sodium despite normal saline therapy led to resistant seizures requiring intubation.

**Conclusion:** Exercise-induced hyponatremia can result in significant morbidity, even in association with relatively common events such as marathons. The pathophysiology of this disease most likely involves a combination of water intoxication and hormonal maladaptations to moderate-to-severe exercise. Females appear to be at higher risk. These results along with the existing literature have led to our recommendations, which include the rapid analysis of serum sodium and the use of hypertonic saline with severe hyponatremia.

## 155 The Effect of Trendelenburg Position on Subclavian Vein Diameter in Euvoletic and Hypovolemic Volunteers

Gibson GP, Rankins RC, Utech T/University of California—San Francisco, University Medical Center, Fresno, CA

**Study objectives:** We sought to compare the diameter of the subclavian vein in supine and Trendelenburg positions with both euvoletic and hypovolemic subjects. Our goal was to determine if there was a significant change in the diameter of the vein that would aid in central line placement.

**Methods:** Thirteen volunteers were enrolled and 10 completed the study. All volunteers had subclavian vein measurements made with ultrasound while in the supine and Trendelenburg position in both euvoletic and hypovolemic states. Hypovolemia was accomplished by phlebotomizing 2 units of blood from the volunteers. The films were then read by a radiologist who was blinded to the volunteer's position and volume status.

**Results:** The average change in the diameter of the subclavian vein (Trendelenburg—flat) in euvolemia was  $-0.02$  mm (95% confidence interval [CI],  $-0.28$  to  $+0.24$ ). In hypovolemic subjects, the average change was  $+0.09$  mm (95% CI,  $-0.39$  to  $+0.57$ ).

**Conclusion:** Trendelenburg position produces little change in the subclavian vein diameter in euvoletic and hypovolemic patients. These small changes are unlikely to be clinically significant in the placement of a subclavian central venous catheter.

## 156 The Sexual Assault Examination: A Comparison of Physical Findings Between an Emergency Department and Freestanding Nurse Examiner Clinic

Rossman L, Wynn B, Jones JS/Spectrum Health-Downtown Campus, MSU College of Human Medicine, Grand Rapids, MI

**Study objective:** To compare the documentation of genital trauma in women evaluated for sexual assault between an academic emergency department and a freestanding nurse examiner clinic (NEC).

**Methods:** This was a retrospective cohort analysis of consecutive female patients presenting after alleged sexual assault to either the ED of a university-affiliated urban hospital ( $n=100$  patients) or to a freestanding NEC ( $n=100$ ). The ED was staffed by board-certified emergency physicians and residents who identified genital trauma using gross visual examination alone. The NEC is located within 1 mile of the hospital and is staffed by registered nurses trained to perform medicolegal examinations using

colposcopy with digital imaging. The 2 patient groups were compared for baseline demographics, assault history, and documentation of genital trauma using a standardized classification system. Primary outcome was the frequency and type of documented genital injuries.

**Results:** Case files of 200 patients were reviewed; the mean age was 24.5 years (range 14 to 69 years) with 95% reporting penile-genital contact. The 2 patient groups (NEC, ED) were comparable in terms of demographics, time to examination, assault history, relationship to offender, type, and frequency of nongenital trauma. Genital injuries were documented in 71% of the patients evaluated in the NEC (mean number of genital injuries, 2.1). In comparison, 20% of those patients examined in the ED had documented genital trauma (mean number of injuries, 0.3). These differences were statistically significant ( $\chi^2=50.4$ ,  $P<.0001$ ). Trauma types varied in both groups by site—tears appeared most often on the posterior fourchette and fossa, abrasions appeared on the labia, and ecchymosis was seen on the hymen.

**Conclusion:** These results suggest that colposcopy with digital imaging improves detection of genital trauma in female sexual assault victims and may provide valuable medical and legal information.

## 157 Do Diabetic Patients Present to Emergency Departments With Infectious Complications at a Higher Rate Than Nondiabetic Patients?

Feuer H, Butterfass A, Fairweather P, Richardson L/Mount Sinai School of Medicine, New York, NY

**Study objective:** Diabetes mellitus is a medical disorder that is recognized to impair the immune system. Diabetic patients are assumed to present to emergency departments with infectious complications at a higher rate than nondiabetic patients. We tested the hypothesis that diabetic patients have a more frequent disposition diagnosis of an infectious etiology than nondiabetic patients.

**Methods:** A retrospective chart review was conducted for two 1-week periods during different seasons at a municipal hospital in the northeastern United States with 70,000 adult ED visits annually. The charts of all patients who identified themselves as having diabetes mellitus were reviewed; an equal number of nondiabetic patient charts were randomly selected from the same time periods as controls. A precoded data collection instrument for chart review was developed; pertinent demographic and clinical information was abstracted from these ED charts. ED diagnoses were categorized as infectious or noninfectious in etiology. Data were analyzed using SPSS 8.0. The  $\chi^2$  statistic was used to analyze categorical variables; the Student's  $t$  test was used for continuous variables.

**Results:** A total of 2,585 adult patients presented to our ED during the two 1-week study periods. Data were obtained from 168 diabetics (6.5% of all ED visits) and 148 nondiabetic controls. The mean age of all study patients was 46.1 years of age (range 18 to 103 years). Fifty percent were male, 50% female; 14.3% were white, 17.3% African American, 51.1% Hispanic, 14% Asian, and 5.8% other. There were no statistically significant differences in demographic composition between our diabetic and nondiabetic study groups. In the diabetic group, 34.9% took insulin for glucose control, and 3.5% had other immune-compromising illnesses (HIV or malignancy) versus 5.0% for controls ( $P=.58$ ). Diabetics were found to have a significantly higher rate of cardiac comorbidities, 15% versus 6.4% ( $P=.01$ ). The diabetic group was also found to have significantly higher rates of Medicare and Medicaid coverage. There was no statistical difference between the 2 groups in the frequency of an infection-based diagnosis: 12.1% of diabetics versus 14.2% of nondiabetics ( $P=.62$ ). More insulin-dependent diabetics (17.0%) were diagnosed with infection than non-insulin-dependent diabetics (9.3%), although this was not statistically significant ( $P=.19$ ). The data also revealed a significantly higher admission rate among diabetic patients: 31.5% versus 18.1% for nondiabetics ( $P<.005$ ).

**Conclusion:** The incidence of infectious conditions in patients visiting our ED was not shown to significantly differ between diabetic and nondiabetic populations. Ancillary data gathered portray diabetics using the ED as a more acutely ill population with a significant coincidence of cardiac disease.

## 158 Empiric Treatment of Gonorrhea and Chlamydia in the Emergency Department

Weist DR, Spear SJ, Bartfield JM/Albany Medical College, Albany, NY

**Study objectives:** This study was conducted to determine how often women screened for *Neisseria gonorrhoeae* (GC) and *Chlamydia trachomatis* (CT) in an emergency department setting are given proper empiric treatment.

**Methods:** This retrospective chart review was conducted in an urban university

teaching hospital ED among females 12 to 40 years of age who had GC/CT screens sent to the hospital laboratory between January 1, 1998, and January 31, 1999. Sexual assault victims were excluded because it is our practice to empirically treat these patients. GC/CT results identified from microbiology records were recorded. Patient charts were abstracted for age, race, diagnosis, provider, and treatment. Patients who were treated on the index visit with Centers for Disease Control and Prevention–approved regimens for GC/CT were considered empirically treated for GC/CT. The following variables were tested for their ability to predict appropriate empiric treatment: patient age, race, pregnancy, and provider type (midlevel provider [MLP] or physician [MD]). A  $\chi^2$  test was used for categorical data and *t* test for continuous data with significance defined as *P* < .05.

Results: One thousand ninety-three records were reviewed. The mean age was 24±6 years; 580 (53%) were African American, 420 (38%) Caucasian, 72 (7%) Hispanic, and 21 (2%) were of other ethnic backgrounds. Cervicitis or pelvic inflammatory disease was diagnosed in 216 (20%) of the patients; 182 (17%) patients were found to be pregnant. One hundred thirteen (10%) subjects had positive screens: 39 for GC only, 56 for CT only, and 18 for both GC and CT; 980 (90%) had negative screens. Of the 254 (23%) patients given empiric treatment, 54 had positive screens and 200 had negative screens. Thus 48% (54/113) subjects with positive screens were appropriately treated and 20% (200/980) with negative screens were overtreated. Provider type and pregnancy were the only factors that consistently influenced empiric treatment. MLPs were more likely than MDs to empirically treat subjects. MLPs treated 35 of the 45 subjects (78%) with positive screens compared with 19 of 68 (28%) patients seen by MDs (*P* < .0001). MLPs overtreated 110 of the 285 (39%) patients with negative screens compared with 89 of the 691 (13%) patients seen by MDs (*P* < .0001). None of the 13 pregnant patients with positive GC/CT screens were initially treated compared with 54 of 100 (54%) nonpregnant patients with positive screens (*P* = .0001). Of the 169 pregnant patients with negative screens, only 1 (0.6%) was overtreated compared with 199 (25%) of 811 nonpregnant subjects (*P* < .0001).

Conclusion: In this retrospective study, women screened for GC/CT received empiric treatment 23% of the time. The majority of these patients had negative screens for GC/CT, and only approximately half of the patients with positive screens received empiric treatment. MLPs gave empiric treatment more often than MDs. Further prospective studies are needed to determine factors that influence practitioner decisionmaking.

## 159 The Incidence, Treatment, and Disposition of Hemorrhagic CVA in the Emergency Department

Bunney EB, Sloan EP, Silva JC, Sharpe LJ, Rosengerg MS/Resurrection Medical Center, University of Illinois, Chicago, IL

As new modalities become available for the treatment of ischemic cerebrovascular accident (CVA), there is greater interest in studying patients who present with an acute hemorrhagic CVA. However, little information exists regarding the acute treatment and outcome of these patients.

Study objective: To describe hemorrhagic CVA patients who were initially diagnosed and treated in the emergency department. This study was conducted in a comprehensive urban, community hospital ED.

Methods: A retrospective chart review of 108 consecutive ED hemorrhagic CVA patients treated between January 1996 and December 1997 was performed. The mean age was 66 years, and 46% were male. Hypertension was noted in 56%, coronary artery disease in 16%, and diabetes in 8%.

Results: The incidence of hemorrhagic CVAs was 1 per 500 ED patients. The most common sites of hemorrhage were parietal (49%) and temporal (22%) lobes. The most common hemorrhage types were intraparenchymal (67%), subarachnoid (24%), ventricular (23%), and subdural (14%). Coma was present in 43% of patients, and intubation was required in 37%. Mannitol was used in 53%, decadron (52%), phenytoins (18%), and nimodipine in (7%). Surgical intervention took place in 39% of patients. The overall mortality rate was 34%. At discharge, 43% of the patients had minimal disability and 22% had severe disability. Mean hospital length of stay was 9.5±6.8 days. Disposition to home was possible for 30% of the patients. A nursing home was required in 16%.

Conclusion: Hemorrhagic CVA patients are seen commonly in the ED. Although the mortality for hemorrhagic CVA remains high, the majority of the surviving patients were successfully discharged home with only minimal residual disability. The findings suggest that aggressive therapy, similar to the "Brain Attack" for ischemic CVA, is warranted for these patients. More information regarding optimal treatment strategies could be obtained through a multicentered prospective case series.

## 160 Emergency Medicine Resident Training in Mechanical Ventilation

Couvillon L, Brandhurst R, DeBlieux P/Medical Center of Louisiana at New Orleans, New Orleans, LA

Study objective: Emergency physicians confront respiratory failure and the need for the institution of mechanical ventilatory support frequently in their practice. Currently emergency medicine literature minimally addresses this topic. The goal of this study was to describe mechanical ventilation (MV) education during emergency medicine residency training.

Methods: The study design was a closed cohort survey of 126 emergency medicine programs. A 14 question survey was E-mailed or faxed to emergency medicine program directors with follow-up via fax or E-mail. Programs were asked if they provided didactic instruction in the initiation of MV and by whom, the number of hours a year dedicated to the topic, and average and maximum duration of time patients are managed in the ED on MV.

Results: Seventy-seven (61%) of 126 programs responded. The amount of didactic instruction a year included: 53% of programs offer <2 hours and 16% offer <1 hour. Primary instructors included 37.6% ED staff only, and 22% by a combination of pulmonary, critical care, surgery, and ED staff; 28.3% of programs stated the average duration of time patients were managed on MV in their ED was >3 hours and 75% have managed patients on MV in their ED for ≥3 hours this year.

Conclusion: All emergency medicine programs receive some form of MV instruction during their residency training, although more than half receive less than 2 hours per year. With the frequency of instituting MV in the ED and the prolonged times patients are managed in the ED on MV, the authors feel additional educational interventions are warranted.

## 161 Perceptions of Medical Providers Regarding Their Care of HIV-Positive Patients in the Emergency Department Setting

Alcindor F, Stoller M/Albert Einstein College of Medicine, Emergency Medicine Residency Program at Beth Israel Medical Center, New York, NY

Study objective: To identify any significant differences in the perceptions of emergency department providers and HIV-positive patients relating to the care delivered in the emergency department setting.

Methods: A 42-item survey was mailed to 172 emergency medicine residents, 357 attending physicians, and 290 emergency medical services (EMS) staff in the New York City area to assess their perceptions about the care provided to HIV-positive patients. There was a 45% response rate. The results were compared with the responses from a previous matching 42-item survey of 301 HIV-positive ED patients. Data were analyzed by the *t* test and Fisher's exact test.

Results: The majority of providers felt that they allocated adequate time to take a proper history (97%), considered non-HIV causes of complaints (96%), thought that the patients had confidence in them and the ED staff (96%), perceived themselves as being compassionate and nonjudgmental in their care (99%), and paid more attention to chief complaints because of the patients' HIV status (97%). Most of the HIV group shared these perceptions; however, a significant proportion felt ignored (35%), reported being touched only with gloves (31%), and perceived their providers as judgmental (37%). Forty percent of providers believed that the HIV-positive patients complied with ED recommendations, whereas their HIV-positive patients reported a compliance rate of 85%. Both providers and patients concurred that there was inadequate aftercare follow-up after the ED visit.

Conclusion: There were significant differences in the perceptions of ED providers and HIV-positive patients pertaining to the care delivered in the ED. Although the majority of both groups have the same perception about the compassion and competence of the ED provider, a significant proportion of the HIV group felt that they did not receive competent, compassionate care. They felt dehumanized by their experience.

## 162 Differences in Patient Age and Antibiotic Type in the Inappropriate Use of Antibiotics in the ED

Stone S, Cairns CB, Gonzalez R, Lowenstein SR/University of Colorado Health Sciences Center, Denver, CO

Antibiotic resistance has become a major health threat. Several recent studies have demonstrated a direct association between recent antibiotic use and drug resistance. We recently reported on the inappropriate use of antibiotics in adult emergency department patients.

**Study objective:** To examine specific antibiotic prescriptions and differences according to patient age in ED patients with common colds, upper respiratory tract infections (URI), and bronchitis.

**Methods:** Data were obtained from the 1996 National Hospital Ambulatory Medical Care Survey (NHAMC) of 21,902 ED visits and 450 emergency service areas. A standardized patient record with patient, visit, and provider characteristics was used. Exclusion criteria included asthma, emphysema, and chronic bronchitis. Statistical analysis included  $\chi^2$  and multivariate logistic regression for independence of association.

**Results:** Overall, there was a difference in antibiotic prescription rates for pediatric (<18 years) patients (27% had antibiotics prescribed) versus adult (40%;  $P<.05$ ). Adults were further stratified from 18 to 45 years (41% had antibiotics prescribed), 46 to 64 years (40%), and  $\geq 65$  years (34%;  $P<.01$  for trend with age). Of the antibiotics prescribed, patients with colds or URIs usually received amino-penicillins, whereas bronchitis patients received macrolides.

**Conclusion:** (1) Antibiotics are often prescribed inappropriately for patients with viral URIs. (2) Pediatric and elderly patients are less likely to receive antibiotics for these conditions. (3) There are differences in the types of medications given for each of these conditions. (4) Further study of the reasons for these prescribing patterns and the impact on antibiotic resistance is warranted.

## 163 Leukocyte Esterase as a Marker of the Presence of Fecal Leukocytes

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**Study objective:** The presence of fecal leukocytes (FL) aids in the diagnosis of invasive bacterial diarrhea. This study compares microscopic examination of stool for FL with leukocyte esterase (LE) reactivity from urine dipsticks exposed to stool.

**Methods:** Blood and stool samples were obtained for analysis. The blood was serially diluted with saline, then mixed with stool. All specimens were stained with methylene blue and microscopically examined for FL. Each specimen was exposed to the LE tab of a standard urine dipstick. The dipsticks were moistened with saline before the addition of the specimen. Statistical analysis was done using McNemar's exact test.

**Results:** FL were present up to and including the 1:16 dilution, whereas LE were present up to and including the 1:32 dilution. Further dilutions were negative for each test. These data are summarized in the Table. The probability that the difference between the 2 groups was due solely to chance was greater than 75% ( $P=.75$ ).

**Conclusion:** LE may represent a quick, surrogate, bedside test for the presence of FL. This study provides the foundation for larger, clinical trials.

**Table, abstract 163.**

**Presence of FL compared with that of LE reactivity**

	Stool Only	Blood Only	1:1	1:2	1:4	1:8	1:16	1:32	1:64	1:100	1:1,000	1:10,000	1:100,000
Dilution (Control)	(Control)	(Control)	1	2	4	8	16	32	64	100	1,000	10,000	100,000
FL ( $\pm$ )	—	+	+	+	+	+	+	+	—	—	—	—	—
LE ( $\pm$ )	—	+	+	+	+	+	+	+	—	—	—	—	—

## 164 Validation of a Computer Model for the Determination of Aortic Compliance Curves

Summers RL, Mizelle LH, Jones AE, Montani JP/University of Mississippi Medical Center, Jackson, MS

**Study objective:** A reduction in aortic compliance (AC) is known to be a marker for atherosclerosis and coronary artery disease. However, specific AC measurements are dependent on the patient's current hemodynamic state, thus making evaluations and comparisons difficult. An individual's AC is best defined as a series of complex curves using computer models that incorporate the effects of reflexes, pressure, and the mechanical state of the artery.

**Methods:** A computer model of the aorta based on physiologic principles was constructed using object-oriented simulation software to define subject-specific AC curves using clinically determined hemodynamic profiles. To validate the method, the actual AC was measured in chronically instrumented conscious dogs over a varying range of hemodynamic states and compared with those values predicted by the computer-sim-

ulated curves using a paired  $t$  test ( $P<.05$ ). The study was approved by the institutional animal care committee.

**Results:** The computer model generated AC curves consistent with those typically observed experimentally. In 7 dogs studied, there was no significant difference in the extrapolated values of AC determined from the simulated curves and those observed in the individual animals at 2 widely different levels of heart rate, stroke volume, and arterial pressure.

**Conclusion:** A computer model that accurately predicts AC over a wide range of hemodynamic states was validated using parameters invasively measured in dogs. This model and method may be clinically useful in defining patient-specific AC curves under a variety of hemodynamic conditions.

## 165 Pneumothoraces on Abdominal CT in Pediatric Blunt Trauma Patients

Holmes JF, Brant WE, Bogren HG, London KL, Kuppermann N/University of California-Davis School of Medicine, Sacramento, CA

**Study objective:** To compare abdominal computed tomography (CT) with plain chest radiography (CXR) for the detection of pneumothoraces in pediatric blunt trauma patients.

**Methods:** We conducted a prospective observational cohort study of pediatric (<16 years old) blunt trauma patients undergoing both abdominal CT and CXR in the emergency department of a Level I trauma center over a 28.5-month period. All abdominal CTs were interpreted by a single faculty radiologist. The CXRs of all patients with pneumothoraces detected on CT scan, as well as a random sample of CXRs in patients without pneumothoraces on abdominal CT (ratio: 4 normals per pneumothorax), were reviewed by a second faculty radiologist. Both radiologists were masked to all clinical data and the objective of the study. All patients were followed through their hospital courses to document therapy and outcome.

**Results:** Five-hundred fifty children underwent abdominal CT and were enrolled. Nineteen patients (3%) were found to have pneumothoraces on CT. Of these 19 patients, 8 (42%, 95% confidence interval 20% to 67%) had pneumothoraces identified on initial CXR and all 8 underwent tube thoracostomy. In the remaining 11 patients with pneumothoraces visualized only on abdominal CT, 1 patient (9%, 95% confidence interval 0 to 42%) underwent tube thoracostomy. None of the 10 patients with pneumothoraces detected only on CT and who were managed without tube thoracostomy (including 2 patients who underwent positive-pressure ventilation) had complications from their pneumothoraces. No patient had pneumothorax solely on CXR.

**Conclusion:** Of pediatric blunt trauma patients with pneumothoraces identified on abdominal CT, less than half have pneumothorax identified on CXR. Patients with pneumothoraces identified solely on abdominal CT, however, rarely require tube thoracostomy.

## 166 Observation Improves CT Scan Utilization in Abdominal Pain Evaluation for Appendicitis

Graff L, Mahadevan M, Russell J/New Britain General Hospital, New Britain, CT

**Study objective:** Observation improves computed tomography (CT) scan utilization without worsening its diagnostic performance in identifying acute appendicitis in abdominal pain patients.

**Methods:** This was a threshold for testing analysis of the value of observation combining 2 retrospective observational cohort studies. One was at 11 acute care hospitals examining consecutive patients who had an appendectomy for possible acute appendicitis ( $n=1,045$ ). Use of imaging was identified. The second was at 1 acute care hospital examining during 1 year all consecutive acute appendicitis ( $n=105$ , 44 underwent observation before surgery), all consecutive emergency department observation unit patients ( $n=252$ ), and a sample of consecutive ED abdominal pain patients without acute disease ( $n=100$ ). Clinical findings were abstracted on all patients to calculate Alvarado appendicitis score and probability of disease.

**Results:** In the first study, 916 patients had appendicitis and 110 patients had a negative laparotomy. During that same period at those hospital EDs, there were an estimated 20,044 abdominal pain patients evaluated who did not have appendicitis. CT scans were performed on 131 (14%) of 916 appendicitis patients with 89% sensitivity. In the second study, there were 2,401 abdominal pain patients evaluated in the ED. At a threshold 5 Alvarado appendicitis score (15.4% pretest probability of disease) to test patients with CT scan, the use of observation improved sensitivity (76.3% to 80.6%), improved specificity (89.5% to 90%), and decreased CT scan usage from 3,265 (15.6%) of 20,960 patients to 2,753 (13.1%) of 20,960 patients,  $P<.001$ .

**Conclusion:** Observation lowers the utilization of CT scan imaging without worsening its diagnostic performance in identifying acute appendicitis in abdominal pain patients.



## 167 Impact of ACI-TIPI on Resource Utilization in Emergency Department Patients With Chest Pain

Zalenski RJ, Shama F, Waselewsky D, Sherwin R, Bock B, Kosnik J/Wayne State University, Grace Hospital, Detroit, MI; William Beaumont Hospital, Royal Oak, MI; Huron Valley Hospital, Commerce Township, MI

**Study objective:** Although the acute cardiac ischemia-time insensitive predictive instrument (ACI-TIPI) has been shown to reduce unnecessary coronary care unit (CCU) admissions, its effect on emergency department process of care outcomes, such as length of stay and resource utilization, is not known.

**Methods:** This was a prestudy/poststudy design in 2 inner-city hospitals where no ACI-TIPI was used for 8 weeks (control) followed by 8 weeks where emergency physicians were provided ACI-TIPI scores with the initial ECG for all stable chest pain patients >18 years. Primary outcomes, stratified by ACI final diagnosis, were hospital admissions, use of diagnostic testing, cardiac consultation, and length of ED stay.

**Results:** Five hundred thirty-seven patients had a mean age of 52.5 years, with 68% male, 75% blacks, 15.5% whites, and 9.5% other. In the 426 (79.3%) patients without a final diagnosis of ACI, there were no differences in control versus ACI-TIPI periods in the rates of hospital admissions or use of diagnostic testing (chest radiography, cardiac enzymes, or intravenous insertion). The rate of cardiac consultation (91.8%) in the control period was nonsignificantly lower than in the ACI-TIPI intervention period (96.7%,  $P=.2$ ). There were no differences in the mean time to intravenous line insertion, aspirin treatment, ED length of stay, admission time to CCU in the group with or without a final diagnosis of ACI.

**Conclusion:** In this study, ACI-TIPI did not appear to reduce resource utilization or decrease length of stay.

## 168 Early Centrifugation of Chemistry Specimens and Hemolysis

Verma R, Ambalu M, Ross H, Hsu C/Beth Israel Medical Center, New York, NY

**Study objective:** Postphlebotomy hemolysis is a common problem in the emergency department causing delay in service and disposition of patients. Blood specimens sent to the laboratory may encounter delays in processing. This study investigates whether early centrifugation of blood chemistry samples reduces the rate of hemolysis.

**Methods:** The control group consisted of all chemistry specimens sent "STAT" on specific days. The study group were all chemistry specimens sent "STAT" on specific days and were all centrifuged in the ED within 20 minutes of phlebotomy. For both groups, the ED staff was not aware of the study parameters. No attempt was made to change any behavior related to the acquisition, transport, and analysis of the specimens. Both control and study specimens were analyzed in the same laboratory. The technicians evaluating the specimens for hemolysis were blinded to which of the tubes had undergone early centrifugation.

**Results:** In the control group, 29 (21%) of 141 samples were hemolyzed. In the study group, 43 (36%) of 119 were hemolyzed ( $P<.5$ ). Contrary to expectations, early centrifugation was associated with a statistically significant increase in hemolysis rate.

**Conclusion:** We conclude that early centrifugation of blood chemistry specimens offers no improvement in hemolysis and may potentially increase postphlebotomy hemolysis.

## 169 Accuracy of Day 4 Bone Scans and Efficacy of Clinical Findings in the Assessment of Patients With Clinical Scaphoid Fractures

Woolfrey K, Eisenhaur M, Murphy D, Roth J, Doig G/Carteret General Hospital, Morehead City, NC; London Health Sciences Centre, University of Western Ontario, London, Ontario, Canada

**Study objectives:** (1) To validate the accuracy of day 4 bone scans in predicting the presence or absence of fracture in patients with "clinical scaphoid fracture." (2) To assess the efficacy of clinical predictors in the diagnosis of "clinical scaphoid fractures."

**Methods:** This was a prospective sensitivity study, conducted at 2 tertiary care teaching hospital emergency departments. Eligible study participants included all ED patients older than 16 years and younger than 70 years with the diagnosis of clinical scaphoid fracture. Patients diagnosed with a clinical scaphoid fracture were immobilized in a thumb spica cast and had bone scans of the wrists and hands 4 days after injury. Patients with positive bone scans remained in plaster immobilization, and those with normal bone scans had the plaster cast removed. All patients were reevaluated on day 10 with repeat plain radiographs and consultation with a hand surgeon. Patients with positive day 4 bone scans or positive day 10 clinical examination then underwent computed tomography (CT)

or magnetic resonance imaging (MRI) scans as deemed appropriate by the hand surgeon. Scaphoid fracture was diagnosed by either positive day 10 radiograph or CT. In addition, 6 clinical examination findings including presence of effusion, tenderness on palpation of the snuff box, scaphoid tubercle, scapholunate ligament, radial styloid, or with scaphoid compression.

**Results:** One hundred twenty-three patients were enrolled from September 1995 through August 1998. Seventy-nine patients successfully completed the study protocol. Sixteen patients had positive day 4 bone scans for scaphoid fracture and 15 of these were confirmed by CT scan; 3 of these patients had positive day 10 radiographs. The single false-positive bone scan was in fact confirmed by CT as a "bone island" with no evidence of fracture. Day 4 bone scans were 100% sensitive and 98.4% specific for scaphoid fracture, for a positive predictive value of 94% and a negative predictive value of 100%. Many other abnormalities (25) were identified on the day 4 bone scans, but only 8 of these were subsequently confirmed on CT scan, and felt to be clinically significant. One patient had a negative bone scan, but at day 10 follow-up was felt to be tender and swollen over the scapholunate ligament, and subsequent MRI revealed a scapholunate ligament tear. None of the evaluated clinical findings proved to be statistically predictive of scaphoid fracture.

**Conclusion:** Day 4 bone scans are an accurate means of both diagnosing and ruling out scaphoid fracture. However, because of a significant number of false-positive scans at day 4, they are not reliable in diagnosing other carpal bone fractures. No single examination finding, or combination of findings, were predictive of scaphoid fracture. Use of day 4 bone scans also allowed earlier mobilization of patients with negative scans, reducing the morbidity associated with more prolonged immobilization.

## 170 Use of the Cerebrospinal Fluid (CSF) Cell Count as a Screening Test in the Evaluation of Afebrile Emergency Department Patients Presenting With Headache

Hale DB, Minnigan HJ/Health Partners-Regions Hospital, St. Paul, MN

**Study objective:** To determine if the cerebrospinal fluid (CSF) cell count is a safe screening test in evaluating afebrile headache patients presenting to the emergency department.

**Methods:** This was an observational, retrospective cohort study evaluating lumbar puncture (LP) results of adult patients that presented to an urban, academic ED (58,000 visits per year) from January 1, 1995, to March 1, 1999. All 279 charts of patients that underwent an LP in the ED, as identified by billing codes, were evaluated by 1 of 3 trained reviewers. Data were recorded on a standardized form and included LP indication, associated symptoms, LP results, disposition, and 1- to 6-month follow-up results. Follow-up was defined as presenting to the ED or a clinic after the initial ED visit. All visits within the 1- to 6-month period were reviewed. RBC and WBC data were recorded from the last CSF tube that was analyzed for cell count; 0 to 5 CSF WBCs (cells/mm<sup>3</sup>) was considered normal and >5 WBCs elevated. Charts were randomly reviewed to ensure accurate data collection. One hundred thirteen patients were excluded who underwent an LP for indications other than evaluation of an afebrile headache. Patients excluded included 74 who had an LP as part of a fever workup, defined by documented ED fever or patient complaint of fever; 36 who had an LP to evaluate altered mental status, focal neurologic findings, or seizures; and 3 who had no documentation of an LP in any hospital or outpatient setting.

**Results:** Of 166 patients, 114 had an LP for a nonspecific headache complaint and 52 for subarachnoid hemorrhage evaluation. Twenty-seven patients had elevated CSF WBC counts and 139 patients had normal CSF WBC counts. None of the 139 patients with normal CSF WBC counts had a central nervous system infection or bleeding at 1- to 6-month follow-up (95% confidence interval 0 to 2.1). None of 139 patients with normal CSF WBC counts had a positive Gram stain. Five of 139 patients with normal CSF WBC counts had cultures that grew *Staphylococcus epidermidis*. Four patients were admitted and received intravenous antibiotics, and 1 was brought back for reevaluation. Evaluating physicians considered all 5 organisms contaminants and no further treatment was instituted. Twelve of 139 patients had isolated elevated protein levels. At 1- to 6-month follow-up, none of 12 patients had further evaluation or a new neurologic diagnosis other than nonspecific headache or migraine. Fourteen of 139 patients had isolated elevated glucose levels, but only 2 of 14 had concomitant serum glucose levels drawn. At 1- to 6-month follow-up, 0 of 14 patients had any further evaluation or a new glucose-related diagnosis. Four of 166 patients had angiogram-confirmed cerebral aneurysms. Four of 4 patients had elevated CSF WBC counts and >50 CSF RBCs.

Conclusion: In afebrile ED patients evaluated for headache, a CSF cell count is a safe initial screening test and other laboratory tests are unnecessary.

## 171 Evaluation of a Computerized Esophageal Detector Device (CEDD) in Patients With Morbid Obesity and Severe Pulmonary Disease

Wolfe TR, Kimball EJ, Hartsell SC/University of Utah School of Medicine, Salt Lake City, UT

Undetected esophageal intubation can result in permanent injury or death. Clinical confirmation is operator dependent and may be misleading. Therefore, alternate methods of intubation confirmation exist. End-tidal CO<sub>2</sub> and esophageal detector devices (EDDs) both identify esophageal intubations with extreme accuracy but may misidentify properly placed tracheal tubes.

Study objective: To create a computerized esophageal detector device (CEDD) that is accurate in all clinical situations.

Methods: Forty elective surgical patients underwent tracheal and esophageal intubation. CEDD data were collected from all tubes and were used to create a decision algorithm. Intubated patients at high risk for EDD failure (severe pulmonary disease or morbid obesity) were eligible for study entry. All ETTs were confirmed to be tracheal by waveform capnography and clinical judgment before study entry. All ET tubes were then tested with the CEDD.

Results: Twenty-eight patients with pulmonary disease and 11 morbidly obese patients were entered. The CEDD properly identified 100% of the ETTs as tracheal in location. A log normal distribution provided the best fit of the data. Using this distribution, the probability of misidentifying a tracheal intubation in this high-risk population was 0 to 2%.

Conclusion: The CEDD can reliably identify tracheal intubations in situations where standard EDDs may fail. Future studies will determine the reliability of this device in less controlled settings.

## 172 Is a Clinical Rule for Predicting the Need for Shoulder X-rays Feasible?

Silver BE, Sexton JD, McGinn MA, Heller MB/St. Luke's Hospital, Bethlehem, PA

Study objective: To determine what history and physical examination factors might be useful in establishing a decision rule for ordering shoulder radiographs.

Methods: This was a prospective, convenience sample of 105 patients presenting to a community hospital emergency department with a chief complaint of shoulder pain. Historical, demographic, and physical examination findings were recorded before obtaining 2-view shoulder films. The presence or absence of abnormality was analyzed by univariate and multivariate analysis; correlation coefficients were calculated for all associations identified by logistic regression.

Results: Two physical examination findings (humeral neck tenderness, sensitivity 50%, specificity 88%; and visible deformity, sensitivity 43%, specificity 96%) were associated with a positive radiographic result ( $P < .001$  and  $\phi > 3.1$ ,  $< 4.1$ , a moderately strong association). One historical finding, a history of blunt trauma was also a predictor of X-ray positivity ( $P < .001$ ,  $\phi = 0.33$ ). No other single predictor of injury was significant, but no patient who denied blunt trauma and also had a full range of motion had a positive radiograph.

Conclusion: There appears to be no frequent and simple combination of history and physical examination factors that has sufficient sensitivity to exclude a fracture with a very high degree of certainty. The combination of no history of blunt trauma and a normal range of motion does merit further evaluation in a validation study.

## 173 Noncontrasted Abdominal Computerized Tomography Compared to Intravenous Pyelography for the Evaluation of Suspected Renal Colic

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Study objectives: Intravenous pyelography (IVP) has been the standard radiologic evaluation technique for suspected ureteral stones. Recently, abdominal computed tomography (CT) with no contrast agent (NCCT) has been proposed as an effective and safer imaging alternative. This study was conducted to compare the utility of IVP with NCCT for radiographic diagnosis of suspected renal colic.

Methods: This observational study was conducted over a 7-month period from April to November 1998, at an emergency department with an annual census of about 80,000. Adult patients with a clinical evaluation suggestive of renal colic were eligible if an imaging technique was felt necessary for diagnostic confirmation and no

contraindications to iodinated contrast existed. Pregnant patients were excluded. Eligible patients, after informed consent, underwent abdominal CT without contrast agent followed immediately by IVP. At a later date, 2 radiologists and 3 emergency physicians reviewed each IVP and NCCT without knowledge of the ED clinical course. Every IVP and NCCT was read independently by each physician in a blinded fashion without knowledge of the result of the other imaging test. Sensitivity and specificity of each test were compared with a final ED radiologic diagnosis, which included information from both the patient's IVP and NCCT along with other relevant clinical information.

Results: A total of 109 patients were analyzed who completed both IVP and NCCT during the study period. Sensitivity using IVP to diagnose renal colic averaged 80% (range 75% to 86%) among emergency physicians and 91% (range 90% to 92%) for radiologists. Sensitivity using NCCT to diagnose renal colic averaged 82% (range 77% to 88%) among emergency physicians and 90% (range 86% to 93%) for radiologists. Specificity using IVP was 86% (range 81% to 89%) for emergency physicians and 83% (range 83% to 83%) for radiologists, and using NCCT was 79% (range 75% to 86%) for emergency physicians and 81% (range 78% to 83%) for radiologists. In 3 cases, clinically significant alternative diagnoses were recognized only by NCCT.

Conclusion: Noncontrasted abdominal CT appears equally sensitive compared with IVP in evaluating renal colic, with similar specificities. Radiologists may interpret both tests slightly more effectively than emergency physicians. As noncontrasted CT avoids complications related to iodinated dye and allows more specific diagnosis of other intraabdominal pathology, it may appropriately become the imaging modality of choice in the evaluation of suspected renal colic.

## 174 Arterial-Central Venous Carbon Dioxide Difference in the Emergency Department: An Indicator of Cardiac Index

Nguyen HB, Mullen MT, Suri P, Rivers E, Cuschieri J, Urrunaga J, Tomlanovich MC/Henry Ford Hospital, Detroit, MI

Cardiac output (CO) and cardiac index (CI) are integral in the hemodynamic management of critically ill patients. The ability to obtain CO and CI in the emergency department is limited by the feasibility of pulmonary artery catheterization.

Study objectives: The purpose of this study was to compare CO and CI obtained by arterial-central venous Pco<sub>2</sub> differences or (a-v)Pco<sub>2</sub> with Doppler CO and CI, respectively.

Methods: This was a prospective cohort of critically ill ED patients who required intubation, mechanical ventilation, vasopressors, arterial, and central venous catheterization for hemodynamic optimization over a 4-month period. CO was measured in all patients from aortic Doppler flow, using esophageal Doppler monitoring (EDM). CI (EDM) was calculated by dividing the CO (EDM) by body surface area. Simultaneous blood gas samples were obtained for calculating CO (a-v)Pco<sub>2</sub> and CI (a-v)Pco<sub>2</sub>.

Results: Twenty-seven patients were enrolled with mean age of 68±16 years. The CO (EDM) and CO (a-v)Pco<sub>2</sub> were 6.73±3.08 L/min and 6.14±2.64 L/min, respectively, with a Pearson's correlation coefficient of 0.71. CI (EDM) and CI (a-v)Pco<sub>2</sub> were 3.58±1.61 L/min/m<sup>2</sup> and 3.41±1.37 L/min/m<sup>2</sup>, respectively, with a Pearson's correlation coefficient of 0.70.

Conclusion: CO and CI obtained by arterial-central venous Pco<sub>2</sub> differences closely approximate CO and CI obtained by EDM. This method provides a practical means of assessing cardiac function in the ED when treating critically ill patients.

## 175 Prospective Evaluation of a Protocol for Selective Thoracolumbar Radiography

Terregino CA, Nyce A, Killian AJ, Lipinski MF, Ross SE/Cooper Hospital, University Medical Center, Camden, NJ

Thoracolumbar (TL) radiography may be unnecessary in clinically evaluable patients without signs or symptoms of injury.

Study objective: To prospectively evaluate a protocol of selective indications for TL radiographs in blunt trauma patients.

Methods: This observational, cross-sectional study was conducted at a Level I trauma center. The protocol implemented required TL spine radiographs in all patient if any of the following criteria were met: Glasgow Coma Scale score <13, intoxication, intubation, cervical fracture, or cervical, thoracic, or lumbar neurodeficit (group 1); or in the absence of the above criteria in those with a major distracting injury (group 2). Otherwise radiographs were based on the presence of clinical signs and/or symptoms (group 3) or their absence (group 4). Data were collected by trained observers. Subjects were reexamined for signs of missed fractures. Test performance characteristics for positive or negative criteria were determined.

Results: Two hundred forty-seven blunt trauma patients were accrued prospectively. Forty-three TL fractures were identified in 24 patients (9.7%). Nine patients had non-contiguous fractures. Eight (7.8%) of the 103 group 1 patients had TL fractures. Seven of the 74 group 2 patients (9.5%) had fractures, 2 without pain or tenderness. Nine of the 24 group 3 patients (37.5%) had a fracture, and the remaining 46 group 4 patients had no missed fractures. The sensitivity for any positive indicator was 100%, specificity 21%, positive predictive value 12%, and negative predictive value of 100%.

Conclusion: Selective use of TL spine radiographs is appropriate. A larger prospective study is needed to further evaluate these criteria and to promote widespread guidelines.

## 176 Hemodynamic Evaluation of the Critically Ill in the Emergency Department: A Comparison of Clinical Impression Versus Transesophageal Doppler Measurement

Urrunaga JJ, Rivers E, Mullen M, Karriem-Norwood V, Nguyen HB, Knoblich B, Ritteninger W/Henry Ford Hospital, Detroit, MI

Accurate hemodynamic assessment of the critically ill is important in the emergency department for appropriate diagnosis and therapeutic intervention. It is well established that vital signs are a poor indicator of tissue perfusion rendering clinical assessment less than desirable when critical decisions are warranted. Transesophageal Doppler or EDM (Deltex Medical, Irving, TX) allows for hemodynamic measurements of equal accuracy to the pulmonary artery catheter.

Study objectives: The purpose of this study was to compare hemodynamic assessment of the clinician with esophageal Doppler monitoring in critically ill patients presenting to the ED.

Methods: This was a prospective case series of adult critically ill patients presenting to a large urban ED and admitted to the ICU. Patients were included if they were intubated, sedated, mechanically ventilated with arterial and central venous catheterization for blood and central venous pressure (CVP) measurement. The ED attending physician was asked to assess preload (volume status), cardiac output, contractility, and systemic vascular resistance (afterload) based on clinical assessment and hemodynamic data obtained from the arterial blood pressure and CVP. These variables were recorded as high, normal, or low. The EDM was placed and the same measurements were obtained after a steady-state reading for 30 seconds. These hemodynamic data were provided to the ED attending physician. Therapy before and after EDM was compared.

Results: There were 34 patients enrolled with a mean age of  $62.5 \pm 12$  years, a mean duration of ED stay of  $6.2 \pm 3$  hours, and a 27% in hospital mortality. The clinician's agreement with EDM was 48% for volume status, 50% for cardiac output, 39% for contractility, and 48% for afterload. There was a 31% change in therapy after the EDM's hemodynamic assessment was provided to the ED attending physician.

Conclusion: EDM is a less invasive alternative to pulmonary artery catheterization and feasible for ED use in the treatment of the critically ill. It provides more accurate information than clinician assessment in the ED even with invasive hemodynamic monitoring. It further leads to a significant change in therapy. Further study is warranted to determine the outcome significance of these findings.

## 177 Now Evaluate Chest Pain With 12-Lead Electrocardiograms and Rapid Markers for Early Recognition of Myocardial Infarctions in the Ambulance (NEW ERA)

Dadkhah S, Fisch C, Crabbe G, Gilbert L, Marcotte MA, Lamothe J, Graff J, Aldinger G/St. Francis Hospital, Evanston, IL

In the United States, more than 1 million patients die of acute myocardial infarctions (AMIs) each year and approximately 30% of them never reached a hospital. Of all AMIs, 50% of ECGs are not diagnostic. It has been shown that patients experiencing AMIs have a delay of at least 100 minutes after the onset of symptoms to arrival in the emergency department, decreasing their chances of salvaging functional myocardium.

Study objectives: This study was performed to evaluate the feasibility of combining the widely available 12-lead ECG with the new innovative rapid cardiac markers to diagnose AMI in the prehospital setting.

Methods: This multicenter trial involved 5 hospitals (4 of which have emergency percutaneous transluminal coronary angioplasty capabilities) and 5 emergency medical services providers. Twelve-lead ECGs and Point-of-Care Rapid Cardiac Markers (Spectral Diagnostics) were performed before arrival in the ED. The result of the ECGs was transmitted while the results of the markers were telephoned in during transport.

Results: Two hundred forty-seven consecutive patients (114 females) were enrolled. Twenty-eight (11.3%) patients had either positive ECGs or markers (rapid myoglobin and rapid creatine kinase isoenzyme MB or rapid myoglobin and rapid troponin I) in

the ambulance; 17 (6.9%) patients had positive ECGs in the ambulance. Nineteen (7.7%) patients had positive markers. Thirty-seven (15%) patients were positive for AMIs in the ED. Forty-four (18%) Patients were diagnosed with AMIs before being discharged from the hospital. One patient was transported to the catheterization laboratory within 11 minutes of arrival in the ED.

Conclusion: It is feasible to diagnose AMI with the use of 12-lead ECGs and rapid cardiac markers in the out-of-hospital setting. The interval between door to diagnosis is shortened allowing for earlier reperfusion strategies.

## 178 Do Age and Gender Affect $\beta$ -Blocker Utilization in Emergency Department Management of Acute Myocardial Infarction?

Pancu DM, Lee DC, Salen PN, Roberts SF, Rudolph GS, Ryan J, Heller MB, Arcona S/St. Luke's Hospital, North Shore University Hospital, Bethlehem, PA

Study objective: To determine how age and gender affects  $\beta$ -blocker utilization in patients who present with acute myocardial infarction (AMI) to the emergency department.

Methods: This is a retrospective cohort pilot study of consecutively enrolled patients (November 1995 to January 1997) presenting with AMI in a 50,000-visit academic ED. Patients were documented to have AMI by symptoms and ECG. Charts were reviewed for age, gender, and  $\beta$ -blocker therapy.  $\beta$ -Blocker utilization was analyzed for gender and age ( $\leq 70$  and  $> 70$  years).

Results: Ninety patients met the inclusion criteria, 27 women and 63 men. The mean age was 60 years. The number of contraindications for patients  $\leq 70$  years was 21% and for patients  $> 70$  years was 27% ( $P = .5$ ); 18% of males and 33% of females had contraindications ( $P = .1$ ). Nineteen (28%) of 67 eligible patients received  $\beta$ -blockers in the ED. Of the 67 patients  $\leq 70$  years, 54 had no contraindication to  $\beta$ -blockers and 18 (33%) received them in the ED; only 1 of the 16 patients in the group older than 70 years received  $\beta$ -blockers, a statistically significant difference ( $P = .032$ ). Sixteen (31%) of 52 males and 3 (16.7%) of 18 females were eligible for  $\beta$ -blocker therapy and received  $\beta$ -blockers in the ED ( $P = .25$ ).

Conclusion: Males versus females and patients  $\leq 70$  versus patients  $> 70$  years show no difference in the frequency of contraindications to  $\beta$ -blocker therapy. In the setting of AMI, age but not gender was an important factor in determining  $\beta$ -blocker use.

## 179 Obstructive Shock in Pulmonary Embolism: Thrombolytic Therapy and Survival

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Study objectives: Shock resulting from massive pulmonary embolism (PE) shows a variable prevalence in literature, without general agreement about thrombolytic therapy effectiveness. The study objective was to appreciate the prevalence and main clinical features of obstructive shock (OS) in patients with PE admitted to our emergency department, and to evaluate thrombolytic therapy effectiveness (BAPE regimen).

Methods: Two hundred eighty-five patients with PE were treated from June 1995 until April 1999; 30 (10.5%) of 285 had OS (17 female, 13 male, mean age  $68 \pm 8.5$  years). In 93.7% of OS cases, we found at least 1 risk factor for venous thromboembolism and, in 65%, 2 or more risk factors. The clinical onset in 5 of 30 patients was cardiac arrest. We found right bundle branch block in 8 of 30 cases and  $S_1Q_3T_3$  pattern in 8 of 30 cases; in 9 of 30 cases the ECG was normal. Echocardiography, performed in 66% of patients, detected in all cases an enlarged and hypokinetic right ventricle; venous duplex ultrasound, performed in 76.6% of cases, detected deep venous thrombosis in 76%. Perfusion radionuclide lung scan, performed in 70.5% of cases, showed a high probability pattern in 96.6% (29/30) and intermediate pattern in 1 patient. D-Dimer assay was positive in all cases; arterial blood gas analysis detected hypoxemia in all cases.

Results: Seventeen of 30 patients with OS were given thrombolysis according to BAPE regimen (recombinant tissue plasminogen activator 0.6 mg/kg over 15 minutes); 13 of 30 patients with OS were not given thrombolysis because of absolute contraindications. Thrombolytic therapy decisionmaking rested on clinical data and echocardiography in 38% of cases and on echocardiography and lung scan in 61% of cases. The in-hospital overall death rate was 36.6% (11/30 patients); all 17 patients given thrombolysis were alive at discharge, whereas 11 (84.6%) of 13 patients not given thrombolysis died in the hospital. No severe complications of thrombolysis were observed.

Conclusion: We found OS in 10.5% of PE cases; all 17 patients given thrombolysis were alive and showed stable hemodynamic parameters at discharge, and 13 of

17 were alive at 1-year follow-up (the other 4 patients are on follow-up yet). In the non-thrombolysis-treated group, 11 of 13 patients died during their hospital stay. An expeditious clinical and instrumental diagnosis is of great relevance as a tool of decisionmaking, especially in thrombolytic therapy. Furthermore, we found a 100% sensibility of D-dimer assay, hypoxemia as detected by arterial blood gas analysis, analysis, echocardiography, and perfusion radionuclide lung scan.

## 180 The Efficacy of Cardiac Monitoring in Syncope Admissions From the Emergency Department

Sipay SS, Gordon JB, Silva JC, Sloan EP, Bordo D/Resurrection Medical Center, University of Illinois, Chicago, IL

Syncope encompasses etiologies ranging from benign to life-threatening. Cardiac etiologies were thought to be uncommon; however, because of the potential for sudden death, the current standard of therapy is to admit most patients to monitored beds.

**Study objective:** To develop criteria differentiating the need for monitored versus general medical admission. The study was conducted in an urban teaching hospital with a high percentage of acutely ill elderly.

**Methods:** We conducted a retrospective chart review of all ED patients admitted with syncope from December 1996 to May 1997. We identified 230 patients for the study, of whom 22 were excluded because of transfer to another institution or no documented loss of consciousness. Of patients determined to have syncope of cardiac origin, 25% of the charts were randomly selected and reviewed by 3 outside faculty members for verification.

**Results:** The mean age was 73 years (15 to 99 years) and 34% were male. Cardiac etiology was diagnosed in 47 patients (23%). Of these, dysrhythmias were found in 27 patients: sick sinus syndrome 10, symptomatic bradycardia 7, Wolff-Parkinson-White syndrome 1, new-onset atrial fibrillation 3, supraventricular tachycardia 3, and patients with ventricular tachycardia 3. Aortic stenosis was identified in 5 patients. Myocardial infarction was diagnosed in 10 patients. Patients age >60 were 3 times more likely to be diagnosed with a cardiac etiology for their syncope (25 versus 10%,  $P<.07$ ). Significant differences were found between the cardiac and noncardiac groups with regard to ECG rates <60 and >100 ( $P=.017$ ) and presence of any injury pattern ( $P=.003$ ).

**Conclusion:** It may be possible to detect high-risk patients based on initial ECG rate disturbances or presence of injury pattern. Older patients were more likely to have syncope of cardiac etiology. However, cardiac dysrhythmias may occur in younger patients; therefore, it may still be necessary to continue the practice of admitting to monitored beds.

## 181 How Many CK-MB Determinations Are Necessary to Rule Out Acute Myocardial Infarction in Patients Without ST-Segment Elevation?

Bassan R, Gamarski R, Pimenta L, Scofano M, Fabricio M, Macaciel R/Pró-Cardíaco Hospital, Rio de Janeiro, Brazil

Strategies to rapidly rule out acute myocardial infarction (AMI) in patients with chest pain and no ST-segment elevation have been shown to reduce both length of stay and costs, but the number of plasma creatine kinase isoenzyme MB (CK-MB) measurements for this purpose is still unclear.

**Objective:** To determine the test accuracy of serial CK-MB measurements for AMI, and the time frame necessary to completely rule in/rule out the diagnosis.

**Methods:** An algorithm using chest pain characterization, serial ECG, and CK-MB levels (baseline, and 3, 6, and 9 hours after admission) was applied to 635 consecutive patients suspected of having AMI or unstable angina who had neither ST-segment elevation nor left bundle branch block (LBBB) in their first ECG. Patients with ST depression/T inversion or definite/probable angina plus a normal/nonspecific (NL/NS) ECG were designated as medium-probability (MP) of AMI ( $n=408$ ). Patients with NL/NS ECG plus probable not angina were designated as low-probability (LP) ( $n=227$ ). AMI was diagnosed by a typical CK-MB curve with or without ECG changes.

**Results:** AMI was seen in 17% of patients in the MP group and in 2% of the LP group. Patients in the MP group had AMI completely ruled out at 9 hours (1% still had normal CK-MB levels at 6 hours), whereas those in the LP group had normal levels at 3 hours. The Table shows the diagnostic accuracy of CK-MB levels for AMI in both groups.

**Conclusion:** A normal CK-MB level on admission does not rule out the diagnosis

of AMI in MP or LP patients with chest pain and no ST elevation or LBBB. Further CK-MB determination is necessary up to 3 hours in LP patients and up to 9 hours in MP patients to completely rule out AMI.

Table, abstract 181.

Diagnostic Accuracy	1st CK-MB		1st-2nd CK-MB		1st-2nd-3rd CK-MB	
	MP (%)	LP (%)	MP (%)	LP (%)	MP (%)	LP (%)
Sensitivity	51	75	78	100	96	100
Negative predictive	89	99	95	100	99	100

## 182 Gender Differences of Echocardiographic Findings in Acute Cardiogenic Pulmonary Edema

Silverman R, Goldman DA, Weg IL, Roth S, Campbell C, Simmons D, Watson M/Long Island Jewish Medical Center, New Hyde Park, NY

**Study objectives:** Gender-related differences in clinical outcome, patient characteristics, and echocardiographic findings have been reported in patients with congestive heart failure. Acute cardiogenic pulmonary edema (APE) is assumed to be caused by systolic dysfunction when patients present to emergency department with resultant management implications. The objective is to characterize the echocardiographic findings in patients with APE by gender.

**Methods:** An echocardiogram was performed within 72 hours of ED arrival in patients with APE. APE was identified by clinical presentation, a diagnostic chest radiograph, and the onset of severe dyspnea within 12 hours. Six contiguous myocardial segments were assessed for hypokinesis or akinesis. Ejection fraction, degree of left ventricular hypertrophy, and degree of mitral regurgitation were measured. Patients with APE and normal systolic function were considered to have diastolic dysfunction.

**Results:** Ninety-one patients were included. Mean age was 76 years, 66% were female, and the mean time from ED arrival to echocardiography was 30 hours. Median length of stay was 7 days, and the in-hospital mortality rate was 10% (9/91). Ages of men did not differ from women (74 versus 77 years,  $P=NS$ ), nor did the time to echocardiography (27 versus 32 hours,  $P=NS$ ). Men were more likely to have systolic dysfunction: 87% of men had an ejection fraction <55% versus 50% of women ( $P=.007$ ). Men had a trend toward lower systolic blood pressure on arrival, with 13% of men having systolic blood pressure <120 versus 3% of women ( $P=.077$ ). There were no significant differences ( $P<.05$ ) between men and women respectively, for the following: degree of left ventricular hypertrophy  $\geq$ mild (57% versus 68%), presence of mitral regurgitation  $\geq$ mild (63% versus 78%),  $\geq$ 1 wall motion abnormalities (74% versus 65%), myocardial infarction diagnosed in first 72 hours (19% versus 22%), length of stay (7 versus 7 days), and in-hospital death rate (10% versus 10%).

**Conclusion:** Men presenting with APE were more likely to have systolic dysfunction than women, as well as a trend toward lower systolic blood pressure. Diastolic dysfunction was more common in women and should be considered in this population. There was no gender-related outcome difference, although the ability of the study to determine prognostic value of echocardiographic findings in gender is limited by the relatively few deaths.

## 183 Is Sestamibi Useful for Identifying Cardiac Disease in Patients With Equivocal Chest Pain?

Johnson GA, Rodriguez E, Von Tramp C, Brown LH/State University of New York Health Science Center, Syracuse, NY

**Study objective:** To determine the sensitivity and specificity of the sestamibi scan in identifying cardiac disease in emergency department patients with equivocal chest pain.

**Methods:** This study was conducted in an urban ED with a volume of 41,000+. All patients presenting with chest pain are routinely assigned to 1 of 5 pathways. Two of those pathways are for patients with chest pain clearly of cardiac etiology, and 1 is for patients with chest pain that is clearly not cardiac in nature. The remaining 2 pathways are for patients with chest pain of unknown or unclear etiology. The patients assigned to those 2 pathways served as the sample for this study. All patients in the 2 equivocal pathways are evaluated with 12-lead ECG and determination of troponin I,



creatinine kinase (CK), and CK isoenzyme MB (CK-MB) levels. During the time of this study, these patients were also referred for a sestamibi scan. The results of the sestamibi scan were compared with final ED or hospital discharge diagnosis. We calculated the sensitivity and specificity of sestamibi in predicting an ultimate diagnosis of myocardial infarction (MI) or coronary artery disease (CAD).

**Results:** One hundred thirty-seven chest pain patients presented during the study period; 91 of these were assigned to the pathways for equivocal etiology. Five of those patients did not complete sestamibi scanning, leaving 86 patients for inclusion in the study. Two patients (2.3%) were ultimately diagnosed with MI, and 4 patients (4.7%) were ultimately diagnosed with CAD (1 patient had both diagnoses). Sestamibi identified 1 (50%) of the MI patients and all (100%) of the patients with a final diagnosis of CAD. There was 1 false-negative result, and 18 (of 22) false-positive results. The sensitivity of sestamibi for identifying either MI or CAD was 80% and the specificity was 79%.

**Conclusion:** In patients with equivocal chest pain, the sestamibi scan has moderate sensitivity and specificity, with a particularly high frequency of false-positive findings. A larger study is needed to determine the true clinical value of this procedure.

## 184 Indigent Patients' Utilization of Emergency Department-Based Chest Pain Centers for Nonmedical Reasons

Robinson B, Garcia TB, Walton JF, Todd KH/Emory University, Atlanta, GA

**Study objective:** To determine whether indigent patients at public hospital emergency departments use chest pain centers (CPCs) for social reasons.

**Methods:** We conducted a retrospective review of 1,247 consecutive admissions to the CPC at Grady Memorial Hospital. CPC admissions are evaluated using troponin T, serial creatine kinase isoenzyme MB (CK-MB), and sestamibi scans. Records were analyzed for duplication of name and/or medical record number. Cases were followed up for 6 months after the last admission for evidence of subsequent hospitalization.

**Results:** During the 8-month study interval, 4% of CPC patients ( $n=48$ ) had 2 or more admissions accounting for 9% of CPC admissions ( $n=111$ ). This group included 38 patients with 2 admissions, 6 with 3 admissions, 3 with 4 admissions, and 1 with 5 CPC admissions. Thirty-five (31%) of the 111 CPC admissions warranted hospitalization—27 for AMI or other acute cardiac conditions, 5 with positive sestamibi scans, and 3 for other reasons. The other 76 (69%) resulted in discharge with outpatient follow-up. Patients with 2 or more CPC admissions were more likely to have a positive evaluation than patients who were admitted to the CPC only once (32% versus 23%,  $P=.04$ ). The patient admitted to the unit 5 times was diagnosed with cocaine-related AMI on 3 separate occasions. During the 6-month follow-up period, 18 of 48 patients were directly hospitalized without CPC referral for acute cardiac problems.

**Conclusion:** Repeat admissions to our CPC were relatively uncommon. Our findings do not support the idea that indigent patients feign chest pain to gain shelter and/or social services. Physicians working in public hospitals should maintain a high index of suspicion when evaluating repeat visitors with chest pain.

## 185 Improvement in Documentation of Nontraumatic Chest Pain After Implementation of a Chest Pain Evaluation Form in a University Hospital Emergency Department

Youdelman BA, Smith TR, Fink E, Bedell AT, Hunt MJ, Brooks CB/Saint Louis University School of Medicine, St Louis, MO; Westchester Medical Center, Valhalla, NY

**Study objectives:** To compare documentation of nontraumatic chest pain (CP) evaluation before and after the implementation of a chest pain evaluation form (CPEF) in a university hospital emergency department.

**Methods:** Using the ACEP clinical CP policy, a CPEF was designed and implemented in the ED to evaluate patients presenting with nontraumatic CP. The CPEF contains critical documentation items (CDI) listed as questions on the form with boxes for the response. After approval from the institutional review board, we reviewed 250 charts of patients who were evaluated with a blank form, then began using the CPEF in the ED and compared the result of 250 more patients who were evaluated using the form. Data were analyzed using a 2-sample Z test.

**Results:** Of the charts in the control group ( $n=241$ ), 48% were admitted and 52% were discharged. In the CPEF group ( $n=245$ ), 59% were admitted and 41% discharged. The average number of documented CDI with the CPEF was 89% ( $SD=5$ ) versus 41% ( $SD=25$ ) using the blank form. All of the CDI had statistically significant improvements in documentation with the use of the CPEF versus the use of a blank form ( $P<.01$  for questions and  $P<.05$  for ECG, chest radiography, and creatine kinase isoenzyme MB). There were many statistically significant differences in documentation between the admitted and discharged groups in the control group. In the CPEF group, there were

no significant differences except for the number of patients given an ECG and chest radiography (99% and 98% for admitted versus 88% and 84% for the discharged group, respectively).

**Conclusion:** Documentation of CDI was significantly improved using the CP evaluation form. The use of the CPEF will improve protection from liability and is of particular educational advantage in an institution that trains physicians. The use of a CP form may also improve diagnosis, proper treatment, and effective follow-up, although this would take further investigation to determine.

## 186 Outcomes With Observation Units for Chest Pain Evaluation in a Multihospital Network

Graff L, Prete M, Werdman M, Monico E, Smothers K, Krivenko C, Maag R, Joseph A, Klopfer L/New Britain General Hospital, Charlotte Hungerford Hospital, Bridgeport Hospital, Yale New Haven Hospital, Greenwich Hospital, Riverside Methodist Hospitals, New Britain, CT

**Study objective:** To determine whether implementation of emergency department observation units improves the quality of patient care and the cost-effectiveness of acute chest pain evaluation.

**Methods:** This was a prospective, nonrandomized quality improvement initiative with implementation of ED observation units with "rule out myocardial infarction (MI) evaluations" capabilities (chest pain units) at 5 hospitals with historical and case controls. Patient disposition was identified for all ED patients with the chief complaint of chest pain for 1 month before (September 1993;  $n=902$ ) and 1 month during the initiative (June 1997;  $n=1,321$ ). Charges for services were quantified for a consecutive series of chest pain patients at 3 of the hospitals with negative evaluations for coronary artery disease during 1997 (observation unit,  $n=1,494$ ; hospital,  $n=233$ ). Outcome measures were admission rate, observation rate, "rule out MI evaluation" rate, and service charges.

**Results:** By June 1997, 5 hospitals had implemented ED observation units, and compared with historical and case controls the observation rate increased (16.3% versus 0% ( $P<.01$ ) versus 1.6% ( $P<.01$ )). The "rule out MI evaluation" rate (61.4% versus 40.4%,  $P<.01$  versus 44.6%,  $P<.01$ ) was consistent with improved quality of patient care. The hospital admission rate did not increase (47.5% versus 40.4%,  $P<.05$  versus 44.6%,  $P=NS$ ). Service charges were lower for patients admitted to the ED observation unit than to the hospital ( $\$2,214.80 \pm \$80.40$  versus  $\$5,464.30 \pm \$93.60$ ).

**Conclusion:** Implementation of ED observation units improves the quality of patient care and the cost-effectiveness of the evaluation of patients with acute chest pain.

## 187 Low Molecular Weight Heparin in the Treatment of Unstable Angina: A Systematic Review

Magee K, Rowe BH/University of Alberta, Edmonton, Alberta, Canada

**Study objectives:** To determine the effectiveness of low molecular weight (LMWH) compared with unfractionated heparin (UFH) in the treatment of adults who present to the emergency department with acute coronary syndromes.

**Methods:** Randomized controlled trials were identified from EMBASE, MEDLINE, and other computerized searches. Pharmaceutical manufacturers, primary authors, and content experts were also contacted. Studies were included if patients had unstable angina or non-Q-wave myocardial infarction, were treated with UFH versus LMWH, and either MI or death was reported. Two reviewers independently assessed studies for relevance, inclusion, and study quality.

**Results:** Four trials were identified; a total of 4,831 patients have been studied (2,446 LMWH, 2,385 UFH). Patients receiving LMWH demonstrated a significant decrease in MI (odds ratio [OR]=0.71; 95% confidence interval [CI]: 0.52 to 0.97). There were no significant differences in revascularizations (OR=0.77; 95% CI 0.6 to 1.0) or recurrent angina (OR=0.73; 95% CI 0.47 to 1.13). LMWH caused less thrombocytopenia (OR=0.65; 95% CI 0.43 to 0.97), but major (OR=0.92; 95% CI 0.71 to 1.21) and minor (OR=0.91; 95% CI 0.37 to 2.2) bleeding complications were similar between treatments. A nonsignificant increase in deaths was seen with LMWH (OR=1.63; 95% CI 0.46 to 5.74).

**Conclusion:** Despite some encouraging results, evidence does not clearly support changing current practice from UFH to LMWH for the early treatment of acute coronary syndromes. Further research is pending to clarify this issue and the review will require updating.

## 188 Effect of Primary Changes in Heart Rate on Circulatory Dynamics

Summers RL, Mizelle HL, Jones AE, Montani JP/University of Mississippi Medical Center, Jackson, MS

**Study objective:** The interpretation of acute changes in vital signs is one of the most important functions of the emergency physician. Although the heart rate is usually determined in response to a principal alteration in other hemodynamic parameters,

ters, it is also important to understand the effects of a primary change in frequency of cardiac contraction on general circulatory dynamics.

Methods: The hemodynamic parameters of stroke volume, cardiac output, pulse pressure, mean arterial pressure, and peripheral resistance were measured in chronically instrumented conscious dogs in which a pacemaker was implanted to control heart rate. After monitoring the dogs for a 24-hour control period, the heart rate was manually increased abruptly while changes in circulatory dynamics were recorded for an additional 24 hours. Observed differences are reported as an average percent of the 24-hour control means.

Results: In 6 dogs studied, the heart rate was increased an average of 2.3-fold over the basal control level by pacing. This increase in heart rate resulted in a mean fall in stroke volume and arterial pressure by 73% and 20%, respectively, while peripheral resistance increased by 45%. There was also a 43% average fall in the pulse pressure while cardiac output changes were highly variable.

Conclusion: Although a substantial primary change in heart rate can significantly affect the stroke volume, peripheral resistance, and pulse pressure, there is a much less consequential effect on the mean arterial pressure.

## 189 Enhanced Diagnosis of Narrow Complex Tachycardias Using Increased ECG Speed

Accardi AJ, Miller R, Holmes JF/University of California—Davis School of Medicine, Sacramento, CA

Study objective: To determine whether the addition of a rapid (50-mm/s) ECG increases the diagnostic accuracy of narrow complex tachycardia when compared with standard speed (25-mm/s) ECG alone.

Methods: We conducted a prospective comparative trial at a university-based urban hospital. Thirty-two ECGs with narrow complex tachycardia (heart rate range 149 to 260 beats/min) were printed at both 25-mm/s (standard) and 50-mm/s (rapid) speeds. Eight board-certified emergency physicians were asked to initially interpret the standard ECG (standard group). After a 2-week washout period, the same 8 participants were given both the standard and rapid speed ECGs (rapid group) for interpretation. The ECG diagnosis was based on the patient's ultimate clinical diagnosis and was independently confirmed in all cases by a board-certified cardiologist masked to all clinical data. The ECG distribution was as follows: atrial flutter (17), atrial fibrillation (9), paroxysmal supraventricular tachycardia (PSVT) (4), and sinus tachycardia (2). Participants were masked to the ECG ratios. We compared the diagnostic accuracy between the 2 groups' diagnoses using the Wilcoxon sign rank test.

Results: Correct diagnosis of the ECG improved in the rapid ECG group compared with the standard ECG group (median 73%, 95% confidence interval [CI] 69% to 78% versus 61%, 95% CI 54% to 68%;  $P=.01$ ). The diagnosis of atrial flutter significantly improved in the rapid group compared with the standard group (median 56%, 95% CI 44% to 67% versus 44%, 95% CI 30% to 58%;  $P=.01$ ). The diagnosis of atrial fibrillation significantly improved in the rapid group compared with the standard group (median 100%, 95% CI 96% to 100% versus 95%, 95% CI 87% to 100%;  $P=.047$ ).

Conclusion: Correct diagnosis of narrow complex tachycardias was significantly improved when ECGs at both 25 mm/s and 50 mm/s were used for interpretation. It appears that the simple technique of speeding up the ECG paper, thus effectively spacing out the rhythm, enhances the diagnostic ability of the observer.

## 190 Comparison of Accuracy of Plasma Myoglobin and CK-MB for the Diagnosis of Acute Myocardial Infarction

Bassan R, Gamarski R, Volschan A, Gaspar S, Mohalleh K, Macaciel R/Pró-Cardíaco Hospital, Rio de Janeiro, Brazil

Acute myocardial infarction (AMI) is diagnosed by ECG changes and/or elevated plasma cardiac markers. The enzymatic gold standard is creatine kinase isoenzyme MB (CK-MB), but new protein markers of myocardial injury have been used recently. Myoglobin is a nonspecific cardiac protein that increases in AMI 1 to 3 hours after pain onset, therefore earlier than CK-MB.

Study objective: To determine whether myoglobin is more accurate than CK-MB for the early diagnosis of AMI.

Methods: In this prospective study, serial plasma myoglobin levels (baseline and 3, 6, and 9 hours after admission) were determined by immunoturbidimetry for the diagnosis of AMI in 688 consecutive patients with chest pain seen in the emergency department. Plasma CK-MB levels were simultaneously measured and the diagnosis of AMI was made in 156 patients by a typical CK-MB curve.

Results: Median time of chest pain onset to hospital arrival was 2.0 hours for AMI patients. Sensitivity of the first myoglobin determination for AMI was significantly better

than that of the first CK-MB level (69% versus 46%,  $P=.002$ ), and this significant difference was seen in both early-arriving ( $\leq 2$  hours) and late-arriving ( $> 2$  hours) patients. By the second measurement, the cumulative sensitivities were similar. Predictive value of 2 consecutive normal myoglobin and CK-MB determinations was similar; a third normal measurement still did not rule out AMI (3% and 1%, respectively).

Conclusion: For early diagnosis of AMI, myoglobin is significantly better than CK-MB. Better early sensitivity of single myoglobin determination is already seen after 1 hour of pain onset but not after 5 hours (greater difference being with  $\leq 3$  hours). Some patients with AMI may still have normal myoglobin or CK MB levels at 6 hours, especially when they do not have ST elevation on admission.

## 191 Physician Probability Estimates for Patients Presenting With Chest Pain

Schäider J, Reilly B, Das K, Roberts RR, Rydman RJ, Evans A/Cook County Hospital, Rush University, Chicago, IL

The disposition of emergency department patients with chest pain is difficult and has a significant impact on the resource utilization of telemetry and critical care beds. Safely admitting patients to lower-level care leads to improved resource allocation. Assessment of the risk of major complications (COMP), coronary artery disease (CAD), and myocardial infarction (MI) are important determinants in appropriate chest pain (CP) disposition decisions.

Study objectives: The goal of this study was to determine physician estimates for the above 3 risk categories and to compare these estimates with the actual risks.

Methods: Using published data, 20 CP patient cases were developed such that each case represented a different combination of very low, low, moderate, and high risks based on COMP, CAD, and MI risks. One hundred forty-seven physicians reviewed each case and assigned an estimate of risk (0 to 100%) for COMP, CAD, and MI for each of the 20 cases. Physician estimates were compared with the actual risks using stratified matched pair analysis.

Results: Forty-six emergency physicians, 88 internists, and 13 cardiologists reviewed the cases. There were no significant differences between these groups. Overall, for very low-risk CP patients, the estimated versus actual risks were: COMP 10% versus 0.6%; CAD 38% versus <10%; MI 18% versus 2%. For low-risk CP patients, the actual versus estimated risks were: COMP 17% versus 4%; CAD 49% versus 10% to 50%; MI 39% versus 14%. For moderate-risk CP patients, the actual versus estimated risks were: COMP 21% versus 8%; CAD 68% versus 51% to 99%; MI 48% versus 25%. For high-risk CP patients, the actual versus estimated risks were: COMP 42% versus 16%; CAD 75% versus 100%; MI 82% versus 75%.

Conclusion: For very low-risk CP patients, physicians overestimate the risk of COMP by a factor of 17, CAD by a factor of 7, and MI by a factor of 9. In addition, physicians overestimate complication risk for all risk categories of patients complaining of chest pain. Better understanding of physician risk assessment should help to improve physician triage and admission decisions and to potentially improve resource allocation.

## 192 Serious Head Injury and Death Associated With the Operation of All-Terrain Vehicles and Motorcycles by Minors

Kapur RK, Mader TJ, Letourneau P/Baystate Medical Center, Tufts University School of Medicine, Springfield, MA

Study objective: In most US states, children younger than age 16 are not legally able to operate motor vehicles independently. Despite this prohibition, many are allowed to operate recreational vehicles (RVs), such as all-terrain vehicles (ATVs) and motorcycles (MCs), without adult supervision. In January 1988, sale of new 3-wheel ATVs were banned in the United States because of the high incidence of serious injury associated with their use. The purpose of this study was to review the incidence of serious head injury and death associated with underage use of ATVs and MCs, with and without helmet use, since 1988.

Methods: This study was a retrospective analysis of data collected (1988-1998) by the National Pediatric Trauma Registry (NPTR) for more than 75,000 pediatric trauma patients. There were 923 children in the database who were <16 years of age, injured or killed while operating an ATV or MC and had data recorded on use of protective gear. Patients who used and did not use helmets were descriptively compared.

Results: The Table summarizes the main results. The groups were similar in makeup. All patients were admitted. There was no difference in injury severity by pediatric trauma score (PTS) between the 2 groups. Of the 923 patients, 375 (41%) had neurologic complications from their injuries. Neurologic injuries accounted for

the large majority of the deaths. Outcome (mortality and functional performance) was worse in the group that did not use helmets.

Conclusion: Operation of ATVs and MCs by minors can be associated with serious injury or death. Use of protective gear will significantly reduce morbidity and mortality.

**Table, abstract 192.**

Variable	No Helmet (n=610)	Helmet (n=313)
Male (%)	82 (79-85)	92 (89-95)
Mean age (y)	11.9 (11.0-12.1)	11.9 (11.6-12.2)
PTS	8.7 (8.5-9.0)	9.1 (8.9-9.4)
Admitted (%)	100 (99-100)	100 (98-100)
Injury complications, CNS (%)	9 (7-12)	6 (4-10)
Mortality (%)	3 (1.8-4.6)	0.3 (0-1.8)
Hospital discharge to home (%)	91 (88-93)	95 (92-97)
FIM	110 (106-114)	117 (115-120)

**CNS**, Central nervous system.

Values represent means or proportions. Values in parentheses represent 95% confidence intervals.

## 193 Emergency Department Observation of Trauma Patients: Predictors of Further Hospitalization

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Study objective: Experience with emergency department observation of Level I trauma patients has been limited. Guidelines for patient selection including their severity of injuries and length of stay need to be developed. This study was undertaken to identify variables predictive of which trauma observation patients would require inpatient hospitalization.

Methods: A retrospective chart review was performed on 594 patients in a Level I urban teaching hospital from February 1997 to April 1998. Level I trauma patients placed in observation were identified from observation unit and trauma logs. Age, length of stay in the observation unit, mechanism of injury, Injury Severity Score (ISS), presence of abnormal vital signs, Glasgow Coma Scale (GCS) score, and observation unit failure were abstracted. Presence of abnormal vital signs was defined as systolic blood pressure <90 mm Hg, pulse rate >100 beats/min, respiration rate >20 breaths/min, or  $\text{SaO}_2$  <95%. Mechanisms of injury included: pedestrian accidents, motor vehicles accident, blunt injury, penetrating injury, and falls. Predictor variables were tested individually to determine which were associated with observation unit failure. Any variable significant in the univariate analysis was entered simultaneously into a logistic regression equation to assess its unique contribution.

Results: Patients averaged 29 (SD=3.7) years of age. The median ISS was 4.0 (interquartile range 2 to 5). Median length of stay was 5 hours, 50 minutes (interquartile range 4 hours to 8 hours). One hundred sixty-four patients (27.6%) displayed abnormal vital signs. Median GCS score was 15.0 (interquartile range 15 to 15). Forty-six patients (7.7%) failed observation and were admitted to the hospital. Univariate analysis indicated that age and GCS did not differ between those who failed and those who were discharged. Length of stay was shorter for those who failed (median=3 hours, 50 minutes) than those discharged (5 hours, 55 minutes;  $P=.004$ ). Of those who failed, 54.3% had abnormal vital signs versus 25.4% of the discharged patients ( $P<.001$ ). ISS was higher for those who failed (median=5.0) than those discharged (median=4.0;  $P=.002$ ). Finally, mechanism of injury was associated with failure: pedestrians (22.0%), motor vehicle accidents (7.1%), blunt injury (5.3%), penetrating injury (4.5%), and falls (8.0%;  $P=.03$ ). Logistic regression yielded 3 significant predictors of observation unit failure: ISS (odds ratio [OR]=1.27, 95% confidence interval [CI] 1.16 to 1.40), abnormal vital signs (OR=3.71, 95% CI 1.92 to 7.16), and mechanism of injury. Mechanism of injury was coded as a dummy variable so each category was tested against the average effect of all other categories. Failure rate in pedestrian accidents was significantly higher (OR=3.10, 95% CI 1.38 to 6.92).

Conclusion: Three variables were independent predictors of observation unit failure. Only 2 of these variables may be clinically useful. Patients struck by vehicles and those with abnormal vital signs while in the observation unit were more likely to require inpatient hospitalization.

## 194 Relationship of Age to Timing of Surgery in Trauma Patients

Lane PL, Porter RS, Zhao N/Albert Einstein Medical Center, Philadelphia, PA

Study objective: With the aging of the population, care of the elderly trauma patient is becoming of greater concern. We examined the question of whether older trauma patients who require laparotomy or thoracotomy undergo surgery as soon as younger patients, taking into account differences in mechanism and severity of injury. We also assessed the effect of these factors on mortality.

Methods: We retrospectively reviewed data collected by the state trauma registry on all trauma patients  $\geq 16$  years having either laparotomy or thoracotomy within 24 hours of arrival at any of the 24 trauma centers in the state during 1996 and 1997. Exclusion criteria were field time >6 hours, incomplete data, and blood pressure/heart rate=0 in the emergency department. Patients were divided by age into 7 groups with 10-year intervals. One-way analysis of variance including a Tukey-HSD test was performed on time from ED arrival to surgery (ED-Op). In addition, linear regression analyses were performed on the 2 subsets of those <65 years, and those 65 years and older. The effects of Injury Severity Score (ISS), Revised Trauma Score (RTS), and injury mechanism were analyzed.

Results: Nine hundred sixty-one patients met criteria and had complete data (Table). Only group 7 (>75 years) was significantly different from any of the others (different from all except group 6) at a significance level of 0.05. Group 7 was then compared by analysis of variance with all the other groups combined (total n=915). In this analysis, we controlled for the TRISS coefficient, blood pressure  $\leq 90$  mm Hg or >90 mm Hg in the ED, and blunt/penetrating mechanism of injury, all of which were shown to independently relate to time to surgery. Group 7 was still significantly different when these factors were taken into account ( $P<.01$ ). In both the <65 years group and the  $\geq 65$  years group, ISS and RTS in the ED were significant predictors of survival ( $P<.05$ ). Neither injury mechanism nor time to operation reached significance in either group.

Conclusion: The very elderly (>75 years) appear to be taken to surgery more slowly than younger patients with similar injuries and physiologic measures. Whether this is because of increased need for stabilization or the failure to recognize the need for surgery will need to be determined.

**Table, abstract 194.**

**Relationship of age to timing of surgery in trauma patients**

Age Group (y)	No.	Mean ED-op Time	SD
1 (16-25)	359	1:44:12	2:12:08
2 (26-35)	243	1:45:07	2:22:03
3 (36-45)	177	1:50:15	2:26:29
4 (46-55)	65	2:31:30	2:59:06
5 (56-65)	47	2:22:26	3:38:02
6 (66-75)	34	3:05:28	3:08:26
7 (>75)	36	4:35:45	5:09:28
<b>Total</b>	<b>961</b>	<b>1:59:55</b>	<b>2:41:11</b>

## 195 Out-of-Hospital Blood Administration for Critically Injured Patients Transported by Helicopter

Price DD, Norton RL, Zechin AD, Eldurkar J, Chok J, Mann NC/Oregon Health Sciences University, Portland, OR; Loma Linda University, Loma Linda, CA

Study objective: To evaluate the efficacy of early blood transfusion by comparing trauma patients who received crystalloid and blood out-of-hospital with matched controls receiving only crystalloid during ground transport.

Methods: This retrospective case control study compares trauma patients who received non-cross-matched type O-negative packed RBCs (PRBCs) during air medical transport according to standard protocols (OUTHOSP) with control patients transported by ground who received only crystalloid en route but PRBCs during hospital resuscitation (INHOSP). Patients were matched based on age, gender, type of trauma, and Injury Severity Score (ISS), and were transported to the 2 Level I trauma centers in Portland, OR, between January 1989 and June 1995.

Results: The 84 OUTHOSP and 162 INHOSP patients were similar in terms of age, gender, trauma type, and ISS. They differed significantly in out-of-hospital crystalloid resuscitation with an OUTHOSP mean of 2,997 mL (SD 1,823) compared with 803 mL (SD 902) INHOSP ( $P<.0001$  for log-transformed data). En route, OUTHOSP patients received a mean of 426 mL of PRBCs (SD 262). OUTHOSP patients were intubated more frequently, 47% versus 34% ( $P=.04$ ), and had significantly longer transport times: 19 minutes (SD 13) compared with INHOSP 11 minutes (SD 7) ( $P<.0001$ ). Mean PRBCs given during hospital resuscitation was significantly greater in OUTHOSP (1,414 mL [SD 1,660]) than INHOSP patients (1,007 mL [SD 935];  $P=.023$ ). Initial heart rate in the hospital was significantly higher for OUTHOSP patients (113 beats/min [SD 23]) than INHOSP patients (98 beats/min [SD 43];  $P=.002$ ). Although systolic blood pressure never differed significantly, mean initial diastolic blood pressure in the hospital was higher for the OUTHOSP group (69 mm Hg [SD 19]) than INHOSP group (49 mm Hg [SD 30];  $P=.003$ ). There was no significant difference between the 2 groups in other vital signs, out-of-hospital cardiopulmonary resuscitation, initial or 24-hour hematocrit, injuries, amounts of crystalloid or blood components administered, ICU or hospital length of stay, disposition, or mortality. Mortality was 45% for the OUTHOSP and 40% for INHOSP groups ( $P=.52$ ).

Conclusion: Out-of-hospital blood transfusion was not associated with improved outcome in this group of critically injured patients. Blood administration may have compensated for the negative impact of longer transport times and possibly more gravely injured patients (as indicated by more frequent intubation). Prospective evaluation is needed to further elucidate this question.

## 196 The Use of ISS and TRISS as Measures of Injury Severity and as Mortality Predictors in the DCLHb Traumatic Hemorrhagic Shock Trial

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Injury severity adjustment and mortality prediction are an important part of covariate adjustment between groups in clinical trials.

Study objectives: To examine how Injury Severity Score (ISS) and Trauma and Injury Severity Score (TRISS) predicted mortality risk in the diaspirin cross-linked hemoglobin (DCLHb) traumatic hemorrhagic shock study. This was a multicenter, randomized, unblinded, normal saline procedure-controlled efficacy trial. The study group comprised 98 severely injured trauma patients with hemorrhage and persistent hypoperfusion, intended to have a mortality risk of approximately 40%.

Results: The mean age was 39 years; 56% were white, and 79% were male. The most common mechanisms of injury were motor vehicle crashes (36%) and gunshot wounds (32%). In treated patients, 20% were >55 years of age, 28% had a Revised Trauma Score (RTS) <4, 41% had a Glasgow Coma Scale (GCS) score <9, 18% had an ISS >50, and 28% had a TRISS >60%. Intermediate ISS scores (25 to 49) were seen in 48% of patients. Intermediate TRISS mortality risk (41% to 60%) was seen in only 4% of patients ( $P<.001$ ) (Table).

Conclusion: There was a significant difference in the distribution of ISS and TRISS risk in this shock study. Whereas the ISSs predicted that the greatest number of patients had an intermediate mortality risk, TRISS mortality prediction showed a bimodal distribution at the low and high risk extremes. These data demonstrate the importance of strictly balancing physiologic status and age at the time of enrollment in comparative hemorrhagic shock clinical trials. Initial vital signs and GCS score (which are used to calculate the RTS), as well as age must be stratified to produce a normal mortality risk distribution.

Table, abstract 196.

Risk Strata	ISS	ISS Frequency (%)	TRISS Mortality (%)	TRISS Frequency (%)
Low	1-25	34	0-40	62
Medium	26-49	48	41-60	4
High	50-75	18	61-100	33

## 197 The Incidence of Hypothermia in the Setting of Major Trauma: Strategies for Prevention and Timely Identification

Lauder CT, Largent KN, O'Connor RE, Tinkoff GH/Christiana Care Health System, Newark, DE

Study objective: Hypothermia in the setting of multiorgan system trauma is associated with serious consequences, such as coagulopathy and cardiac arrhythmias. We conducted this study to determine the prevalence of hypothermia in trauma, and to recommend strategies for more timely detection.

Methods: Data for this observational study were collected from a retrospective cohort at a Level I trauma center during 1998. Patients with trauma team activation because of mechanism of injury or clinical evidence of shock were eligible. The interval from ED arrival to temperature measurement (TIME) and site (ICU, emergency department, operating room [OR]) of measurement (SITE) were determined. Statistical analysis included correlation coefficient, analysis of variance, and  $\chi^2$  tests.

Results: A total of 178 patients were studied with a mean age of 33 years, mean TIME of 144 minutes, and mean temperature of 36°C (32.6°C to 39.4°C). Forty patients (22%) had initial temperatures <35°C. The SITE was the ED for 41 (23%), OR for 64 (36%), and inpatient beds for 73 (41%). Temperature correlated weakly with time ( $r^2=0.02$ ) and age ( $r^2=0.01$ ). The mean temperature was significantly lower in the OR group (35.1°C) than either the ED (36.4°C) or inpatient (36.6°C) groups ( $P<.0001$ ). The mean TIME (minutes) was significantly shorter for the ED group (65) than either the OR (114) or inpatient (216) groups ( $P<.0001$ ). A significant proportion (32/40) of initial temperatures <35°C were in the OR group ( $P<.0001$ ).

Conclusion: Hypothermia is noted in a significant proportion of trauma patients, with many cases first detected intraoperatively. Initial ED temperature measurement in trauma patients should be mandatory. For patients requiring surgery, serial temperature measurements should be made throughout the operative course.

## 198 Triage Score: A New Triage Tool for Rapid Categorization of Injured Patients

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Study objective: The RTS (Revised Trauma Score) has served as the standard triage tool of trauma for 10 years. Despite its stalwart service, the RTS has 2 weaknesses. First, it is very difficult to differentiate systolic blood pressure 0 mm Hg from 1 mm Hg in profound shock. Second, untrained persons, such as emergency medical technicians or emergency nurses, could not calculate the Glasgow Coma Scale (GCS) score easily. We modified the RTS so that scoring method could be simple and calculated easily by untrained personnel who are working in the emergency medical services system. The purpose of this study was to evaluate the effectiveness of the new triage score tool, called "Triage Score," comparing it with RTS in identifying severely injured patients and separating them from less severely injured patients.

Method: The grading steps of systolic blood pressure and respiration rate per minute were divided into 4 groups according to the clinical severity, and scored from 0 to 3 points, although RTS divided them in 5 groups. The GCS component of RTS was replaced with AVPU scale in Triage Score, and the predictive power of the AVPU scale was compared with that of the GCS by bivariate correlation test. We also compared the performance of Triage Score with RTS in a group of 511 patients accrued at the Ulsan University Hospital over 6 months.

Results: Complete data were available for the analysis of status of consciousness in 511 patients. The analysis demonstrated that the AVPU scale was almost as good as the GCS score (correlation coefficient=0.901). A correlation model was defined as follows: GCS score=3.80 × (AVPU scale)−0.21. Triage Score was strongly correlated with RTS ( $P<.001$ ; 95% confidence interval 1.16 to 1.24; Spearman's  $\rho$  correlation=0.905). A correlation model between the RTS and Triage Score was defined as follows: RTS=2.978 + Triage Score. The Triage Score was correlated with ISS, and it was statistically significant ( $P<.001$ ).

Conclusion: The Triage Score keeps close relation with RTS and ISS statistically despite its simplicity. We conclude that the Triage Score would displace the RTS in the EMS system as a triage tool.



**Table 1, abstract 198****Revised Trauma Score**

Score	Systolic Blood Pressure (mm Hg)	Respiration Rate (beats/min)	GCS Score
4	>90	10-29	13-15
3	76-89	>29	9-12
2	50-75	6-9	6-8
1	1-49	1-5	4-5
0	0	0	3

**Table 2, abstract 198****Triage Score**

Score	Systolic Blood Pressure (mm Hg)	Respiration Rate (beats/min)	AVPU Scale
3	≥90	10-29	Alert
2	76-89	≥30	Response to verbal order
1	50-75	6-9	Response to pain stimuli
0	≤49	≤5	Unresponsiveness

## 199 Accuracy of Estimation of External Blood Loss by EMS Personnel

Patton KR, McErlean M, Funk DL/Albany Medical College, Albany, NY

Emergency medical services (EMS) personnel provide care for ill and injured patients in the out-of-hospital setting. Information regarding the nature of illness or the mechanism of injury relayed by the EMS providers can influence emergency department management. Estimates of blood loss are often communicated to ED staff.

**Study objective:** To determine whether EMS providers can accurately estimate the volume of external blood loss.

**Methods:** This was a prospective, blinded, cross-sectional, observational study of area EMS agencies. Subjects were a convenience sample of EMS providers of varying levels of training. Participants were asked to view 4 blood loss scenarios in random order. Each scenario used a specific quantity of "blood" (a non-blood product made of detergent and food coloring) spilled on an impermeable surface. The amount in each scenario corresponded to the blood loss likely to cause the 4 classes of hemorrhagic shock in a 70-kg adult as defined by the American College of Surgeons. Therefore, scenarios 1 to 4 were 500 mL, 1,000 mL, 1,500 mL, and 2,100 mL, respectively. Estimates are reported using median and interquartile ranges (IQRs).

**Results:** Ninety-two EMS providers completed the study. Thirty-two participants were emergency medical technician (EMT)-basics, 31 were EMT-intermediates or EMT-critical care technicians, and 29 were EMT-paramedics. The median estimated "blood" volume and IQRs for each of the 4 scenarios are as follows: scenario 1: 150 mL (IQR 60 to 280 mL); scenario 2: 300 mL (IQR 100 to 500 mL); scenario 3: 325 mL (IQR 200 to 800 mL); and scenario 4: 700 mL (IQR 300 to 1,000 mL). There was no consistent pattern in the accuracy of estimates with regard to level of training or years of experience. Only 28 (8%) estimates made were within 20% of the absolute amount of "blood" volume. Further, only 69 (24%) estimates were within 50% of actual "blood" volume.

**Conclusion:** In this model, EMS personnel were unable to accurately estimate "blood" volume irrespective of level of training. In general, estimates were lower than the actual "blood" volume.

## 200 The Initial Cross-table Lateral Cervical Spine Film for the Helmeted Athlete in the Emergency Department With a Suspected Neck Injury: Helmet/Pads On or Off?

Veenema KR, Greenwald R, Kamali M, Freedman A, Spillane L/University of Rochester School of Medicine, Rochester, NY

**Study objective:** Emergency medical services (EMS) protocols presently require that

an athlete with a neck injury is transported with the helmet and shoulder pads on. Whether this allows adequate visualization of the cervical spine on the initial cross-table lateral film done in the emergency department has not been determined.

**Methods:** An uninjured adult male volunteer was immobilized on a spine board in a trauma room at a Level I ED. A single cross-table lateral cervical spine film was obtained with no equipment on followed by successive films with the volunteer wearing football and lacrosse equipment. A panel of 11 attending emergency physicians and 9 attending radiologists independently analyzed the 3 films. Impressions were recorded on a questionnaire administered after each film was reviewed. Outcomes measured included (1) visualization of all 7 cervical vertebrae, (2) visualization of the upper cervical spine (C1-C2 and C3-C4 levels), and (3) visualization of the lower cervical spine (C5-C6 and C7-T1 levels). A power analysis was done a priori and a 95% confidence interval was selected. Data were analyzed using the  $\chi^2$  test to compare proportions.

**Results:** When no helmet and pads were worn, 90% (18/20) adequately visualized all 7 cervical vertebrae, 100% (20/20) adequately visualized the upper cervical spine, and 100% (20/20) adequately visualized the lower cervical spine with the exception of the C7-T1 interspace. When a football helmet and pads were worn, none of the reviewers (0/20) adequately visualized all 7 cervical vertebrae, and none (0/20) adequately visualized the upper cervical spine; however, 50% (10/20) adequately visualized the C5-C6 level of the lower cervical spine. Obstructing metal hardware was most frequently cited as the cause of inadequate visualization. When a lacrosse helmet and pads were worn, 20% (4/20) adequately visualized all 7 cervical vertebrae, 100% (20/20) adequately visualized the upper cervical spine, and 95% (19/20) adequately visualized the lower cervical spine with the exception of the C7-T1 interspace.

**Conclusion:** Football helmets and shoulder pads should be removed before the cross-table lateral cervical spine film in the ED. Other sports helmets and shoulder pads (ie, lacrosse) may allow adequate initial cervical spine visualization while remaining on the player.

## 201 Does the Presence of Street Drugs or Ethanol Increase the Risk of Intracranial Pathology in Minor Head Injury Patients?

Haydel MJ, Luber S, Piper D/Louisiana State University at New Orleans, New Orleans, LA

**Study objectives:** Minor head injury (MHI) after blunt trauma is commonly evaluated in the emergency department. Patients under the influence of ethanol or street drugs are thought to have an increased rate of intracranial pathology on head computed tomography (CT) scans. The study hypothesis was that the presence of ethanol or street drugs increases the rate of head CT abnormalities in patients with MHI. MHI was defined as patients with a Glasgow Coma Scale score of 15 who reported posttraumatic amnesia or loss of consciousness. A positive head CT scan included subarachnoid hemorrhage, subdural or epidural hematoma, or intracerebral hemorrhage or contusion.

**Methods:** A retrospective, observational cohort design was used. We searched an MHI database of a large, inner-city ED for patients who had ethanol levels or toxicology screens obtained. Ethanol-positive (E+), ethanol-negative (E-), drug-positive (D+) and drug-negative (D-) groups were established using ethanol levels of 0.1 mg/dL or greater, or toxicology screens positive for common drugs of abuse. The rates of positive head CT for each group were compared. Results were analyzed using  $\chi^2$  analysis and *t* tests.

**Results:** Over a 12-month period ending September 1998, 382 MHI patients had an ethanol level blood sample drawn and 331 had a toxicology screen drawn. Ethanol results were as follows: 159 (41%) were in the E+ group and 223 (59%) in the E- group. Head CT findings were positive in 8.2% (13) of the E+ group and 7.2% (16) of the E- group.  $\chi^2$  Analysis revealed no significant association between positive CT rates and ethanol intoxication. Using a *t* test for independent samples, mean ethanol levels (0.094 mg% CT-positive and 0.075 mg% CT-negative) were not significantly associated with CT results. Street drug results were as follows: 143 (43%) were in the D+ group and 188 (57%) in the D- group. Head CTs were positive in 8 (5.5%) of the D+ group and 16 (8.5%) of the D- group.  $\chi^2$  Analysis revealed no significant association between positive CT rates and presence of street drugs.

**Conclusion:** We conclude that the presence of ethanol or street drugs is not associated with an increased rate of head CT abnormality in MHI patients with a Glasgow Coma Scale score of 15.

## 202 New Diagnostic Peritoneal Lavage (DPL) Criteria to Detect Hollow Viscous Injury for Blunt Abdominal Trauma

Lee CC, Carter WA/Bellevue Hospital Center, New York University Medical Center, New York, NY

Diagnostic peritoneal lavage (DPL) has been extensively used for blunt trauma to

determine the presence of intraabdominal injury. A WBC count greater than 500/mm<sup>3</sup> in peritoneal fluid has been the most reliable measure of intestinal injury for surgical intervention. However, DPL has been criticized as being overly sensitive resulting in unnecessary laparotomy. When a patient sustains an intraabdominal injury resulting in hemoperitoneum, the WBC response from intestinal perforation will occur (which accounts for 500/mm<sup>3</sup>), but there will also be a demargination from ruptured blood vessel that will be collected into the hemoperitoneum. The ratio of WBC to RBC in a peripheral blood vessel is WBC=RBC/500.

Study objective: New DPL criteria of WBC count >500 (intestinal injury) +RBC/500 (vessel injury) was formulated to detect intestinal injury and decrease the number of unnecessary laparotomy.

Methods: This study is retrospective and ongoing, reviewing charts comparing the DPL results with operative finding.

Results: Reviewing charts from 93 patient who received DPL using conventional DPL criteria, 7 patients had unnecessary laparotomy. By using new DPL criteria, 5 patients would not have had laparotomy.

Conclusion: Although the role of DPL has been markedly decreased since the development of ultrasound and computed tomography scan, a diagnosis of hollow viscous injury is not accurate and DPL may still be valuable in this instance. Because conventional DPL criteria is overly sensitive, this new criteria of WBC count >500 +RBC/500 may be able to be used to detect intestinal injury in the presence of hemoperitoneum. Further study is required.

## 203 The Utilization of the Burden Nasoscope for Nasotracheal Intubation in the Prehospital Setting

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Study objectives: The purpose of this study was to determine the utility of the Burden Nasoscope, a new device invented to assist in nasotracheal intubation in the prehospital setting.

Methods: A prospective controlled trial was performed to compare nasotracheal intubation with and without the Burden Nasoscope in a moving ambulance. Participants included 20 paramedics, all of whom had previous experience with traditional nasotracheal intubation. Intubations were performed on a self-breathing, practice mannequin using a No. 8 Endotrol type tube. Each of the participants intubated the mannequin in the back of a moving ambulance with traditional blind nasotracheal technique then with the Burden Nasoscope. Each attempt was timed from the point of entering the nares to successful tracheal intubation. The times were averaged and standard durations calculated for each set. The data was then analyzed using the Dunnett's method with  $\alpha$  set at .05 to determine statistical difference.

Results: No statistically significant difference was found between the 2 groups. Participants successfully intubated the mannequin using the traditional blind technique with an average time of 13.3±11.8 seconds versus intubation with the Burden Nasoscope with an average time of 13.6±25 seconds.

Conclusion: The Burden Nasoscope appears to have no effect in facilitating quicker nasotracheal intubation in a mannequin model in a moving ambulance. Further study is needed on patients in the clinical prehospital setting to determine its true clinical utility.

## 204 The Use of Blood Banking Resources in a Large Urban Trauma Center

Henderson SO, Korn CS, Doshi A, Robinson K/Los Angeles County—University of Southern California Medical Center, Los Angeles, CA

Study objective: A high percentage of trauma patients (TP) presenting to the emergency department are typed and cross-matched (T&C) for blood regardless of severity of injury. We attempted to identify major risk factors for blood product transfusions within the 24 hours of ED arrival in an effort to define a population that did not require initial T&C.

Method: A retrospective chart review of 657 consecutive TP presenting to an urban, Level I trauma center over a 6-month period. Seven variables were gathered: age ( $\leq 55$  or  $> 55$ ), initial systolic blood pressure (SBP) in ED, pulse in ED, respiratory rate in ED, Glasgow Coma Scale (GCS) score, hematocrit No. 1, and risk level. High risk was defined as a TP who: (1) sustained trauma to the chest between mid-clavicular lines, (2) had an abdominal injury with diffuse tenderness, (3) was the survivor of a fatal vehicular accident, (4) had been ejected from a vehicle, (5) had sustained a stab or gunshot wound to the trunk.

Results: TPs who received blood products in the first 24 hours after injury had lower systolic blood pressure (SBP) in the ED, lower GCS scores on presentation, and were more often involved in high-risk injuries ( $P=.05$ ). Controlling for other factors, the incidence of transfusion within 24 hours for TP with SBP of  $< 90$  mm Hg was 5.8 times greater than those whose SBP was  $\geq 90$  mm Hg. The incidence of transfusion for the group presenting to the ED with a GCS score  $< 9$  or a high-risk injury was more than twice that of patients whose GCS scores were  $\geq 9$  or had a low-risk injury. No individual variable or group of variable was 100% accurate in determining the need for transfusion.

Conclusion: Although a group of trauma patients at high risk for transfusion was identified, the implications that a group might be identified who did not need T&C were false.

## 205 Severe Head Trauma: Prehospital Assessment and Management

Jagoda A, Gorenstein S/Mount Sinai Medical Center, New York, NY

Study objective: This investigation has 2 important purposes. The first was to determine the knowledge base of prehospital providers in our community as it applies to head trauma. The second purpose was to provide pilot data to develop an education program for prehospital personnel.

Methods: A 1-day symposium entitled "Brain Injury: The Cutting Edge: Prehospital Diagnosis and Management" was conducted on June 13, 1998, with the help of an unrestricted educational grant from the Aitken Neuroscience Center and Parke Davis. The symposium consisted of a series of lectures regarding brain injury. Each lecture began with a set of multiple-choice questions. All members of the audience received a keypad that enabled them to answer questions regarding management of brain injuries. A computer-driven, interactive system (Meridia Interactive Information Services) analyzed the answers given by the participants. At the end of the lecture, the results of the entire audience were given and the correct answers to the questions were reviewed.

Results: There were a total of 95 participants: 18 emergency medical technicians (EMTs), 47 paramedics, 14 nurses, 14 physicians, and 2 non-health care providers. Overall, 97% of the participants found the program "outstanding" or "very good"; 31% of EMTs and 18% of paramedics were not comfortable performing a neurologic examination. One hundred percent knew the components of the Glasgow Coma Scale (GCS) score, but 80% of the EMTs and 55% of the paramedics could not calculate the score based on a case scenario. Fifty percent of the EMTs and 38% of the paramedics did not know that increased intracranial pressure caused pupil dilatation. Twenty-five percent of participants reported treating more than 5 patients per month with traumatic brain injury. Forty percent of EMTs and paramedics did not know that GCS correlated with outcome. Twenty-seven percent of EMTs and 9% of the paramedics did not know that patients with severe brain injury should be brought to a trauma center. Forty-two percent of EMTs and 25% of paramedics did not identify hypoxia and hypotension as the 2 conditions "that should be avoided at all costs in the brain injured patient." Forty-four percent of EMTs and 41% of paramedics did not know the indications for hyperventilation. When asked how to manage increased intracranial pressure, 58% of the EMTs responded hyperventilation, 8% responded nitroglycerin, and 33% responded "not sure"; 84% of the paramedics responded hyperventilation, 9% responded mannitol, 3% responded dilantin, and 3% responded "not sure."

Conclusion: Based on the data from the symposium, there is a need for education of the prehospital providers regarding management of brain-specific injuries. As expected, the paramedics had a better knowledge base than the EMTs, but there were deficiencies in both groups that could have detrimental consequences for brain-injured patients, especially in those areas where transport time is a consideration. Based on the responses, the format of the symposium was effective and enjoyable to the participants. Although this study had limitations (small numbers, ambiguous questions, and possible population bias), it begins to look at important questions regarding the prehospital care of traumatic brain injury.

## 206 Does Emergency Transport Really Stress the Patient?

Doerges V, Dix S, Kuehl A, Schumann T, Hueppe M, Schmucker P/University Hospital of Luebeck, Luebeck, Germany

Study objectives: Emergency transport may be a stressful event for patients, which may have an adverse effect on recovery and/or outcome. Simulated emergency transport might be a useful model to measure levels of stress response. Conclusions might be drawn to improve emergency management of patients.

Methods: After approval by the institutional review board and written informed

consent was obtained, 32 male volunteers (age 18 to 40 years) were randomized into 2 groups: strain (n=16) and control (n=16). The variable "strain" was realized with a downstairs transport from a third-floor apartment (72 steps) followed by a standardized high-speed emergency transport in an ambulance for 15 minutes. The following values were taken: plasma hormones (epinephrine [E], norepinephrine [NE], cortisol [C]), blood pressure (BP), and heart rate (HR). Plasma hormones were taken in the apartment as base levels (A), at the ground-floor (B), and at the end of the 15-minute emergency transport (C). Blood pressure and heart rate were recorded continuously. The control group had to sit on a chair for 5 minutes and afterward lay on a stretcher for 15 minutes. Blood samples, BP, and HR were taken at equivalent times. The results were evaluated by a 2-factor variance-analysis. The Wilcoxon test was then used to determine differences in CVS values and plasma-hormones. A 2-sided *P* value <.05 was considered significant.

Results: Downstairs transport induced a significant increase (*P*<.001) in E, NE, C, and HR. Emergency transport in the ambulance appears to be of less stress to the patient, as reflected by a significant decrease (*P*<.001) of HR, E, and NE in comparison with the ground-floor (B) levels. No significant alterations could be shown in the "control" group.

Conclusion: Depending on its different periods, a simulated emergency transport induces different grades of stress response. More attention should be performed on the period of emergency transport from the scene to the ambulance to attenuate the most stressing event. Further studies concerning sedation before transportation appear to be necessary.

## 207 Opiate Overdose: What Is the Total Time of Significant Intoxication?

Panacek EA, Rowland C/University of California–Davis Medical Center, Sacramento, CA; Bellevue Medical Center, New York, NY

Study objectives: Opiate overdose is a common medical problem in emergency medicine. The purpose of this study was to determine the average and maximal duration of narcotic intoxication after an opiate overdose (OOD) for patients seen in the emergency department.

Methods: This was a retrospective observational study in a single university hospital. Participants were all patients with an OOD who were seen in the ED between 1992 and 1996. A standardized data abstraction form was used to collect data from emergency medical services, ED, and hospital charts of all OOD patients. This form collected information regarding the type of overdose, amount and timing of all reversal agents, patient responses, and patient demographics. Data were collected regarding the last evidence of narcotic intoxication or requirement of a reversal agent. Presence of other intoxicating substances was also noted. The study was exempt from institutional review board review, meeting waiver criteria.

Results: During the study period, a total of 286 OOD patients were identified. Complete records were available for 254 (89%). Of these, 192 (76%) were treated and released from the ED, 35 (14%) were admitted to an ICU, and 27 (10%) were admitted to a non-ICU bed. Thirty patients (11.8%) were categorized as having initially mild intoxication, 38 (15%) as moderate intoxication, and 186 (73.2%) as severe opiate intoxication. Two hundred one (79%) patients had taken the opiate intravenously, 30 (11.8%) had ingested it orally, 11 (4.3%) used a combination, and the remainder were either unknown or used other means of administration. One hundred twelve cases (44%) were pure opiate intoxications, but the remainder were mixed intoxications. The most common combination was with a sedative hypnotic (83, 32.7%). The mean ( $\pm$ SD) time of observation in the ED was 4.2 $\pm$ 0.4 hours (range 0.2 to 20.2 hours). Evidence of significant toxicity was absent by time of discharge on all patients. In pure intravenous OODs, the mean number of hours in the ED was 3.96 $\pm$ 0.48. Only 4 patients (1.6%) received a dose of Narcan more than 8 hours after presentation. Of these, 2 of 4 received it without any clear clinical indication, 1 had a severe mixed OD, and the final patient had ingested oral heroin.

Conclusion: The majority of patients with pure opiate overdoses, from intravenous use, require observation for a period of 4 hours or less. Only patients with severe mixed overdoses, or with oral ingestions of opiates, require significantly longer periods of observation or hospital admission. Even for severe oral ingestions of opiates, no patient required reversal agents after a period of more than 8 hours. There were very few overdoses with methadone in this study.

## 208 Hazardous Materials Events at a New York City Trauma Center

Trutt J, Oster NS/Mount Sinai School of Medicine, New York, NY; Elmhurst Hospital Center, Elmhurst, NY

Study objective: Most hazardous materials events with injured or contaminated patients present to the emergency department, yet little has been published on management of

contaminated patients, decontamination procedures, or use of personal protective equipment in the ED.

Methods: A prospective cohort study was conducted at a Level I trauma center in New York City. Fifty-seven contaminated patients were identified over a 7-month period. Information was collected on the need for decontamination, who performed the decontamination (emergency medical services [EMS] or ED staff), where it was performed, the personal protective equipment requirements, and whether secondary contamination occurred.

Results: Fifty-seven patients from 30 hazardous materials events presented to our ED. Eleven (19%) needed decontamination before entering the treatment area. Although EMS transported all 11 of these patients, they decontaminated only 1 patient before arrival at the ED. The remaining 10 were decontaminated by ED personnel, either in the external (30%) or internal (70%) showers. Four of the patients requiring decontamination were EMS personnel with secondary contamination. No ED personnel were secondarily contaminated. Six patients were admitted to the ICU. There were no deaths. Hazardous materials exposures included the following: 37 (65%) to pulmonary irritants, 7 (12%) to unknowns, 5 (9%) to explosives, 4 (7%) to caustics, 3 (5%) to noncaustic liquids, and 1 (2%) to radioactive material.

Conclusion: One cannot assume that EMS will decontaminate patients before arrival. ED staff must therefore be aware of the hazardous materials risks in their communities, be able to quickly identify contaminated patients, and be trained in decontamination procedures. Four EMS personnel were secondarily contaminated, which suggests that EMS in our region may benefit from further hazardous materials training. Our ED has undergone multiple hazardous materials scenario drills. No ED staff or patients were secondarily contaminated, which suggests that drills may be helpful in training ED personnel to identify and decontaminate hazardous materials patients while avoiding secondary contamination.

## 209 Quantitative Comparison of Fluoride Neutralization Potential of Various Hydrofluoric Acid Burn Therapies

Cox RD, Summers RL/University of Mississippi Medical Center, Jackson, MS

Study objective: The treatment of hydrofluoric acid burns is based on neutralization of free fluoride with calcium (Ca) and magnesium (Mg), both of which form insoluble salts with fluoride. A variety of methods for administering Ca and Mg have been described in the literature, although few have been evaluated experimentally. This study compares the fluoride neutralization potential (equivalents of Ca or Mg) delivered to a burn site on the hand for published methods for treating hydrofluoric acid burns.

Methods: A physiologic-based hemodynamic compartment flow model was used to calculate the amount of Ca or Mg that reaches a cutaneous burn site on the hand. Because published values for brachial artery, radial artery, and cutaneous hand flows vary, ranges were used for these values and results are expressed over the blood flow range. Results are expressed as milliequivalents of Ca and Mg reaching a 1-cm<sup>2</sup> area of skin on the hand.

Results: For intraarterial Ca administered in the brachial artery (20 mL of 20% calcium gluconate (CaGl) over 4 hours), the amount of Ca reaching a burn site on the hand is 2.7 $\times$ 10<sup>-3</sup> to 11 $\times$ 10<sup>-3</sup> mEq/cm<sup>2</sup>. Intraarterial Ca administered in the radial artery (10 mL of 10% CaGl over 4 hours) provides 2.2 $\times$ 10<sup>-3</sup> to 12 $\times$ 10<sup>-3</sup> mEq/cm<sup>2</sup>. Intravenous Mg (1 mEq/kg MgSO<sub>4</sub> IV over 4 hours) provides 6.4 $\times$ 10<sup>-3</sup> to 21 $\times$ 10<sup>-3</sup> mEq/cm<sup>2</sup> to the burn site. The physiologic amount of free Ca and Mg that reaches a burn site on the hand over 4 hours with no treatment is 8.4 $\times$ 10<sup>-3</sup> to 27 $\times$ 10<sup>-3</sup> mEq/cm<sup>2</sup>. Thus, intra-arterial Ca augments the physiologic levels of Ca and Mg reaching the burn site by approximately 35%, and intravenous Mg augments it by 76%. Intravenous regional Ca (25 mL of 2% CaGl as a Bier block over 20 minutes) provides 0.35 $\times$ 10<sup>-3</sup> mEq/cm<sup>2</sup>, but deprives the tissue of 0.70 $\times$ 10<sup>-3</sup> to 2.3 $\times$ 10<sup>-3</sup> mEq/cm<sup>2</sup> by obstructing blood flow for 20 minutes. Topical Ca (2.5% CaGl gel) provides 5.8 $\times$ 10<sup>-3</sup> mEq/cm<sup>2</sup> if 50% absorption is assumed from the 1 mm of the gel contacting the burn, and 12 $\times$ 10<sup>-3</sup> mEq/cm<sup>2</sup> if 100% absorption from this layer is assumed. Subcutaneous injections of Ca or Mg (0.5 mL/cm<sup>2</sup> 10% CaGl or 10% MgSO<sub>4</sub>) provides 230 $\times$ 10<sup>-3</sup> mEq/cm<sup>2</sup> of Ca or 2,000 $\times$ 10<sup>-3</sup> mEq/cm<sup>2</sup> of Mg.

Conclusion: Parenteral methods of supplying Ca or Mg provide less fluoride neutralization per unit area of skin than subcutaneous injections. The greatest quantity of fluoride neutralization is achieved with subcutaneous MgSO<sub>4</sub>. Cutaneous blood flow to the hand is highly variable and can increase up to 4 times by warming an extremity. Augmentation of hand blood flow would provide a much greater quantity of Ca and Mg than current parenteral methods.

## 210 The Use of Alternative Medicine Therapies by Emergency Department Patients

Sullivan DE/San Antonio Uniformed Services Health Education Consortium, San Antonio, TX

**Study objective:** To identify the frequency and patterns of use of alternative medicine therapies in adult patients presenting for care to an emergency department.

**Methods:** A cross-sectional prevalence study was done by distributing an anonymous survey form to a convenience sample of 500 adult patients (age >18 years) who presented to 2 urban based, military-affiliated, Level I EDs. Data were collected over a 2-month period. Each survey queried patients of their frequency of use of any of 13 alternative or complementary medical treatment options, as well as demographic information, outcome experience from the use of these treatments, and if they had ever had any physician interaction in regard to these alternative treatment regimens.

**Results:** Of the 58.4% (292/330) of completed surveys, 68.5% of respondents reported using at least 1 form of alternative medicine therapy. The most common modalities to be used were (in order of decreasing frequency) relaxation techniques, herbal medicine, megavitamin therapy, and massage; 90.1% of surveyed patients reported that their physician had never asked them about their use of any of these therapies, and 81.7% reported that they had never discussed these treatments with a physician. As to outcome, 96.5% denied ever experiencing any bad outcomes or adverse effects from using one of these treatments, whereas 78.8% reported having positive effects.

**Conclusion:** The use of alternative medicine therapies in adult ED patients is a common phenomenon. The majority of time, patients who use these therapies do not disclose or discuss this use with their physician. Although most patients experience no adverse effects, a small percentage, 3.5%, report a bad outcome or adverse effect. These alternative medical treatment modalities can have significant health effects, which may be deleterious to our patients. We as physicians need to query our patients as to their use of any of these alternative medicine treatment modalities and encourage them to discuss the use of these treatments with their regular physician.

## 211 How to Maintain Medications at a Reasonable Temperature? Evaluating a New Method of Product Packing

Sayah AJ, Schuhwerk K, Nagle R/Brigham and Women's Hospital, Harvard Medical School, Boston, MA

**Study objective:** Under many circumstances, including the prehospital field, environmental temperature changes could adversely affect the effectiveness of pharmaceuticals. The purpose of this study is to evaluate the ability of a packing configuration to maintain a product at a temperature below 25°C during environmental changes between 22°C and 38°C.

**Methods:** Two vials each containing 25 mL normal saline solution and two 1-lb TCP/Reliable Exo-Gel EX-1100 refrigerant packs were packed in a Tech Pak cooler and corrugated box. The package was conditioned at 20°C for at least 24 hours before testing. The package was then exposed to 7 consecutive cycles of temperature variations. Each cycle consisted of 10 hours at 22°C alternating with 2-hour spikes at 38°C. Product and ambient temperatures were hourly recorded using an Omega ECD 5-channel data logger connected to Type K thermocouples.

**Results:** Although the ambient temperature varied between 22°C and 38°C, there were no instances where the product temperature reached or exceeded 25°C. The ambient temperature fluctuations had no effect on the integrity of the packaging and its ability to maintain the product at a relatively constant temperature for the duration of the test. After 3 cycles of testing, an equilibrium state was reached where the product temperature repeatedly peaked at just below 25°C and cooled to just below 24°C in each of the subsequent cycles.

**Conclusion:** The test indicates that the proposed packaging configuration maintained the product at a temperature below 25°C with environmental variations between 22°C and 38°C. This packaging configuration could be useful in maintaining a product at a reasonable temperature when it is used in a warm environment with variable ambient temperatures.

## 212 Caveat Emptor—Buyer Beware!

Challoner KR, Salgado A, Segal A, Lin ST/Los Angeles County+University of Southern California Medical Center, Los Angeles, CA

Herbal use by many segments of the population is increasing. Two recent studies have reported that 34% of English respondents interviewed in 1990 and 42% in 1997 had used unconventional therapy in the last year. Of 114 randomly selected patients attending a university HIV clinic, 22% reported using 1 or more herbal products in the last 3 months. Serious toxicity from herbal products is well documented in the literature.

**Study objectives:** The prestudy hypothesis stated that potentially toxic herbal or folk medicinals could be purchased easily in central Los Angeles and that the purchaser would not receive adequate instructions as to indications, contraindications, and adverse effects at the time of purchase.

**Methods:** Three emergency residents were asked to visit multiple ethnic stores (of their own background and language) as ordinary customers, to attempt to purchase products, and to record on a standardized questionnaire the amount of instruction given, either from the supplier, the label, or any accompanying instructions. A literature search was run on the substances obtained to determine their toxic profile.

**Results:** Cinnabar (mercuric sulfide) and calomel (mercuric chloride) were available in 3 of 6 Asian stores and easily purchased in 2 of 3. Dosages were imprecise, there were no written warnings, and all instructions were verbal. One Chinese herbalist refused to sell the products because of their toxicity. Bali Goli beans and Kandu powder (known to contain lead) were purchased in 3 of 4 Asian Indian stores without warnings or instruction. Pennyroyal and Comfrey were purchased in 3 of 3 Hispanic stores without warnings or instruction even when specific questions were asked. Multiple cases of toxicity were described in the literature with all 6 substances.

**Conclusion:** Potentially toxic herbal products can easily be purchased in Los Angeles with little or no accompanying instruction or warning. This study demonstrates the need for public health research involving alternative medicine practices and the need for community education programs in poison prevention.

## 213 Consecutive Doses of Levalbuterol and Racemic Albuterol Result in Comparable Safety and Efficacy: A Pharmacokinetic and Pharmacodynamic Study in Mild-Moderate Asthmatics

Gumbhir-Shah K, Koch P, Jusko W, Vaickus L/State University of New York at Buffalo, Buffalo, NY

**Study objective:** To evaluate the pharmacokinetic (PK), pharmacodynamic (PD), and safety of cumulative doses of levalbuterol (Lev) compared with racemic albuterol (Rac, equal amounts of (R)- and (S)- albuterol) in patients with asthma. Doses were chosen to mimic those used in an acute care setting.

**Methods:** This was a randomized, double-blind, crossover study in patients 18 to 50 years old with FEV<sub>1</sub> 50% to 85% of predicted. On 2 separate days, patients received 4 doses of 1.25 mg Lev or 2.5 mg Rac every 30 minutes by nebulization. Patients withheld short-acting  $\beta$ -agonists and inhaled steroids for  $\geq 8$  hours before visits.

**Results:** Seven males and 6 females (mean FEV<sub>1</sub> 70% predicted) were enrolled. The PK profiles were similar for (R)-albuterol administered as the single isomer or as part of a 50:50 mixture with (S)-albuterol. T<sub>max</sub> was reached at 2 hours and the t<sub>1/2</sub> was 3.5 hours for both dosage forms. The plasma area under the curve (AUC) and the plasma levels of (R)-albuterol over time were slightly higher after Lev, and peaked 15 minutes after the last dose. After administration of Rac, (S)-albuterol was detected in all patients, peaked 15 minutes after the last dose of Rac, and remained at or near peak for 1 to 3 hours. (S)-albuterol was not detected in 67% of patients before treatment, and remained undetectable in 67% of patients after treatment with Lev. There were no significant differences between Lev and Rac in peak % change FEV<sub>1</sub>, time to peak % change, and AUC for FEV<sub>1</sub>. Changes in serum potassium, glucose, and ventricular heart rate were similar and not clinically significant. Twelve patients reported 22 adverse events (AEs) after treatment with Lev, compared with 11 reporting 27 AEs for Rac. The majority of AEs were  $\beta$ -mediated, all were mild or moderate, and all resolved.

**Conclusion:** Cumulative doses of 5 mg of Lev (4 $\times$ 1.25 mg every 30 minutes) and 10 mg of Rac (4 $\times$ 2.5 mg every 30 minutes) result in comparable efficacy and safety in patients with mild to moderate asthma.



## 214 Reduction in the Cobalt Binding Capacity of Human Albumin With Myocardial Ischemia

Bar-Or D, Lau E, Rao N, Bamos N, Winkler JV, Curtis CG/Swedish Medical Center, Englewood, CO; Diagnostic Markers, Inc, BioDynamics, Cardiff, UK; University of Cambridge, Cambridge, UK

**Study objective:** We observed, in serum samples of patients with myocardial ischemia, reduced in vitro binding of Co(II) to albumin. This decrease in cobalt binding to albumin focused our attention on the locus of the binding sites(s) and how this region might be affected during ischemia. Previous studies have shown that for the transition metals copper, nickel, and cobalt, the amino terminus of albumin is a strong binding site. In addition to being a major binding site for metal ions, the N-terminus of human albumin is also particularly susceptible to degradation compared with albumin from other species. Consequently, significant changes to or loss of the N-terminal region of human albumin during ischemia would be expected to reduce the binding of cobalt. The objective of this study was to provide evidence for a rapid colorimetric assay measuring cobalt binding to human albumin as a test for cardiac ischemia.

**Methods:** A simple colorimetric assay was developed to screen human plasma/serum samples for decreased cobalt binding to albumin. A measured amount of cobalt chloride was added to plasma and the binding to albumin measured indirectly by assay of the free (unbound) cobalt after the addition of dithiothreitol at 470 nm.

**Results:** Using this assay, we screened serum samples for cobalt binding in 99 patients with chest pain suggestive of ischemia and 40 healthy volunteers. Of the patients clinically diagnosed with myocardial ischemia, 95 (96%) of 99 had reduced cobalt binding, whereas 37 (92.5%) of 40 normal volunteers without any evidence of ischemia had higher cobalt binding capacity than the ischemic patients.

**Conclusion:** These results suggest that measuring the cobalt binding capacity of human albumin could be used for the early diagnosis of myocardial ischemia. The underlying mechanism for the cobalt binding capacity assay we describe here is dependent on rapid modification of circulating albumin that detects ischemia within minutes and long before blood markers of myocardial cell membrane disruption.

## 215 Use, Understanding, and Beliefs About Alternate Medicines

Weiss SJ, Ernst AA, Takakuwa K/University of California—Davis Medical Center, Sacramento, CA

**Study objective:** To describe the extent of alternate medicine (AM) use among emergency department patients, evaluate patients' understanding of AMs, and determine gender differences in beliefs about AMs.

**Methods:** This study was a convenience sampling of patients seen in an urban ED. Patient demographics were recorded. A questionnaire was administered that assessed patients' knowledge and use of AMs. Patients were also asked about their beliefs on safety, medication interactions, and conveying information about these substances to their physicians.

**Results:** A total of 100 ED patients were included in the study; 69% had heard of at least one of the AMs. There was no difference between genders, but there was a significant difference among races (89% of white, 53% of black, and 25% of Hispanic patients had heard of AMs;  $P < .01$ ). The most commonly known AMs were ginseng (60%), ginkgo biloba (39%), eucalyptus (38%), St John's wort (38%), echinacea (30%), and melatonin (28%). Forty-eight percent of respondents had used AMs at some time and 22% were presently using AMs. The most commonly used AMs were ginseng (33%), St John's wort and ginkgo biloba (20% each), and echinacea and eucalyptus (19% each). Six respondents (6%) were seeing a provider of alternative medicines. All AMs were considered to be safe by 14%, 30% would not tell their doctor, 15% believed that AMs do not interact with other medications, and 18% trusted AMs to be more effective than medicine. Females were more likely than males to believe that AMs do not interact with other medications (19% versus 2%, 95% confidence interval 4% to 29%).

**Conclusion:** Two thirds of ED patients have heard of AMs, half have used them at some time, one fifth are presently using them, and 6% see AM providers. Thirty percent of patients state they would not tell their physician about AMs despite the fact that some are very toxic. Understanding race and gender differences can help in addressing AM use. Questions about AM use should be routinely included in ED examinations.

## 216 Serious Injury and Death Associated With Alcohol and Drug Use in Adolescents

Nyquist SN, Mader TJ, Letourneau P/Baystate Medical Center, Tufts University School of Medicine, Springfield, MA

**Study objective:** The purpose of this study was to review the incidence of alcohol and non-prescription drug use in adolescent trauma patients and examine its influence on outcome.

**Methods:** This study was a retrospective analysis of data collected (1994-1998) by the National Pediatric Trauma Registry (NPTR). Patients with positive toxicology screen (TS) were descriptively compared with those who were negative.

**Results:** Of the 22,059 patients in the NPTR, 5,761 were age 12 to 17 years. Sixteen percent (928) had blood alcohol level (BAL) or urine toxicology screen (UTS) done on admission. Twenty-nine percent (95% confidence interval 26% to 32%) of the TS obtained were positive. Both groups were predominately male and had similar mean Glasgow Coma Scale (GCS) scores. The TS-positive children were older and more likely to have penetrating injuries. A positive TS was associated with more severe injury, as determined by the pediatric trauma score (PTS) ( $P < .05$ ). No statistically significant difference was found in measured outcomes as outlined in the Table including morbidity and mortality. There was a slight decrease in the duration of ICU care for the TS-positive group ( $P < .05$ ).

This study is limited by not having quantitative measures of BAL and no detail on what nonprescription drugs were included on the UTS.

**Conclusion:** A significant number of adolescent trauma patients have positive toxicology screens. A positive toxicology screen is associated with penetrating trauma but does not appear to adversely affect outcome.

**Table, abstract 216.**

Factor	Negative (n=661)	TS (n=267)	Positive BAL Only (n=82)
Male	66 (62-69)	67 (61-73)	62 (51-73)
Age (y)	15.0 (14.8-15.1)	15.6 (15.4-15.7)	15.8 (15.6-16.0)
Blunt injury (%)	88 (85-90)	80 (75-85)	92 (83-96)
GCS	14.5 (14.5-14.6)	14.6 (14.6-14.7)	14.4 (14.3-14.5)
PTS	8.5 (8.4-8.6)	7.9 (7.6-8.3)	8.2 (7.6-8.8)
Intubations (%)	20 (17-23)	25 (20-30)	21 (13-31)
Admission to operating room (%)	33 (29-36)	41 (35-47)	40 (30-52)
Admission to ICU (%)	46 (42-50)	48 (42-54)	46 (35-58)
ICU stay (d)	4.2 (4.0-4.3)	3.8 (3.7-3.9)	4.5 (4.0-5.0)
Complication rate (%)	32 (28-35)	30 (24-35)	29 (20-40)
Delayed diagnosis (%)	0.6 (0-2)	0.8 (0-3)	1.2 (0-7)
Mortality rate (%)	3.8 (2-6)	3.8 (2-7)	5.0 (1-12)

Values represent means or proportions. 95% Confidence intervals shown in parentheses.

## 217 Epidemic US Opiate Mortality Rates: 1979-1996

Martin TG/University of Washington, Seattle, WA

Poisoning is the third leading cause of injury mortality and opiates are the leading cause of poisoning mortality in the United States.

**Study objectives:** To describe unintentional opiate-related mortality (UOM) in the United States overall and within subgroups.

**Methods:** The US National Center for Health Statistics' (NCHS) compressed mortality data were analyzed by the Centers for Disease Control and Prevention (CDC) Wonder computer program. UOM was identified from the underlying cause of death (UCOD) field containing either an *International Classification of Diseases—ninth revision* N or E code. Rates, changes in rates and proportions in sex, race, and age groups in 52 states and 4 national regions were determined. All rates are per 100,000 population.

**Results:** From 1979 to 1996, 20,666 cases of UOM had the following UCOD distribution: 85.4% E850.0 (Accidental Poisoning, Heroin), 5.5% E850.1 (Accidental Poisoning, Methadone), 4.6% E850.2 (Accidental Poisoning, Other Opiates), 2.8% N305.5 (Nondependent Abuse of Opioids), 1.6% N304.0 (Opioid Dependence), 0.2% E935.0 (Adverse Effects of Heroin), and 0.1% E304.7 (Dependence on Opioid Combinations). Opiates were responsible for 9.5% of all unintentional deaths in the United States in 1979 compared with 23% in 1996. During this period, the UOM rate in males was 4 times greater than females and accounted for 80% of all UOM. UOM in blacks accounted for only 18% of all UOM, but blacks had a higher rate (0.69) than whites (0.45) or the "Other" (0.19) racial group. Of male groups, blacks had the highest UOM rate (1.66), then whites (1.51), then others (0.53). The 25- to 34-year-old and 35- to 44-year-old age groups had the highest overall UOM rates (0.93 and 1.24)

and accounted for 33.2% and 37.5% of overall UOM, respectively. From 1979 to 1996, the US UOM rate increased 329% overall, 380% in males, 374% in whites, and 809% in the 35- to 44-year-old group. The 5 states with the highest overall unintentional opiate-related death rates were California (1.5), New Mexico (1.3), Oregon (1.1), Arizona (0.9), Washington (0.8), and the Western region of the United States had the highest regional rate (1.2).

Conclusion: The United States is in the midst of an alarming epidemic in unintentional opiate-related mortality. The highest UOM rates occurred in the black racial group, male sex, 35- to 44-year-old age group, and the Western region of the United States. Unless vigorous and effective countermeasures are taken, UOM will continue to be a major cause of poisoning mortality. Recent, marked increases in purity and decreases in price of heroin in the United States have probably not yet affected these UOM rates and may lead to even higher rates in the coming years.

## 218 Clinical Analysis of Puffer Fish Poisoning

Park CW, Ryoo E, Yang HJ, Lee K/Gil Medical Center, Gachon Medical School, Incheon, Korea

Study objective: Puffer fish can be the source of lethal food poisoning in human beings and tetrodotoxin (TTX) poisonings are not infrequent in Korea, but there are few clinical reports. The authors reviewed the patients of TTX poisoning and analyzed the clinical characteristics for establishment of strategy in the treatments of patients.

Methods: A retrospective study was performed of 40 patients who visited Chung Ang Gil Hospital from January 1, 1995, to May 31, 1998, with a diagnosis of TTX poisoning by a review of patients' medical records and telephone inquiries. The diagnosis of TTX poisoning was made by causal links between consumption of puffer fish and development of typical symptoms of TTX intoxication. The clinical severity of the patients in this study was classified according to the classification of Fukuda.

Results: Mean age of the patients was 40 years, and the highest incidence was in the fourth decade (52.5%). The ratio of male to female was 3.44:1. Except 1998, seasonal distribution was as follows: 12 patients in spring, 6 in summer, 5 in autumn, and 12 in winter. The mean interval between consumption and early symptom onset was 137 minutes. Common initial symptoms were circumoral numbness (32 patients) and paresthesia of extremities (24 patients), and various symptoms developed after ingestion of puffer fish such as neuromuscular (39 patients), cardiovascular/pulmonary (23 patients), and gastrointestinal (16 patients) system. Mean recovery time from the onset of early symptom was 21.98 hours. All were treated with symptomatic and supportive measures, and in 2 cases ventilatory support was needed for 18.5 hours and 31.5 hours, respectively.

Conclusion: Despite the previous reports of high mortality rates associated with TTX poisoning, there was no fatal case in our study. Many contributors to explain this finding, such as the season and locality of catch, species and tissues of puffer, and amount of ingested toxin could be proposed, but could not be proved. However, because death results from respiratory or cardiovascular collapse, in severe TTX poisoning early intubation with assisted ventilation and support of cardiovascular function are of vital importance and in mild cases admission and observation for about 2 days is needed depending on the progression of symptoms.

## 219 Double-Blinded Randomized Comparison of Oral Doxepin and Diphenhydramine in Treating Acute Urticaria

Meggs WJ, O'Meara S, Jones K, Ford JL/East Carolina University, Greenville, NC

Study objective: To determine the relative efficacy of oral doxepin and diphenhydramine in the treatment of acute urticaria presenting to the emergency department. Doxepin has a higher affinity for the H<sub>1</sub> histamine receptor than diphenhydramine and has been shown to be superior to diphenhydramine in the treatment of chronic urticaria. Use of doxepin for acute urticaria has not been previously studied.

Methods: This was a randomized, double-blind, controlled study in the ED of a 750-bed teaching hospital with 48,000 emergency visits per year. Participants were nonpregnant adults between 18 and 65 years of age presenting to the ED for treatment of acute urticaria. Written informed consent was obtained. Patients were randomized to receive doxepin 25 mg or diphenhydramine 50 mg orally. A randomization table was maintained in the hospital pharmacy, which supplied the study drugs, blinded to patients and ED personnel. Patient and physician ratings of improvement at 1 hour were recorded. Patients rated itching, redness, and urticaria on a 10-cm analog scale at the beginning of the study and at 1 hour.  $\chi^2$  Analysis

and Student's *t* test were used to compare outcomes as appropriate, with  $P < .05$  considered significant.

Results: Twenty-nine patients completed the study. Fifteen were female, and 14 were male, with no significant gender differences between the groups. Fifteen were randomized to receive doxepin, and 13 received diphenhydramine. By physician assessment, 11 of 15 (73%) of patients receiving doxepin were improved at 1 hour, versus 6 of 13 (46%) of patients receiving diphenhydramine ( $P = .05$ ). Doxepin was superior to diphenhydramine on all analog scales, but these results did not achieve statistical significance. Other than drowsiness and mucous membrane dryness, no adverse effects were seen with either medication.

Conclusion: Oral doxepin is an effective alternative to oral diphenhydramine in treating acute urticaria in the ED, and may have improved efficacy at 1 hour.

## 220 Emergency Medicine Residents' Perceptions of Bioethical Education

Salen PN, Siersenski PR, Heller MB/St. Luke's Hospital, Bethlehem, PA; Christiana Care Health Systems, Newark, DE

Study objective: To evaluate the self-reported exposure of emergency residents to bioethical issues and to assess the perceived quality of their bioethical education.

Methods: An anonymous 15-question survey was distributed to 100 emergency medicine residents attending a chief residents' forum at a national emergency medicine conference. The survey asked their opinion on a 7-point (1 to 7) Likert scale indicating their agreement (least to most) with questions regarding their experience during residency with aspects of bioethical education.

Results: Sixty surveys were completed for a response rate of 60%. Residents were most likely to be dissatisfied with their didactic education in bioethical issues and the degree of attending supervision regarding such issues. There was a significant dichotomy between the importance they ascribed to observation rather than didactics and the degree to which their attending physicians actively observed their performance (4.90 versus 3.80,  $P < .01$ ).

Conclusion: Emergency medicine residents perceive end-of-life and decision-making capacity issues as important aspects in clinical practice. Many emergency medicine residents express dissatisfaction with both didactic instruction and clinical oversight of their bioethical education.

Table, abstract 220.

Aspects of Bioethical Education	Mean	Mode
DNR and end-of-life issues frequently discussed	5.85	6
Decisionmaking capacity impact on care	5.76	6
Observational education more important than didactic	4.90	6
Attending supervision of resident performance	3.80	2
Satisfaction with bioethical education	4.25	2

DNR, Do-not-resuscitate.

## 221 Redundancies in a Database of Emergency Department Patient Visits

Zimmer GD, McAfee AT/Brigham and Women's Hospital, Harvard Affiliated Emergency Medicine Residency Program, Boston, MA

Relational database architectures are more efficient than traditional flat-file ones by taking advantage of redundancy of data.

Study objective: To determine the degree of redundancy in a flat-file database of emergency department patient data.

Methods: This was a retrospective electronic medical record database analysis conducted at a university tertiary referral center with annual ED census of 46,000. Subjects were all consecutive ED visits from July 1, 1994, to September 30, 1994. Duplicate data elements were determined for the following: medical record number (MRN), full name, city of residence, zip code, insurance, and *International Classification of Diseases—ninth revision (ICD-9)*, diagnosis code.

Results: Of 11,795 patient visits over the 3-month period, 2,068 (17.5%) were

duplicate entries by coding of the MRN reflecting repeat visits. The Table reflects redundancies in recording data for the ED visits over the 3-month study period. Listed for each data element are the median, the maximum frequency, and the number and percent of total of unique entries. A similar analysis for the MRN alone for a 12-month period revealed 31.6% (14,710/46,497) repeat visits, indicating that redundancies increase as the data are collected over a longer period of time.

Conclusion: Redundancies in ED patient data support the use of relational database architectures. Researchers and administrators are encouraged to support efforts to implement relational architectures to minimize storage and to maximize query efficiency.

**Table, abstract 221.**

Value	MRN	Name	City	Payer	Zip	ICD-9
Median	1	1	1	377	1	2
Maximum	15	15	1,721	2,259	1,160	469
Unique (No.)	9,727	9,568	513	17	593	1,321
Unique (%)	82.5	81.1	4.3	0.14	5.0	11.2

## 222 The Administrative Dilemma: Perceptions and Misconceptions

Mulvey AW, Silva JC, Bellino M, Misiewicz VM, Leone J/Resurrection Medical Center, Chicago, IL

Administration is an important component of emergency medicine resident training. Although included as a major element of the Core Content of Emergency Medicine, there exists an incongruity between practice needs and resident administrative training.

Study objectives: To evaluate whether emergency medicine residents are provided uniform, adequate administrative education relevant to today's health care environment. The study also investigated discrepancies in the perceptions of residents and program directors concerning their administrative education.

Methods: Program directors and chief resident(s) of all accredited US emergency medicine programs were mailed a 1-page questionnaire. The resident's survey also included a single question used to test resident knowledge of Health Care Financing Administration (HCFA) documentation requirements.

Results: The response rate of the survey was 66% (74/112). Seventy-two percent (53/74) of the residency programs responding had administrative rotations as part of their residency. Residents of programs with an administrative rotation were more likely to receive training in credentialing (34% versus 0%), quality assurance (91% versus 50%), budgeting (31% versus 0%), and contract evaluation (68% versus 40%;  $P \leq .05$ ). Residents from programs with an administrative rotation were more likely to correctly answer the question regarding HCFA documentation requirements (76% versus 50%;  $P \leq .05$ ). Although responses from many directors indicated that they were providing adequate education in the areas of credentialing, budgeting, and contract evaluations, matched responses from their own residents indicated that they received no education in these areas.

Conclusion: Current emergency medicine resident education in administration varies greatly program to program and is often neglected. Establishing dedicated academic time including an administrative rotation is a way of ensuring better resident training in administration.

## 223 College Research Associates as Screeners for Firearms Injury Risk Assessment in an Urban, Community, Teaching Hospital Emergency Department

Cordone M, Bradley K, Werdman M/Bridgeport Hospital, Yale University School of Medicine, Bridgeport, CT

Study objective: To determine whether college research associates (RAs) could successfully screen for firearms risk assessment in adult patients presenting to an urban, community, teaching hospital emergency department.

Methods: This prospective, observational study was conducted in an urban, community, teaching hospital. Volunteer college RAs received training on screening using a formatted script that took about 90 seconds to administer. The screening instrument was based on the American Medical Association Physician Firearm Safety Guide, "Risk Factors for Firearm Injury and Death." When not enrolling patients in

other studies, RAs screened a convenience sample of nonacute, adult ED patients. If the patient said that they or someone they knew had a gun, they were asked if they would allow a follow-up call at 1 month to see if there had been a change in their risk factors. If the patient was a city resident and did not have a trigger lock, they were eligible to receive a free one in the ED. All patients received information on their firearm risk and safety factors.

Results: Six hundred thirty-one patients were approached for ED screening by RAs over 160 shifts during 13 weeks. Six hundred nine (97%) were screened for firearms injury risk assessment; 111 (18%) had a gun. An additional 98 patients knew someone who owned a gun for a total of 208 patients (34%) for whom screening could potentially influence gun ownership/risk behavior. Of those who said that they owned a gun, 30 (27%) said they did not have a trigger lock, 23 (21%) said the gun was not secured, and 18 (16%) said that the gun was kept loaded. Seven patients (6%) were eligible for free trigger locks and 3 accepted them. Nine eligible staff also received trigger locks. Twenty-one (19%) of the gun owners would allow contact after ED discharge. Post-ED discharge contact could be made with 7 of the gun owners. Three refused to answer further questions. Of the 4 who answered questions, 2 said they no longer had the gun, 2 reported that they had placed trigger locks on their guns, 1 reported locking a previously unlocked gun, and 1 reported that a gun that had been kept loaded was now stored unloaded.

Conclusion: RAs can successfully screen for primary health care issues in the ED. This screening identifies important firearm risks among patients attending the ED. The outcome of this screening on the risk factors of those with a gun could not be determined.

## 224 The Relation Between Stressors, Strain, and Coping Among Emergency Medicine Residents

Boudreaux ED, Ary R/Louisiana State University, Baton Rouge, LA

Study objectives: Because emergency medicine is a young field, relatively little has been published on the stress associated with residency. The current study explored the relation between stressors, strain, and coping among emergency medicine residents.

Methods: A cross-sectional design was used. All emergency medicine residents attending 2 programs located in the southern United States were eligible to participate ( $N=83$ ). To guarantee anonymity, subjects were specifically instructed to omit any identifying/demographic information. We used the Health Professions Stress Inventory (HPSI) and the Occupational Stress Inventory, which is divided into the Occupational Roles Questionnaire (ORQ), the Personal Strain Questionnaire (PSQ), and the Personal Resources Questionnaire (PRQ). The ORQ has 6 subscales, the PSQ has 4 subscales, and the PRQ has 4 subscales. These instruments have extensive research supporting their reliability and validity. Two Pearson product-moment correlation matrices were generated: Stressor (HPSI, ORQ)×Strain (PSQ) scales and Coping (PRQ)×Strain (PSQ) scales. Because of multiple comparisons, we focused on a significance level of  $P < .01$  instead of  $P < .05$  to help reduce the likelihood of type I error.

Results: Complete surveys were collected on 52 (62.7%) residents. Table 1 summarizes the results of the Stressor×Strain analyses, whereas Table 2 summarizes the results of the Coping×Strain analyses.

Conclusion: Elevated physical strain, as manifested by symptoms such as muscle tension, lethargy, and insomnia, correlated with 5 of 7 stressor subscales. The 2 subscales most highly correlated with physical strain were those assessing stressors specific to working in the health care environment (eg, being responsible for patient outcomes, having non-health care professionals dictate medical practice) and those assessing work overload (eg, tight time deadlines, having to split attention between equally important areas, inadequate resources). Heightened psychologic strain (eg, depression, anxiety, irritability) was also evident in residents who endorsed higher levels of stressors across 4 of 7 subscales, although the relations were not as quite strong or consistent as those observed with physical strain. Psychologic distress was highest in those who reported uncertainty regarding what was expected of them and divided loyalties on the job (ie, multiple supervisors with conflicting expectations). Residents reporting greater use of coping strategies involving recreational activity and social support also reported less physical, psychologic, and interpersonal strain. Interestingly, those who reported higher use of self-care (eg, regular exercise, sufficient sleep, avoidance of alcohol) reported less physical strain but greater vocational strain (eg, job dissatisfaction, concentration problems, absenteeism), suggesting some coping styles may be associated with both positive and negative outcomes.

**Table 1, abstract 224.****Correlations between stressor (HPSI, ORQ) and strain (PSQ) subscales**

	HPSI	ORQ:PE	ORQ:R	ORQ:RA	ORQ:RB	ORQ:RI	ORQ:RO
PSQ:IS	.327*	.326*	-.183	.382†	.203	.291*	.209
PSQ:PHS	.513†	.420†	.340*	.373†	.453†	.354*	.595†
PSQ:PSY	.332*	.367†	-.050	.403†	.409†	.378†	.213
PSQ:VS	.099	.250	-.167	.288*	.099	.277*	-.219

**HPSI**, Health Professions Stress Inventory (stressors related to providing health care); **ORQ:PE**, Physical Environment (extent to which individual is exposed to environmental toxins, extreme physical conditions, erratic schedules); **ORQ:R**, Responsibility (extent individual has great deal of responsibility for performance and welfare of others); **ORQ:RA**, Role Ambiguity (extent to which priorities, expectations, and evaluation criteria are clear to individual); **ORQ:RB**, Role Boundary (extent to which individual is experiencing conflicting role demands and loyalties); **ORQ:RI**, Role Insufficiency (extent to which individual feels unprepared for job requirements); **ORQ:RO**, Role Overload (extent to which job demands exceed personal and workplace resources); **PSQ:IS**, Interpersonal Strain (extent of disruption in interpersonal relationships); **PSQ:PHS**, Physical Strain (extent of physical illness/complaints or poor self-care habits); **PSQ:PSY**, Psychological Strain (extent of psychological and/or emotional problems); **PSQ:VS**, Vocational Strain (extent to which individual is having problems in work quality or output, job satisfaction).

\* $P < .05$ .† $P < .01$ .**Table 2, abstract 224.****Correlations between coping (PRQ) and strain (PSQ) subscales**

	PRQ:RC	PRQ:RE	PRQ:SC	PRQ:SS
PSQ:IS	-.169	-.322*	-.091	-.467†
PSQ:PHS	-.312*	-.468†	-.575†	-.234
PSQ:PSY	-.045	-.495†	.035	-.593†
PSQ:VS	-.097	-.108	.389†	-.269

**PSQ:IS**, Interpersonal Strain (extent of disruption in interpersonal relationships); **PSQ:PHS**, Physical Strain (extent of physical illness/complaints or poor self-care habits); **PSQ:PSY**, Psychological Strain (extent of psychological and/or emotional problems); **PSQ:VS**, Vocational Strain (extent to which individual is having problems in work quality or output, job satisfaction); **PRQ:RC**, Rational/Cognitive Coping (extent to which individual possesses and uses cognitive skills and reason); **PRQ:RE**, Recreation (extent to which individual makes use of and derives pleasure from regular recreational activities); **PRQ:SC**, Self-care (extent to which individual regularly engages in personal activities which reduce chronic stress); **PRQ:SS**, Social Support (extent to which individual feels support and help from those around him/her).

\* $P < .05$ .† $P < .01$ .

## 225 How Do Emergency Medicine Residents Learn Compared to Non-Emergency Medicine Residents? A Novel Assessment of Behavior and Learning Styles

Ramalanjaona GR, Calabro JJ/Seton Hall University, South Orange, NJ

Understanding an individual's behavior pattern and learning style has been shown to enhance adult learning. However, this concept has not been applied to postgraduate emergency medicine and internal medicine education.

Study objectives: (1) To evaluate a new assessment of behavior and learning styles for emergency medicine and internal medicine residency training using this concept. (2) To compare emergency medicine and internal medicine residents' behavior tendency and learning styles.

Methods: This is a prospective study using a modified Kolb's Personal Profile System and Learning Style inventory on cohort of emergency medicine and internal medicine residents. Each resident's behavior pattern and learning style was recorded, and the group's overall results compared using analysis of variance and  $\chi^2$ .

Results: The most common behavioral pattern of both emergency medicine (N=30) and internal medicine (N=29) residents (27% and 24%, respectively) is creative (which

combines a desire for tangible results balanced by a drive for perfection) (Table). The predominant learning style for emergency medicine (70%) and internal medicine (68%) is converger (consists of deductive reasoning and solving specific problems;  $P < .05$ ).

Conclusion: There is a clear similarity of behavior and learning style in both emergency medicine and internal medicine residents. This is the first report of this instrument's new application in emergency medicine and internal medicine training. It is simple to administer, practical, and allows identification of emergency medicine and internal medicine residents' learning strengths with subsequent tailoring of education tools and experiences.

**Table, abstract 225.**

	Emergency Medicine	Internal Medicine
<b>Behavior pattern (%)</b>		
Creative	27	24
Inspirational	6	8
Objective thinker	20	17
Perfectionist	4	17
Promotor	10	17
Result-oriented	23	17
<b>Learning style (%)</b>		
Converger*	70*	68
Diverger	6	6
Assimilator	14	20
Accommodator	10	6

\* $P < .05$ .

## 226 Stressors Experienced by Emergency Medicine Residents

Boudreaux ED, Ary R/Louisiana State University, Baton Rouge, LA

Study objectives: Considerable research has focused on the stress of medical residency. However, most of these studies have investigated internal medicine or family practice residents. Because emergency medicine is a young field, relatively little has been published on the stressors experienced by emergency medicine residents. The current study used 2 well-validated instruments to explore the level and types of stressors experienced by a sample of emergency medicine residents.

Methods: A cross-sectional design was used. All emergency medicine residents attending 2 programs located in the southern United States were eligible to participate (N=83). Subjects were specifically instructed to omit any identifying or demographic information to guarantee anonymity and to encourage honest responses. Residents completed the questionnaires before a weekly didactic session. We used the Health Professions Stress Inventory (HPSI), which is a measure assessing stressors specific to health care providers, and the Occupational Roles Questionnaire (ORQ), which is a measure assessing general job-related stressors. The ORQ has 6 subscales: Role Overload, Role Insufficiency, Role Ambiguity, Role Boundary, Responsibility, and Physical Environment. These instruments have extensive research supporting their reliability and validity.

Results: Complete surveys were collected on 52 (62.7%) residents. The mean score on the HPSI placed them in the high average range (based on physician normative data); 13.5% of the sample scored  $\geq 2$  SDs above the mean. On the ORQ, mean scores on the Physical Environment subscale fell in the clinically elevated range (T score  $> 70$ ); 53.8% of the sample scored  $\geq 2$  SDs above the mean. Mean scores on the other subscales of the ORQ were within normal limits. Stressor profiles differed significantly between the 2 programs on Role Overload (T score: 56 versus 44,  $P < .001$ ) and Responsibility (T score: 64 versus 49,  $P < .001$ ).

Conclusion: Emergency medicine residents' scores on the HPSI imply that the frequency/intensity of patient care-related stressors were within the normal range for most residents. However, approximately 13.5% of the emergency medicine residents scored in the worrisome range (ie,  $\geq 2$  SDs above the mean). The ORQ revealed only 1 of the 6 subscales to be significantly elevated: the Physical Environment subscale. This subscale assesses job characteristics such as erratic work schedules and exposure to noxious/dangerous environmental stimuli. Although both programs yielded elevated



scores on the Physical Environment subscale, the stressor profiles obtained on 2 of the other ORQ subscales (Role Overload, Responsibility) differed significantly between the 2 programs. This highlights an important point: conclusions regarding the stressors that emergency medicine residents face during their training should be made cautiously because these stressors may be program-specific. Larger studies should be designed to investigate the relation between program characteristics, specific stressors, and outcome measures (ie, psychological distress, performance evaluations).

## 227 Evaluation of an Integrated Conscious Sedation Curriculum

Newton KI, McCormick J, Pritchard B, Henderson SO/University of Southern California, Los Angeles, CA

Emergency physicians must be able to provide conscious sedation (CS). There are stringent monitoring requirements and significant potential risks to the patient who undergoes this procedure on an emergency basis.

**Study objective:** We designed an integrated curriculum to improve our residents' knowledge base. Its efficacy was tested by an examination presented to our emergency medicine residents.

**Methods:** The curriculum included lectures, didactic material, and assigned outside reading. The material was originally taught to the PGY-III class over a 2-week period. An optional 2-week CS rotation was offered. Simultaneous with the establishment of a new curriculum, a 22-question test was developed using multiple current resources. Four general CS questions and 18 medication-specific questions were designed with a focus on 8 common CS medications. Before the didactic curriculum, PGY-III emergency medicine residents were given the examination (pretest) to establish a baseline. Nine months after the curriculum was assimilated clinically, the identical examination was given to the same class (posttest) and to their concurrent PGY-IV class (who had not participated in the curriculum) as a control group.

**Results:** Fourteen of 18 PGY-III residents completed the pretest and 15 completed the posttest. Comparing the pretest and posttests for the general CS questions, we found no significant difference in the number of correct answers ( $P$  range=.483 to 1.000; Fisher's exact test). The pretest/posttest comparison for the medication specific questions demonstrated a significant improvement in the number of correct answers for the majority of medications. Of the 18 questions, 11 showed a statistically significant improvement in the number of correct answers on the posttest ( $P$  range: .001 to .025). Two questions regarding fentanyl were scored too highly on the pretest to demonstrate improvement on the posttest. Although there appeared to be an improvement in the number of correct answers in the posttest group for the remaining 5 questions, they were not statistically significant ( $P$  range: .06 to .54). Comparing the initial test scores of the study group and the concurrent control group, we found no statistically significant differences in scores, suggesting clinical experience was not a source of the study group's improvement ( $P$  range .19 to 1.00).

**Conclusion:** The implementation of a standardized, focused CS curriculum is associated with an improvement in the knowledge base of the emergency medicine residents. The implementation of a similar curriculum should be included for all emergency medicine training programs to improve physician knowledge in excess of what experience would otherwise provide.

## 228 Initiation of X-Rays by the Triage Nurse: Competency and Its Effect on Patients' Total Time Spent in the Accident and Emergency Department

Than KC, Leong YL, Ngiam BS/Changi General Hospital, Singapore, Republic of Singapore

**Study objective:** To assess the competency of triage nurses in initiating radiographs for patients with minor trauma based on a preset radiology protocol and its effect on patients' total time spent in the Accident and Emergency (A&E) department.

**Methods:** A prospective study was carried out over a period of 3 months in the A&E department of an acute setting hospital. A sample of 193 patients with extremity and skull injuries were included in the study. A matched control of 83 patients comparing total time spent between groups of patient who had radiographs initiated at triage and a group who did not was also conducted.

**Result:** Statistical analysis of the results showed that 99.49% (95% confidence interval [CI] 0.98% to 1.0%) of the radiographs initiated by triage nurses were relevant; 98.46% (95% CI 0.96% to 1.0%) were necessary and 94.8% (95% CI 0.90% to 0.98%) were adequate to the patients' complaints. An average time saving of 24.45 minutes in patients' total time spent in the department was achieved when radiographs were initiated by triage nurses.

**Conclusion:** Triage nurses are competent to initiate radiographs for minor trauma

cases based on a preset radiology protocol and this results in a significant reduction of patients' total time spent in the A&E department.

## 229 Medical Student Comfort With Lifesaving Clinical Skills

Anders DS, Heilpern K, Parramore C/Emory University School of Medicine, Atlanta, GA

**Study objectives:** To determine medical student attitudes about their comfort with basic lifesaving clinical skills before and after a structured training session using mannequins and simulators.

**Methods:** The entire class of new third-year medical students received a 4-hour hands-on practicum in lifesaving skills, taught by emergency medicine faculty. Topics included identification and treatment of life-threatening arrhythmias, chest compressions, and airway management. The medical students completed a 5-point Likert scale survey examining individual comfort with these skills. In a small group format, students were trained using arrhythmia simulators and both cardiopulmonary resuscitation (CPR) and airway mannequins. A second survey was administered at the conclusion of the training session.

**Results:** One hundred four of the 105 medical students who attended orientation were enrolled and completed both parts of the survey. Significant improvement in medical student comfort with lifesaving clinical skills was noted (Table).

**Conclusion:** Small group training sessions for third-year medical students by emergency medicine faculty using simulators and mannequins improved the students' perceived comfort with lifesaving clinical skills.

**Table, abstract 229.**

**Question: I am comfortable with the following lifesaving clinical skills:**

	Pretest	Posttest	Mean Units of Improvement	95% Confidence Interval
Identification of arrhythmias	2.34	3.75	1.41	(1.23, 1.60)
Treatment of arrhythmias	2.20	3.39	1.19	(1.00, 1.38)
Performance of chest compressions	3.56	4.37	0.81	(0.64, 0.98)
Opening and maintaining an airway	3.36	4.31	0.95	(0.76, 1.15)
Use of airway adjuncts	2.36	4.14	1.79	(1.59, 1.99)
Use of bag-valve-mask	2.71	4.29	1.58	(1.36, 1.80)
Recognition of oxygen sources	2.28	3.40	1.13	(0.93, 1.32)
Technique of endotracheal intubation	2.06	3.65	1.60	(1.38, 1.81)

## 230 Team 7000: A Look at an Emergency Department-Based In-Hospital Emergency Response Team

Ko PP, Yoon YD, Jagoda A, Jacobson S/Mount Sinai School of Medicine, New York, NY

**Study objectives:** At our institution, the emergency department has the responsibility of responding to medical emergencies in nonpatient areas of the hospital called Emergency Department Team 7000. This study aims to describe the population served by ED Team 7000 and evaluate the strengths and weaknesses of the intervention.

**Methods:** From July 1998 to April 1999, a 2-page questionnaire was completed by ED Team 7000 members after response to calls. The survey documented patient characteristics, Team 7000 response time, and operational issues.

**Results:** To date, data have been collected on 30 Team 7000 responses. There were comparable numbers of male and female patients within the study group. The mean patient age was 49.2 years (range 11 to 78 years). The majority of subjects were patients who were not on a patient floor at the time of the medical emergency. One response was for a visitor to the medical center, 6 were employees, 10 were inpatients, and 10 were outpatients. The most prevalent preliminary diagnostic categories were cardiopulmonary, neurologic, and toxic-metabolic. The median response time was 3 minutes (range 1 to 21 minutes). Our survey noted that 40% of the time there were logistical barriers to reaching the patients including a locked door, distance, elevator, and congestion. At all times, a physician and registered nurse responded to the scene. Team 7000 responders indicated that 23% of the time necessary equipment was not readily available. Unavailable equipment included backboard, cervical spine collar, oxygen tank key, and triple-lumen set. Approximately 53% of the time, the case was deemed nonemergency by the responders and consequently called off. Only 20 of 30 patients were transported back to the ED.

Conclusion: Our experience with ED Team 7000 emergencies has been surprising. We did not anticipate the diversity of patient age and medical problems. These preliminary data suggest areas for improvement of the service, the most apparent being decreasing barriers and increasing equipment availability.

## 231 Patient Perceptions of the Specialty of Emergency Medicine

Olsen JC, Johnson BC, Brown AM, Levinson SR/University of Chicago, Chicago, IL; Lutheran General Hospital, Park Ridge, IL

Study objective: To investigate emergency department patients' perceptions and understanding of the specialty of emergency medicine.

Methods: This study used a descriptive survey among a convenience sample of adult, English-speaking ED patients at a 600-bed suburban, community, teaching hospital and a 600-bed urban tertiary care teaching hospital. The survey included 13 questions regarding patients' knowledge of the specialty of emergency medicine.

Results: Five hundred seven patients completed surveys. Sixty-two patients refused to complete surveys for an 89% return rate (507/569). The age range was 18 to 94 years (mean 45.6 years). Forty-three percent of the patients were male and 57% female. Highest level of education completed included: some high school 20.7%, high school 38.5%, college 33.1%, and postgraduate 7.7%. Responses included the following: 22% believed that emergency physicians have their own practice outside the ED; 26% of patients with primary care physicians expected to be seen by their primary care physician in the ED; 19% thought emergency physicians care for patients on the floor after admission; 26% thought that emergency physicians perform surgery (eg, appendectomy, gallbladder operations); 62% perceived emergency medicine to be a specialty; 15% have heard of the American College of Emergency Physicians; 71% thought that emergency physicians are board-certified, and 15% thought paramedics were emergency physicians. Patients estimated the annual mean salary to be approximately \$100,000, and 61% believe that emergency physicians were hospital employees. Many of the patients were unsure of the answers to these questions.

Conclusion: An effort to improve ED patient education about the specialty of emergency medicine is needed.

## 232 Why This Emergency Department?

Rucker DW, Edlow JA, Brennan TA, Burstein HR/Beth Israel Deaconess Medical Center, Boston, MA

Study objectives: With increasing competition in health care, the decision of which emergency department to visit when there is a choice becomes critical to the economic health of hospitals and emergency physicians. We surveyed the reasons patients come to a specific ED in one urban area.

Methods: We asked patients or their families the "one main reason" they came to "this emergency department today." During a 1-month study period, 2,889 (84% of eligible) on-site surveys were completed at the study sites which were 5 urban, teaching hospital EDs. Adult patients who presented with 6 selected chief complaints (abdominal pain, chest pain, hand lacerations, head trauma, shortness of breath, and vaginal bleeding) were interviewed or asked to fill out a questionnaire as part of a study on risk management and patient satisfaction.

Results: Patients reported the "one main reason" they chose a specific ED to visit that day was: "my doctor practices here" 24.9%; "been there before" 18.3%; "good reputation" 15.7%; "convenient location" 15.5%; "my health plan sent me" 9.8%; "ambulance brought me here" 7.1%; and "receive free care here" 1.1%, with "other" cited by 7.6% of respondents.

Conclusion: Patient use of a specific ED is determined by measurable factors, some of which are subject to patient preference and some of which are determined by pre-existing local characteristics of primary care practice, ambulance traffic, and health plan coverage. In this setting, no one factor predominated but physician practice affiliation was the single biggest determinant of which ED a patient decided to visit.

## 233 A Comparison of Teaching Models for Focused Abdominal Sonography for Trauma

Salen P, Pancu D, Passarello B, O'Connor R, Melanson S, Heller M/St. Luke's Hospital, Christiana Care Health Services, Bethlehem, PA

Study objectives: Sonographic evaluation of hemoperitoneum in the setting of trauma is becoming the standard of care in the emergency department. Several instructional models are available for training physicians in the performance of focused abdominal sonography for trauma (FAST). The objective of this study was to use and compare 2 instructional models, the peritoneal dialysis patient (PD) and a mannequin simulator (MS).

Methods: Twenty ED residents with no prior experience in the FAST examination

received a 1-hour didactic lecture after which they practiced the performance of the FAST technique on each other. The physicians were evenly divided into PD and MS groups and given proctored instruction for 6 minutes with each model, then tested on their ability to interpret still images of FAST examinations for the presence or absence of intraperitoneal free fluid. The physicians also filled out a postcourse questionnaire regarding their satisfaction with the course and their opinions regarding the different teaching models for the FAST examination.

Results: The PD group had a mean score on the posttest of  $82\% \pm 6.6\%$ , whereas the MS group had a mean score of  $78\% \pm 7.8\%$  ( $P=.95$ ). The participants rated the importance of visualizing intraperitoneal free fluid (with either model) in learning to perform and interpret the FAST examination as a 3.5 on a Likert scale from 1 to 4. On the same scale, the participants rated the importance of practicing the FAST examination with their instructor on an individual basis as 3.7. Comparing the perceived utility of the 1 models on a 1 to 4 Likert scale, the mean scores for the MS and the PD dialysis models were 2.2 and 2.8, respectively ( $P=.21$ ).

Conclusion: Both the MS and the PD models appear similar in their ability to teach the FAST examination.

## 234 Emergency Medicine Resident Ultrasound Evaluation in Patients Suspected of Having Renal Colic

Stava M, Stone CK, Koury SI, Wynn B, Stapczynski JS/University of Kentucky College of Medicine, Lexington, KY

Study objective: The purpose of the study was to evaluate the ability of emergency medicine residents to perform and interpret bedside ultrasound evaluations in patients suspected of having renal colic after receiving an introductory 8-hour course in bedside ultrasound.

Methods: The study was conducted in a Level I trauma center emergency department that sees approximately 40,000 patients annually. Participants included 12 emergency medicine residents who attended an 8-hour introductory emergency medicine ultrasound course that included both didactic and practical training. Residents were required to log ultrasounds done in the ED with their interpretation for quality assurance. Ultrasounds were done at each resident's discretion in his or her patients suspected of having renal colic in which the resident intended to obtain a noncontrast computed tomography (CT) scan for definitive diagnosis. For suspected renal colic, residents indicated if hydronephrosis was present or absent. The resident interpretation was retrospectively compared with the official radiology report for the presence or absence of hydronephrosis.

Results: Residents performed 45 renal ultrasounds for the presence of hydronephrosis. There were 23 true-positive, 15 true-negative, 3 false-negative, and 4 false-positive examinations. For resident-interpreted ultrasound, the sensitivity was 92%, specificity 78.9%, positive predictive value of 85%, and negative predictive value of 83%.

Conclusion: Residents performed and interpreted bedside ultrasound for hydronephrosis yields a sensitivity higher than and a specificity lower than expected compared with previously published literature of radiologist interpreted ultrasounds. An 8-hour introductory ultrasound course appears to provide adequate training for the performance of bedside ultrasound for suspected renal colic.

## 235 Injury Control in Honduras: A Survey of Injury Mortality

Richman M, Shayne P, Heron S, Lowery D, Todd K/Emory University, Atlanta, GA

Study objective: To conduct a preliminary investigation of injury mortality in rural Honduras by identifying local resources for data collection, and quantifying the magnitude of the problem, in the interest of establishing a long-term program of injury control.

Methods: Mortality data were collected from a rural, regional health center database containing age, sex, and cause of death for one geographic sector in the State of Olancho, Honduras. Causes of death were classified as medical or intentional versus unintentional injury.

Results: Accurate mortality data were difficult to obtain for several reasons: (1) deaths are often recorded by untrained health care workers, (2) causes of death are not coded in a standard manner, and (3) infant mortality is underreported. We found 132 recorded noninfant deaths. A disproportionate number of these resulted from injury, especially from intentional injury, particularly among males aged 12 to 49 years. Eighty-two percent of males aged 12 to 49 years who died did so from injuries and 52% died from intentional injuries. Overall, 48% of all male deaths were injury-related. The estimated male mortality rate (age 12 to 49 years) from injuries was 4.5 times that of the United States.

Conclusion: Injury, particularly intentional injury, is an important cause of mortality in rural Honduras, and particularly among males aged 12 to 49 years. This suggests a fertile opportunity for intervention. Several weaknesses in the local infrastructure for data

collection were identified. More reliable data collection will be necessary to accurately target which specific causes of injury death are most amenable to interventions and to monitor the impact of injury control programs.

## 236 New Technique for Emergency Stabilization of Dentoalveolar Fracture

Lee CC, Matos J, Datikashvili M, Carter WA/Bellevue Hospital Center, New York University Medical Center, New York, NY

Dentoalveolar (DA) trauma is a frequent finding in the emergency department. This occurs primarily in moderate to low-speed motor vehicle crashes, specifically unrestrained back seat passengers in taxicabs who strike their faces into the divider between the front and rear compartments. Review of the literature suggests splinting techniques with composite resin and wire for acute stabilization; however, the use of orthodontic appliances is very technique- and material-sensitive making it very dangerous in inexperienced hands. Also, etched-composite and wire technique has had extensive use with varying results and has also been found to have technique-sensitive features.

**Study objective:** Use of either modified floss string or 2.0 nylon and composite resin technique to passively splint that allows for physiologic mobility of teeth and encourages periodontal ligament attachments.

**Methods:** The authors used a modified floss string and a composite resin for 5 patients and a 2.0 nylon and a composite resin for 2 patients with DA fracture for acute stabilization. The patients needed to have good occlusion after reduction and 2 stable teeth distal to both sides to perform this techniques. The patients were followed up within 2 days by an oral surgeon.

**Results:** There were no complications, and the procedure was thought to be effective for stabilization of teeth.

**Conclusion:** Although the treatment of DA fracture accepted by most oral surgeons is to use the composite resin and orthodontic wire for stabilization, the authors have found this technique simple, cost-effective, well accepted by patients, and effective at stabilizing tooth/teeth positions when the DA fracture is a toothborne fracture. With close follow-up with an oral surgeon, this simple procedure can be done in the emergency department for acute stabilization. A follow-up study with a larger group needs to be done to validate these results.

## 237 Adolescents Need Adequate Health Risk Assessment in the Emergency Department

Mahadeo R, Richardson L, Carrera M, Wilets I, Keshavarz R, Low C/Mount Sinai Medical Center, New York, NY

**Study objectives:** (1) To describe the health risk behaviors and health care resource utilization of adolescents who present to the emergency department, and (2) to assess the adequacy of physician documentation of psychosocial history for adolescents presenting to the ED.

**Methods:** A retrospective chart review of all patients presenting during a 1-month period to an urban ED with an annual volume of 80,000 visits was done. A standardized precoded data collection form was used to extract data from the ED chart of all individuals aged 13 through 19 years. The data form included patient demographics, psychosocial history, and laboratory tests. The data were entered into the SPSS 8.0 computer program and descriptive statistics were generated.

**Results:** Data were analyzed on 343 patients, 13 to 19 years (15% of all ED visits); 60% were female and 40% male. Forty-eight percent of patients had Medicaid and 22% had no insurance. Forty-four percent of patients had no medical provider. Eighty-three percent of patients had no information documented about illicit drug use, alcohol consumption, cigarette usage, or sexual activity. Eighty-seven percent of patients were not asked about condom usage. The number of sexual partners was never obtained. When a sexual history was obtained (n=31), 55% of patients admitted having had a sexually transmitted disease, 60% of patients had pregnancy tests done, and 75% of patients had gonorrhea/chlamydia cultures done.

**Conclusion:** When a sexual history was obtained for these adolescent patients, there appeared to be a high frequency of risky behavior. A large proportion of adolescents used the ED as their only source of medical care. In the vast majority of adolescents, the emergency physicians' documentation of the psychosocial history is inadequate. Adolescents presenting to the ED may present the emergency physician with a unique opportunity to intervene and lower their potential risky behavior.

## 238 Effect of the 1994 Northridge Earthquake on Patient Volume, Injury, and Illness at a Level I Trauma Center Near the Epicenter 24 Hours After the Event

Silka PA, Kim S, Kim JY/Cedars-Sinai Medical Center, Los Angeles, CA

**Study objectives:** To document the census, injuries, and illnesses presenting to the emergency department after the 1994 Northridge earthquake.

**Methods:** The ED registration log was reviewed for the 24-hour period from 4:31 AM on January 17 to 4:31 AM on January 18, 1994. Patients with the chief complaint of cardiac arrest, chest pain (CP), or discharge diagnosis of laceration or fracture were reviewed. Mean weekday census and range of patient complaints were calculated from the ED computerized log for the month of January in 1997 and 1998.

**Results:** Census in the ED on Mondays for the control period was 169.25 (95% confidence interval [CI]  $\pm 10.98$ ). The census for the 24 hours after the earthquake was 297. In 24 hours, 82 lacerations, 23 fractures, and 24 CP complaints were evaluated and 3 patients presented in cardiopulmonary arrest (CPA). The control had 5 lacerations (95% CI  $\pm 1.52$ ), 11 CP complaints (95% CI  $\pm 1.96$ ), and 0.25 CPA (95% CI  $\pm 0.321$ ).

**Conclusion:** Contingencies for disaster response require estimations for services that will be needed after a catastrophic event. After the 1994 Northridge earthquake, there was an increase in ED census. Significant increases of patients presenting with soft tissue and orthopedic injuries, as well as nontraumatic CP, were documented. Such data should be used to develop plans for earthquake responses of similar magnitude in urban settings.

## 239 Evaluation of Documentation Practices of Sexual Assault Nurse Examiners

Minshall L, Patel M/Kern Medical Center, Bakersfield, CA

**Study objectives:** The advent of the Sexual Assault Nurse Examiner (SANE) and standardized data collection forms have greatly relieved much of the responsibility emergency physicians have in the care of sexual assault victims. We compared the documentation practices of SANEs with the standards put forth in the medical literature.

**Methods:** Comprehensive medical documentation was defined from the obstetrician/gynecologist, emergency medicine, and other relevant medical literature. Elements listed in the Table reflect comprehensive documentation. We retrospectively reviewed charts of sexual assault victims managed by SANEs who presented to a county teaching hospital between January 1996 and November 1998. For all sexual assault victims, a standard recording tool is used for medicolegal documentation (OCJP 923). Inclusion criteria included age older than 16 years, chart availability, victim of sexual assault, evidence kit completed, and OCJP 923 standard documentation form completed.

**Results:** There were 162 cases of sexual assault over the time period; 127 (78%) charts were available for review, 79 (49%) of which met inclusion criteria. Elements reviewed are listed in the Table.

**Conclusion:** SANEs demonstrated diligence in the completion of the standardized medicolegal form (OCJP 923). However, key aspects of the history and physical examination, which are essential for comprehensive medical documentation, are often omitted or undocumented.

### Table, abstract 239.

#### Evaluation of documentation practices of SANEs

Elements	%	95% CI
<b>History</b>		
<i>General medical history</i>	43.0	31.9-54.6
<i>Allergies</i>	100	99.5-100
<i>Current medication</i>	31.6	21.7-43.2
Obstetrics/gynecology history	100	99.5-100
History of assault	100	99.5-100
Postassault actions	100	99.5-100
<b>Physical examination</b>		
General physical condition	100	99.5-100
Wood's lamp	44.3	32.8-55.5
<i>Examination of oral cavity</i>	16.5	9.2-26.8
<i>Examination of external genitalia</i>	98.7	93.1-100
<i>Examination of cervix/vagina</i>	90.9	81.9-96.2
<i>Bimanual examination</i>	5.2	1.4-13.0
Examination of anus/rectum	94.9	87.3-98.6
<b>Laboratory tests and disposition</b>		
<i>STD cultures</i>	92.4	84.0-97.1
<i>Pregnancy test</i>	87.2	77.2-93.5
<i>Pregnancy prophylaxis</i>	59.7	49.7-71.9
<i>STD Prophylaxis</i>	94.9	87.3-98.6
<i>Follow-up/referral</i>	100	99.5-100

**STD,** Sexually transmitted disease.

Elements not on standardized form are listed in italics.

## 240 Should Parents Be Present? Physician Perception of Parental Presence During Emergency Department Procedures

Beckman A, Moore G, Knoop K/Indiana University School of Medicine, Indianapolis, IN; Portsmouth Naval Hospital, Portsmouth, VA

**Study objective:** Several previous studies have demonstrated parental desire to be present when invasive procedures are performed on their children in the emergency department. No large study, however, has addressed physician beliefs and preferences regarding parental presence during procedures. This was our purpose.

**Methods:** Anonymous written surveys, consisting of 6 scenarios of varying procedural invasiveness were used. The study was conducted at 10 EDs of training institutions that included community, academic, and military sites. All 10 sites frequently cared for pediatric patients. Surveys were distributed to attending staff and residents providing care in their respective EDs.

**Results:** Of 437 surveys distributed, 306 were returned for an overall response rate of 70.0%. Results are summarized in the Table.

**Conclusion:** In this study, a significant majority of physicians believe parents should be present for some invasive pediatric procedures (intravenous start, laceration repair, conscious sedation). However, as the invasiveness of pediatric procedures increases, fewer physicians believe that parents should be present. Specifically, in a resuscitation scenario, a substantial majority of physicians do not believe that parents should be present. Contrary to previous parental surveys, most physicians believed that they, either unilaterally or in consultation with parents and/or nurses, should determine whether parents are present. Even physicians familiar and comfortable with pediatrics were much less willing to allow parental presence than they themselves as parents would expect.

**Table, abstract 240.**

Scenario	No. (%) Who Believed Parents Should Be Present
Peripheral intravenous start	274/300 (91.3%)
Laceration repair	280/300 (93.3%)
Lumbar puncture	197/300 (65.7%)
Conscious sedation	246/296 (83.1%)
Major resuscitation	95/298 (31.9%)
Resuscitation with likely death	105/295 (35.6%)
<b>Who should determine whether parents are present?</b>	
Physician alone should determine parental presence	131/298 (44%)
<b>Should parents be present for resuscitations?</b>	
<b>Postgraduate Experience (y)</b>	<b>% Allowing Parental Presence</b>
0-5	28.3%
6-10	30.7%
>10	43.9%

## 241 HIV Counseling, Testing, and Referral Practices for Patients With Sexually Transmitted Diseases in Emergency Departments

Cartone KJ, Fincher-Mergi M, Mischler J, Pasieka P, Lerner EB, Billittier IV AJ/State University of New York at Buffalo, Buffalo, NY

**Study objectives:** Current treatment recommendations for patients with sexually transmitted diseases (STD) who present to emergency departments include HIV testing. This study evaluated the HIV counseling, testing, and referral practices of ED health care providers for patients presenting with STDs.

**Methods:** An anonymous written survey was distributed to all 377 ED health care providers (ie, registered nurses [RNs], nurse practitioners [NPs], physician assistants [PAs], and MDs/DOs) from all 14 urban, suburban, and rural EDs in a northeastern county.

**Results:** One hundred fifty-four surveys (RN=99, NP=5, PA=7, MD/DO=39, other=3) were returned from 10 of the EDs. The average number of years in practice was 10.7 (minimum 2 years, maximum 29 years). Only 9% of respondents were certified to provide the state-mandated HIV pretest counseling (not required for MDs/DOs). Respondents reported caring for an average of 12 patients per week with suspected STDs. Fifty-five percent of respondents always or usually warn these

patients of their HIV risk, yet only 10% always or usually encouraged these patients to consent to HIV testing in their ED (RN=7%, NP=25%, PA=0%, MD/DO=16%).

Reasons for not offering HIV testing in the ED included follow-up concerns (48.7%), not certified to provide pretest counseling (43.5%), and too time-consuming (18.8%). Interestingly, 26.6% indicated HIV testing was not available in their ED despite all hospital laboratories reporting HIV testing capability. Ninety-nine percent of respondents were aware that confidential testing sites were available, but only 36% always or usually referred patients not tested in their ED elsewhere for HIV testing.

**Conclusion:** ED health care providers frequently fail to provide recommended HIV counseling, testing, and referral for patients with suspected STDs. Streamlining mandated counseling and testing procedures may facilitate compliance with this standard of care.

## 242 Prevalence of Cardiac Ischemia and Infarction in Emergency Department Patients With Chief Complaint of Chest Pain

Kohn MA, Tabas JA/San Francisco General Hospital, University of California—San Francisco, San Francisco, CA

Although the differential diagnosis of chest pain (CP) is well established, the frequencies of serious (admittable) underlying conditions in adults presenting to the emergency department with a chief complaint (CC) of CP are not known.

**Study objective:** To estimate the absolute and relative prevalence of the serious diagnoses that might cause a patient to present to the ED with CP.

**Methods:** A computer database of 343,101 complete visits to the San Francisco General Hospital ED between July 1, 1993, and November 30, 1998, was queried for visits where the CC was CP. Special effort was taken to identify variants of CP, misspellings, and typographical errors. Incomplete visits, visits related to trauma, and visits by patients  $\leq 35$  years old were excluded. Visits for CP that resulted in hospitalization were assigned to diagnostic groups according to the primary final diagnoses as coded by hospital specialists for administrative purposes.

**Results:** A total of 10,057 visits (2.9%) were by individuals  $>35$  years with a CC of CP; 3,628 (36%) of the visits for CP resulted in hospitalization. The breakdown of admissions by diagnostic group was as follows: myocardial infarction (MI) 9.9%, unstable angina (UA) 22.3%, congestive heart failure 8.5%, acute pulmonary process 11.7%; surgical abdominal process 1.6%, pulmonary embolism 0.3%, aortic dissection 0.3%, MI/UA ruled out 29.1%, other 16.4%.

**Conclusion:** Assuming the ED workup and decision to admit is highly sensitive ( $>95\%$ ) for MI and UA, the prevalence of MI/UA in ED patients with a CC of CP is about 12%. Depending on assumptions, our ED's specificity for MI/UA is 77% to 86%. These estimates are useful when structuring a CP observation protocol at an urban, public hospital ED.

## 243 Vaginal Bleeding: Documentation and Frequency of Coagulopathy

Singer AJ, Jeong C/State University of New York, Stony Brook, NY

**Study objective:** To assess the documentation of historical and physical features in patients presenting with vaginal bleeding (VB), and to evaluate the frequency of coagulopathy in these patients.

**Methods:** A retrospective chart review of patients presenting to a university emergency department in 1995 with VB was performed using standardized abstraction forms that included demographic, historical, physical, and laboratory features. The frequency of documentation of 12 historical and 6 physical findings relevant to VB was ascertained. Coagulopathy was defined as a prothrombin time [PT]  $>14$  seconds, partial thromboplastin time [PTT]  $>34$  seconds, or platelet counts  $<100,000/\text{mL}$ . A hemoglobin  $<10$  and a hematocrit  $<30$  were considered abnormal.

**Results:** Of 258 eligible patients, 242 charts (94%) were reviewed. The mean age was  $50 \pm 10$  years; 30 (12.4%) were pregnant. Fewer than 8 historical features were documented in 195 charts (80.5%), whereas 153 (63%) had 3 or fewer physical features documented. A personal or family history of abnormal clotting, and the presence or absence of petechia and ecchymosis were each documented in less than 5%. CBC counts were obtained in 222 cases (92%); 30 (13.5%) were abnormal. PT/PTTs were ordered in 75 cases (31%); 4 were abnormal (5.3%).  $\beta$ -Human chorionic gonadotropin levels were obtained in 188 cases (78%); 30 (16%) were positive. Of 5 patients with coagulopathy, 4 were taking coumadin and the fifth was 1 of 3 with a history of abnormal clotting.

**Conclusion:** Documentation of historical and physical features in women presenting with VB is poor. Coagulopathy is rare in these patients and can be identified by a thorough history. Limiting coagulation studies to patients taking



anticoagulants or with a history of abnormal clotting may result in significant cost savings.

## 244 Diagnostic Accuracy of the ECG for Acute Myocardial Infarction and Unstable Angina: Experience in a Chest Pain Unit

Bassan R, Scofano M, Mesquita E, Dohmann HF, Sanmartin C, Clare C/Pró-Cardíaco Hospital, Rio de Janeiro, Brazil

Test accuracy of the ECG for acute myocardial infarction (AMI) and unstable angina (UA) is not fully established because of variability in the studied populations and nonuniform diagnostic criteria. Chest pain units constitute the ideal scenario for this purpose because of the systematic diagnostic strategy used in all suspected patients.

Study objective: To determine the diagnostic accuracy of the initial ECG for AMI and UA in patients with chest pain in the emergency department.

Methods: From a series of 1,003 consecutive patients with chest pain seen in the ED, 668 had ECG and serial measurements of plasma creatine kinase isoenzyme MB (CK-MB) levels (baseline and at 3, 6, and 9 hours after admission). AMI (n=156) was diagnosed by typical CK-MB curve with or without ECG changes. UA (n=209) was diagnosed by prolonged (>20 minutes) chest pain classified as definite/probable angina-associated or not spontaneous, or exercise-induced ischemia and/or positive coronary arteriography. Positive ECG for AMI was defined as ST-segment elevation (mode I) or ST elevation or depression or T wave inversion (mode II). Positive ECG for UA was defined as ST depression or T inversion. The Table depicts the diagnostic accuracy of initial ECG.

Conclusion: The admission ECG is very specific although quite insensitive for the diagnosis of AMI (and UA), unless one trades off for a lower specificity. The typical criteria of ST-segment elevation, beside being observed in only half of patients with AMI, may be false-positive in some 20% of them.

Table, abstract 244.

	AMI (Mode I)	AMI (Mode II)	UA
Sensitivity (%)	52	81	35
Specificity (%)	96	79	94
Positive predictive value (%)	79	54	78
Negative predictive value (%)	87	93	69

## 245 Is Routine Acetaminophen Screening Necessary for All Overdose Patients?

Paul S, Burke C, Lerner EB, Krause R, Billittier AJ/State University of New York at Buffalo, Buffalo, NY

Study objective: To determine whether routine acetaminophen screening is necessary when emergency health care providers believe intentional overdose patients who deny acetaminophen ingestion.

Methods: Data were collected by emergency health care providers and students for patients presenting to a tertiary care emergency department with a suspected non-recreational overdose over a 6-month period. Emergency health care provider status (ie, attending emergency physician, resident, physician assistant/nurse practitioner, student), patient demographics, patient admission or denial of acetaminophen ingestion, health care provider belief or disbelief of denial, and confidence in belief (1 to 5 scale) were recorded. Acetaminophen levels were obtained by laboratory analysis.

Results: A total of 120 patients who denied acetaminophen ingestion and were believed by the emergency health care provider were included. None of these patients had detectable amounts of acetaminophen in their serum (95% confidence interval [CI] 97.5% to 100%). The average age of these patients was 31 years ( $\pm 13$  years). Seventy-four percent were white, 21% were African American, and 2% were Hispanic. Fifty-six percent were female, 60% were unemployed, 22% were married, and 22% also had alcohol detected.

Conclusion: Emergency health care providers ruled out acetaminophen ingestion with 100% accuracy for all patients with suspected intentional overdose based on history alone. Routine acetaminophen screening may not be necessary for all nonrecreational overdose patients.

## 246 Can Room Air Pulse Oximetry Be Used to Screen for Clinically Significant Hypercapnia?

Witting MD, Lueck CH/University of Maryland, Baltimore, MD

Study objectives: To determine whether room air pulse oximetry can detect clinically significant hypercapnia ( $\text{PaCO}_2 > 50$  mm Hg).

Methods: The study was divided into a retrospective part and a prospective part. In the retrospective part, blood gas results from the hospital laboratory from patients measured while breathing room air (RA) were analyzed to determine a possible cutpoint for a hypercapnia screening test. The cutpoint selection was based on prospectively defined criteria. In the prospective part, RA oxygen saturation ( $\text{RA SaO}_2$ ) was measured simultaneously with arterial blood gas (ABG) collection in a convenience sample of emergency department patients. The proportion of patients with hypercapnia was compared between the group with high  $\text{RA SaO}_2$  values and those with low  $\text{RA SaO}_2$  values using Fisher's exact test with  $P < .05$  considered significant.

Results: Based on 513 retrospective ABG values, an oximetry cutpoint of 97% was chosen. In the prospective part, 224  $\text{RA SaO}_2$  and blood gas readings were obtained from 216 patients. Hypercapnia was significantly less likely with high  $\text{RA SaO}_2$  than with low  $\text{RA SaO}_2$  (0% versus 15%,  $P = .001$ ). The test of  $\text{RA SaO}_2 < 97\%$  had sensitivity of 1.0 (0.7 to 1.0, 95% confidence interval [CI]) and negative predictive value of 1.0 (0.93 to 1.0, 95% CI) in detecting hypercapnia ( $\text{PaCO}_2 > 50$  mm Hg).

Conclusion: RA oxygen saturation  $< 97\%$  effectively screens for clinically significant hypercapnia.

## 247 Have Emergency Department Patients Used or Are Willing to Use Alternative Medicine?

Singer AJ, Gulla J/State University of New York, Stony Brook, NY

Study objective: To assess knowledge, use, and receptiveness toward using alternative medicine in emergency department patients.

Methods: This was a prospective observational survey of a convenience sample of 139 ED patients. A trained research assistant administered a written questionnaire containing demographic and historical features to all patients. Patients were asked whether they had heard of, had used, or were willing to use a variety of alternative medicine modalities including therapeutic touch, Reiki, acupuncture, massage therapy, reflexology, bodywork, herbs, chiropractic, hypnosis, yoga, energy healing, biofeedback, and meditation. Patients were also queried regarding effectiveness of any prior alternative medicine treatments and whether their personal physicians were aware of these practices.

Results: There were 139 patients. Their mean age was 41 years; 50% were female, 68% were white, and 60% had at least a college education. Of all patients, 54% had tried alternative medicine, 87% of whom felt alternative medicine was effective. Of 9 patients who had used alternative medicine for their current medical problem, 5 stated that it was effective. Most patients were willing to try alternative medicine (63%) for their current problems, wanted their personal physicians to know more about alternative medicine (75%), and wanted their physicians to use alternative medicine (84%). The most frequently tried alternative methods were massage therapy (31%), chiropractic (30%), herbs (24%), meditation (19%), and acupuncture (15%). The methods patients were most willing to try were massage therapy (52%), chiropractic (43%), herbs (42%), acupuncture, (42%) and meditation (38%). Most patients who tried alternative medicine failed to notify their physicians of this treatment (70%).

Conclusion: Many ED patients have either tried or are willing to try alternative medicine for their medical problems. Of patients who had tried, alternative medicine was often felt to be effective, yet their physicians were often unaware of this therapy. Emergency physicians should specifically query patients regarding prior use of alternative medicine and explore the use of alternative medicine for their patients.

## 248 Utilization of Saline Wells in a University Center Emergency Department

Rovere RM, Bartfield JM, Raccio-Robak N, Choi DS/Albany Medical College, Albany, NY

Study objective: To determine how often saline wells (SWs) placed in the emergency department are used.

Methods: This prospective descriptive study was conducted in an urban university teaching hospital ED. The study population comprised all ED patients who had saline wells placed in the ED, between March 31 and April 30, 1999. ED staff members who started SWs were asked to complete a closed-question data sheet providing the following information: chief complaint, decision to place SW (nurse versus physician), num-

ber of attempts to start SW, use of SW, final diagnosis, and disposition. SWs that were not used for either medication or fluid administration or which were not placed preoperatively were considered "prophylactic placement/not used." All charts of enrolled patients were reviewed for diagnosis and to verify use of SW (chart review was considered correct when discrepancies existed). Analysis was limited to descriptive statistics.

Results: Data were obtained on the placement of 630 SWs (representing approximately one third of all SWs placed in the ED during the study period). Of these, 54% of the patients were female and the mean age was 42 years (range, 4 weeks to 100 years). The most common chief complaint was abdominal pain (17%), chest pain (13%), fever/infection (10%), and vaginal bleeding (4%). The decision to place an SW was made by the nurse in 184 (29%) of the cases. The median number of attempts to place an SW was 1 with an interquartile range of 1 to 1. The most common final diagnosis was fever/infection (14%), chest pain (13%), abdominal pain (12%), vomiting/diarrhea (10%), and vaginal bleeding (4%). Two hundred eighty-seven (46%) patients were admitted. SWs were used in 461 (73%) patients (medication administration 297, hydration 296, preoperatively 21). SWs were used in 461 (73%) patients.

Conclusion: SWs placed in the ED were used nearly three fourths of the time. Clinical decisionmaking regarding SW placement in the ED should be further studied.

## 249 A Pilot Study Using Low-Dose Intravenous Ketamine as an Analgesic for Acute Pain in Adults

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Study objectives: Ketamine has been widely used for sedation of pediatric patients undergoing painful procedures in the emergency department. Its use for deep sedation and analgesia in adults has been limited by its propensity to induce emergence reactions. This pilot study evaluated the efficacy of low-dose intravenous ketamine as an analgesic in adults using an experimental pain model.

Methods: This was a double-blind, block-randomized, placebo-controlled trial conducted on healthy volunteers. Using a transcutaneous peripheral nerve stimulator, participants were subjected to an escalating electrical stimulus (10 to 50 mA) delivered as a train-of-four through electrodes placed on the earlobe. After each stimulus was produced, subjects were asked to mark their perceived pain response on a standard 10-cm visual analog scale (VAS). The series of stimuli was terminated if the subject found the pain intolerable. After a series of stimuli was delivered in the control phase, subjects performed the digit span subtest of the revised Wechsler Adult Intelligence Scale (WAIS-R) examination. Participants were then randomized to receive either ketamine (0.25 mg/kg) or an equivalent volume of placebo (normal saline solution). Two minutes after the infusion of drug or placebo, the testing procedure was repeated. Blood pressure, pulse, and oxygen saturation were recorded every 3 minutes. Subjects were interviewed 48 hours after the study. Differences in VAS at each stimulus were calculated (VAS $\Delta$ ) as were differences in WAIS scores (WAIS $\Delta$ ) before and after administration of drug/placebo. Multivariate analysis of variance was used to compare the VAS $\Delta$  at each stimulus setting. WAIS $\Delta$  and hemodynamic data were analyzed using unpaired *t* tests.

Results: Seventeen subjects (ketamine 8, placebo 9) were studied. At higher stimulus levels, subjects in the ketamine group reported significantly less pain as measured by the VAS. At a stimulus of 45 mA, the mean VAS for the ketamine group was 2.5 cm compared with 0.8 cm for the placebo group (difference 1.7 cm, 95% confidence interval [CI] 0.1 to 3.3 cm, *P*=.04). At a stimulus of 50 mA, the mean VAS for the ketamine group was 2.6 cm and 0.3 cm for the placebo group (difference 2.3 cm, 95% CI 0 to 4.5 cm, *P*=.05). The mean WAIS for the ketamine group was 2.5 compared with -0.8 for the placebo group (difference 3.3, 95% CI 0.4 to 4.1, *P*=.02). Pulse rate was significantly higher in the ketamine group: 99 beats/min and 93 beats/min, at 3 and 6 minutes, respectively, compared with the placebo group: 72 beats/min and 74 beats/min, respectively (*P*>.01). Systolic blood pressure was also significantly higher for these time points in the ketamine group: 150 mm Hg ketamine versus 125 placebo (*P*=.04 for 3 minutes, *P*=.02 for 6 minutes). No significant alterations in diastolic blood pressure or oxygen saturation were noted, and no significant changes in vital signs were noted after 6 minutes. The following other effects were reported by subjects after receiving ketamine: nausea 25% (*P*=.47), sleepiness 63% (*P*=.03), vertigo/dizziness 38% (*P*=.20), auditory alterations 38% (*P*=.20). No subjects reported any adverse effects beyond the immediate study period.

Conclusion: This pilot study on the use of low-dose ketamine in adults suggests that it provides significant pain relief as measured in this model. A number of minor side effects were noted, but none appear to have effects beyond the immediate period

of administration. Alterations in the method of administration may obviate some of these effects without altering ketamine's effectiveness as an analgesic.

## 250 Concordance Between Prehospital Notification by EMS and Actual Patient Presentation With Relation to the Allocation of Hospital Resources

Carlson TE, Oster N, Shashaty J/Mount Sinai School of Medicine, Elmhurst Hospital Center, New York, NY

Study objectives: To evaluate concordance between emergency medical services (EMS) notification reports and patient presentation, and identify any site or patient factors contributing to imprecise information relayed.

Methods: A prospective analysis of EMS notifications was conducted from October 1, 1998, through December 31, 1999, in a busy metropolitan Level I trauma center. A logbook for recording history, vital signs, basic life support (BLS)/advanced life support (ALS), was located near our "red phone," where all advanced EMS calls are accepted. The triage nurse recorded the EMS notifications on the logbook templates and delivered the information to the provider receiving the patient. The providers were instructed to determine concordance, based not on correct diagnoses but on whether the notification (1) was consistent with patient presentation (ie, stability), (2) placed an unexpected burden on ED resources and, (3) contributed positively to the patient treatment plan and outcome. The project staff evaluated the log book information, EMS run sheet, and the patient ED chart to track concordance. Subject selection was limited only to "red phone" notifications regardless of disease or injury.

Results: A total of 183 EMS notifications were reviewed with a total 84% of recordings accurate with patient presentation. Although the majority of notifications were consistent, there was a noticeable lack of concordance of EMS notifications involving multiple casualties. Of the 5 incidents involving multiple casualties (3 or more patients on scene), only 7 of 24 patients presenting (29%) had concordance with EMS notification. Single patients with trauma (motor vehicle accidents, stab wounds, gunshot wounds), as well as medical conditions (cardiovascular accident, myocardial infarction, acute pulmonary edema), were consistently accurate with concordance rates ranging in the 90th percentile.

Conclusion: Precise advanced notification by EMS remains an essential component to proper allocation of hospital resources, patient care and continuous quality improvement. Overall, EMS notifications during this study were favorably concordant, with the exception of those involving multiple casualties at the scene. In April 1999, a follow-up study was initiated to further evaluate the notification protocol and critically examine the factors that lead to accurate or inaccurate notifications.

## 251 Prehospital Use of a Sternal Intraosseous Infusion Device

Horwood BT, Adams J, Tiffany BR, Pollack CV, Adams B, Scalzi R, Sucher M/Maricopa Medical Center, Phoenix, AZ

Study objective: Reliable, high-flow vascular access is arguably the single most valuable tool in the resuscitation of the acutely ill patient, but achieving that access quickly in moribund patients can be difficult. Tibial intraosseous infusion (IOI) is a widely accepted route of access in the pediatric population, but is not feasible in adults because of the thickness of the tibial cortex. The adult sternum is an appropriate site for IOI access with its relatively thin cortex and highly vascular marrow space. The Food and Drug Administration has recently approved the first sternal IOI device in the United States, the FAST-1 (Pyng Medical Corp, Vancouver, BC, Canada). We report on our initial prehospital experience with this device.

Methods: Paramedics in a limited geographic area and the emergency department personnel at the 2 hospitals potentially receiving study patients were trained by the investigators in the insertion and removal of the device. Patients were eligible for the study if they were in nontraumatic cardiac arrest and the initial attempt at peripheral intravenous access had failed. A single FAST-1 insertion attempt was made. If successful, the IOI line was used as the primary line for drugs and fluids, with further attempts at peripheral access at the paramedics discretion. After arrival at the receiving hospital, the paramedic was asked to record basic information about the patient and the insertion attempt, drugs infused via the FAST-1 device, and approximate flow rates. A successful attempt was defined as infusion of fluid through the device without evidence of infiltration. The study was approved by the institutional review boards of the 2 base station hospitals and the Arizona Department of Health Services.

Results: Between December 1, 1998, and May 12, 1999, there were 37 FAST-1

insertion attempts by paramedics, of which 30 (81.1%) were successful. Mean insertion time for successful attempts was  $64.36 \pm 2.1$  seconds, and the mean recorded gravity flow rate was  $23.0 \pm 9.8$  mL/min. One infusion achieved a rate of 100 mL/h with a pressure bag. Common resuscitation drugs, including epinephrine, atropine, lidocaine, bretylium, and 25% dextrose solution were successfully infused. Complications seen in successfully inserted devices included minor leakage of fluid at site (5), kinking of the infusion tubing (2), difficulty with device removal (3), and poor adhesion of the target/stabilization patch (5). Information on failed attempts is included in the Table.

Conclusion: Vascular access was achieved in 81.1% of patients with adequate flow rates to serve as a primary line for drug and fluid infusion in cardiac arrest. The FAST-1 device may be a useful alternative means of achieving rapid intravenous access when difficulty is encountered in obtaining timely peripheral access in the prehospital setting.

#### Table, abstract 251.

##### Unsuccessful insertion attempts

Patient	Comments
6	440 lb; device deployed into presternal soft tissue
8	220 lb; device did not deploy, infusion tubing in presternal soft tissue (probable operator error)
12	200 lb; insertion attempted at "bad angle" deployed into presternal soft tissue (operator error)
21	100 lb; device did not deploy, "poor placement of patch," "never hit bone"
23	110 lb; device did not deploy
27	"Normal body fat"; device deployed but unable to infuse with syringe pressure; no infiltration
32	120 lb; needles bent during insertion, noted "1/4-in stepoff in sternum" under insertion site.

## 252 Automated External Defibrillators Can Appropriately Recognize Ventricular Fibrillation in High Electromagnetic Fields

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Study objectives: Automated external defibrillators (AEDs) are increasingly available in industrial settings, but many industries have high electromagnetic fields (EMF), which can interfere with the function of electronic devices. This study evaluates the performance of several AEDs when exposed to high EMF.

Methods: Three commercially available AEDs were evaluated in the setting of a public utility coal-fired electrical generation plant. Each AED was placed in 3 areas of high EMF ranging from 310 to 1,600 mG. A signal generator, used to simulate various cardiac rhythms, was connected to the AEDs. Rhythms simulated were ventricular fibrillation, asystole, and normal sinus rhythm. Each of the AED's interpretations of various rhythms were evaluated in the different EMF settings.

Results: Rhythms of ventricular fibrillation, asystole, and normal sinus rhythm were correctly recognized by each AED in each of the 3 areas of high EMF. Each AED appropriately recommended defibrillation when presented with ventricular fibrillation. No misinterpretations or inappropriate defibrillations were observed.

Conclusion: EMF generated by an electrical power plant did not interfere with 3 commercial AEDs' abilities to correctly interpret simulated rhythms and recommend appropriate defibrillation.

## 253 Patterns in Complaints Filed by the Public Against Paramedics in an Urban Emergency Medical Services (EMS) System

Pi RD, Pons PT, Markovchick V/Denver Health Medical Center, Denver, CO

Study objective: The purpose of this study is threefold: (1) to identify the source of complaints, (2) to analyze the type of complaint, and (3) to quantify the complaints by season and year.

Methods: A retrospective review of complaints on file at the Denver Health Paramedic Division for a 6-year period ending December 1998. Originators of complaints fell into 8 different groups, and the complaints were categorized as 12 major types. All reviews were done by the principal author.

Results: The Denver Health Paramedic Division's annual field responses numbered about 50,000 (range 48, 771 to 53,733). The mean number of complaints per year was 48 with a range from 24 to 78. There was no consistent pattern in total com-

plaints or annual complaint rate from year to year. Although the most complaints were registered in the summer in 3 of the 6 years studied, summer was also consistently the time of highest system demand as well. However, the warmer half of the year, spring/summer, accounted for a 67% higher rate of complaints (10/10,000 responses versus 6/10,000 responses). Patients generated 52% of the complaints. The next largest 2 groups, respectively, were medical personnel (19%) and family members (12%). The top 4 categories of complaints accounted for three quarters of the complaints: rude/inappropriate behavior (24%), history/physical/technical skills (20%), disagreement with transport/destination (18%), and loss of belongings (13%).

Conclusion: No prior study has evaluated the origins or scope of complaints made against emergency medical services personnel. This study documents an average complaint rate of 9 per 10,000 responses (standard deviation  $\pm 3$  per 10,000) during the study period. The identification of high dissatisfaction areas will allow targeting of paramedic training programs for improvement.

## 254 Prehospital Evaluation of Patients With Suspected Stroke

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Study objective: To determine the extent of paramedic field evaluation of suspected acute stroke patients before implementation of a training program on stroke recognition and treatment.

Methods: This retrospective study examined a consecutive series of all patients presumptively identified with an acute stroke by Los Angeles City Fire Department paramedics from January 1, 1996, through December 31, 1996. Each emergency medical services report was evaluated to determine the patients' most common presenting signs and past medical history (PMH), and whether key elements were documented to determine patient eligibility for thrombolytic treatment as per new national guidelines.

Results: There were 779 patients who met the study's inclusion criteria, with a mean age of 72 years ( $\pm 13.9$  years), of whom 430 (55%) were female. The most common PMH conditions included hypertension (49%), heart disease (30%), prior stroke (27%), and diabetes (13%). Eighty-eight (115) patients were found to be in atrial fibrillation. The most common findings on physical examination were unilateral weakness (66%), altered level of consciousness (33%), facial droop (26%), and dysarthria (19%). Paramedics failed to document the time of onset or duration of symptoms in 621 (80%) cases; 273 (35%) had no blood glucose measurement; 117 (15%) had no recorded Glasgow Coma Scale score, and 35 (4.5%) had no documented ECG.

Conclusion: Although paramedics identified common presenting signs of acute stroke, additional training should stress documentation of the time of onset of symptoms to determine patients' eligibility for thrombolytic therapy and mandatory blood glucose measurement to rule out reversible causes.

## 255 The Impact of "Mosh Pits" on Medical Incidents at Mass Gatherings

Jancher T, Samadder R, Milzman D/Georgetown University School of Medicine, Providence Hospital, Washington, DC

Mass gatherings, such as concerts, where audience members participate in "moshing," a violent form of dancing involving pushing, shoving, kicking, crowd surfing, and stage diving, has the potential to dramatically increase injuries requiring evaluation and transport by medical personnel covering these events compared with non-mosh pit events.

Study objective: To compare the rate and type of injuries, and rate of patient transport at mass events with mosh pits with mass events without mosh pits.

Methods: A prospective study collected data from 4 events with mosh pits and compared the data with 6 non-mosh pit events held at the same outdoor stadium. Student *t* test and  $\chi^2$  analysis were used with a value of  $P < .05$ .

Results: There was an average attendance of 63,030 persons at the mosh pit events with a total attendance of 252,120 over the 4 event days. There was an average attendance of 39,244 persons at the non-mosh pit events with a total attendance of 235,469 persons over the 6 event days. There were a total of 1,542 medical incidents at the mosh pit events with 30% (466) of these incidents being directly related to moshing. The average age was 21.0 years with 60% being female. A total of 39 persons needed hospital transport for further care; 29 (74%) of these had injuries directly related to mosh pit activity. At the non-mosh pit events, there were a total of 180 medical incidents. The average age was 29.3 years with 56% being female. A total of 5 persons needed transport at the non-mosh pit events. There was a higher rate of medical incidents at the mosh pit events with a total incident rate at these events of 61.1

per 10,000 versus 7.6 per 10,000 at the non-mosh pit events ( $P<.05$ ). At the mosh pit events, there was a rate of 18.5 of 10,000 for injuries directly related to moshing activity. There was a higher rate of patients needing hospital transport at the mosh pit events with a total transport rate at these events of 1.5 of 10,000 versus 0.2 per 10,000 for the non-mosh pit events ( $P<.05$ ). The transport rate for patients injured in the mosh pit was 1.2 per 10,000. Of the injuries at the mosh pit events, 37% were lacerations and musculoskeletal mechanisms versus 28.3% at the non-mosh pit events ( $P<.05$ ). Average temperature at the mosh pit events was 77.2° F, whereas the average temperature at non-mosh pit events was 81.2°F.

Conclusion: Mass gatherings where mosh pits are present tend to have an increase in medical incidents and injuries. There is also an increase in the number of patients requiring hospital transport. The increase in these injuries tend to be lacerations and musculoskeletal in nature. These increases can possibly overburden medical personnel responsible for these events if not properly prepared. Future event planning should take precautionary or even restrictive measures to prepare for mosh pit activity.

256 Spinal Immobilization After Motor Vehicle Collision in Patients Who Are Ambulatory at the Scene: Is It Justified?

Levy BM, Shubert RA, Phelan PK, Bennett MA, Lauder CT, Mullen DA, Megargel RE, O'Connor RE/Christiana Care Health System, Newark, DE

Study objective: Emergency medical services (EMS) protocols often require spinal immobilization for patients involved in motor vehicle collisions (MVCs). Protocols for the clinical clearance of cervical spine injury in the field have been tested, with varying success. We conducted this study to determine whether patients who are noted to be ambulatory at the scene has clinical bearing on cervical spine clearance.

Methods: A prospective cohort of patients treated by EMS personnel with spinal immobilization, who were noted to be ambulatory at the scene, were enrolled. All patients were transported to a Level I trauma center. Outcome measurements included age, use of passenger restraints, radiologic studies, diagnosis, and disposition. Statistical analysis included  $\chi^2$  and 95% confidence intervals.

Results: A total of 171 patients met enrollment criteria, with 112 (65%±7%) using restraints. Mean age was 29 years. Restraint use was higher in those younger than 18 years than those older than 18 years, although this difference was not significant. Radiologic studies were as follows: cervical spine 64 (37%), lumbosacral spine 15 (9%), extremities 37 (22%), and head computed tomography 7 (4%). Differences in use of radiology with regards to passenger restraints were not significantly different. Two patients were admitted to the hospital, 1 for an orthopedic injury, and the other for closed head injury. A total of 109 patients were discharged from the emergency department with a diagnosis of cervical or lumbosacral strain; the remaining 60 had another diagnosis. None of the patients had spinal fracture or significant ligamentous injuries (0%, 1.7%).

Conclusion: Patients who ambulate at the scene after MVCs are at low risk for spinal injury and may not require spinal immobilization. Ambulatory patients may represent an ideal subgroup to apply clinical clearance criteria in the field because of their low risk.

257 Reliability of Prehospital Triage Criteria for Pregnant Blunt Trauma Patients

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Study objectives: (1) To test the reliability of current emergency medical services (EMS) trauma protocols for appropriate triage of pregnant blunt trauma patients, and (2) to identify prehospital signs and symptoms that may predict the need for a trauma center in these patients.

Methods: We reviewed the medical records of all pregnant blunt trauma patients admitted to an urban Level I trauma center over a 5-year period. Before data analysis, the need for a trauma center was defined as follows: ICU admission, operative therapy within initial 24 hours, intra-abdominal injury (IAI), intracranial hemorrhage (ICH), spinal injury, pneumothorax, uterine rupture, abruptio placentae, pelvic fracture, or patient death. The abstractor was blinded to these criteria during chart review. The sensitivity and specificity of this county's present prehospital triage criteria were determined. Categorical data were analyzed using Fisher's exact test. Variables associated with a need for a trauma center in the univariable analysis ( $P\leq.05$ ) were entered into a backward elimination regression analysis.

Results: Two hundred forty-four patients met study criteria. Thirty (12%) had incomplete EMS and/or hospital charts and were excluded. Thirty-nine (18%) of the patients met criteria for requiring a trauma center. The sensitivity and specificity of the

present EMS triage criteria were 41% (95% confidence interval [CI] 26% to 58%) and 83% (95% CI 76% to 88%), respectively. Injuries in the 23 patients not identified by the present prehospital criteria included IAI (5), ICH (3), pneumothorax (1), abruptio placentae (9), and pelvic fracture (4). Prehospital findings associated with the need for a trauma in the univariate analysis included third trimester of pregnancy (64% versus 46%), heart rate >110 beats/min (44% versus 18%), prehospital complaint chest pain (31% versus 16%), and history of loss of consciousness (36% versus 11%). In the regression analysis, third trimester of pregnancy ( $P=.008$ ), heart rate >110 beats/min ( $P=.009$ ), prehospital complaint of chest pain ( $P=.04$ ), and history of loss of consciousness ( $P<.001$ ) were all independently associated with the need for a trauma center.

Conclusion: Most pregnant trauma patients admitted at this trauma center did not require a trauma center. Present prehospital triage criteria in our county, however, undertriage more than half of the pregnant trauma patients with injuries best served at a trauma center. Prehospital findings in the pregnant trauma patient independently associated with an increased need for a trauma center include a heart rate >110 beats/min, complaints of chest pain, history of loss of consciousness, and third trimester of pregnancy.

258 Evaluation of EMD Priority Coding and Disposition of Patients

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Study objectives: The triage of nonurgent patients who call 911 to alternative care sites, using Emergency Medical Dispatch (EMD)-coded calls, alpha (nonurgent) is often a popular idea. However, no study has demonstrated an accurate method of achieving this goal. The purpose of this study was to evaluate the accuracy of EMD compared with emergency medical services (EMS) disposition of 911 calls.

Methods: This is a retrospective comparison of EMD code versus emergency medical technician (EMT) disposition requests for EMS in an urban environment of 225,000 population from January 1 to February 6, 1998. Dispositions for these calls were divided into 9 categories dependent on seriousness of complaint (advanced life support [ALS] versus basic life support [BLS] versus nontransport) and mode of transport to hospital (lights and sirens versus regular). Cross-tabulation technique was used to compare EMD code (A, B, C, D, or other) with disposition. Overtriage was determined as an EMD code for C or D that had a disposition as BLS (graded according to increase of level of seriousness), and undertriage as A or B that had a disposition as ALS. Green versus red refers to whether the patient was transported using lights and sirens.

Results: A total of 3,784 calls were included in the study. The Table charts the destination of the calls. Detailed analysis of alpha calls requiring ALS (7.28%) was undertaken to determine those specific EMD codes as problem areas. Seventy-nine of 686 "A" calls were upgraded to ALS, with 3 of these identified as life-threatening (ALS red). Five EMD codes had a ≥33% instance of being upgraded to ALS. If all of these alpha calls were upgraded to a "B"-level call, the "A" response would have a 96% accuracy for not requiring ALS and a 99.8% accuracy that the person is not having a life-threatening emergency.

Conclusion: EMD alpha coding with modification may be an accurate method of determining calls not requiring ALS. Further study is needed to determine whether these calls will be appropriate for alternative destination.

Table, abstract 258.

Disposition	Coding					Sum
	Alpha	Bravo	Charlie	Delta	Other	
1 ALS Red	3	9	13	51	6	82
2 ALS Green	76	51	230	234	14	604
3 BLS Red	0	0	0	1	0	1
4 BLS Green	790	405	529	343	83	2,151
5 Nontransport	153	111	94	90	17	465
6 Canceled	35	121	55	40	42	293
7 DOA	1	6	0	11	0	18
9 No patient	19	63	15	34	19	150
10 Other	8	3	3	3	3	20
Total	1,086	770	939	807	184	3,784



## 259 An Effective Salvage Technique for Severed Endotracheal Cuff Pilot Tubes and Incompetent Pilot Balloon Valves

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**Study objectives:** Leaking endotracheal tube (ETT) cuffs are not uncommon and can be an obstacle to effective ventilation, as well as increase patient risk of aspiration and migration of the ETT out of the trachea. The leak can be caused by damage to the cuff itself, to the pilot tube leading to it, or to the valve that maintains the closed system. Repair of the leak would be preferable to reintubation when patients have difficult airways, are hemodynamically unstable, or require high levels of positive end-expiratory pressure to maintain oxygenation. A review of the literature reveals 3 technical notes describing a similar procedure. When a pilot tube or valve is damaged or severed, a 22-gauge intravenous catheter is inserted into the free end of the pilot tube as far as it can be advanced. This is accomplished by withdrawal of the needle to just inside the catheter to avoid puncture of the pilot tube. Once in place, the needle is withdrawn completely and the catheter is insufflated with 10 mL of air. We sought to evaluate this technique to determine whether adequate cuff pressure could be maintained for an extended period. This would be immediately applicable to the emergency practitioner who has such a situation and will be away from his or her patient for an extended period of time (as during transportation to another facility).

**Methods:** After testing for cuff integrity, ten 9.0 endotracheal tubes (Portex, Keene, NH) had their pilot tube valves severed. A 22-gauge intravenous catheter was inserted into the severed end as far as it could be advanced and the needle withdrawn. A 3-way connector was placed on the hub, and a 10-mL syringe was used to then insufflate the cuff to a pressure of 60 mm Hg (with a pressure of 25 mm Hg being standard for patient care). Cuff pressure was then reassessed at 10, 30, and 60 minutes, and again at 2, 3, and 6 hours.

**Results:** Using the protocol, all endotracheal cuffs maintained their pressure of 60 mm Hg for the first 3 assessments. The mean pressure at 2 hours was 58 mm Hg, at 3 hours was 54 mm Hg, and at 6 hours was 50 mm Hg. Anecdotally, one of the cuffs was left in place for 3 days and continued to maintain a pressure of 35 mm Hg through that time.

**Conclusion:** We found that when an endotracheal cuff pilot tube was severed, adequate cuff pressure could be maintained easily through 6 hours using the salvage protocol. At pressures much greater than usual, all cuffs maintained at least 80% of original insufflation pressure through 6 hours. We find that this is an effective method for ETT salvage when a pilot tube or valve has been damaged or severed.

## 260 Painful Discrimination: The Differential Treatment of Fractured and Nonfractured Ankle and Foot Injuries

Wiater JG, Kozlowski MJ, Jackson RE, Swor RA, Pascual RG/William Beaumont Hospital, Royal Oak, MI

**Study objectives:** Our objective was to compare the reported pain of patients with an isolated lower extremity injury with and without fracture, and to study whether the presence of fracture is associated with providing analgesia.

**Methods:** This was a prospective observational trial at our 90,000-visit suburban teaching hospital emergency department. All adult patients who presented with an isolated lower extremity injury and had a radiograph of the ankle or foot over a 9-week period were included. Patients without trauma, those with multiple trauma, patients admitted to hospital, and those seen by a study investigator were excluded. Practitioners were blinded to study objectives. Patients were contacted by phone using a standardized questionnaire. We inquired about their perceived level of pain on arrival using a 0 to 10 verbal analog scale, about the analgesia they received both in the ED and in prescription form on discharge.  $\chi^2$  and Mann-Whitney *U* tests were used for analysis.

**Results:** Of 516 consecutive patients who had radiographs of the ankle or foot, 111 met the exclusion criteria and 3 had incomplete data. We contacted 382 (95%) of the remaining 403 patients. The mean time to call was 3 days. Fractures were present in 128 (34%) of the patients. There was no significant difference in mean initial pain score for patients with and without fractures (6.6 $\pm$ 2.2 versus 6.8 $\pm$ 2.2). One quarter of each group stated they took a pain medication before arriving to the ED. The patients receiving analgesics in the ED had a higher initial pain score ( $P<.001$ ) and 91% reported some pain relief. Patients with a fracture were more likely to receive medication in the ED (23% versus 15%,  $P=.047$ ). There was no difference in pain score at discharge by presence of fracture ( $P=.5$ ), or for those given or not given any medication (6.6 versus 6.0,  $P=.06$ ). Prescriptions were given to 30% of patients, 36% with fracture and 27% without fracture ( $P=.09$ ).

**Conclusion:** Most patients who undergo foot or ankle radiographs following traumatic

injury receive no pain medication in the ED. Patients report equivalent levels of pain whether or not they have fracture. Patients with a fracture are more likely to receive analgesia. Perception of patients; pain may be influenced by radiographic findings.

## 261 One-Month Follow-up and Natural History of Patients Presenting to an Emergency Department With Symptoms Suggestive of Acute Cardiac Ischemia

Nagurney JT, Brown DF, Chae C, Chang YC, Cranmer H, Chung W, Dan L, Fisher J, Grossman S, Jang I, Lewandowski K, O'Connor M/Massachusetts General Hospital, Harvard Medical School, Boston, MA

**Study objective:** To characterize the 1-month follow-up and natural history of patients presenting to an emergency department with symptoms suggestive of acute cardiac ischemia (ACI).

**Methods:** This was a prospective descriptive study based on a telephone survey using a close-ended questionnaire and trained interviewers. Patients 30 years and older who presented to an urban ED with symptoms consistent with ACI and were either admitted for a "rule-out myocardial infarction [MI]" protocol or discharged home from the ED with a recommendation for an outpatient ACI evaluation were contacted 30 to 45 days after the ED visit.

**Results:** We attempted to telephone 351 study subjects, and reached 253 (72%). The median age of patients contacted was 64 years (interquartile range 53 to 75 years); 60% of patients were male. Not surprisingly, the most common reason for our inability to contact subjects ( $n=98$ , 28%) was telephone related: no answer or tape, telephone disconnected, or wrong number (60%). However, 7 subjects (7%, 95% confidence interval [CI] 2% to 12%) were currently hospitalized and an additional 4 (4%, 95% CI 0 to 8%) had expired. Of the 253 patients successfully contacted, 71 (28%, 95% CI 22% to 34%) still experienced the potential ACI symptoms that had originally brought them to the ED; furthermore, 70 patients (28%, 95% CI 22% to 34%) had not followed up with a provider since their ED visit. Of those 179 patients (71%, 95% CI 65% to 77%) who had seen a provider, 38 (21%, 95% CI 15% to 27%) had undergone a standard 12-lead ECG, and 39 (22%, 95% CI 16% to 28%) had undergone an exercise-tolerance test as part of their outpatient evaluation.

**Conclusion:** Death or hospitalization is a frequent reason for the inability to contact patients 30 to 45 days after an ED visit for symptoms consistent with ACI. Among the majority of patients who can be contacted, more than one quarter experience persistence of the symptoms that first brought them to the ED and lack of follow-up is common.

## 262 Clinical Characteristics and Outcomes of Rhabdomyolysis: A Case Review of 252 Patients

Chin RL, Sporer KA, Rimpel NR/University of California—San Francisco, San Francisco General Hospital, San Francisco, CA

**Study objective:** To determine the clinical characteristics and outcome of patients with rhabdomyolysis in a large study.

**Methods:** We conducted a retrospective chart review of all patients ( $n=252$ ) who were admitted to San Francisco General Hospital from July 1993 to December 1997 with an *International Classification of Diseases—ninth revision*, diagnosis of rhabdomyolysis. We recorded demographics, laboratory data, etiology, treatment, and complications, and studied differences between subgroups using  $\chi^2$  and *t* tests. For each patient, we analyzed the trend in creatine kinase (CK) levels using an exponential model.

**Results:** Most patients (218) were male, with a mean age of 42 years. Common etiologies included immobilization (92), cocaine (53), methamphetamine (33), heroin (29), seizure (26), and trauma (22). Patients were treated by hydration (236), alkalization (172), and dialysis (12). Patients requiring dialysis had significantly higher potassium and blood urea nitrogen levels and lower sodium, chloride, and calcium levels ( $P<.001$ ). Complications occurred in one half of cases (126), including acute renal failure (94), compartment syndrome (16), and death (5). Complications occurred more often in cases involving cocaine (rate 66%,  $P=.013$ ). Patients with complications had significantly higher potassium, blood urea nitrogen, glucose, phosphate, and WBC levels, and lower chloride, bicarbonate, and calcium levels. On average, patients had 5.6 CK measurements, with a mean maximum value of 34,675. The mean half-life of CK was 1.64 days.

**Conclusion:** The most common etiologies of rhabdomyolysis were drug-related. Most patients had good outcomes with hydration and alkalization.

## 263 How Good Are Emergency Physicians in Predicting the Results of Shoulder X-Rays?

Silver BE, Sexton JD, McGinn MA, Heller MB/St. Luke's Hospital, Bethlehem, PA

**Study objective:** To determine how well emergency physicians predict the results of shoulder radiographs.

**Methods:** This prospective trial at a teaching community hospital ED with board-certified attending emergency physicians enrolled 105 patients presenting with a chief complaint of shoulder pain. In these patients, attending emergency physicians were asked to predict the likelihood of an abnormal finding on radiographs, defined as the presence of a fracture, dislocation, or acromioclavicular separation, using a scale of "high" (>50%), "moderate" (5% to 50%) and "low" (<5%) suspicion. Estimates were recorded after ordering but before viewing the radiograph.

**Results:** Of the 105 cases, suspicion was rated as high in 20 cases (19%), whereas in 24 cases (23%) and 61 cases (58%) suspicion was moderate and low, respectively. When suspicion for an abnormal radiograph was high, 90% were abnormal; when moderate, 17%; and when low, 0%. Overall, when all radiographs were reviewed, 21% (22/105) were abnormal with 77% fractures, 14% dislocations, and 9% AC separations.

**Conclusion:** Shoulder radiographs had a relatively low rate of positivity as used in our community hospital ED. A low clinical suspicion for an abnormality after deciding to order radiography was 100% predictive of a normal finding, although no explicit criteria were used to determine the degree of suspicion. A high suspicion, although much less common, was quite accurate in predicting abnormality as well.

## 264 Circadian Variation in the Presentation of Sickle Cell Pain Crisis

del Mundo A, Zautcke J, Morris R, Metzger S, Stredler K/University of Illinois, Chicago, IL

**Study objectives:** This study tested the hypothesis that there is a rhythmicity to the presentation of sickle cell pain crises to the emergency department.

**Methods:** This was a retrospective study of sickle cell crisis presentations to an emergency department from January 1, 1993, to December 31, 1994, in the ED of an urban academic medical center. This study looked at all patients who presented to the ED with the diagnosis of sickle cell pain crisis over a 24-month period.

Of the patients who presented to the ED during the study, 1,306 (4.2%) were for pain crisis related to sickle cell anemia. The data collected for each patient consisted of date and time of presentation, sex, and age. Data were entered into a Quattro Pro spreadsheet format and then entered into SPSS for statistical analysis. Standard chronometric analysis with particular use of the PharmFit curve fitting procedure was used.

**Results:** Our data revealed a circadian pattern of presentation with a peak presentation at 5:19 PM  $\pm$  36.2 minutes ( $P < .05$ ). When looking at gender, females exhibited a peak presentation at 3:40 PM ( $P < .05$ ), whereas males exhibited a 12-hour rhythm with peaks at 10:28 AM and 10:28 PM ( $P < .05$ ).

**Conclusion:** The results of this study show the existence of significant rhythmicity of patients presenting to the ED with a sickle cell pain crisis. Surprisingly, the male and female rhythms were different. Although the causes of these findings are most likely multifactorial, an understanding of the chronometric nature of sickle cell pain crisis presentations to the ED may lead to better resource utilization and improved patient care.

## 265 Emergency Care Delivery in an Overcrowded Metropolis: The Challenges and Goals for Ho Chi Minh City

Nguyen MT/Louisiana State University Medical Center, New Orleans, LA

**Study objectives:** To describe the progress of emergency medical care in Ho Chi Minh City with its unique set of challenges, its goals to improve emergency care delivery, and potential for collaboration.

**Methods:** This was an observational study of 5 city hospitals' and 1 regional hospital's emergency ward visits over a 2-week period, collection of emergency department statistics for 1997, review of the Ministry of Health 1997 proposal for developing a new emergency care center, interviews with emergency medical services (EMS) directors, review of ambulance calls, and experience with ambulance rides.

**Results:** EMS is easily accessed by dialing 115 (US equivalent of 911), but is not widely used by the public. Ambulances provide primary and emergency care at a ratio of 1 ambulance per 280,000 population. Traffic congestion, poor road conditions, and lack of bridges to cross the Saigon River further slow EMS response time. Most EDs are staffed by physicians with little advanced emergency medicine training. Specialty hospital EDs are staffed by their respective residency-trained physicians. The concept

of self-triage by the public was noted with the availability of specialty hospitals and partially accounts for an average waiting time of less than 15 minutes. The city hospitals handled approximately 150,000 injuries per year (motor vehicle accident-related >800, work-related >150, altercation-related >150, other injuries >1,600 per week).

**Conclusion:** Urbanization has changed the health care needs of Ho Chi Minh City. A written description of Vietnam's interest to develop an emergency medicine system to regionalize all trauma care and coordinate better prehospital care has been identified. Education and collaboration with a well-established emergency medicine system would be invaluable for the future of emergency medicine in Vietnam.

## 266 Recidivism Among Elderly EMS Patients Brought to an Urban Emergency Department

Weiss S, Miller P, Ernst A, Russell S/University of California—Davis Medical Center, Sacramento, CA

**Study objectives:** Previous studies of recidivism in the elderly have focused on trauma cases only. The purpose of this study was to identify emergency medical services (EMS) recidivism by elderly patients transported by EMS, to identify demographics, and to compare chief complaints.

**Methods:** A population-based, retrospective cohort study was conducted. Data for this study were obtained from computerized registration files in an urban, university-affiliated emergency department with an annual census of approximately 60,000 visits. Recidivism was defined as more than 1 visit within a 12-month period. Recidivism was classified as follows: "bounces" (within 72 hours), "short-term" (within 2 months), and "long-term" (within 12 months). Patients were included if they were 65 years of age or older and they were transported by EMS in 1998. The recidivist group included patients who had  $\geq 1$  EMS transports in the previous 12 months. The comparison group was composed of all patients with 1 EMS transport during the study period. Demographics extracted from the database were sex, chief complaint, total number of visits, and time since previous visits. A  $P$  value  $< .05$  was considered statistically significant.

**Results:** There were 340 (18%) recidivists and 1,586 (82%) nonrecidivists. Visits by recidivists accounted for 1,040 (40%) of the total EMS transports. Sixty-one percent of all EMS transports were female with no significant differences between the groups. There were significantly more transports for a chief complaint of trauma among the nonrecidivists than among the recidivists (23% versus 11%, difference 12, 95% confidence interval 9% to 15%). Among the 340 recidivists, 198 (58%) had 1 previous visit, 79 (23%) had 2 previous visits, and 63 (19%) had 3 or more visits. Of the 627 return visits by recidivists, 15 (2%) were bounces, 217 (35%) were short-term, and 395 (63%) were long term.

**Conclusion:** Recidivists accounted for 18% of EMS patients and 40% of EMS transports. There were significantly less trauma transports in the recidivist group. One half of all recidivists only return once in a 12-month period, and two thirds of these occur more than 2 months apart. It is important to understand the characteristic of elderly EMS recidivists if we want to use this opportunity for education and surveillance.

## 267 Can Patients With Renal Colic Be Safely Discharged From the Emergency Department Without an Imaging Procedure?

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**Study objectives:** To determine the necessity for diagnostic imaging (DI) in the management of acute renal colic in the emergency department.

**Methods:** A prospective cohort study was conducted at a 2-site university hospital ED from July 1997 to February 1999. Consecutive patients presenting with acute flank pain were enrolled. All patients underwent DI using unenhanced computed tomography (CT) or intravenous pyelogram (IVP) based on radiologists' preference. Imaging results were confirmed by a radiologist. Analgesics were given using a medication protocol. Patient symptom relief was recorded using a visual analog scale. Results were analyzed for resolution of patient symptoms, length of stay (LOS) in the ED, discharge diagnosis, and whether DI results influenced physician decisionmaking.

**Results:** Two hundred forty-five patients were enrolled. DI was positive for ureteral pathology in 194 patients: 136 CT and 58 IVP. DI changed physician management in 18 cases. In the admitted cases (9), management was changed for the following reasons: obstructive pyelonephritis (4), complete ureteral obstruction (3), renal infarction (1), and ruptured appendix (1). In the discharged cases (9), management was changed for the following reasons: pyelonephritis with no obstruction (2), renal colic confirmation (1), facilitation of urgent outpatient urology referral because of the severity of renal stone pathology (1), ovarian cysts (2), and further investiga-

tion for alternative diagnoses (3). DI did not change physician management in 4 patients who were admitted for persistent pain (3) and HIV medication side effects (1). All renal colic patients with no fever and pain relief were discharged. The average LOS for patients was 8.5 hours, with IVP patients (10 hours) staying longer than CT patients (7 hours).

Conclusion: Urgent DI is not necessary in most cases of renal colic. Patients that present with a history and physical examination compatible with renal colic who are afebrile and whose pain is adequately controlled can be safely discharged with close follow-up for outpatient evaluation. In these cases, LOS can be decreased by not imaging acutely. In the presence of persistent pain and fever, one must rule out complete ureteral obstruction or other diagnoses to rule out significant pathology.

## 268 The Emergency Medicine CyberSchool: Computer-Assisted Instruction on the Internet as a Useful Tool for Educating Medical Students

Baumlin KM, Besette M, Lewis C, Richardson L/Mount Sinai Medical Center, New York, NY

Study objective: Our specialty lags behind in published accounts of work in the area of computer-assisted instruction (CAI) and education over the Internet. Although many emergency medicine Internet sites exist, our group's efforts have focused on using the now accepted medium as a useful and desired educational tool. We implemented this tool to enhance the required fourth-year medical student clerkship.

Methods: The Emergency Medicine CyberSchool consists of several educational components in case-based format. The design allows students to participate in an interactive educational experience at any time. The CyberSchool covers the same materials taught in our standard case-based lecture format. We prospectively studied the impact of integrating CAI into the curriculum. We randomly assigned fourth-year medical students, by 4-week blocks, into a CAI group and a non-CAI group. When a non-CAI group was rotating through the department, the CyberSchool was unavailable on the Internet. All students completed an entry survey on their previous computer experience and an exit survey on their use and opinion of the CyberSchool. We also queried users on-line on entering the CyberSchool.

Results: Of the population of 112 students, we had completed data from 100 students. All students have access to the Internet in the school library, but only 92% acknowledged this availability. Few spend more than 1 to 2 hours per week on the Web. We discovered that 65% of students wanted CAI as an adjunct to their course curriculum, but of those students in the CAI group, only 28% actually used the educational tool. Those students who did use the site rated it useful (average 4.2/5), easy to use (4.4/5), and easy to access (4.1/5). The on-line data revealed that those students who used the CyberSchool did so at home (60%), in the library (10%), and in the emergency department (5%). Of the students who had access and chose not to use the CyberSchool, 77.8% reported not having enough time as the reason they did not use the site. The mean examination scores for the students in the CAI group were 72.8% versus 68.2% in the non-CAI group ( $P=.058$ ).

Conclusion: CAI available on the Internet is a useful tool for assisting in educating medical students in a required emergency medicine clerkship. More work needs to be done to ensure that students perceive such tools as useful and worthy of their limited time for academic study.

## 269 Emergency Department Observation Unit Occupancy Is Maximized by a Novel Hybrid Design

Ross M, Gibb K, Wilson A, Naylor S/William Beaumont Hospital, Royal Oak, MI

Study objective: Justifying staffing for an emergency department observation unit (EDOU) may be difficult because of the unit's variable occupancy. We describe an EDOU model not previously reported. It combines ED patients with scheduled non-ED outpatient postprocedure, or "short stay" (SS) patients in the same unit. We evaluated the impact of this hybrid EDOU model on unit occupancy.

Methods: This is a descriptive retrospective study of a 15-bed SS unit that became a hybrid SS-EDOU unit in 1995. ED patients were made available by displacing 2 (of 14) SS conditions, cardiac catheterization (CC) and arteriogram (ART) patients, to alternative locations. Eight beds were dedicated to ED patients and 7 beds for SS patients. Length of stay (LOS) and occupancy data were retrieved for 1997 from a hospital patient database and unit logs.

Results: In 1997, there were 2,990 ED patients and 3,138 SS patients. ED occupancy was highest (95%) from 4 AM to 10 AM when SS occupancy was lowest (<5%), from 11 PM to 8 AM. ED occupancy was lowest (<40%) from 3 PM to 10 PM, when SS occupancy was highest (100%) from 10 AM to 6 PM. Occupancy patterns were found to be

consistent; on average, the 15-bed hybrid unit maintained an occupancy of 6 patients from 9 PM to 7 AM, 12 patients from 7 AM to 5 PM, and 8 patients from 5 PM to 9 PM. SS patients experienced an increase in LOS when cared for in alternated hospital locations.

Conclusion: Combining services showed a complementary diurnal occupancy pattern. This maintained adequate occupancy to justify support staff.

## 270 Do Emergency Departments Comply With the New EMTALA Guidelines Regarding Preauthorization?

Irvin CB, Hunt C/St. John Hospital and Medical Center, Detroit, MI

The Health Care Financing Administration (HCFA) has recently issued revised Emergency Medical Treatment and Active Labor Act (EMTALA) enforcement guidelines. These newly issued guidelines clarify that it is not appropriate for a hospital to request or a health plan to require prior authorization before the Medical Screening Exam (MSE) is completed.

Study objective: To evaluate how often hospital emergency departments provide telephone information regarding preauthorization that complies with the new EMTALA guidelines.

Methods: Convenience telephone calls presenting the same mock scenario of a parent with a nontoxic ill child were made to a random selection of Michigan emergency departments. The mock parent requested information about whether the ED would be contacting their insurance company before an evaluation by a physician. Telephone calls were made to the triage areas during all hours of the day. ED administration for each ED contacted authorized presentation of mock scenarios, and answers given to the mock parent were returned to the ED administrators as a confidential quality assurance endeavor. Institutional review board approval was obtained. Statistical analysis was performed using Fisher's exact test with a null hypothesis that 95% of hospitals contacted would be in compliance with the EMTALA guidelines.

Results: Of the 45 hospitals contacted, ED administrators declined to allow the presentation of a mock scenario at 5 hospitals. Of the remaining 40, 23 admitted to calling insurance companies for preauthorization before completion of the medical evaluation ( $P<.001$ ). One ED refused to commit to whether a preauthorization call would be placed, and 16 clearly stated that the insurance company would not be called before a complete evaluation.

Conclusion: More than 50% of the hospitals contacted by telephone admitted that preauthorization was sought before the MSE was completed. Although HCFA has clarified prior authorization as "not appropriate," many EDs may not be complying with the revised guidelines.

## 271 Why Do Patients Come to Emergency Departments?

Derlet RW, Ledesma AM/University of California—Davis Medical Center, Sacramento, CA

Study objective: To determine patient motivating factors, referral sources, and expectations when presenting for care in an emergency department.

Methods: A convenience survey of patients 18 years of age and older during 4 weeks was performed in an academic ED waiting room. The survey asked patients to select from 1 of 6 motivating reasons why they came to the ED. Patients were also asked to select the type of physician they preferred to see, their estimated waiting times, and severity of pain they were experiencing. Percentages were calculated by dividing the total sum of specific responses by the total number of completed surveys. Comparisons were made using  $\chi^2$  analysis.

Results: A total of 202 patients completed questionnaires. Motivating factors to be seen in the ED included: patient believed condition was an emergency medical condition that needed ED care (55%), referred by their primary care physician (19%), referred by advice line (8%), unable to get timely physician appointment (6%), told to come by friends or family (6%), and other (6%). A total of 61% of patients stated they were in severe pain. Of the severe pain group, 63% felt they had an emergency medical condition compared with 39% of the non-pain group ( $P\leq.001$ ). A total of 97.5% of all patients wanted to be seen by a physician; only 2.5% wanted care only by a nurse. Preferences for physicians were as follows: board-certified in emergency medicine (45%), any physician (17%), internist (12%), surgeon (9%), family practitioner (8%), pediatrician (5%), and obstetrician/gynecologist (4%).

Conclusion: Most patients presenting to the ED believe they have an emergency medical condition and many have severe pain. Patients expect to see a physician. Patients referred by physician offices and advice lines also constitute a significant proportion of ED visits.

## 272 Functional Limitations of Emergency Department *International Classification of Diseases—Ninth Revision Codes*

Tintinalli JE, Waller A/University of North Carolina, Chapel Hill, NC

The suitability of the *International Classification of Diseases (ICD)* as a claims database for emergency medicine has never been established.

**Study objectives:** To determine the agreement between diagnoses entered on the emergency department record and the ICD code, and to determine the suitability of ICD codes for reimbursement decisions.

**Methods:** Retrospective chart reviews were performed to assess: (1) agreement for diagnoses between the ED record (EDR), the ED practice database (EDPD); and the ED claims database (EDCD); (2) ability of ICD-9 code to determine medical necessity for reimbursement rejections and for LMRPs. Codes were assigned by certified nosologists, and ED diagnoses were recorded by the attending emergency physician. A single expert reviewed all records. Reimbursement rejections categorized as "not a medical emergency" by 2 managed care payers were reviewed. Conditions were classified as "not meeting the prudent layperson standard (PLS)" if chart review indicated a minor disorder lasting 1 day or more with normal vital signs, or a minor injury that did not require radiographs or suturing. A convenience sample of ED visits not in compliance with LMRPs was reviewed to determine the relationship between ICD code and medical necessity. Descriptive statistics and proportions of agreement were calculated as appropriate. The studies were exempted from institutional review board review.

**Results:** Eighty-five randomly selected ED patient encounters from September 1996 were and the proportion of agreement between the numbers of diagnoses entered on the EDR, EDPD, and ED CD was 48% to 52%, and for any single diagnosis was 71% to 81%. Two hundred ED visits were retrospectively reviewed for accounts still open in September 1998. Eighty-six percent of denials by payer No. 1 and 62% by payer No. 2 were felt to meet the PLS. The ICD-9 diagnosis code was unable to identify cases that met the PLS. Most denials were eventually paid based on chart review. To assess medical necessity for ancillary tests, 30 ED visits for 29 different patients were analyzed. In 70%, all ancillary tests were felt to be appropriate. In 63%, there was no similarity between chief complaint, risks for morbidity, comorbid diseases, and ICD code.

**Conclusion:** There is insufficient agreement in both numbers and quality of diagnoses between the EDR, EDPD, and ED CD for the ICD code alone to serve as an ED CD. ICD codes alone cannot identify which ED visits meet the PLS. LMRPs that use ICD codes alone to determine medical necessity misclassified 70% of cases. For optimal reimbursement, emergency medicine should develop a system for diagnosis recording that incorporates chief complaint, risk factors, and comorbid diseases, as well as acute diagnoses.

## 273 Emergency Department Staff Estimates of Patient Satisfaction: The Squeaky Wheel Gets the Grease

Boudreaux ED, Ary R, Mandry C/Louisiana State University, Baton Rouge, LA

**Study objective:** Theories outlining determinants of patient satisfaction point out that the health care providers' own beliefs and attitudes influence their behavior toward the patient and, therefore, indirectly influence patient satisfaction. Hence, emergency department staff's expectations regarding patient satisfaction may actually influence patient satisfaction through its effect on staff behavior. For example, if a provider overestimates his or her patient's satisfaction, he or she may miss important but subtle cues of dissatisfaction, causing him or her to miss an opportunity to rectify the situation before the patient leaves the ED. Our study investigated the accuracy of ED staff's estimates of their patients' satisfaction with services. We hypothesized that ED staff would exhibit a self-serving bias (ie, they would estimate patient satisfaction as higher than it actually is).

**Methods:** The study was conducted through a municipal ED with approximately 89,000 visits per year. Actual patient satisfaction was assessed using a telephone interview with 22 indicators across several domains, including registration, nursing staff, physician staff, wait times, discharge instructions, and other miscellaneous areas. Shortly after the assessment was complete, but before the results of the survey were disseminated, ED staff were asked to "predict" the results by estimating the average rating they believed patients gave for each of the 22 indicators. Staff members were also asked to estimate the patients' average length of stay. To further reduce bias, ED staff were not informed that the patient satisfaction survey was being conducted. Independent samples *t* tests were used to compare averages for each item obtained through staff ratings versus averages derived from actual patient satisfaction.

**Results:** Surveys were solicited from 478 (42.1%) of 1,139 patients and 59 (77.6%) of 76 ED staff (nurses, residents, physicians). Statistically significant differences existed

between ED staff's estimates of patient satisfaction and actual patient satisfaction across 19 of the 22 indicators ( $P < .005$ ). Across each of these 19 indicators, staff consistently estimated average satisfaction scores to be lower than what patients actually reported. Staff did not overestimate scores on any items. The 19 items were spread across multiple domains. Additionally, staff overestimated average patient length of stay by more than 2 hours ( $P < .001$ ).

**Conclusion:** In contrast to the hypothesized self-serving bias, ED staff consistently estimated patients to be less satisfied than they actually were. This trend held true across multiple domains, including satisfaction with registration, nursing and physician staff, and wait times. Moreover, ED staff estimated average length of stay to be more than 2 hours longer than it actually was (5.7 hours versus 3.5 hours). Such biases may act as a self-fulfilling prophecy, negatively affecting both patient satisfaction and employee morale. Future research should focus on assessing provider estimates of patient satisfaction in "real time" (versus asking for estimates of averages).

## 274 The Utility and Futility of UB-92 Data for Emergency Department Profiling

Sacchetti A, Warden T, Moakes ME, Harris R/Our Lady of Lourdes Medical Center, Camden, NJ; Sinai Hospital, Baltimore, MD; Coordinated Health Services, Horsham, PA

**Study objective:** The Universal Billing Code of 1992 (UB-92) is the hospital standard for itemized patient charges. This study examines use of UB-92 information for emergency physician profiling and education. The study was conducted at a community hospital emergency department.

**Methods:** Routine urine cultures (UCs) were considered unnecessary in a low-risk (LR) ED population defined as discharged females 16 to 60 years of age undergoing urinalysis (UA) as part of ED treatment. UB-92 data from 3 consecutive months of ED visits were abstracted for patient age, primary *International Classification of Diseases—ninth revision (ICD-9)* diagnosis, disposition, sex, emergency physician, and urinary studies. Statistical analysis was through  $\chi^2$ .

**Results:** Of a total of 7,780 ED patients, 1,850 underwent UA with 1,092 (59%) undergoing UC. There were 328 LR patients, 163 (50%) of whom underwent both UA and UC compared with 929 (61%) of 1,522 non-LR patients ( $P < .002$ ). There was a significant difference in UC utilization among the 6 full-time emergency physicians with rates between 32% to 65% of LR patients ( $P = .006$ ). Recognized problems included failure of UB-92 to distinguish between registration attending and treating physician during times of multiple physician presence and automatic entry of a UC with every UA by certain unit clerks.

**Conclusion:** The UB-92 has the potential to profile utilization of certain resources within the ED and by individual emergency physicians and to identify specific departmental process problems.

## 275 Colorado Physicians' Knowledge of and Attitudes Toward Mandatory Reporting Laws

Houry D, Utz A, DeWitt C, Feldhaus K/Denver Health Medical Center, Denver, CO

**Study objective:** Laws that mandate police involvement in cases of domestic violence (DV)-related injuries have been criticized because of concerns that these laws violate patient confidentiality, increase the risk of violence for the victim, and deter victims from seeking medical care. In 1995, Colorado established a law mandating physician reporting of DV-related injuries. The purpose of our study was to measure physicians' understanding of this law, to identify physicians' attitudes toward this law, and to determine any differences between emergency physicians and primary care physicians (PCPs) in regard to the law.

**Methods:** A confidential, anonymous survey sent to all members of the Colorado ACEP chapter and internal medicine, obstetrics, and family practice physician members of the Colorado Medical Society.

**Results:** Of 2,038 surveys mailed, 697 (34%) were returned; 72% of respondents were male ( $n = 498/689$ ). Emergency physicians comprised 25% ( $n = 169/670$ ) of the respondents, 41% ( $n = 276/670$ ) were family practitioners, 14% ( $n = 96/670$ ) were obstetricians, and 19% ( $n = 129/670$ ) were internists. Eighty percent ( $n = 541/674$ ) practiced in an urban setting, and 38% ( $n = 260/685$ ) stated that they had received some training regarding the DV reporting law. Ninety-two percent ( $n = 630/684$ ) correctly identified the current definition of the reporting law. Fifty-seven percent ( $n = 390/687$ ) correctly answered a scenario involving an acute DV injury, and only 48% ( $n = 334/696$ ) correctly answered a question involving a patient with a history of DV. Only 41% ( $n = 180/443$ ) stated they always reported DV-related injuries to the police. Emergency physicians were significantly more likely to report DV to the police than PCPs (61%



versus 30%;  $P < .001$ ). Emergency physicians were also more likely to feel that these laws would not increase the risk of retaliation (68% versus 55%;  $P = .006$ ) and do not deter patients from seeking medical care (54% versus 49%;  $P = .003$ ).

Conclusion: Physicians in Colorado do not completely understand the mandatory reporting laws, and a significant number may not comply with the law. Emergency physicians are more likely than PCPs to be aware of the mandatory reporting law, to comply with the law, and feel that the law is not detrimental to patient care.

## 276 Wide Interresident Procedure Variability Suggests Need for National Standards in Emergency Medicine

Lotfipour S, Lewandowski C, Nguyen HB/Henry Ford Hospital, Detroit, MI

Study objective: To describe emergency medicine residents' experience with procedures and resuscitations in a large inner-city teaching hospital.

Methods: Procedures and resuscitations were defined according to the Residency Review Committee (RRC-Emergency Medicine) guidelines. Residents were required to record their procedures directly onto a computerized data base while assigned to the emergency department. From November 1, 1998, to April 30, 1999, all procedures and resuscitations performed in the ED were tabulated. Residents were unaware of this study. Fifteen common procedures are reported as follows: adult medical resuscitations (AMR), adult trauma resuscitations (ATR), arterial line (AL), central line (CL), cricothyrotomy (CT), intraosseous infusion (II), lumbar puncture (LP), nasotracheal intubation (NI), orotracheal intubation (OI), pediatric resuscitations (PR), pericardiocentesis (PC), resuscitative thoracotomy (RT), saphenous cutdown (SC), thoracentesis (TC), and tube thoracostomy (TT).

Results: Twenty-seven residents (PGY II, III) were in the department during the included 6-month time period. The mean ( $\pm$ SD) and range (listed in parentheses) for each procedure by the average resident is as follows: AMR 15.6 $\pm$ 14.0 (1 to 40); ATR 8.2 $\pm$ 6.7 (1 to 23); AL 10.4 $\pm$ 5.5 (1 to 19); CL 10.8 $\pm$ 5.1 (1 to 20); CT 0.0; II 1.4 $\pm$ 0.5 (0 to 2); LP 3.6 $\pm$ 2.8 (1 to 9); NI 0.2 $\pm$ 1.0 (0 to 2); OI 12.6 $\pm$ 6.0 (1 to 22); PR 1.7 $\pm$ 1.0 (1 to 4); PC 0.5 $\pm$ 0.5 (0 to 1); RT 0.5 $\pm$ 0.5 (0 to 1); SC 0.0; TC 0.5 $\pm$ 0.5 (0 to 1); and TT 2.2 $\pm$ 1.7 (0 to 6).

Conclusion: There is great variability between residents as to their experience with procedures and resuscitations. The cause of this variability is undetermined, although underreporting, aggressiveness of the resident, shift distribution, pathology of patient population, or seasonal variations may play a part in this variability. Understanding the influences of these factors on resident education would aid in scheduling, evaluation, and feedback. The wide interresident variability found in our residents is consistent with previous reported series in the literature. This highlights the need for national standards for minimum competency with necessary lifesaving procedures in the ED.

## 277 A National Survey of the Aeromedical Transport of High-Risk Obstetrics Patients

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Study objective: Aeromedical transport of high-risk obstetric (HROB) patients can be accomplished with minimal risk of in-flight delivery and can be advantageous for neonatal survival. A survey of helicopter aeromedical programs belonging to the Association of Air Medical Services was conducted to determine the frequency and current US practices in the transport of HROB patients.

Methods: Each program was contacted by telephone, and aeromedical personnel were asked to provide answers to a survey consisting of 12 questions based on personal experience and statistics compiled by their programs. The results are reported as percent of total respondents.

Results: Of the 203 programs surveyed, 133 (66%) of which operated a total of 145 helicopters, provided responses. The mean annual number of HROB transports was 50.7 accounting for 4.8% of the mean 1,049 total annual transports. Although 72% of the responding programs used the standard flight crew during the HROB transport, only 47% required crew members to maintain neonatal resuscitation certification. Only 52% of the aircraft allow pelvic access in the normal patient configuration. Although only 21% have specific HROB launch protocols, 52% reported having obstetricians involved in dispatching flights and 86% carry tocolytic agents in their standard drug kit. The greatest concerns over HROB transport included in-flight delivery (60%), inadequate fetal monitoring (6%), and lack of experience (5%).

Conclusion: Although HROB transports account for nearly 5% of aeromedical flights, many programs appear to be poorly prepared to handle these patients.

## 278 An Evaluation of a Multisite First Responder Automated External Defibrillation Program

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Study objective: To describe demographic and treatment factor differences for cardiac arrest survivors and nonsurvivors treated by a multisite philanthropic-sponsored first-responder (FR) automated external defibrillation (AED) program.

Methods: FR fire and police agencies from 10 participating sites provided information for out-of-hospital cardiac arrest patients including age, gender, unwitnessed/witnessed arrest, time to defibrillation, number of shocks, time to emergency department arrival, and survival to hospital discharge. This information was compared for survivors and nonsurvivors.

Results: Data were reported for 887 patients; average age was 63 years, 58% were male, 36% were witnessed arrests, 6.2 minutes was the average time to defibrillation, 29.6 minutes was the average time to ED arrival, and 4% survived to hospital discharge. Average age was 59 years for survivors and 64 years for nonsurvivors. Sixty-eight percent of survivors and 57% of nonsurvivors were male. Arrests were witnessed for 87% of survivors and 32% of nonsurvivors. The average time to defibrillation was 4.9 minutes for survivors and 5.1 minutes for nonsurvivors. Sixty-eight percent of survivors and 36% of nonsurvivors had defibrillation by FRs. The average time to ED arrival was 30.2 minutes for survivors and 29.7 minutes for nonsurvivors. One hundred nine patients had a known discharge status and had received shocks by FRs. Of this subgroup, 12% survived to hospital discharge. Average age was 59.7 years for survivors and 64.1 years for nonsurvivors. Sixty-nine percent of survivors and 69% of nonsurvivors were male. Arrests were witnessed for 83% of survivors and 57% of nonsurvivors. The average time to defibrillation was 4.8 minutes for survivors and 5.0 minutes for nonsurvivors. The average time to ED arrival was 32.9 minutes for survivors and 30.5 minutes for nonsurvivors.

Conclusion: As expected, younger age, witnessed arrest status, and defibrillation by FRs appeared to be associated with a greater chance of survival to hospital discharge. Interestingly, the average time to defibrillation was similar for survivors and nonsurvivors.

## 279 An Evaluation of Paramedics' Ability to Recognize Chest Pain of Cardiac Origin

Sandy CC, Lucas RH/George Washington University School of Medicine, Washington, DC

Study objective: To determine whether paramedics can identify chest pain of cardiac origin and correctly apply a protocol for prehospital administration of nitroglycerin.

Methods: All patients arriving to George Washington University Medical Center Emergency Department by ambulance with a chief complaint of chest pain during an 11-month period were eligible for the study. The ED record and the emergency medical services (EMS) run sheet were reviewed. For each patient, it was determined whether nitroglycerin was given by the paramedic, and whether they had an ED diagnosis consistent with coronary ischemia (acute myocardial infarction [AMI], unstable angina, rule out MI, admitted for chest pain, and so on). Patients were excluded if they did not meet the criteria to receive nitroglycerin according to protocol (hypotension, no current chest pain, traumatic causes) or had incomplete medical records. Based on the ED diagnosis of coronary ischemia as a true positive, the sensitivity and specificity of the paramedic's decision to administer nitroglycerin will be calculated.

Results: A total of 240 patients complaining of chest pain were transported to the site ED during the study period. One hundred fifteen patients met the criteria for inclusion and comprised the study group. Forty-eight (42%) of the patients were given an ED diagnosis consistent with acute coronary ischemia. Of these, only 27 (56%) received prehospital nitroglycerin. Sixty-seven (58%) patients were given diagnoses of something other than an acute coronary ischemic event. Of these, only 6 (9%) received nitroglycerin. Using  $\chi^2$  analysis, the administration of nitroglycerin indicating acute coronary ischemia is statistically significant ( $\chi^2$  27.294,  $df$  1,  $P < .000$ ). Sensitivity is 56.3% (95% confidence interval [CI] 45.9 to 63.2), specificity is 90.8% (95% CI 83.1 to 95.9), positive predictive value is 81.8% (95% CI 66.8 to 91.9), and negative predictive value is 73.8% (95% CI 67.7 to 77.9).

Conclusion: Paramedics in the EMS system tend to reliably determine chest pain is of noncardiac etiology and do not indiscriminately administer nitroglycerin. However, they tend to underrecognize chest pain of cardiac origin, thus not treating patients who may benefit from the acute administration of nitroglycerin. Further study is needed to determine whether this is because of atypical presentations of cardiac ischemia or other causes.

## 280 The Utility of Routine Fire Department Response to Motor Vehicle Crashes

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The routine dispatch of fire department (FD) vehicles to the scene of motor vehicle crashes (MVCs) imposes a potential hazard to the public and FD personnel.

Study objectives: To identify how often FD response to the scene of MVCs is necessary.

Methods: A retrospective review of MVCs between January 1, 1997, and December 31, 1998, occurring in a suburban municipality (population 79,000; 13 FDs) was conducted. Data abstracted included total number of reported MVCs, number of MVCs with personal injury, number of MVCs to which the FD responded, number of MVCs requiring any extrication, number of MVCs requiring extensive extrication with FD equipment and personnel, and number of MVCs requiring fire suppression. Data were analyzed using descriptive statistics.

Results: A total of 9,486 MVCs occurred during the study period; 1,414 (14.9%) resulted in personal injury. An FD responded to 128 MVCs (9.1% of personal injury MVCs). Nineteen (14.8% of FD responses) required simple door release. Eight (6.3% of FD responses) required extensive extrication using specialized FD equipment or personnel. No MVC required fire suppression.

Conclusion: During this study period, specialized equipment and personnel were rarely needed for patient extrication from MVCs in this municipality. At no time was fire suppression required. This study suggests the potential hazard imposed by routine FD response to MVCs for purposes of extrication or fire suppression is not warranted in this emergency response system. A prospective study, including a cost analysis, should be undertaken to further clarify the role of FD response to MVCs.

## 281 Evaluation of the "Appropriateness" of Triage Requests for Air Transport to Level I Trauma Centers Directly From the Scene Versus a Community Hospital

Reenstra WR, Tracy J, Jeanmonod D, Hirsch E, Millham F/Boston University School of Medicine, Boston, MA

Multiple trauma scoring methods have been devised in attempt to reliably quantify injury severity and to facilitate scene decisionmaking with regard to air or ground transport.

Study objective: To compare the rates of "inappropriate" helicopter triage between trauma patients flown directly from scenes, and transported from referring hospitals.

Methods: A retrospective cohort analysis was conducted on a consecutive series of adult and pediatric trauma patients transported by helicopter to 2 urban university-affiliated Level I trauma centers, during 1995 to 1998. The primary goal was assessment of whether transport to the Level I trauma center was appropriate. We devised 2 definitions of appropriateness. Appropriateness was defined as present if any of the following were satisfied: Criteria A: (1) length of stay (LOS)  $\geq 3$  days, (2) ICU admission, (3) Injury Severity Score (ISS)  $>16$ , or (4) patient died; Criteria B: same as criteria A with the addition of computed tomography (CT), specialized procedures (eg, angiography) or operative procedure. Criteria A were applied to both Level I trauma centers, whereas the more stringent definition B was applied to the data (1992-1995) from only 1 facility.

Results: During the study period 1995-1998, the combined centers admitted 1,523 trauma patients in helicopter transfer. Nine hundred seventy-five (64%) of these were directly from trauma scenes; the other 548 (36%) patients were stabilized at community hospitals before helicopter transfer. Of the 1,523 total transfers, 311 (20.4%) were defined as inappropriate by criteria A. In the combined study by criteria A, scene flights were significantly more likely to be inappropriate than interfacility transports (24.0% inappropriate for scenes, 13% inappropriate for interfacility,  $P=0.001$  by  $\chi^2$ ). Part 2 compared criteria A versus B in 1 trauma center from 1992 to 1998. Of the 1,141 total transfers, 138 (12.0%) were defined as inappropriate by criteria A; 72 (6%) were defined as inappropriate by criteria B. Scene flights were more likely to be inappropriate than interfacility transports (criteria A: 8.5% for scenes, 3.5% for interfacility,  $P=0.007$  by  $\chi^2$ ; criteria B: 4.3% inappropriate for scenes, 1.9% for interfacility,  $P=0.02$  by  $\chi^2$ ).

Conclusion: Trauma patients flown directly from the scene were less likely to fulfill either of the study definitions of appropriateness than trauma patients transferred from community hospitals. Interestingly, the more stringent the overtriage criteria, the less significant differences were observed. Although the limitations of the data are recognized, further research characterizing the definition of overtriage seems warranted.

## 282 The Impact of a System-wide Airway Management In-Service on Paramedic Intubation Practices

Heck J, Fildes J, Tsang A/Uniformed Services University, Bethesda, MD; University of Nevada School of Medicine, ANTEON Corporation, Reno, NV

Study objective: To assess the effectiveness of mandatory airway management in-service training that did not include intubation practice on the airway practices of paramedics in the out-of-hospital setting.

Methods: Paramedics completed a survey collecting information on 500 consecutive patients in whom endotracheal intubations (ETIs) were attempted. ETIs were classified as "without difficulty," and "with difficulty" by the paramedic attempting intubation. In addition, the reason an intubation was classified as "with difficulty" was also recorded. The system's quality improvement committee reviewed the collected data and developed a training program to address the problems identified in those patients with difficult intubations. All certified paramedics, as well as paramedics in training, were required to complete the program. After training was completed, information on 500 additional patients was collected. We then compared the ETI practices between the pre-education and posteducation groups.

Results: The 2 groups were similar in age, Glasgow Coma Scale score, and reason for intubation. There was a significant improvement in ETIs in trauma patients (without difficulty 39.62% versus 21.67%,  $P=0.001$ ). There was no significant change in patients categorized as cardiac arrest, respiratory, or other medical. Additionally, the utilization of airway adjuncts increased: Combitubes (42.65% versus 25.81%,  $P<0.05$ ); nasogastric tubes (16.71% versus 7.54%,  $P<0.05$ ); and end-tidal  $\text{CO}_2$  detectors (68.26% versus 38.73%,  $P=0.001$ ).

Conclusion: A periodic in-service training program can increase the success rate of ETIs in selected patients and improve the utilization of airway adjuncts.

## 283 Physicians in Tactical Emergency Medicine

Smock W, Hamm M, Krista M/University of Louisville, Louisville, KY

Study objectives: Tactical emergency medicine is a specialty in its infancy. Little has been written about the physician who chooses to practice in this area of prehospital care. This survey is designed to learn more about these physicians and the role they play in the tactical environment.

Methods: One hundred fifteen surveys were mailed to physicians who had completed the Counter-Narcotics Tactical Operation Medical Support Program (CON-TOMS). Participation in the survey was voluntary. Forty-two surveys were returned for a response rate of 37%. Recipients were asked a variety of questions regarding their demographics and their role on the tactical team.

Results: Thirty of the responding physicians were actively involved in tactical medicine; all 30 were male. The average age was 43 years. Twenty-seven of the physicians were medical doctors, and 3 were doctors of osteopathic medicine. Twenty-seven were board-certified. There were 21 emergency physicians, 3 family practitioners, 2 critical care specialists, 1 dermatologist, 1 otorhinolaryngologist, and 1 surgeon. Sixteen respondents were sworn officers of law enforcement agencies. Twenty physicians were armed when working with the team. One physician had a dual role as a sniper. Most of the physicians stayed outside of the line of fire by standing by at a command post or inner perimeter; however, 7 physicians actually functioned as members of the entry team. The average amount of time each physician spent in training with the tactical team was 78 hours per year.

Conclusion: The majority of tactical physicians responding to the survey were male, board-certified emergency medicine specialists. More than half were sworn officers in law enforcement agencies. Some perform dual roles as both physician and member of the entry team. The growing number of incidents that require the intervention of special weapons and tactics teams and the increasingly violent nature of these incidents underscores the need for physicians specifically trained in tactical medicine. The tactical environment poses unique challenges to the physician. The management of mass casualty situations, the need to ensure the safety of the team as well as personal safety, and preservation of evidence at a crime scene are areas that are not taught in most medical schools and residency programs. Further research in this area could help to improve understanding of the field and help to expand the base of knowledge to improve patient care and team safety.

## 284 The California 500: Medical Care at a NASCAR Winston Cup Race Event

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Stock car racing is America's fastest-growing professional sport. With more than 5.5 million paid admittances and another 148 million watching the 31-race NASCAR

Winston Cup series on television, emergency physicians are increasingly called on to organize medical support for such events. Currently little reliable information is available to assist in determining what specific personnel and equipment are necessary to optimally support a race event.

**Study objective:** To characterize the spectrum of presenting injuries and illnesses at a NASCAR Winston Cup event.

**Methods:** This study is a retrospective review of all patients presenting to 9 on-site first aid stations from June 19 to June 22, 1997, for the inaugural California 500 race weekend at the California Speedway in Fontana, CA. Staffing was provided by 20 paramedics, 25 emergency nurses, 5 emergency physicians, 9 advanced life support (ALS) ambulances with 2 crew each, 4 mini-ambulances, 9 golf cart teams, and a medically configured helicopter with flight crew. At least 1 station was open 24 hours per day and staffed with an emergency physician, nurse, and paramedics. Medical care rendered ranged from basic first aid to intravenous fluid hydration, suture lacerations, removal of foreign bodies from the eyes, antibiotics, and advanced cardiac and trauma life support.

**Results:** Of the 923 patients seen, 38 were drivers/crew, 230 were track employees, and 644 were spectators. One hundred thirty-six of the patients were treated in the 2 infield facilities, whereas 787 were treated in the grandstand first aid stations. Patients seen per hour peaked just before the start of the race at 73 patients. Of the 10 patients transported to the hospital, 3 required admission. No deaths occurred.

**Conclusion:** We treated 923 patients among 214,000 attendees at a NASCAR Winston Cup race weekend. Drivers and crew members constituted only 4% of all patients seen during the race weekend. Only about 1% of patients required transport to a hospital (Table).

**Table, abstract 284.**

	Thursday (Testing)	Friday (Qualifying)	Saturday (Support Race)	Sunday (Winston Cup)	Grand Totals
Attendance estimate	Closed to public	48,000	71,000	95,000	214,000
Minor care (<5 min)	1	57	118	149	325 (35.2%)
Basic Care (5-15 min)	9	135	182	227	553 (59.9%)
Advanced care (ALS procedures)	2	4	20	19	45 (4.9%)
Transferred to hospital	0	3	3	4	10
<b>Total patients treated</b>	12	196	320	395	923
Patients treated per 10,000 spectators		0.41	0.45	0.42	0.43

## 285 Diversions of Advanced Life Support Ambulances: Causes and Effects in a Large Urban System

Silka PA, Geiderman JM, Kim JY/Cedars-Sinai Medical Center, Los Angeles, CA

**Study objectives:** To determine the causes and effects of diversions of advanced life support (ALS) paramedic units.

**Methods:** This was a retrospective study of ALS-diverted patients in a large urban region of Los Angeles County during a consecutive 3-month period. A diversion is defined as an ALS transport of a patient to an emergency department other than the initially designated receiving facility. Controls were obtained by selecting a case-matched concurrent cohort of patients not diverted. Total run time (TRT), on-scene interval (OSI), patient transport interval (PTI=scene to the receiving ED), were recorded for all patients.

**Results:** During the study period, 2,534 ALS runs occurred, of which 147 (5.8%) were diverted. Twenty-four (16.3%) diversions had incomplete run times, leaving 123 (83.7%) for analysis. The most common reason for diversion was special consideration (patient, family, law enforcement, or private medical doctor request), 56.1% (69/123). Special consideration diversions accounted for longer TRT ( $P<.001$ ) and PTI ( $P<.001$ ) versus nondiverted controls ( $n=213$ ). Other diversions did not significantly increase any transport time interval.

**Conclusion:** Special consideration diversions increased emergency medical service's TRT and PTIs, thereby decreasing ALS unit availability. Diversion policy must take into account prolonged PTI and decreased availability of ALS units when providers permit special consideration diversions.

## 286 An Evaluation of the Clinical Predictors for the Presence of Ureteral Calculi on Spiral CT in Patients With Suspected Renal Colic

O'Connor RE, Leisley JR, Gould SW, McGraw P/Christiana Care Health System, Newark, DE

**Study objective:** Unenhanced spiral computed tomography (CT) has become a useful imaging modality in the evaluation of patients with suspected renal colic. Previous studies have demonstrated the high sensitivity and specificity of spiral CT for diagnosing ureteral calculi. Our study objective was to determine which clinical criteria could predict ureteral calculi on spiral CT.

**Methods:** This retrospective cohort study was conducted on patients presenting to a tertiary care hospital's emergency department with suspected renal colic. The charts of consecutive patients who underwent unenhanced spiral CT of the abdomen and pelvis were reviewed. Various clinical criteria were correlated with the presence of ureteral calculi on spiral CT. The following clinical criteria were analyzed as possible predictors: dysuria, hematuria, nausea and vomiting, restlessness, patient disposition, presence of diaphoresis, pain quality, duration, location, and radiation. Data were analyzed by multiple logistic regression and  $\chi^2$ .

**Results:** Of the 131 patients undergoing CT scan for presumed renal colic, 96 had positive findings for stones. There were no significant differences between patients with and without stones for the following: dysuria, restlessness, patient disposition, presence of diaphoresis, and pain quality, duration, location, and radiation. The following differences were significant predictors of stone presence: hematuria (79% of CT-positive versus 58% of CT-negative;  $P=.01$ ), and nausea and vomiting (61% of CT-positive versus 36% of CT-negative;  $P=.001$ ). Those with stones had an average of 4 of 9 positive findings described above, whereas those without stones had an average of 3 of 9 ( $P=.01$ ). Hematuria, nausea, and vomiting were absent in 9% of patients with stones and 24% of patients without stones ( $P<.001$ ).

**Conclusion:** Hematuria along with nausea and vomiting can be used to predict which patients will have kidney stones on CT, but these criteria may be absent in certain patients. It does not appear that clinical criteria alone can be used to assess whether a stone is present in patients with suspected renal colic.

## 287 Incidence of Negative Hematuria in Emergency Department Patients Diagnosed With Acute Renal Colic by Spiral CT Scan

Wolfe MB, Pelayo A, Schreiber D/Stanford University Hospital, Stanford, CA

**Study objective:** To determine the incidence of negative hematuria in patients presenting to the emergency department with clinically suspected renal colic and spiral computed tomography (CT) scans showing abnormalities consistent with this diagnosis.

**Methods:** This was a retrospective review of all Stanford University Hospital ED patients diagnosed with acute renal colic during 1996 and 1997 who had spiral CT scan abnormalities supporting this diagnosis ( $N=155$ ). We then categorized both the degree of microscopic hematuria observed and the urine dipstick results.

**Results:** We found the incidence of negative hematuria by microscopic examination to be 18.7% in this population, with the incidence of negative urine dipstick examination being 15.4%. Furthermore, 34.2% of these patients had fewer than 5 RBCs on microscopic examination, and 21.9% had trace or no blood on urine dipstick examination.

**Conclusion:** To our knowledge, this is the first report in the literature analyzing the incidence of negative hematuria in patients diagnosed with acute renal colic by spiral CT scan, which is rapidly becoming the diagnostic gold standard throughout the country. The incidence of 18.7% is somewhat higher than that previously reported in studies using alternative means for diagnosis. The degree of hematuria on urine dipstick test was similar to the microscopic examination, although several false-positive results were observed. Although other diagnoses must always be considered, the absence of hematuria in patients presenting with acute renal colic is not uncommon.

## 288 Effect of Cold Water Immersion on Finger Pulse Oximetry Readings

Kolb JC, Summers RL, Jones AE/University of Mississippi Medical Center, Jackson, MS

**Study objective:** Measurements of oxygen saturation by pulse oximetry ( $\text{SaO}_2$ ) is usually obtained with a finger probe. It is frequently thought that changes in hand temperatures can influence digit blood flow and pulse oximetry accuracy. The purpose of this study was to determine the effect of extremes of cold temperatures on measurements of  $\text{SaO}_2$  in normal subjects.

**Methods:** Baseline pulse oximetry measurements of  $\text{SaO}_2$  under ambient conditions

were obtained from normal healthy volunteers using a standard portable finger probe. These measurements were then repeated immediately after immersion of the subject's hand in ice-cold water for as long as could be reasonably tolerated. The averages of these measurements were compared using a paired *t* test analysis (*P*<.05).

Results: In the 15 individuals studied (average age 34±4.3 years), there were no significant differences in the values of SaO<sub>2</sub> measured before and after cold water immersion. However, the average determined saturations were found to increase slightly after the cold exposure (before 98.4%±0.23%, after 99.1%±0.45%).

Conclusion: Despite the intuitive impression that external temperatures may affect pulse oximetry measurements, there appears to be no significant differences in the values obtained after cold water immersion. It is postulated that warmer temperatures can shunt blood to the venous side of the circulation, creating venous pulsations and thereby decreasing the observed SaO<sub>2</sub>.

**289 The Analysis of Erythrocyte Sedimentation Rate, C-Reactive Protein, White Blood Cell Count, and Temperature in the Diagnosis of Acute Endocarditis**

Chuang R, Olshaker J, Robinson D/University of Maryland Medical Center, Baltimore, MD

Study objective: This study attempts to identify if the levels of initial erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), WBC count, or temperature tend to correlate with the eventual diagnosis of endocarditis.

Methods: This prospective cohort study was conducted in an urban university medical center of all suspected cases of endocarditis that presented to the emergency department from August 31, 1998, to March 31, 1999. These included all febrile intravenous drug abusers, and any other patients with suspected native or artificial valve endocarditis who were admitted through the ED. The initial WBC count, ESR, CRP, and highest ED temperatures were recorded on these patients. Data were then prospectively collected and examined with 2-tailed Student's *t* test. Data are represented as mean±SD.

Results: A total of 147 consecutive cases were analyzed with 14 confirmed cases of endocarditis. The initial ESRs were higher in those with endocarditis (56.5±6.1 seconds versus 45.6±14.8 seconds, *P*=.01), as were C-reactive proteins (16.1±10.1 versus 7.2±6.9, *P*<.001), and WBC count (16,300/mm<sup>3</sup>±11,700/mm<sup>3</sup> versus 8,400/mm<sup>3</sup>±5,100/mm<sup>3</sup>, *P*<.001). The patients' maximum temperatures in the ED were similar in both groups (101.7°F versus 101.6°F, *P*=.84). Using the normal laboratory limits of ESR for the diagnosis of endocarditis, the sensitivity is 100% and specificity is 9.8%. For CRP, the sensitivity is 100% and specificity is 6%. However, the lowest ESR and CRP in the confirmed cases of endocarditis were twice the upper level limit of normal for ESR, and 2 times the upper limit for CRP. Using these values, the specificity increases to 25% and 44%, respectively.

Conclusion: This pilot study demonstrates that none of the eventually confirmed cases of endocarditis had normal initial ESRs or CRP levels. These relatively inexpensive tests may prove to be valuable initial screening tests for the exclusion of endocarditis.

**290 Is Spiral Computed Tomography the Diagnostic Imaging of Choice for Patients With Renal Colic?**

Shirley L, Dubinsky I/University Health Network, University of Toronto, Toronto, Ontario, Canada

Study objectives: To determine the efficacy of spiral computed tomography (CT) versus intravenous pyelogram (IVP) in diagnosing renal colic in the emergency department.

Methods: A prospective cohort study was conducted at a 2-site university hospital ED from July 1997 to February 1999. Consecutive patients presenting with acute flank pain and suspected urinary tract obstruction were enrolled. Baseline blood studies for renal function and a urinalysis were performed. One hundred sixty-six patients underwent helical unenhanced CT and 79 patients underwent IVP. All diagnostic imaging results were confirmed by a radiologist.

Results: Evidence of ureteral stone disease was confirmed to be present in 136 (81.9%) of CT patients and 56 (73.4%) of IVP patients. CT detected the size and location of stones in 90.4% of positive CT scans for renal colic disease versus 60.3% of IVPs. Ureter dilation was detected in 61% of CTs and 56.9% of IVPs. CT also detected hydronephrosis (51.5%), perinephric stranding (51.5%), renal enlargement (15.4%), and edema (5.9%). IVP detected hydronephrosis (8.6%), renal enlargement (3.4%), and edema (6.9%). CT offered additional information regarding other diagnoses not available with IVP. Alternate diagnoses were made on CT requiring admission in 2 cases: ruptured appendix (1) and renal infarction (1). Three patients were diagnosed with complete obstruction requiring admission. Four patients were admitted because of obstructive pyelonephritis. CT also facilitated diagnosis of ruptured ovarian cysts in 2 cases. A number of incidental findings were also found on CT such as diverticulosis

(6), gallstones (3), masses (1 adrenal adenoma, 1 liver, and 1 renal), uterine fibroids (4), and cysts, all of which were referred for outpatient follow-up. The average length of stay (LOS) for IVP patients was 10 hrs versus 7 hours for CT patients. Two patients had allergies to contrast dye, necessitating utilization of CT.

Conclusion: Spiral CT is a valuable diagnostic tool in the management of renal colic in the ED. Further studies need to be done to evaluate CT as a more effective means of diagnosing and managing patients presenting with flank pain, from both a radiologic and patient LOS perspective.

**291 Cardiac Ultrasound Evaluation of Pulseless Patients in the Emergency Department**

Salen P, Sierzenski P, Pancu D, O'Connor R, Passarello B, Langsam A, Amadio T, Heller M/St. Luke's Hospital, Bethlehem, PA; Christiana Care Health Services, Newark, DE

Study objectives: During cardiac resuscitation, the absence of central pulses may not reflect cardiac standstill. The presence of cardiac activity in pulseless patients may have important prognostic and therapeutic implications. Our objective was to determine the utility of emergency department ultrasound (US) in pulseless patients undergoing resuscitation.

Methods: This study, conducted at 2 community teaching hospital EDs, prospectively enrolled adult pulseless ED patients. Emergency physicians with US experience performed and interpreted the studies. Patient data, including electrical rhythm, sonographic findings, and impression of clinical utility were recorded. Cardiac US was performed during cardiopulmonary resuscitation (CPR), primarily by the subxiphoid approach.

Results: Fifty-one patients were enrolled. The heart was successfully identified sonographically in all cases. On a 1 to 5 Likert scale (1=easy to 5=difficult), the performance of cardiac ultrasound was graded as 1 or 2 in 73% of cases. Twenty-six patients presented with pulseless electrical activity (PEA), 19 with asystole, 2 with ventricular tachycardia, and 4 with ventricular fibrillation. Fifteen (58%) of the patients with PEA had cardiac contractions on ultrasound; 4 of these patients were admitted. Of the patients in PEA without cardiac contractions, none survived to admission. Cardiac standstill was confirmed in 19 patients with asystole, and all of these died in the ED (Table). Clinical impression was altered in 20 cases and 10 patients had changes in their medical management. US had a beneficial effect on clinical decisionmaking in 47% of cases.

Conclusion: The failure to sonographically identify cardiac activity was associated with a fatal outcome. The presence of contractions may be a predictor for successful resuscitation.

Table, abstract 291.

Outcome	Cardiac Activity Present			Cardiac Activity Absent		
	PEA	VF	VT	PEA	Asystole	VT
Died	11	2	0	11	19	1
Survived	4	1	2	0	0	0

VF, Ventricular fibrillation; VT, ventricular tachycardia.

**292 Bedside K<sup>+</sup> Determination in Intraosseous Aspirates Using an Arterial Blood Gas Analyzer**

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A bedside analyzer using a 0.5-mL sample of whole blood can produce a K<sup>+</sup> determination in 2 minutes. This rapid K<sup>+</sup> determination may make a crucial difference in a pediatric resuscitation where an intraosseous (IO) sample may be the first and only sample drawn. The use of an IO sample in an arterial blood gas analyzer (ABG) has not been previously studied.

Study objectives: To determine (1) whether an ABG analyzer can run IO samples, (2) if such samples have concordance with a standard laboratory determination of K<sup>+</sup>, and (3) if multiple IO samples adversely affect the ABG analyzer.

Methods: Bone marrow was obtained from laboratory animals (swine). The first 2 mL of each bone marrow aspirate was aspirated into a syringe and transferred to a chemistry tube for analysis. The next 1 mL was run on the ABG analyzer.



Results: Eleven pairs of samples were obtained. The ABG and laboratory determine K<sup>+</sup> showed concordance as determined by a *t* test for paired samples (*n*=11; mean difference 0.12, SD 0.90, confidence interval: -0.75 to 0.486.) There was no alteration in the performance characteristics of the ABG cartridge.

Conclusion: Multiple IO samples can be run on an ABG analyzer and show concordance with laboratory determinations of K<sup>+</sup>.

## 293 Safety of Emergency Department Transesophageal Echocardiography in Acute Aortic Disease

Hwang SO, Lee KH, Hong ES, Oh BJ, Cho JH, Lee SH, Yoon J, Choe KH/Wonju College of Medicine, Yonsei University, Wonju, South Korea

Study objective: Safety of emergency transesophageal echocardiography (TEE) has never been evaluated in patients with acute aortic disease in the emergency department. The purpose of this study was to evaluate the safety of TEE as an emergency diagnostic procedure to detect thoracic aortic diseases.

Methods: Twenty-five patients in whom thoracic aortic disease was suspected and who underwent TEE as the first diagnostic tool in the ED were enrolled. Biplane TEE was used under the administration of low-dose benzodiazepine and pharyngeal spray of lidocaine. Airway protection by endotracheal intubation was done if the patient had no gag reflex or was unconsciousness. Blood pressure and heart rate were measured before and during TEE.

Results: Among the 25 consecutive patients (including 16 patients with nontraumatic cause and 9 patients with trauma), 18 patients had thoracic aortic diseases on TEE. Three of 9 patients with trauma had aortic injury (an aortic tear, an aortic aneurysm, and an aortic subintimal hematoma). Fifteen of 16 patients with nontraumatic cause revealed aortic dissection on TEE. Systolic blood pressure and heart rate was not significantly changed by TEE. There was no complication during TEE in 23 patients (92%). Severe hypertension was noted in a patient, and cardiac tamponade from previous pericardial effusion developed in a patient during TEE.

Conclusion: Our observation suggests that TEE is a safe diagnostic modality to detect thoracic aortic disease in the ED.

## 294 Correlation of the Radiographic Cardiothoracic Ratio With Cardiac Function in Patients With Acute Congestive Heart Failure

Summers RL, Kolb JC, Woodward LH/University of Mississippi Medical Center, Jackson, MS

Study objective: Determination of the radiographic cardiothoracic ratio (CTR) may provide insight into the severity and mechanism of the cardiac dysfunction in acute congestive heart failure (CHF). This study correlates the determined CTR with measures of systolic and diastolic function in patients with CHF.

Methods: The CTR was measured from upright anteroposterior plain film radiographs obtained in patients with acute CHF. Values for the isovolumic relaxation times (IVRT), filling times (FTs), Heather Index (HI), and ejection fraction (EF) were calculated from the impedance cardiography (IC) tracings. These functional measures were correlated with the CTR by multiple regression analysis (*P*<.05). Ventricular hypertrophy (left ventricular hypertrophy [LVH] by ECG criteria) was also correlated to the measures for comparison.

Results: In 45 patients with CHF, there was no significant correlation of the IVRT and FT with the corresponding CTR. However, the HI and EF were inversely correlated with the CTR (*r*=-0.36). The degree of LVH was not significantly related to systolic function but was highly correlated to the IVRT.

Conclusion: CTRs in patients with CHF appear to correlate well with measures of cardiac systolic function and may be useful in predicting the severity and mechanism of cardiac dysfunction.

## 295 Abstract Withdrawn

## 296 How Many Patients With Acute Myocardial Infarction Would Be Missed If a Chest Pain Unit Was Not Available?

Bassan R, Pimenta L, Dohmann HF, Gamarski R, Araújo M, Clare C/Pró-Cardíaco Hospital, Rio de Janeiro, Brazil

Patients with chest pain and no ST-segment elevation on admission may be erroneously released from the emergency department without knowledge that they are having an acute myocardial infarction (AMI). This also may happen when the ECG is normal or nonspecific (NL/NS) and/or when a single creatine kinase isoenzyme MB (CK-MB) measurement is normal. It has been estimated that this occurs in 5% of patients, with an out-of-hospital mortality rate >20%.

Study objective: To determine how many patients with chest pain are at risk of being erroneously discharged from the ED with AMI.

Methods: By using an algorithm we systematically evaluated 1,003 consecutive patients with chest pain, 635 of whom had neither ST-segment elevation or left bundle branch block (LBBB) in their first ECG nor a definitely not angina-type chest pain associated with an NL/NS ECG. These patients underwent serial ECG and plasma CK-MB measurements (baseline and 3, 6, and 9 hours after admission) and 79 of the 635 had an AMI by typical CK-MB curve.

Results: The Table depicts the observed incidence of AMI in these patients as stratified by ECG and CK-MB level on admission. Irrespective of ECG, patients with atypical angina had a very low rate of AMI, especially when the first CK-MB level was normal.

Conclusion: Patients with chest pain and no ST-segment elevation or LBBB on admission had an 11% chance of having AMI. Neither NL/NS ECG nor normal first CK-MB level ruled out AMI, even when both were associated. Chest pain type was a good discriminator for non-AMI in these patients, especially when the first CK-MB level was normal. If systematic and careful screening is not done, atypical AMI patients will continue to be erroneously released from the ED.

Table, abstract 296.

First ECG	AMI	Plus First CK-MB	AMI
↓ST/↓T (n=159)	28%	Normal (n=120)	18%
NL/NS (n=476)	6%	Normal (n=395)	4%

## 297 Is It Possible to Identify Patients With Chest Pain and No ST-Segment Elevation Who Have Acute Coronary Insufficiency?

Bassan R, Pimenta L, Dohmann HF, Araújo M, Scofano M, Soares JF/Pró-Cardíaco Hospital, Rio de Janeiro, Brazil; Federal University of Minas Gerais, Belo Horizonte, Brazil

Chest pain is one of the most frequent symptoms seen in patients presenting to the emergency department. Complete and costly workups are frequently necessary to rule out the diagnosis of acute coronary insufficiency (ACI) and avoid unnecessary coronary care unit (CCU) admissions and inappropriate ED release.

Study objective: To determine whether it is possible to obtain simple clinical variables that would accurately identify chest pain patients with no ST-segment elevation who are at risk of ACI.

Methods: By using an algorithm with chest pain type, serial ECG, and plasma creatine kinase isoenzyme (CK-MB) measurements (baseline and 3, 6, and 9 hours after admission) and early stress testing, we prospectively studied 566 consecutive patients who had neither ST-segment elevation nor left bundle branch block (LBBB) in their first ECG. Acute myocardial infarction was diagnosed by typical CK-MB curve (with or without ECG changes), whereas unstable angina by prolonged (>20 minutes) chest pain classified as definite/probable angina associated or not associated with spontaneous or exercise-induced ischemia and/or positive coronary arteriography.

Results: By multivariate regression analysis, the following variables were found to be independently related to the final diagnosis of ACI: diabetes (*P*=.024, odds ratio [OR]=2.76), previous history of coronary artery disease (*P*<.001, OR=2.92), age ≥60 years (*P*<.002, OR=2.32), definite or probable angina-like chest pain (*P*<.000, OR=17.30), and ST-segment depression/T inversion (*P*<.001, OR=3.54). Patients with all these variables had 100% (12/12) chance of having ACI, whereas those with none had a 5% (9/178) chance. A classification and regression tree obtained by recursive partitioning analysis using chest pain type, age, and ECG data correctly identified 481 (85%) of patients with and without ACI. Patients identified as low probability of ACI had only 8% chance of error.

Conclusion: Probability of presence or absence of ACI can be easily and accurately predicted on admission in most patients with chest pain and no ST-segment elevation or LBBB in the ED by using simple clinical data.

## 298 Outcome in Acute Myocardial Infarction Patients Transferred for Acute Angioplasty

Silva JC, Sloan E, Rosenberg M/Resurrection Medical Center, Our Lady of Resurrection Hospital, University of Illinois, Chicago, IL

Although emergency angioplasty may improve outcome in acute myocardial infarction (AMI), not all institutions are capable of providing this intervention. Whether

angioplasty should be used when it is not available depends on many variables including patient outcome after transfer to another institution for the intervention.

Study objective: To describe the outcome of AMI patients who are transferred for acute angioplasty. The transferring institution is a comprehensive emergency department from an urban, community hospital. The receiving institution is an urban, community hospital with coronary artery bypass grafting (CABG) and 24-hour angioplasty capabilities.

Methods: This was a retrospective chart review of 74 consecutive ED AMI patients transferred for angioplasty between April 1997 and April 1998.

Results: The mean age was 63.3±11.8 years and 75% were male. Prior AMI was noted in 19% and prior angioplasty in 6%. Acute anterior wall AMI was noted in 11%, and inferior-lateral AMI in 3% of patients. Cardiogenic shock was present in 4%, and ventricular fibrillation/ventricular tachycardia (VF/VT) occurred in 15% before transfer. Mean transport time was 27.3±8.8 minutes, and the mean ED to angiography time was 124±69 minutes. During transport, no complications occurred. All transferred patients had successful angioplasty, with 36% receiving a coronary artery stent. After transfer, cardiogenic shock was present in 7%, VF/VT occurred in 3%, intubation was required in 4%, and balloon pump in 5% of patients. The overall mortality rate was 6%. The mean length of stay was 8.8±6.9 days.

Conclusion: Transferring AMI patients for angioplasty appears feasible in light of (1) the low complication rate during and after transport, and (2) the low mortality observed in these patients. Further study will compare time with procedure, outcome, and complications to patients for whom angioplasty is provided in the same institution as the ED to which the patients originally present.

299 Prevalence and Determinants of QT Dispersion in Patients Presenting to the Emergency Department With Chest Pain

Jones AE, Mizelle HL, Summers RL/Carolinas Medical Center, Charlotte, NC; University of Mississippi Medical Center, Jackson, MS

Study objective: Dispersion of repolarization (QTD) has been shown to be a predictor of arrhythmic events and sudden death in patients with coronary artery disease (CAD). This study examines the prevalence and determinants of significant life-threatening QTD in patients presenting with chest pain.

Methods: A multiple regression analysis of varied hemodynamic parameters from ED patients presenting with acute chest pain was performed to determine those factors associated with QTD. The initial 12-lead ECG was used to calculate the QTD. The degree of CAD determined by cardiac catheterization was graded on a 4-point scale. Prevalence of significant QTD (>80 ms) is reported as percent of total.

Results: In 44 patients who met the study criteria, 61% had evidence of significant QTD. Of this group, 75% had obstructing CAD by cardiac catheterization. A significant correlation was found between the stroke volume, heart rate, and aortic compliance and the severity of the QTD (P<.05). The graded degree of CAD was not significantly correlated with the amount of QTD.

Conclusion: Although QTD appears to be common in patients with chest pain, only those factors affecting blood flow appear to be important determinants.

300 Outcome Evaluation of Goal-Driven Therapy Utilizing Central Venous Oxygen Saturation

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Critically ill patients with normal vital signs have been shown to have inadequate oxygen delivery. Maximizing oxygen delivery (Do<sub>2</sub>) and consumption (Vo<sub>2</sub>) in critically ill patients improves morbidity and mortality. A fiberoptic catheter that records central venous oxygen saturation (Scvo<sub>2</sub>) is now available and affords emergency physicians the tool to continuously follow Do<sub>2</sub> and Vo<sub>2</sub>. The aim of this study is to evaluate the efficacy of goal-oriented therapy in the emergency department management of critically ill patients based on continuous or intermittent Scvo<sub>2</sub> monitoring.

Study objective: To determine whether ED therapy using algorithm-driven goals and Scvo<sub>2</sub> will improve patient outcome.

Methods: Critically ill ED patient meeting inclusion/exclusion criteria were block randomized to either continuous or intermittent Scvo<sub>2</sub> monitoring. All patients underwent resuscitation based on a goal-oriented treatment algorithm. Samples for arterial blood gas, central venous blood gas, and lactate determinations were drawn at baseline and 1, 2, 4, and 6 hours. Outcomes were defined as incidence of MOF, survival to discharge, lactate clearance, and base deficit correction. Data were analyzed by  $\chi^2$ , Mann-Whitney U, and 2-tailed t test. The goal-oriented therapy (GOT) group was compared with case-matched historical controls (HC).

Results: To date, the data from 14 patients have been analyzed. Baseline character-

istics (age, vital signs, and presenting lactate level) were similar in both groups; however, presenting base deficit was significantly higher in HC versus the GOT group. Oxygen saturation from central venous blood gas studies versus Scvo<sub>2</sub> catheter readings yielded an excellent correlation (r=0.936). Peak lactate levels were similar (GOT versus HC, mean±SEM: 7.93±2.37 versus 8.64±1.71, P=NS), but peak base deficit was higher in HC (6.38±1.87 versus 11.41±1.89, P=.09). Twenty-four-hour Acute Physiology and Acute Health Evaluation (APACHE)-II scores, percent lactate clearance at 6 hours, and incidence of MOF displayed improvement in the GOT group (10.75±2.17 versus 18.9±3.47; 32.9±22.5 versus 21.4±4.6; 25% versus 40%; P=NS). The incidence of organ failure was lower and survival rate higher in the GOT group (25% versus 70%, P=.095; 100% versus 30%, P=.07).

Conclusion: The HC and the GOT groups were well matched by baseline parameters except for base deficit, which is unusual with equivalent lactate levels. Despite this difference, GOT tended to increase lactate clearance, reduce 24-hour APACHE scoring, and the incidence of MOF. Further, the reduction in both death rates and the incidence of organ failure nearly cleared statistically, but had poor power ( $\beta$ =.46). Goal-oriented acute resuscitation based on Scvo<sub>2</sub> appears to increase survival and decrease organ failure.

301 The Role and Cost-Effectiveness of Emergency Department Observational Units in the Evaluation of Transient Ischemic Attacks (TIAs)

Jauch EC, Cohen D, Fenner M, Pancioli AM, Kothari RU/University of Cincinnati College of Medicine, Cincinnati, OH

Study objective: This study was designed to investigate whether transient ischemic attacks (TIAs) evaluated in a Rapid Diagnostic and Treatment Unit (RDTU) within the emergency department could result in reduced total costs compared with inpatient TIA evaluation.

Methods: A retrospective chart review of 89 inpatients with the *International Classification of Diseases—ninth revision*, diagnosis of TIA from July 1996 to July 1997 in an urban teaching hospital was performed. Diagnostic and imaging studies performed were recorded. Hospital charges were obtained through the billing department. Cost analyses were performed for a 12-hour RDTU protocol and then compared with the mean inpatient charges.

Results: The average inpatient length of stay (LOS) was 2.1 days, with a range of 1 to 10 days, and a median of 2 days. Inpatients had 84 computed tomographic (CT) scans, 46 magnetic resonance imaging/magnetic resonance angiography (MRI/MRA) tests, 32 echocardiograms, and 20 carotid Doppler studies performed. In the RDTU, every patient would receive a noncontrast head CT and a carotid Doppler study. If the RDTU patients receive the same proportion of additional imaging studies (MRI/MRA, transthoracic echocardiography) as the inpatient population, the total RDTU expenditure mean is \$2,741, yielding savings of \$68,828 annually (22% reduction in total cost; Table).

Conclusion: A TIA RDTU protocol could theoretically provide both cost savings as well as consistent TIA management. TIA evaluation by a standardized RDTU protocol could conserve hospital resources, shorten LOS, and expedite diagnostic workup. Current prospective studies are being conducted to validate these findings.

Table, abstract 301.

Location	Mean Hospital Charges						Total (\$)
	LOS (d)	Room+ED (\$)	Radiology (\$)	Laboratory (\$)	Pharmacy (\$)	Other (\$)	
Inpatient	2.1	1,279	1,202	356	211	650	3,515
RDTU	0.5	507	1,099	296	5	64	1,971

302 Prevalence and Reliability of Hypercholesterolemia Assessment in the Emergency Department

Chandra A, Compton S, Zalenski RJ/Wayne State University, Detroit Medical Center, Detroit, MI

Recent evidence suggests a 1% reduction in cholesterol levels results in a 2% reduction of coronary events. Emergency physicians may make an impact on coronary events by identifying and addressing chest pain (CP) patients with hypercholesterolemia.

**Study objective:** To estimate the proportion of CP patients eligible for cholesterol-lowering therapy and assess the reliability of ED cholesterol values.

**Methods:** This was a secondary analysis of a cohort study of patients with CP who received an ECG and were hemodynamically stable. The study was conducted in the emergency (urgent care) department of a Veterans Administration Hospital.

**Methods:** Presenting characteristics, final diagnosis of acute cardiac ischemia (ACI), proportion with elevated total cholesterol levels ( $>200$  mg/dL) at the ED visit and agreement with subsequent outpatient testing.

**Results:** Of 102 patients with available data, mean age was 59.2 years (range 21 to 90 years,  $SD \pm 13.7$ ), 73.8% were African Americans, 100% were male, and 17.5% had a final diagnosis of ACI. The prevalence of hypercholesterolemia in the ED was 36.3% (95% confidence interval [CI] 0.27 to 0.46). The mean total cholesterol value in the subgroup ( $n=36$ ) with an elevated ED value was 225 mg/dL ( $SD$  24 mg/dL), not statistically different from their outpatient results (218 mg/dL;  $SD$  32 mg/dL) ( $P=.17$ , paired  $t$  test). Overall agreement between ED and outpatient values (at the cutoff of  $>200$  mg/dL) was 78.4% with a  $\kappa$  of 0.52 ( $P<.001$ ) indicating good agreement.

**Conclusion:** Approximately one third of Veterans Administration CP patients were candidates for lipid-lowering therapy. Emergency physicians have an opportunity to lower coronary events by screening and providing education/drug therapy during the "teachable moment" when patients present to the ED with CP. Further investigation of cholesterol risk factor modification in the ED is warranted.

### 303 Noninvasive Estimation of Myocardial Oxygen Consumption

Summers RL/University of Mississippi Medical Center, Jackson, MS

**Study objective:** Ischemia results when there is a discrepancy between myocardial oxygen consumption (MOC) and delivery. Treatment strategies have traditionally focused on maneuvers to improve oxygen delivery. Optimizing MOC requires a complex understanding of the determinants of ventricular mechanics. A clinically useful technique for estimating MOC was developed using a noninvasive measure of the ventricular pressure-volume area (PVA).

**Methods:** A method for determining the ventricular PVA was derived from the parameters measured by impedance cardiography (IC) and noninvasive brachial manometry. From these measurements, calculations of the left ventricular ejection fraction, end-systolic and diastolic volume, and the end-systolic pressure-volume relationship were used to estimate ventricular mechanical work and the elastic potential energy. When combined, these components of myocardial energetics define the PVA, which is also known to be directly proportional to the MOC. The MOC was then calculated in a group of normal healthy individuals and correlated with heart rates. The method was also used to compared the MOC at different heart rates in a series of patients during conversion from supraventricular tachycardia (SVT).

**Results:** In the 22 normal subjects studied, the methodology accurately demonstrated the expected linear increment in MOC with increasing heart rate ( $r=0.83$ ). However, the MOC for each individual heart beat was not significantly different regardless of the rate ( $P<.05$ ). The 6 patients observed with a primary SVT were also found to have rate-related proportional changes in their MOC.

**Conclusion:** A clinically useful method for estimating MOC was derived from the noninvasive parameters determined by IC and brachial manometry.

### 304 Utilizing Project Management as an Organizational Model for Modifying Emergency Physician Behavior

Richardson D, MacKenzie R, Worrlow C, Nester B/Lehigh Valley Hospital and Healthcare Network, Allentown, PA

**Study objective:** Changing physician behavior can be a slow and frustrating task. Project management is a scientific discipline for moving "temporary tasks" in a timely fashion. The application of this model to clinical pathway engineering has not been well described in the medical literature. In this study, project management was used to establish the clinical formula for changing physician behavior relative to patients with renal colic (RC).

**Methods:** This "before and after" study took place at a 2-ED hospital network ( $>60,000$  annual visits) with a diverse practice environment (19 emergency physicians and 9 urology practices). Project management organizational forms were filed for the development of a new RC clinical algorithm. The project management format, composed of 3 phases and 10 steps, established goals, key personnel, and timelines for each interdependent step. The final algorithm limited "routine" imaging and laboratory investigations during the ED encounter, and supported the use

of helical computed tomography (CT) over intravenous pyelography or ultrasound for the diagnosis of renal lithiasis. Emergency physician behavior was retrospectively evaluated before (calendar year 1997) and after (calendar year 1998) the rollout of the algorithm. Outcome measures were laboratory and imaging utilization, and type of diagnostic study ordered.

**Results:** One hundred twenty-three ED RC encounters in the before period and 103 in the after period were reviewed. Laboratory utilization rates decreased significantly with the initiation of the RC algorithm (from 80% to 32% for routine laboratory tests,  $P<.05$ ), and from 73% to 39% for urinalysis,  $P<.05$ ). Similarly, imaging utilization decreased by 20% and CT became the choice study in 93% of cases (up from 7% in the before group).

**Conclusion:** Project management can be used in a diverse practice environment (the ED) to swiftly and effectively change physician behavior. Further investigation is warranted to identify improvements in patient flow, efficiency, and cost savings directly related to this model.

### 305 Emergency Medicine Resident Preparedness for the Threat of Weapons of Mass Destruction: Results of a National Residency Program Director Survey

Bonucci PH, Vuletic MA, Smith GM, Johnson ME/Cook County Hospital, Chicago, IL

**Study objectives:** The health threat posed by potential exposure to nuclear, biological, or chemical (NBC) agents, also known as weapons of mass destruction (WMD), is receiving significant public attention. The Nunn-Lugar-Domenici WMD act of 1997 was passed by Congress to address the perceived lack of preparedness among emergency personnel. However, training in WMD has not yet become a required part of the curriculum for emergency medicine residency programs. The investigators believe the first step in addressing this issue should be a needs assessment to identify current activities and deficiencies. Therefore, we surveyed the program directors of all US emergency medicine residencies to determine current educational efforts in WMD and their perception of the preparedness of their residents to manage these threats.

**Methods:** A 1-page survey of emergency medicine residency program directors was developed; the survey included estimated hours of didactic instruction on NBC topics and rating of preparedness of recent graduates to manage incidents in each of these areas using a 5-point Likert scale (1=minimally prepared to 5=well prepared). The survey was telefaxed to 116 allopathic and 26 osteopathic emergency medicine residency programs. Follow-up telephoning and faxing was conducted to increase the rate of response.

**Results:** Ninety-one of 142 program directors completed the survey, representing a response rate of 64%. The estimated training time spent on NBC averaged 11.3 hours per year for all programs responding. The average training time for each component was 1.7 hours nuclear exposure/management, 1.7 hours biological weapons, 2.5 hours chemical, and 5.4 hours disaster management. The composition of this time was 51% lecture, 31% drills, 16% external conferences, and 2% other. Twenty-eight percent of residency programs had discussed NBC topics in journal club during the past 3 years. Program directors rated the level of preparedness of their graduates to manage an incident in each NBC agent as follows: nuclear 2.2 points, biological 2.3 points, and chemical 2.7 points. The percentage of program directors that rated their graduates minimally prepared was 39%, 35%, and 21%, respectively, for each NBC agent, and less than 1% rated their graduates well prepared.

**Conclusion:** This needs assessment is the first phase of a 3-part analysis of the preparedness of emergency physicians to manage medical aspects of WMD threats. Program director responses suggest that in a substantial proportion of emergency medicine residency programs, the training to manage these threats may be inadequate. We suggest that the development of a targeted curriculum and its inclusion in residency programs may enable emergency physicians to better manage the medical aspects of WMD.

### 306 Content and Source of Patient Health Care Education

Woods J, Smith B, Michelin M, Garner G, Paracha M, Zalenski R, Rydman RJ, Roberts RR/Cook County Hospital, Rush University, Chicago, IL

**Study objectives:** Needs assessment is an important step in designing effective patient health education programs. The purpose of this study was to examine the content and source of knowledge about coronary artery disease (CAD) among patients hospitalized for chest pain suspicious for acute coronary syndromes.

**Methods:** This prospective, cross-sectional, face-to-face standardized survey was piloted and conducted in a large urban public teaching hospital emergency department.

Results: Of 80 patients surveyed, 45 (56%) were currently in treatment for the following chronic diseases that increase probability of CAD ("disease risks"): hypertension (46%), diabetes (14%), hypercholesterolemia (23%), or known CAD (17%). When asked what factors increased risk of CAD or myocardial infarction, 56% of the total sample were aware of one or more of the above listed disease risks; 61% cited vices such as smoking, cocaine, or alcohol; and 71% knew of lifestyle factors such as diet, exercise, obesity, and stress. When asked to state what can be done to prevent CAD or myocardial infarction, 46% believed that treatment of disease risks was preventative; 60% believed that reduction in vices such as smoking, cocaine, or alcohol was preventative; and 68% believed that change in lifestyle was effective. Using  $\chi^2$  analysis, there was no significant difference ( $P>.05$ ) in knowledge of risks or prevention among patients who were receiving care for chronic diseases and those who were not receiving treatment. The most common sources of the information patients had received were as follows: mass media 54%; 25% learned from friends or relatives who had been ill; and only 20% had received their information from a physician or nurse. Among patients currently receiving treatment for chronic disease, only 14% cited a physician or nurse as the source of their information. Nearly all patients (94%) wished to receive more health information. Their preferred sources were pamphlet 56%, video 51%, seminar 53%, and their own physician 33%.

Conclusion: We conclude that more health information is useful and desired by patients. However, our findings suggest that health care providers may not be the most effective source of this information. The media was cited most often as providing patients with health education. Collaboration between health care providers and those with expertise in communications could be an effective solution.

### 307 Training for Domestic Terrorism Response in Emergency Medicine Residency Program

Irizarry L, Diner B, Leber M, Mendez A, Brenner B/The Brooklyn Hospital Center, Weill College of Medicine, Cornell University, Brooklyn, NY

Terrorists have the capability to strike anywhere in the world. Recent examples include the World Trade Center and Oklahoma City bombings and the Tokyo subway nerve gas attack. In all 3 cases, emergency departments received >90% of victims. In preparing for potential future needs, emergency residents need to be trained to respond to domestic terrorism and in the management of nuclear, biological, and chemical (NBC) events.

Methods: A national survey of US residency programs ( $n=120$ ) was performed from July 1998 to December 1998. Frequencies and  $\chi^2$  ( $P<.05$ ) were reported on all categorical data.

Results: Response rate was 70% (85/120). Seventy-four (88.1%) residencies had 1 to 4 hours annually of disaster training, but most of these (46/85, 54.8%) did not include a response to domestic terrorism. In fact, 26 (31.0%) devoted just 1 to 2 hours to this annually. Although a total of 46% (38/85) surveyed have received patients involved in actual NBC incidents, only 66% (25/38) of these programs have conducted drills involving NBC events. All 10 (100%) programs in the Far West had NBC disaster drills compared with all other regions (42/75, 56%;  $P=.023$ ). For 66.7% of hospitals, the disaster committee was headed by emergency medicine. Ninety-five percent of respondents believed emergency medicine should take the lead in developing these programs.

Conclusion: The majority of emergency medicine residencies have no didactic NBC teaching programs, no experience with NBC disasters, and have not conducted NBC drills except for Far West programs. The survey suggests that emergency medicine programs are limited in preparing for domestic terrorism.

### 308 Walking Distances During an Emergency Department Shift: A Comparison Between Types of Hospitals and Physician Training Levels

Panacek EA, Woo J/University of California—Davis Medical Center, Sacramento, CA

Study objectives: To determine average walking distances during emergency department shifts.

Methods: This prospective cohort study was conducted during 10 consecutive day-time shifts in EDs at South Sacramento Kaiser Hospital (SKH) and the University of California—Davis Medical Center (UCDMC). Participants were attending physicians and residents. Participants wore pedometers during their ED shift. The pedometers were first calibrated to the individual's stride length and tested for accuracy before study measurements began. Mileage was recorded at the end of each shift.

Results: At UCDMC, EMR-3 residents walked an average of 3.08 miles (SD=0.876)

and EMR-1 residents walked 3.67 miles (SD=0.437), emergency medicine residents at Kaiser walked an average of 3.25 miles (SD=1.56) over a 12-hour period. Attending physicians at UCDMC walked 4.39 miles (SD=1.36) and those at SKH walked 3.31 miles (SD=1.43). Statistical analysis revealed no significant difference between mileage walked at UCDMC and Kaiser, between Kaiser staff and UCDMC staff, Kaiser residents and UCDMC staff, and UCDMC PGY-3 and PGY-1 residents. At UCDMC, attending physicians did walk a longer distance than EMR-3 residents ( $P=.003$ ).

Conclusion: Emergency physicians walk a significant distance during their ED shifts. There is not much difference between walking distances at the 2 EDs studied or by level of training. Emergency medicine attending physicians may actually walk longer distances than do emergency medicine residents.

### 309 What Proportions of Hospital Admissions From the Emergency Department Are Suitable for a Subacute Care Unit?

Wilson AG/William Beaumont Hospital, Royal Oak, MI

Hospital overcrowding quickly leads to emergency department overcrowding.

Study objective: To determine what proportion of admissions from our 91,000-visit ED may be suitable for transfer to a subacute bed in an extended care facility (ECF).

Methods: Our setting is a busy suburban ED with 24,587 (27%) admissions in the last year. Capabilities for patient care in an ECF subacute bed were examined and found to be analogous to a regular medical floor. Criteria to identify admissions possibly compatible with subacute care were developed. Criteria included age more than 15 years, admission to a regular medical floor through the ED, and admitting diagnoses, 17 in all, including deep venous thrombosis, pneumonia, cellulitis, asthma, pyelonephritis, congestive heart failure, uncontrolled diabetes mellitus, osteomyelitis, and detoxification. ED admissions for a 14-day period were screened. The author reviewed ED records of those meeting the screening criteria to determine cases suitable for transfer.

Results: Of 878 admissions during the 14-day study period, 182 (21%) met inclusion criteria. Of those 182, 93 patients were judged compatible. This is an average of 6.6 patients per day or 10% of total ED admissions and 5% of total hospital admissions for the 14-day period.

Conclusion: A significant proportion of ED admissions could be deflected to the less costly option of subacute care in an ECF.

### 310 Value of CPR Training for Friends/Family of Emergency Department Chest Pain Patients

Milzman D, Pitts M, Bullock K, Moskowitz L, Zlidenny A, Janchar T/Georgetown University School of Medicine, Providence Hospital, Washington, DC

Washington, DC, like other urban centers, has reported poor survival rates (<2%) from out-of-hospital cardiac arrest with <5% availability for bystander cardiopulmonary resuscitation (CPR).

Study objective: To determine whether the families of emergency department patients presenting with cardiac complaints are prepared to provide CPR or if they would be interested in training prior to initiating a new ED-based CPR training program for families of chest pain patients while they wait in the ED. The study was conducted in an urban, community teaching hospital with 38,000 annual ED visits. The study used a simple self-administered survey on current availability of bystander CPR, interest in training and knowledge of advanced directives (AD) to any patient/family presenting with chest pain to an ED. Data analysis used  $P$  values <.05.

Results: One hundred sixty-eight consecutive patient/families were surveyed with 97% completion rate. The mean patient age was 48.3 years (95% confidence interval [CI] 43.2 to 53.4) with a 4:5 male/female ratio and 72% of the patients admitted to the hospital. Of all patient/families, 12.5% had current CPR certification and 36.4% claimed to have had CPR training at sometime during their lives, although they were not currently certified; 93.2% volunteered that they would take CPR training if free, decreasing to 56.1% if any payment were involved. Thirty-one percent of those surveyed were geriatric (>60 years), with a mean age 71.8 years and had a decreased bystander CPR availability: 9.1% versus 13.6% for those patient/families less than 60 years ( $P<.05$ ). Thirty-eight percent of geriatric patients had discussed AD compared with 0% of nongeriatric ( $P<.01$ ).

Conclusion: CPR training appears to be very acceptable to these high-risk patients/families; however, current rates of bystander training for these cardiac patients point out deficiencies in implementation. ED-based training programs can be explored to improve survival in urban centers where response to citywide offerings of free training have been poor. A brief presentation on AD may also be made to offer the subset of terminal patients/families an alternative.



## 311 Study of Psychosocial Needs of Young Persons Who Are Victims of Interpersonal Violence

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**Study objectives:** Although emergency departments are treating an increasing number of patients who are victims of interpersonal violence, few are addressing their psychosocial needs as means to prevention. This study describes the needs of victims of interpersonal violence using a psychosocial assessment tool in the ED.

**Methods:** A prospective random sample of young persons ages 10 to 24 years who were victims of life- or limb-threatening interpersonal violence in 1998-1999, excluding domestic violence, sexual assault, and child abuse, were interviewed using the psychosocial assessment tool to determine the needs of young persons. The study was approved by the institutional review board. The youth assessment tool is composed of 12 constructs including exposure to violence, legal issues, drug use/abuse, mental health, gang issues, gun accessibility, learning problems/general equivalency diploma (GED) programs/education, employment, life skills, pregnancy/parenting issues, medical care, and recreational activities. The study site is a community, teaching Level I trauma center. Interview information was entered directly into a computer database. Answers to the constructs determined referrals to medical, mental health, or social service agencies.

**Results:** Seventy-two victims of interpersonal violence were interviewed (mode age 18 years); 86.1% were male, 65.3% African Americans, and 31.9% Hispanic; 76.4% were shot, 12.5% stabbed, and 11.1% were assaulted. Of the victims, 63.9% had been involved with the law, 68.1% use alcohol, and 61.1% use illegal drugs; 39.9% answered yes to at least 1 question in the CAGE assessment. Among the respondents, 41.7% reported feeling sad or down before their injury, and the majority (52.8%) were in a gang; 59.7% of the victims were not in school, did not finish school, or obtain a GED. The top psychosocial needs included educational issues (15.3%), mental health (13.9%), and job (12.5%). A few stated they did not need intervention or were not interested in the assessment (3%).

**Conclusion:** Persons 10 to 24 years who are victims of interpersonal violence have a significant need for psychosocial, medical, and mental health services.

## 312 The Excess of "Case Reports" in the Emergency Medicine Literature

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**Study objective:** As emergency medicine grows as a specialty, emergency medicine research must follow suit, away from case reports to more traditional research. We compared the frequency of case reports in the mainstream medical literature (MSML) with the emergency medicine literature (EML).

**Methods:** A MEDLINE search was performed using the key word "case report." The frequency of the key word appearance in the citations in 4 internal medicine journals (*New England Journal of Medicine*, *Annals of Internal Medicine*, *Journal of the American Medical Association*, and *Lancet*) and 4 surgical journals (*Archives of Surgery*, *Journal of Trauma*, *Annals of Surgery*, and *American Journal of Surgery*) was compared with the frequency of appearance in 4 emergency medicine journals (*Annals of Emergency Medicine*, *Academic Emergency Medicine*, *Journal of Emergency Medicine*, and *American Journal of Emergency Medicine*). The search was conducted for the years 1992-1994 compared with the years 1996-1998.

**Results:** The key word "case report" appeared in 2,054 of a possible 18,506 (11%) citations in the internal medicine journals and 318 of 3,202 (10%) citations in the surgical journals as compared with 530 (26%) citations of 2,013 in the emergency medicine journals from 1992 to 1994. From the years 1996 to 1998, "case report" appeared 1,580 times (9.8%) in 16,073 citations in the internal medicine journals and 380 (11.9%) of 3,204 citations in the surgical journals compared with 585 times (24%) in 2,433 citations in the emergency medicine journals. All the differences between EML and MSML were significant at  $P < .0001$ .

**Conclusion:** Although emergency medicine has begun to move toward more traditional research, case studies continue to make up a disproportionate amount of emergency medicine citations compared with MSML. To achieve academic growth and credibility, emergency medicine should move away from case report publication.

## 313 Loss of Consciousness and Mechanism of Injury Helicopter Scene Triage Criteria and Presence of Neurosurgical Traumatic Injury

Jean R, Amatangelo M, Thomas SH, Wedel S/Boston MedFlight, Harvard Medical School, Boston University Medical School, Boston, MA

**Study objectives:** Helicopter emergency medical services (HEMS) are sometimes dispatched to trauma scenes to transport apparently uninjured patients who are

judged to warrant HEMS because of potential head injury as indicated by loss of consciousness (LOC) or mechanism of injury (MOI) criteria. This study aimed to determine whether use of LOC and MOI as HEMS triage criteria was warranted based on association of these variables with head injury, in motor vehicle crash (MVC) patients without apparent non-head injury.

**Methods:** This was a retrospective consecutive case series, with information obtained from review of flight and medical records, of an urban 2-helicopter EMS program transporting patients using a nurse-paramedic team with off-line medical control, triaged to trauma scenes by field EMS squads. Patients were transported to an urban university-affiliated Level I trauma center. Study patients were 122 consecutive patients triaged to HEMS scene response, who were not hemodynamically unstable (no systolic blood pressure  $< 90$  mm Hg) before HEMS arrival, and who had a minimum Glasgow Coma Scale (GCS) score of 13. Data collected included LOC status (none, possible, definite), MOI triage criteria (head-on collision, ejection from vehicle, rollover, intrusion, occupant death, and extrication), injuries found during trauma center hospitalization, neurosurgical outcome (operative, nonoperative, no head injury), length of stay, and mortality outcome. Primary analysis was with multivariate logistic regression. Multiple models were used ( $P = .05$  for all analyses) in an attempt to identify triage variables or variable combinations that were predictive of head injury, need for neurosurgery, or death.

**Results:** Forty-one (34%) of 122 patients had head injury; 9 (7.4%) required neurosurgery. Only 1 patient (who ultimately had significant trauma) had "possible LOC" as sole reason for HEMS triage. In multivariate logistic regression models, neither "definite" nor "possible" LOC were independently associated with head injury or neurosurgery; the only significant triage criterion was "ejection from vehicle" (odds ratio 4.2, 95% confidence interval 1.3 to 13.5).

**Conclusion:** These data refute contentions that HEMS triage for "possible LOC" is common and represents an overtriage problem. Analysis of mechanism criteria revealed only one parameter—ejection—as having consistently strong association with head injury or need for neurosurgical intervention. The ejection MOI criterion for HEMS triage should be retained, but others should be revisited. Although few patients are triaged to HEMS for LOC, this should probably not be a sole criterion for HEMS scene response.

## 314 The Safety and Efficacy of an Emergency Department-Controlled Interhospital Critical Care Transport Team

Olshaker J, Rolnick M, Bartoo G, Gaasch W, Browne B, Fannin M, Kuo D, Royston A, Clyne B/University of Maryland Medical Center, Baltimore, MD

**Study objective:** To study the efficacy and safety of an emergency department-controlled interhospital critical care transport system.

**Methods:** This was an observational retrospective review of all critical care transport charts during a 1-year period. Data were tabulated on type of sending and receiving locations, airway status before transport, and stability during transport. Emergency and urgent transport team interventions were documented. All interventions were by critical care nurse paramedic.

**Results:** A total of 2,322 critical care patients were transported to our medical center. Three hundred eighty-eight (16.79%) patients were intubated before transport team arrival. The most frequent sending facilities were EDs (979 patients [39.4%]) and medical or surgical ICUs (379 [15.26%]). The most common receiving destinations were our ICUs (592 patients [25.5%]), cardiac catheterization laboratory (311 [13.39%]), the ED (284 [12.23%]), and the trauma center (255 [10.98%]). Only 8 (0.3%) patients deteriorated and required emergency interventions (6 intubations, 1 needle decompression, 1 cardiopulmonary resuscitation [CPR]). Only the patient requiring CPR did not improve. Two hundred nine (9.0%) patients required urgent interventions, the most common being albuterol (69), paralysis or sedation (55), or hypertension treatment (29). One hundred nineteen (56.9%) of the urgent interventions had a positive effect, and 90 (43.1%) had no effect as measured by chart documentation of improvement of vital signs, pulse oximetry, or clinical condition.

**Conclusion:** Our ED critical care transport team safely and successfully transported critical care patients to our tertiary care center.

## 315 Emphasis on EMS Medical Director Positions by EMS Systems Correlates With Greater Medical Director Involvement and EMS System Output

Stone RM, Seaman KG, Bissell RA/University of Maryland Medical Systems, Baltimore County National Study Center for Trauma and EMS, Baltimore, MD

After previous position statements by the American College of Emergency Physicians (ACEP) on medical direction of emergency medical services (EMS) systems,

the National Association of EMS Physicians (NAEMSP) has declared it a standard that EMS systems provide support for medical directors in its recently published position paper, *Physician Direction of EMS*. To date, few data have been published about the degree of emphasis these systems provide to the medical director positions, and any impact of such.

**Study objectives:** This study was conducted to quantify the degree of support for jurisdictional EMS directors (JMDs) by Maryland jurisdictions, and correlate this with their level of involvement using the position paper as a template, as well as the actual output, or features, of each system.

**Methods:** Twenty-two (96%) of 23 JMDs underwent a structured survey, reporting their frequency of involvement in various activities, the parameters in place to support their positions, and features of their systems. An analog scale used the answers to quantify these 3 items with a score, namely the JMD Score, the Emphasis Score, and the Feature Score.

**Results:** Although most (81%) have a clinical supervisor to assist the JMD, only 5 (22%) of the jurisdictions provide a stipend for the JMD. Jurisdictions providing other parameters number from 2 to 9 (9% to 41%). When JMD Scores are plotted in rank order, the other two increase concurrently. Analysis using Pearson's coefficient shows correlation between the Emphasis and the JMD Scores ( $P=.001$ ), and between Feature and Emphasis Scores ( $P=.017$ ).

**Conclusion:** Greater support for JMD positions correlates with enhanced EMS system output. These data show that greater emphasis on JMD positions is more likely to allow the degree of involvement outlined by the position paper, and thus enhance EMS systems.

## 316 Paramedic Identification of Acute Stroke

Eckstein M, Kidwell C, Starkman S, Weems K/University of Southern California School of Medicine, The Los Angeles Prehospital Stroke Study (LAPSS) Study Group, UCLA Medical Center, Los Angeles, CA

Eligibility for thrombolytic therapy for acute stroke is time-critical. Paramedics must play a vital role in accurately identifying acute stroke patients to expedite their care.

**Study objective:** To determine the accuracy of paramedic identification of acute stroke before implementation of a training program on stroke recognition and treatment.

**Methods:** Emergency medical services (EMS) and hospital records were reviewed for all patients presumptively identified with acute stroke by Los Angeles City Fire Department (LAFD) paramedics from January 1, 1996, through December 31, 1996. The LAFD provides a 2-tiered EMS system serving a population of 3.7 million. The major data elements included emergency department diagnosis, computed tomography (CT) findings, and discharge diagnosis.

**Results:** During the study period, 778 patients met the inclusion criteria, and 338 (43%) of the hospital records were available for review. A discharge diagnosis of stroke or transient ischemic attack (TIA) was made for 296 (88%) patients. Of the actual strokes, 156 (75%) were ischemic and 52 (25%) were hemorrhagic. Among the remaining 42 patients, sepsis, syncope, seizures, metabolic abnormalities, and hypertension were the most frequent alternate diagnoses. Eight (1%) patients required paramedic-level interventions, including 7 who received intravenous glucose and 1 who was intubated.

**Conclusion:** Paramedics accurately identified most patients with stroke or TIA. Additional training should emphasize differentiation from common stroke mimics to better discern those patients who may be eligible to receive thrombolytic therapy.

## 317 Prehospital Resuscitation Practices: A Survey of Prehospital Providers

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**Study objectives:** Although prehospital resuscitation practices are often dictated by local protocol, numerous factors affect the application of such protocols to decisions regarding initiation, continuation, and termination of resuscitative efforts. This study was undertaken to determine resuscitation practices, compliance with protocols, and factors affecting decisionmaking in the prehospital setting.

**Methods:** This study is a cross-sectional survey. Participants include prehospital providers attending a national meeting. The survey included questions regarding termination and withholding of resuscitative efforts in the prehospital setting, as well as survival rates, local protocols, and compliance with advance directives.

**Results:** Of 217 respondents, with a mean 9.0 years of experience, most (79.7%) indicated that they would withhold resuscitative efforts in the presence of an official

state-approved advance directive. Although most (76%) have established local protocols, only 54% considered these protocols adequate. If only an unofficial document or a verbal report of an advance directive were available, most (91.7%) would proceed with resuscitative efforts. However, most (97.5%) would like to see changes in current practices in 3 particular areas: increased autonomy of prehospital providers in the field termination of resuscitative efforts, improved patient education, and improved physician-patient communication regarding advance directives.

**Conclusion:** Although most prehospital providers honor only official state-approved advance directives currently, a majority would like more autonomy in decisionmaking. This study supports the institution of improved clinical guidelines regarding the prehospital termination of resuscitative efforts.

## 318 Out-of-Hospital Provider Beliefs Regarding Use of Red Lights and Sirens

Funk DL, Triner W, Green S/Albany Medical College, Albany, NY

**Study objectives:** Emergency medical services (EMS) often use red lights and sirens (RLS) when responding to calls, believing that their use saves time. Accident data demonstrate increased risk of collision and injury when RLS are used. Our objective is to describe EMS providers' perception of the risks and benefits associated with RLS use.

**Methods:** This was a prospective, cross-sectional survey of EMS providers in area urban, suburban, and rural EMS agencies. A convenience sample of emergency vehicle drivers attending regional training events comprised the study group. Subjects reported level of EMS training, years of experience, driver safety training, type of vehicle driven, and usual territory. In addition, they indicated perceived effect of RLS on response time and risk of collision. Data are described in terms of percentages with  $\chi^2$  used where appropriate.

**Results:** A total of 99 surveys were returned. Most respondents were EMT-Paramedics (41%) or EMT-Basics (35%). Seventy-one percent of respondents had more than 5 years of experience; 66% had completed a driver safety course. Most (78%) drove an ambulance or first-response vehicle primarily, whereas 21% drove a fire truck most often. Fifty-eight percent drove in a suburban area, 23% urban, and 19% rural. Sixty percent believed that RLS saved "significant time." Urban drivers and drivers of fire trucks were more likely to believe that RLS saved time ( $P<.05$ ). No other demographic factors were associated with answers to this question. "Significant time" saved was defined as less than 1 minute by 15% of respondents, 1 to 2 minutes by 27%, 2 to 3 minutes by 16%, and more than 3 minutes by 41%. Thirty-three percent of drivers thought RLS saved less than 1 minute, 37% 1 to 2 minutes, 16% 2 to 3 minutes, and 14% more than 3 minutes. Twenty percent of drivers surveyed believed RLS had no effect on collision risk. No demographic variables were associated with this response.

**Conclusion:** Most drivers surveyed believed RLS save significant time. This belief did not correlate with level of training, years of experience, or driver safety training, but was more common among drivers of fire trucks and urban drivers. A significant number of emergency vehicle operators did not believe RLS increased collision risk.

## 319 Safety of Managed Care Organization Directed Interfacility Transfer of Cardiac Patients

Maravelli A, D'Angelo J, Kupas D, Dula D/Geisinger Medical Center, Danville, PA

**Study objectives:** Managed care organizations (MCOs) routinely attempt to retrieve their patients from out-of-system facilities to participating facilities. This study evaluates the safety of managed care repatriation of cardiac patients with respect to the incidence of predetermined complications.

**Methods:** The study site was a rural tertiary care medical center associated with a managed care organization with more than 200,000 members in more than 40 counties. The MCO repatriation process includes out-of-system physician consultation with a MCO emergency physician and a transfer network capable of air and ground interfacility transports. Patients were included if they were transferred to the MCO's tertiary care hospital over a 14-month period with a transfer diagnosis of chest pain, stable or unstable angina, or myocardial infarction. Records were retrospectively reviewed for objective, predefined transfer complications including hypotension, bradycardia, specific dysrhythmias, chest pain, and the need for various interventions, either during transport or within 3 hours of arrival.

**Results:** The 40 study patients had the following discharge diagnoses: angina (12), acute myocardial infarction (14), non-Q-wave myocardial infarction (5), and noncardiac etiologies of chest pain (9). Seventeen patients were transported by ground advanced life support ambulance, and 23 patients were transported by helicopter with

an average 62-minute transport time. Complications included recurrence of chest pain (11 patients), hypotension (3 patients), and bradycardia (1 patient). Only one of the patients had persistent chest pain after appropriate treatment, and this patient required emergency angioplasty. This patient was transferred from a facility that could not provide cardiac catheterization. Within 3 hours of arrival at the tertiary care facility, 4 patients had cardiac catheterization and 2 of these had angioplasty. All patients requiring emergency catheterization were repatriated from facilities that did not have the ability to perform cardiac catheterization. Three patients who were hypotensive at the original facility had additional hypotension during transfer. Two of these patients were at community hospitals and would have clinically required transfer to tertiary care. During transfer, 1 patient experienced bradycardia that was not hemodynamically significant.

**Conclusion:** From this limited number of managed care patients repatriated for presumed cardiac disease, the most common complication of transfer was recurrence of chest pain. The transport crew adequately treated all complications, and all of the patients requiring emergency catheterization were received from hospitals that lacked the ability to perform catheterizations.

## 320 Sildenafil Citrate: Changes in Paramedic Practice?

Reed D, Ho JD, Gough JE, Brown LH/State University of New York, Health Science Center at Syracuse, Syracuse, NY; Hennepin County Medical Center, Minneapolis, MN; East Carolina University School of Medicine, Greenville, NC

**Study objective:** Sildenafil citrate (SC), a new medication for erectile dysfunction, has been associated with hypotension and death in patients who use nitrates. Use of nitrates for chest pain (CP) patients who have had SC within 24 hours is contraindicated. A prior study revealed that on-line physicians do not routinely screen for SC use when ordering prehospital nitrates. We surveyed emergency medical technician-paramedics (EMT-Ps) to determine whether SC use influences their management of CP patients.

**Methods:** An anonymous survey was distributed to all full-time EMT-Ps in 3 EMS systems.

**Results:** Ninety-four (45%) of 210 paramedics responded. Fifty-five (59%) reported they had received specific guidelines for CP patients on SC. SC-related changes in CP protocols were reported by 16 (17%). Forty-seven (50%) reported that they specifically screen for SC use. Seventy-six (81%) had never identified a CP patient on SC; 17 (18%) estimated that 10% of their CP patients had used SC. Sixty-eight (72%) reported that SC use would influence the medications they would use for CP patients.

**Conclusion:** In these 3 EMS systems, EMT-P management of CP patients on SC varies. Half of the EMT-Ps in this survey do not screen CP patients for SC use, and more than a quarter reported that SC use would not influence the medications they administer to CP patients.

## 321 In-flight Defibrillation by Cabin Attendants: Varig's Experience

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Varig is the largest airline company in Latin America and one of the oldest in operation, being founded in 1926. With 17,000 employees and 117 aircrafts, Varig is a little smaller than the well-known SAS. Varig flies to 87 domestic and 35 international destinations. Brazil is a very large country and some domestic distances are very long; it also has some poor regions, like the Amazon, with very limited medical and aeronautical resources. There is no doubt the number of in-flight medical emergencies has increased in the last few years. This is particularly due to the fact that elderly people are traveling more, because they are stimulated to do so, they have time to do so, and they are actually living longer. Sudden cardiac events are the most frequent serious conditions that occur on board. Varig's experience has been an increasing number of events: a means of 15 medical emergencies on board a month, defined as the need to call a doctor during the flight. Unfortunately, there were 5 deaths on board last year, and already 2 deaths in 1999 (and 1 used automated external defibrillator).

**Methods:** Varig trained 20 instructors (15 physicians and 5 first-aid lay instructors) in the American Heart Association (AHA) Heart Saver plus AED course with the goal of training 400 pursers.

**Results:** A total of 356 persons were actually trained with a 1:3 instructor/student

ratio; 53% did not read the course material; 17% read the entire book; 100% recommend the course; and 13% want to be Basic Life Support instructors. On the written test, the average raw score was 75%±9.7% correct. After the elimination of 4 problematic questions, the average score was 88%±9.1% and only 3 participants scored below 80%. Future steps include tests for retention, skills, and theory (quality assurance); retraining problematic cases; continue training for 300 flight attendants on an emergency basis; continue training for cabin supervisors; and simulation studies on real aircraft.

**Conclusion:** In-flight cardiac arrests present one of the most challenging issues in resuscitation. The chain of survival concept clearly has some weak links in aircraft. Saving lives on board requires commitment of the whole aviation community and the supporting institutions.

## 322 Endocrine Markers as Predictors of Outcome in Elderly Patients Admitted Through the Emergency Department With Febrile Illnesses

Hlibczuk V, Silber S/New York Methodist Hospital, Brooklyn, NY

**Study objective:** The objective of this pilot project is to determine whether endocrine markers (thyroid, adrenal, and gonadotropin) drawn on initial presentation to the emergency department can predict length of hospital stay and mortality in elderly patients admitted with febrile illnesses. The importance of this study is to determine if endocrine function can be used to predict which elderly febrile patients might require more intensive clinical management.

**Methods:** We performed a prospective observational study of all patients 60 years of age or older admitted to the hospital through the ED with temperature 38.3°C (101°F) or higher. Serum levels of thyroid function (total triiodothyronine [T3], free thyroxine [T4], thyroid-stimulating hormone [TSH]), adrenal function (serum cortisol), and gonadotropins (follicle-stimulating hormone [FSH], luteinizing hormone [LH]) were drawn in the ED. Patients with prior history of endocrine disease or previous enrollment in the study were excluded. Outcomes measured were length of stay in the hospital and mortality. Multiple linear regression analysis was used to determine the effect of all combined variables on length of stay in survivors. Each variable was analyzed separately comparing survivors with nonsurvivors using Student's independent *t* test. Differences were considered significant when *P* < .05.

**Results:** Sixty-five patients were entered into the study. Fifty-three survived and were discharged from the hospital. The mean serum cortisol levels were elevated in both survivors and nonsurvivors (upper limit of normal 29 µg/dL). The mean cortisol value was significantly higher in nonsurvivors (40.6 µg/dL) than in survivors (29.5 µg/dL; *P* = .036). Female survivors showed a trend (*P* = .129) of higher mean FSH (37.99 mIU/mL) compared with nonsurvivors (16.43 mIU/mL) with normal values ranging 27 to 133 mIU/mL. A significant inverse relationship was found between length of stay and T3 levels in survivors (*P* = .008). However, when comparing laboratory normal T3 values with abnormal T3 values, no significant difference was found.

**Conclusion:** Our study suggests that hormonal levels had a significant correlation on length of stay and survival in elderly patients admitted through the ED with a febrile illness. Further studies need to be performed to determine the clinical application of these findings.

## 323 Emergency Department Revisit-Admissions for Ectopic Pregnancy: A Case Series and New, Evidence-Based, Diagnostic Protocol

Kohn MA, Kaplan BC/San Francisco General Hospital, University of California, San Francisco, CA

**Study objectives:** To identify problems with the standard protocol for diagnosing ectopic pregnancy (EP) in the emergency department patient with first-trimester pain or bleeding, and to develop a new, evidence-based protocol.

**Methods:** Phase 1 of the study was a retrospective review of all 7-day revisits to the ED that resulted in hospitalization for EP in 1998. Phase 2 involved application of the new protocol suggested by phase 1 to an existing (August 1991 to September 1992) database of 62 ED patients with first-trimester pain or bleeding and human chorionic gonadotropin (HCG) levels less than 1,800 mIU/mL. The study was conducted in urban, public, teaching hospitals. Observations: Number of additional ultrasound procedures and hospital admission required to detect all ED patients with EP.

**Results:** We identified 7 revisit-admissions among a total of 36 admissions for EP through our ED. Of the 7 cases, 3 had an initial HCG level less than 1,800 mIU/L and, per standard protocol, were discharged with 48-hour follow-up. On revisit, 2 of these

3 EPs were ruptured. Review of these cases suggested a new protocol that requires establishing a diagnosis on the initial ED visit or hospitalizing the patient. Application of the new diagnostic protocol to patients with HCG levels less than 1,800 mIU/mL would entail ultrasounds on an additional 16%; it might entail the unnecessary admission of up to 42%; but it would also prevent discharge of the 27% with EP.

**Conclusion:** To prevent the significant morbidity associated with delayed diagnosis of EP, the protocol for patients with first-trimester pain or bleeding, and HCG levels less than 1,800 mIU/mL, should include intravaginal ultrasound and, if the ultrasound is indeterminate, further diagnostic workup, possibly including hospital admission.

## 324 The Use of Noncardiac Laboratory Tests in an Emergency Department Chest Pain Center

Kosowsky JM, Storrow AB, Liu T/University of Cincinnati College of Medicine, Cincinnati, OH

**Study objective:** To determine, in a population of low- to moderate-risk chest pain patients, the frequency with which noncardiac laboratory tests are ordered, and the frequency with which such testing yields abnormal results.

**Methods:** A representative sample from among 285 patients enrolled in an emergency department-based chest pain center (CPC) during the calendar year 1997 was used for retrospective review. The incidence of specific noncardiac laboratory testing, including CBC count, biochemical profile (CHEM-7), and coagulation profile (prothrombin time [PT]/partial thromboplastin time [PTT]), was determined. Results were defined as abnormal if they fell outside the laboratory reference ranges. Descriptive statistics were used with 95% confidence intervals (CI) calculated by exact methods.

**Results:** Of 150 patients sampled, 146 (97.3%, CI 92.9% to 99.1%) had at least 1 set of noncardiac laboratory tests ordered (CBC count 96%, CHEM-7 96%, PT/PTT 64.7%); of these patients, 115 (78.8% CI 71.1% to 84.9%) had at least 1 abnormal test result (CBC count 35.4%, CHEM-7 66.0%, PT/PTT 15.5%). The most common specific laboratory abnormalities were hyperglycemia (glucose >105 mg/dL, range 106 to 378 mg/dL), which was found in 38.2% of patients tested, and anemia (hematocrit <40% for men, <35% for women; range 23.1% to 39.0%), which was found in 18.8% of those tested. The likelihood of having at least 1 abnormal test result was independent of the age or sex of the patient ( $P>.05$ ).

**Conclusion:** In this CPC population, screening laboratory tests are frequently ordered, and abnormalities are encountered at substantial rates. However, these rates are comparable to those reported in previous studies, which have concluded that routine screening tests have little utility in a wide variety of clinical settings.

## 325 Child Abuse and Neglect Presentations to a Pediatric Emergency Department

Keshavarz R, Kawashima R, Low C, Mahadeo R/St. Joseph's Hospital, Paterson, NJ; Mount Sinai Hospital, New York, NY

**Study objective:** Few previous studies have examined children presenting with suspected abuse and neglect to an emergency department. This study describes the epidemiology of reported abuse (physical, sexual, and neglect) in a teaching, metropolitan pediatric ED (PED) with approximately 30,000 annual visits.

**Methods:** We performed a retrospective chart review of all cases from the PED that were referred to the Department of Social Work and reported to the state child protective services (ACS) from April 1995 through December 1998. Demographic information about the victims, as well as medical history, number of previous PED visits, information about the perpetrator, and the nature of the injuries, was obtained.

**Results:** We identified 106 cases over this period that were reported for child abuse or neglect from the PED. Fifty-five percent of cases were reported for suspected physical abuse, 15% for sexual abuse, and 30% for neglect. The suspected perpetrator was the mother in 41% of cases and the father in 21% of cases. Bruises were the most frequent injury reported, seen in 25% of cases. The mean age of the patients was 6.4 years old. They averaged 4.6 previous PED visits, and most patients lived near the hospital. Fifty-five percent of the patients presented for care between the hours of 5 PM and 9 AM. Most of the patients claimed their primary physician was located in a clinic near their home (44%) with only 12.7% being unsure of their primary physician. More victims (89%) had Medicaid or no insurance than other patients in the PED (71%).

**Conclusion:** The incidence of reported abuse and neglect was lower than previous studies have shown. Unpublished data from other hospital sources have also noted this decrease in incidence over the past 5 years. Most cases occurred after regular business hours implying the need for 24-hour a day child protective services. The victims

were very frequent emergency services utilizers, despite the majority reporting a primary care physician being located in close proximity of the hospital. The parents were the alleged perpetrator in two thirds of cases. The majority of reported cases (especially those of sexual abuse) did not have any physical findings at the time of presentation, stressing the need for a high index of suspicion for both abuse and neglect.

## 326 The Value of Measured Anticonvulsant Levels in Patients With Known Seizure Disorder Who Admit Noncompliance With Medications

Valls EM, Paula R, Caplan C/LSU Emergency Medicine, Charity Hospital, New Orleans, LA

**Study objective:** From January 1998 to December 1998, 221 patients were seen in the emergency department with the diagnosis of seizure. Every patient brought to the ED with the chief complaint of seizure who is taking antiseizure medication has an anticonvulsant level measured regardless of whether the patient reports noncompliance. We sought to correlate patients' reports of medication noncompliance with actual measured levels.

**Methods:** This prospective nonrandomized, cohort study was conducted over a 7-month period in an urban, teaching ED. Inclusion criteria were chief complaint of seizure, alert status, orientation to person, place, time, and admitted medication noncompliance. Exclusion criteria were medication compliance, age less than 16 years, Glasgow Coma Scale (GCS) score less than 15, HIV-positive status, fever, new onset or change in seizure pattern. Other data obtained included medication, frequency, dose, and last reported dose. Patients were grouped according to the duration of reported noncompliance.

**Results:** The study results are presented in the Table.

**Conclusion:** Patients with seizures as the only complaint for their ED visit with a history of 1 or more days of medication noncompliance need anticonvulsant levels drawn. Except for one, all patients who reported medication noncompliance of more than 2 days showed subtherapeutic levels (49/51 <2.5  $\mu\text{g/mL}$ ). This first patient was evaluated by a neurologist, diagnosed with pseudoseizures, and admitted. In general, patient history of medication noncompliance can be trusted but it is valuable to measure anticonvulsant levels. The savings (\$25 per test) of not determining anticonvulsant levels were offset by the one patient who falsely reported compliance and required admission because of iatrogenic intoxication.

Table, abstract 326.

	Days of Noncompliance				
	0-1	2-7	7-30	30+	Unknown
Therapeutic (N=10)	9	0	0	1	0
Subtherapeutic	13	19	15	10	7
<b>Total (n=74)</b>	<b>22</b>	<b>19</b>	<b>15</b>	<b>11</b>	<b>7</b>

## 327 Aggressive Emergency Department Management of Diabetic Ketoacidosis Can Reduce ICU Admissions and Hospital Costs Without Adversely Impacting Outcomes

Dunbar LM, Gonzaba WT, DeSoto D, Zaheri K, Sibley D, Thompson H/Louisiana State University Medical Center, New Orleans, LA

**Study objectives:** Aggressive emergency department care is known to affect the disposition and cost for a number of diagnoses including chest pain, congestive heart failure, and asthma. However, diabetic ketoacidosis (DKA) is traditionally managed in the ICU setting. Our purpose was to assess disposition, outcome, and cost for patients in DKA managed in a large, inner-city, university-affiliated ED where prolonged care is the norm of clinical practice.

**Methods:** This is an observational, retrospective study of patients in DKA with a complete database available from January 1994 to March 1995. All patients received intravenous hydration, intravenous insulin, and other indicated therapy. The study included 61 patients (21 females, 40 males); mean patient age was 34.5 years. Parameters assessed were initial serum pH,  $\text{Pco}_2$ ,  $\text{HCO}_3^-$ , glucose, final ED  $\text{HCO}_3^-$ , glucose, disposition (ICU versus floor), and length of stay. Patients were grouped by



initial pH class. A 2-way analysis of variance was done with each parameter as the dependent variable and pH class and disposition as independent variables. InterQual criteria for ICU admission were used to assess likely disposition from a routine ED visit. The difference in disposition was the basis for cost analysis.

**Results:** Fifteen of 61 patients were admitted to the ICU after initial high-severity ED management including all 7 with serum pH less than or equal to 7.00, 5 of 10 with pH less than or equal to 7.10, 2 of 17 with pH less than or equal to 7.20, and 1 of 27 with pH greater than or equal to 7.21. Factors that had a statistically significant effect on disposition were initial pH and  $\text{HCO}_3^-$ ; glucose levels did not. There was no significant difference in ED stay between ICU and floor admission. One patient with pH less than 7.00 died of sepsis in the ICU. All others were discharged from the hospital. Mean stay in ICU was 2 days. Fifty-six of the 61 patients met InterQual criteria for ICU admission; 41 of these were diverted to a regular floor after aggressive management in the ED without adverse effect on outcome.

**Conclusion:** We estimate a reduction in charges of \$65,600 for care of these 61 patients.

## 328 Evaluation of Physical Examination in Determining the Outcomes of Ultrasound for Deep Vein Thrombosis

Chan L, Reilly KM/Albany Medical College, Albany, NY

**Study objective:** To evaluate the ability of physical examination to determine the results of ultrasound (US) for deep vein thrombosis (DVT).

**Methods:** Our tertiary care emergency department has an annual census of 59,000 with a diverse racial and socioeconomic population. This was a retrospective chart review of ED patients who underwent US to diagnose DVT. Charts were identified by the radiology computer system. Age, sex, and the presence or absence of the following physical examination findings were recorded: extremity edema, vein distention, extremity tenderness to palpation, extremity erythema, extremity warmth, calf pain on passive dorsiflexion of the toe, and palpable cord. The outcomes of the US study were recorded as well. Charts were excluded if the US results could not differentiate between chronic and acute DVT. The physical examination was considered positive if any one or more of the physical signs were present. The sensitivity and specificity of physical examination for DVT by US diagnosis were calculated. Positive and negative predictive values of physical examination to predict the results of US for DVT were also calculated. The odds ratio was determined as well.

**Results:** The charts of 186 patients were reviewed. Thirteen charts were excluded because of US inability to determine between acute and chronic DVT. One hundred seventy-three charts (67 males and 106 females) were evaluated. The mean age was  $55.0 \pm 18.9$  years. Ultrasound diagnosed 43 cases of acute DVT and ruled out 130 cases of DVT. Physical examination had a sensitivity of 95% (95% confidence interval [CI] 92% to 98%); specificity of 31% (95% CI 24% to 38%); positive predictive value of 31% (95% CI 24% to 38%); and negative predictive value of 95% (95% CI 92% to 98%). The odds ratio was 9.11.

**Conclusion:** A negative physical examination was reliable and predictive of a negative US result for DVT. Presence of physical examination findings was not reliable or predictive of US results for DVT.

## 329 Patient Preferences Regarding Pain Medication in the Emergency Department

Beel TL, Mitchiner JC, Frederiksen S, McCormick J/St. Joseph Mercy Hospital, Ann Arbor, MI

Previous studies have shown that pain control in the emergency department is inadequate.

**Study objectives:** To determine the proportion of ED patients with acute fractures who want pain medication, the level of pain present on ED admission and desired at ED discharge, and the manner in which these patients want pain medication given.

**Methods:** A convenience sample of 107 adults with acute long-bone fractures seen in a community hospital ED completed a brief 8-item pain questionnaire. Patients with head injury, multiple trauma, fractures more than 6 hours old, questionable fractures, prehospital pain control, evidence of intoxication, or inability to answer questions were excluded. The questionnaire asked patients to score their pain level on ED admission and the level of pain desired at discharge on a 100-mm visual analog scale, and to answer 6 questions.

**Results:** Eighty-eight percent of the patients wanted pain medication given in the ED, and 77% actually received it. Sixty-nine percent were comfortable with a nurse administering pain medication before being seen by a physician. Preferred routes were as follows: intravenous 40%, orally 34%, intramuscular 20%. Seventy percent wanted pain control without being sedated, and 25% wanted complete pain relief even if sedation was necessary to achieve it. Sixty percent of patients were either slightly concerned or not concerned about potential medication side effects.

**Conclusion:** More than 8 of 10 patients with acute fractures want pain medication given while in the ED, and 7 of 10 would accept pain medication administered by a nurse before physician evaluation.

## 330 What Does "Risk of MI" Mean to the Emergency Physician? Results of an Observational Study

Feldman J, Wallace E, Berty C, Mitchell P, Fish S/Boston Medical Center, Boston University School of Medicine, Boston, MA

Previous research has demonstrated that non-emergency physicians' estimates of risk varied widely and that the estimates of risk correlated positively with testing decisions.

**Study objective:** To determine the emergency physician variability in the quantification of 4 categories of estimated probability of myocardial infarction (MI), and to determine the relationship between estimated probability of MI and disposition decisions.

**Methods:** We performed an observational study using a questionnaire given to all emergency medicine faculty at an urban Level I trauma center with an established emergency medicine residency program. The instrument required study subjects to define a range of probability of MI for a 4-group risk classification (very low, low, medium, high) and to determine the appropriate ED disposition based on the estimated probability of MI (home, telemetry/chest pain unit [CPU], coronary care unit [CCU]). We recorded gender and years of emergency medicine experience for all subjects. Years of experience were dichotomized as less than or equal to 5 years (junior) and more than 5 years (senior). Means and SDs were calculated for the cut points between each risk category. We evaluated the effect of gender and experience on risk cut points and triage cut points with a *t* test (2-sided,  $\alpha=.05$ ). The very low risk cut point was compared with estimated MI risk for discharge home.

**Results:** All 24 physicians responded. Of these, 5 (21%) were female; 12 (50%) were seniors in terms of experience. Each cut point for risk classification demonstrated substantial variability: very low to low  $3.5\% \pm 2.7\%$ ; low to medium  $12.1\% \pm 7.9\%$ ; medium to high  $48.9\% \pm 23.5\%$ . The mean estimated probability of MI that would support direct ED discharge to home was  $2.3\% \pm 3.0\%$ ; to CCU  $45.2\% \pm 28.7\%$ . We found that female gender was associated with higher risk cut points (very low to low mean  $6.2\%$  versus  $2.8\%$ ,  $P=.009$ ; low to medium mean  $17.2\%$  versus  $10.8\%$ ,  $P=.11$ ) and MI estimate for discharge to home ( $4.5\%$  versus  $1.9\%$ ,  $P=.08$ ), whereas years of experience was not associated with lower risk probability cut points ( $P>.07$  for all cut points). Fourteen physicians indicated a lower threshold for home discharge than their very low to low cut point, whereas 3 indicated a higher acceptable MI risk for home discharge.

**Conclusion:** Emergency physicians demonstrate great variability when assigning absolute numerical values to commonly used risk categories of estimated probability of MI. Women tended to have higher cut points for very low and low risk of MI categories and higher estimated MI risk for discharge to home. Further research is required to determine the effect of physician risk estimates on testing and triage for patients with possible acute cardiac ischemia.

## 331 Inhaled Corticosteroids in Acute Asthma: A Systematic Review of the Literature

Edmonds ML, Camargo CA Jr, Pollack CA Jr, Rowe BH/University of Alberta, Edmonton, Alberta, Canada; Massachusetts General Hospital, Boston, MA; Maricopa Medical Center, Phoenix, AZ

**Study objectives:** The use of inhaled corticosteroids in asthma is increasing; however, their benefit in the acute setting is unclear. This systematic review was designed to determine the benefit of inhaled corticosteroids for acute asthma in the emergency department.

**Methods:** Randomized controlled trials (RCTs) were identified using the Cochrane Collaboration's Airways Review Group database, hand searching, bibliographies, pharmaceutical company, and author contact. Studies in which an inhaled corticosteroid was compared with placebo or any corticosteroid were considered. Relevance, inclusion, and study quality were assessed independently by 2 reviewers.

**Results:** From 396 identified references, 7 were included. Six of the trials were

published after 1994; overall, study quality was high but trials were not large (maximum 111 patients). Four trials included only adults; 3 trials included only children. Three studies compared inhaled corticosteroids with corticosteroids; 2 studies compared inhaled corticosteroids plus corticosteroids with corticosteroids, and 2 studies compared inhaled corticosteroids alone versus placebo. Various outcome measures were used, including pulmonary function tests, clinical scores, admission rates, and incidence of adverse side effects. Despite the marked differences in study characteristics, results suggest a homogeneous decrease in admissions with inhaled corticosteroid treatment (odds ratio 0.46, 95% confidence interval 0.27, 0.79).

Conclusion: Recent interest in the use of inhaled corticosteroids in the ED has led to a number of small studies with disparate study characteristics. Individually, studies have not demonstrated a clear benefit with addition of inhaled corticosteroids to standard therapy; however, pooled analyses suggest a beneficial effect of inhaled corticosteroids. To clarify this issue, a large RCT of inhaled corticosteroid use in the ED is needed.

### 332 Intravenous Magnesium Sulfate in the Treatment of Severe Asthma: A Systematic Review of the Evidence

Rowe BH, Michaud J, Bourdon C, Bota GW, Camargo CA Jr/University of Alberta, Edmonton, Alberta, Canada; Sudbury Regional Hospital, Sudbury, Ontario, Canada; Massachusetts General Hospital, Boston, MA

Study objectives: To determine the effect of intravenous magnesium sulfate (Mg) for treatment of patients with acute asthma managed in the emergency department.

Methods: Computerized, hand, and bibliographic searches identified randomized controlled trials (Mg versus placebo); the author contact produced additional studies. Outcomes included pulmonary function tests, admissions, and adverse effects. Selection, data extraction, and quality assessments were conducted independently by 2 reviewers. Studies were pooled using weighted mean differences (WMDs) or odds ratios (ORs) with 95% confidence intervals (95% CIs).

Results: From 91 references, 7 trials were included (5 adult, 2 pediatric); a total of 665 patients have been studied (337 Mg; 328 placebo). Overall, patients receiving Mg demonstrated nonsignificant improvements in peak expiratory flow rate (PEFR) (WMD=29.4; 95% CI -3.4 to 62) and % predicted FEV<sub>1</sub> (WMD=4.3; 95% CI -2.3 to 10.9). For patients with severe asthma, Mg improved both PEFR (WMD 52.3; 95% CI 27 to 77.5) and % predicted FEV<sub>1</sub> (9.8; 95% CI 3.8 to 15.8). Likewise, Mg did not significantly reduce admissions overall (OR=0.31; 95% CI 0.09 to 1.02) but did reduce admissions among severe patients (OR=0.10; 95% CI 0.04 to 0.27). Mg was generally very well tolerated.

Conclusion: Current evidence does not support the routine use of intravenous Mg in all patients presenting to the ED with acute asthma. However, Mg appears beneficial in patients who present to the ED with severe asthma, and its use should be incorporated into practice guidelines.

### 333 Edentulism Worsens Obstructive Sleep Apnea

Pivetti S, Navone F, Urbino R, Bonetto C, Colagrande P, Arienti A, Preti G, Carossa S, Gai V/Medicina d'Urgenza, A O San Giovanni Battista, Torino, Italy

Obstructive sleep apnea (OSA) has a prevalence of 2% to 4% in the general population, but it is estimated that 61% of subjects older than 50 years meet the minimum criteria for OSA (apnea/hypopnea index [AHI] >5), with potentially life-threatening consequences. OSA correlates with diurnal systemic hypertension, bradycardic and tachycardic arrhythmias, sudden death, pulmonary hypertension, and chronic respiratory failure. Although craniomandibular abnormalities have been recognized as risk factors for OSA, the role of edentulism has never been systematically investigated.

Study objectives: We investigated whether edentulism is associated with increased risk for OSA.

Methods: We examined 20 edentulous patients wearing complete mobile dentures, 11 with OSA (7 men and 4 women) and 9 without OSA (3 men and 6 women). The 2 groups had similar age (mean age 64 years) and body mass index. All patients underwent 2 full nights of polysomnography (continuous recording of electroencephalography, electromyography, electrooculography, ECG, nasal airflow, body position, thoracic and abdominal respiratory efforts, and oxyhemoglobin level [Sao<sub>2</sub>]) on 2 consecutive nights, one with and one without dentures, in randomized order. OSA was

defined as more than 5 episodes of apnea or hypopnea per hour of sleep (AHI >5). The anteroposterior pharyngeal wall distance (A-PphwD) with and without dentures was assessed by cephalometry.

Results: As shown in the Table, in OSA patients, sleeping without dentures was associated with a significant increase in the AHI (9.4±3.3 versus 16.2±12; *P*<.01), a larger number of apneas (6.9±2.3 versus 18.9±3.9; *P*=.02), a larger number of hypopneas (16.8±3.1 versus 31.2±5.8; *P*<.02), lower mean Sao<sub>2</sub> (92.5%±1.4% versus 88.9%±1.4%; *P*<.02), lower nadir Sao<sub>2</sub> (86.8%±1.6% versus 81.4%±2.1%; *P*<.01) and with a significant decrease in retropalatal space (1.40±0.2 cm versus 0.9±0.1 cm; *P*<.05). AHI was closely related to systemic blood pressure (*r*=0.77, *P*<.01), awake Pao<sub>2</sub> (*r*=-0.63, *P*<.05) and Paco<sub>2</sub> (*r*=0.67, *P*<.05). Sleeping without dentures produced disordered breathing also in patients without OSA; in these patients the only significant finding was a higher number of apnea episodes and AHI (*P*=.05).

Conclusion: These findings indicate that edentulism may dramatically worsen OSA severity and favors sleep-disordered breathing. Considering the potentially life-threatening consequences of OSA, our findings seem to be of clinical relevance in ED. Edentulism patients at risk for OSA, such as the elderly, obese patients, and snorers, should be advised to wear dentures while sleeping.

Table, abstract 333.

Variable	With OSA		Without OSA	
	With Dentures	Without Dentures	With Dentures	Without Dentures
AHI	9.4±3.3	16.2±12*	0.86±0.27	1.06±0.4†
Apneas (No.)	6.9±2.3	18.9±3.9*	0.25±0.2	1.13±0.29†
Hypopneas (No.)	16.8±3.1	31.2±5.8*	2.38±0.73	5.13±2.42
Lowest Sao <sub>2</sub> (%)	86.8±1.6	81.4±2.1*	87.8±1.1	85.0±2.9
Mean Sao <sub>2</sub> (%)	92.5±1.4	89.8±1.4*	94.2±0.6	93.8±0.7
A-Pphw (cm)	1.4±0.2	0.9±0.1†	1.5±0.2	1.3±0.1

\**P*<.01.

†*P*<.05.

\**P*<.02.

### 334 Inhaled Corticosteroids Versus Cromolyn Among Pediatric Patients Presenting to the Emergency Department With Acute Asthma

Clark S, Smithline H, Rowe BH, Camargo CA/Massachusetts General Hospital, Boston, MA; Baystate Medical Center, Springfield, MA; University of Alberta Hospital, Edmonton, Alberta, Canada

Study objective: To identify factors associated with use of either inhaled corticosteroids (ICs) or cromolyn among children presenting to the emergency department with acute asthma.

Methods: A prospective inception cohort study performed during 1997-1998 as part of the Multicenter Asthma Research Collaboration. Forty-four North American EDs enrolled 1,184 patients, ages 2 to 17 years, who presented with acute asthma. Patients underwent a structured interview in the ED and another by telephone 2 weeks later. For the present analysis, we excluded patients ages 2 to 5 (because ICs are not recommended in this age group) and those not taking either medication.

Results: During the 4 weeks before the ED visit, 182 (59%) were taking ICs and 124 (41%) were taking cromolyn. IC patients were older than those taking cromolyn (11±3 years versus 10±3 years, respectively; *P*<.01), but did not differ by sex (*P*>.10). IC patients were more likely to have public insurance, whereas those taking cromolyn were more likely to have private insurance (*P*<.05). IC patients also were more likely to report prior use of systemic steroids, intubation, hospital admission during the past year, and recent use of other asthma medications (all *P*<.05). In a multivariate model, the strongest independent predictors of taking ICs, compared with cromolyn, were having ever taken systemic steroids (odds ratio [OR]=4.5) and being admitted during the past year (OR=2.5); other significant predictors included increasing age, family income, and parental education. Although patients taking ICs had worse chronic asthma, patients taking ICs versus cromolyn did not differ by reporting of "severe"

symptoms, initial pulmonary index score, or ED treatment with  $\beta$ -agonists or steroids (all  $P > .10$ ). Nonetheless, IC patients were more likely to receive other asthma medications in the ED (55% versus 35%;  $P = .001$ ). Multivariate analysis showed comparable rates of admission, relapse, and ongoing exacerbation at 2 weeks.

Conclusion: Recent use of ICs versus cromolyn appears to be related to both clinical and nonclinical factors. ED patients taking ICs had significantly worse chronic asthma than patients taking cromolyn, but the groups did not differ according to acute asthma severity or clinical outcomes.

### 335 Effect of PEEP Therapy on Intrapulmonary Shunt Caused by Pulmonary Contusion

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Study objective: The aim of this study was to evaluate the effect of early positive end-expiratory pressure (PEEP) therapy on intrapulmonary shunt caused by pulmonary contusion.

Methods: Sixteen patients who received PEEP therapy for pulmonary contusion from nonpenetrating chest trauma were enrolled. Hemodynamic monitoring and early PEEP therapy was performed in the emergency department. Hemodynamic parameters including pulmonary vascular resistance index and intrapulmonary shunt fraction were calculated, and arterial oxygen tension was measured before and after PEEP therapy.

Results: Arterial oxygen tension decreased with increase of the intrapulmonary shunt fraction ( $R = 0.75$ ). Intrapulmonary shunt reduced from  $38.4 \pm 15.8\%$  to  $27.6 \pm 9.7\%$  by PEEP therapy at physiologic levels (5 to 10 cm  $H_2O$ ) ( $P < .05$ ). Hemodynamic variables including mean arterial pressure, stroke volume index, and pulmonary vascular resistance were not changed by PEEP therapy. Reduction of intrapulmonary shunt fraction was associated with increase of arterial oxygen tension ( $R = 0.43$ ).

Conclusion: Our observation suggests that early PEEP therapy reduces intrapulmonary shunt fraction caused by pulmonary contusion.

### 336 Does Implementation of an Asthma Pathway Improve the Quality of Care in a High-Volume Emergency Department?

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Study objective: Guidelines for asthma treatment have been promulgated in an effort to stem the recent increase in morbidity and mortality. This study was conducted to determine whether use of an asthma critical pathway would improve treatment.

Methods: This study was conducted at an emergency department with 115,000 annual visits. Data were collected prospectively during a 3-month period following implementation of the pathway. Patients younger than 40 years with an ED diagnosis of asthma were eligible. Asthma patients not enrolled in the pathway served as concurrent controls. The pathway intervention consisted of a preprinted order sheet specifying serial inhaled bronchodilators (NEBS), serial peak flow measurements (PEFR), serial examinations, oral steroids (optional), treatment endpoints, and asthma education. Outcome measures included proportional physician compliance, time to initial NEB, PEFR use, ED length of stay, and steroid use.

Results: A total of 110 patients were eligible with 30 enrolled in the pathway, and 80 serving as controls. The average triage to nebulizer time was 36 minutes in the pathway group compared with 65 minutes for controls ( $P < .002$ ). PEFRs were obtained on 92% of pathway patients and 38% of controls ( $P < .002$ ). The rate of steroid use was 77% in the pathway group compared with 54% for controls ( $P < .02$ ). The mean ED length of stay was 159 minutes with the pathway versus 167 for controls ( $P = .7$ ).

Conclusion: Use of the asthma pathway led to a decrease in triage to treatment time and increased use of steroids. Length of stay was unaffected despite time spent on patient training. We recommend adoption of an asthma critical pathway to facilitate improved care and to streamline evaluation of the asthma patient.

### 337 The Utilization of the Burden Nasoscope in Nasotracheal Intubation: Does It Make a Difference?

Rock TC, Stone CK, May J, Stapczynski JS/University of Kentucky College of Medicine, Lexington, KY

Study objectives: The purpose of this study was to compare the traditional technique of blind nasotracheal intubation and nasotracheal intubation using the Burden Nasoscope, a new device invented to assist in nasotracheal intubation.

Methods: A prospective controlled trial was performed to compare nasotracheal intubation with and without the Burden Nasoscope. Participants included 6 PGY-3, 6

PGY-2, and 6 PGY-1 emergency medicine residents, all of whom had previous experience with traditional nasotracheal intubation. Intubations were performed on a self-breathing, practice mannequin using a No. 8 Endotrol-type tube. Each of the participants intubated the mannequin under a controlled setting without the nasoscope, then again using the nasoscope. Each attempt was timed from the point of entering the nares to successful tracheal intubation. The times were averaged and SDs calculated for each set. The data were then analyzed using the Dunnett's method with  $\alpha$  set at .05 to determine statistical difference.

Results: A statistically significant difference was found between the 2 time sets. Participants successfully intubated the mannequin quicker using the Burden Nasoscope with an average time of  $11.9 \pm 9$  seconds versus the traditional blind technique with an average time of  $18.35 \pm 8$  seconds.

Conclusion: The Burden Nasoscope appears to significantly reduce the time to successful intubation in a mannequin model. Further study is needed on patients in the clinical setting to determine the true utility of the Burden Nasoscope.

### 338 National Emergency Airway Registry (NEAR) Showed Midazolam Significantly Lowers Blood Pressure Compared to Etomidate When Used for Tracheal Intubations

Weissman A, Gutman MB, Sagarin MJ, Walls RM/University of Connecticut, St. Francis Hospital, Hartford, CT; Brigham & Women's Hospital, Boston, MA

Study objectives: To determine whether use of midazolam in tracheal intubations lowers blood pressure significantly.

Methods: The National Emergency Airway Registry (NEAR), a data bank that tracked tracheal intubations in 26 emergency departments in the United States and Canada between December 1997 and December 1998, was queried. Blood pressure and heart rate were measured before, during, and after intubations in which either midazolam or etomidate was the primary induction agent.

Results: A total of 2,392 patients were entered into the NEAR data bank. Sufficient data were available on 352 patients who received only etomidate and 173 who received only midazolam for sedation or induction before tracheal intubation. Systolic blood pressure (SBP) dropped on average 15 mm Hg in the midazolam group ( $P < .001$ ), but remained unchanged in the etomidate group. Furthermore, 12.7% of patients receiving midazolam versus only 4.8% of those receiving etomidate became hypotensive to SBP less than 90 mm Hg (likelihood ratio 3.45). Analysis of specific indications for intubation showed the greatest reduction in SBP when using midazolam in patients with CHF (41-mm Hg decrease) and chronic obstructive pulmonary disease (COPD) (38-mm Hg decrease).

Conclusion: Midazolam may significantly decrease blood pressure when used for tracheal intubations, especially in patients with congestive heart failure or COPD.

### 339 Noninvasive Positive Pressure Ventilation in Acute Respiratory Failure: A Preliminary Experience in the Emergency Department

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Study objectives: To evaluate the efficacy and feasibility of noninvasive positive pressure ventilation (NPPV) in patients with hypercapnic or hypoxemic acute respiratory failure (ARF) admitted to an emergency department or admitted to an acute medical care unit.

Methods: Forty-three patients with ARF (29 males, 14 females; mean age 67 years, range 25 to 91 years) were selected for NPPV according to the following criteria: severe dyspnea at rest, respiratory muscle fatigue, normal mentation, normal upper airways, stable hemodynamics and, as for hypercapnic ARF, pH less than 7.35,  $Paco_2$  more than 45 mm Hg, respiratory rate (RR) more than 25 beats/min, and, as for hypoxemic ARF,  $Pao_2/Fio_2$  less than 200, RR more than 30 beats/min. Twenty-five patients (14 males, 11 females; mean age 68 years, range 50 to 91 years) had hypercapnic ARF as a result of chronic obstructive lung disease (COLD); 8 (7 males, 1 female; mean age 77 years, range 73 to 84 years) had cardiogenic hypercapnic acute pulmonary edema (cAPE); 10 (7 males, 3 females; mean age 55 years, range 25 to 77 years) had severe pneumonia, 2 with hypercapnic ARF.

Endpoints were pH more than 7.35, RR less than 24 beats/min,  $V_T$  more than 7 mL/kg, decreasing dyspnea and signs of muscle fatigue,  $SpO_2$  more than 90%. NPPV was considered successful if the patient was not intubated and mechanically ventilated. NPPV was considered unsuccessful if the patient was intubated and mechanically ventilated, as well as became intolerant of mask or died. NPPV, as pressure support ventila-

tion, was administered by means of BiPAP Respironics ventilators (S/T-D 20, S/T-D 30, Vision), through nasal or facial masks. Furthermore, standard medical therapy for the underlying disease was administered.

Results: NPPV was successful in 21 of 25 (84%) of patients with chronic obstructive pulmonary disease, in all 8 patients with cAPE (100%), and in 3 of 10 patients with severe pneumonia (30%). Failure in 4 COLD patients was related to mask intolerance in 3 cases and to sudden death in 1 case. Seven patients with severe pneumonia (5 seriously immunocompromised) died. Ventilation length ranged from 3 to 98 hours (mean 30.5 hours) in COLD patients, 4 to 15 hours (mean 7.6 hours) in cAPE patients, and from 12 to 223 hours (mean 73.4 hours) in severe pneumonia patients. Ventilation lasted longer in successful severe pneumonia patients (mean 114 hours) than in unsuccessful severe pneumonia patients (mean 56 hours).

Conclusion: Despite the study observational feature, we conclude that NPPV is a feasible and efficacious new approach to ARF in our ED (ED plus medical acute care unit). We found it especially effective in COLD patients with acute exacerbation and in hypercapnic severe cAPE patients. NPPV was disappointing in patients with severe pneumonia, and needs additional studies to be validated, according to the literature.

### 340 Smaller Tidal Volumes, Laryngeal Mask, Combitube: Beneficial During Basic Life Support?

Doerges V, Ocker H, Sauer C, Neuberth E, Schmucker P/University Hospital of Luebeck, Luebeck, Germany

Study objectives: Gastric inflation and subsequent regurgitation is a major hazard of bag-valve-mask (BVM) ventilation during cardiopulmonary resuscitation (CPR). Hence, the laryngeal mask (LM) and the Combitube (CT) have been suggested as alternatives. Additionally, when ventilating an intubated patient in cardiac arrest, the European Resuscitation Council has recommended smaller tidal volumes of 0.5 L instead of 0.8 to 1.2 L, as recommended by the American Heart Association. Using a newly designed 1,100-mL self-inflatable bag with the LM or CT might deliver tidal lung volumes of ~500 mL and may reduce the risk of gastric inflation during CPR with a decreased lower esophageal sphincter pressure (LESP).

Methods: A bench model was designed to compare the success of ventilation using the BVM, LM, and CT with a 1,500-mL and 1,100-mL self-inflatable bag. It consisted of a manikin head, a test lung (compliance=50 mL/cm H<sub>2</sub>O; resistance=16 cm H<sub>2</sub>O/L per second) and a simulated stomach (LESP=6 cm H<sub>2</sub>O). Twenty-six training emergency physicians, untrained in emergency airway management, were shown the correct use of the LM and CT before using each device for a 2-minute ventilation attempt with both self-inflatable bags in a randomized sequence.

Results: Time of insertion was significantly faster ( $P < .001$ ) with the BVM (median 14 seconds; range 4 to 107 seconds) and the LM (29 seconds; 17 to 129 seconds) than with the CT (61.5 seconds; 32 to 180 seconds). Tidal volumes (mL±SD; \* $P < .001$  versus LM, CT) were as follows: 1,500-mL bag, lung: BVM 277±178; LM 692±323; CT 636±249; gastric: BVM 267±120; LM 6±15; CT 0. For the 1,100-mL bag, results were: lung: 346±154; LM 609±374; CT 597±377; gastric: 206±120; LM 14±19; CT 0. Peak airway and esophagus pressures did not show significant differences between both self-inflatable bags.

Conclusion: Significantly higher gastric inflation and insufficient tidal lung volumes when using the BVM with both, the 1,500-mL and 1,100-mL self-inflatable bag clearly show the advantage of the LM and CT for basic ventilatory life support. The 1,100-mL self-inflatable bag may be adequate for ventilation during CPR, as the recently recommended tidal lung volume of 0.5 L is achieved when using the LM or CT.

### 341 Intravenous $\beta$ -Agonists in Acute Asthma: A Systematic Review of the Literature

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Study objectives: The role of intravenous  $\beta$ -agonists in patients with acute asthma is controversial. The objective of this study was to determine the benefit of intravenous  $\beta$ -agonists for patients treated in the emergency department with acute asthma.

Methods: Randomized controlled trials were identified using the Cochrane Airways Review Group database, hand searching, and reference list review. Studies where intravenous  $\beta$ -agonists were compared with placebo and/or standard care for acute asthma were considered and pooled using weighted mean differences (WMD) or odds ratios (ORs) with 95% confidence intervals (95% CIs).

Results: From 976 identified references, 15 trials were included; a total of 584 patients have been studied. All studies were from centers outside North America, published between 1974 and 1997, and involved severe acute asthma. Peak expiratory flow rates (PEFRs) were unchanged after intravenous  $\beta$ -agonist therapy compared with all other treatments at 60 minutes (WMD 20.6; 95% CI -7.4 to 48.6) and 120 minutes (WMD -1.3; 95% CI -21.4 to 18.9). Overall, no patient subgroups demonstrated significant PEFR improvements. In the highest-quality studies, heart rates were higher 120 minutes after intravenous  $\beta$ -agonist therapy compared with all other treatments (WMD 8.9; 95% CI 1.4 to 16.4); there was also a trend toward more autonomic side effects with intravenous  $\beta$ -agonist use (OR 2.25; 95% CI 0.5 to 10.4).

Conclusion: Current evidence does not support the use of intravenous  $\beta$ -agonists in ED patients with severe acute asthma. Because no subgroups were identified in which  $\beta$ -agonist use should be considered, and side effects appear more pronounced with use of intravenous  $\beta$ -agonists, intravenous  $\beta$ -agonist use should be restricted. Future acute asthma research should focus on other treatment options.

### 342 An Inhaled Nitrous Oxide–Oxygen Mixture Versus Placebo as an Analgesic and Anxiolytic Adjunct to Peripheral Intravenous Cannulation: A Clinical Trial

Gerhardt RT, King KJ, Wiegert RS, Trainer MJ/Brooke Army Medical Center, San Antonio Uniformed Services Health Education Consortium, San Antonio, TX; William Beaumont Army Medical Center, Texas Tech University Health Sciences Center, El Paso, TX

Study objective: To determine whether an inhaled 50:50 mixture of nitrous oxide and oxygen (NO<sub>2</sub>/O<sub>2</sub>) provides clinically significant pain and anxiety relief during intravenous cannulation in healthy adults, as a pilot model for further study in patients undergoing noxious bedside procedures in the emergency department. The study was conducted in the ED of a military teaching hospital. Healthy adult volunteers aged 18 to 50 years were study subjects. Exclusion criteria included allergy to NO<sub>2</sub>, anemia, cardiac disease, pregnancy, asthma, and bone marrow disorders.

Methods: This prospective, randomized, double-blind, placebo-controlled crossover design compared a 50:50 mixture of NO<sub>2</sub>/O<sub>2</sub> versus O<sub>2</sub> alone. Subjects were randomized to receive NO<sub>2</sub>/O<sub>2</sub> or O<sub>2</sub>. After recording baseline 100-mm visual analog scales (VAS) for pain and anxiety, subjects inhaled gas for 120 seconds, intravenous cannulation was performed using an 18-gauge over-the-needle catheter in an antecubital vein, then gas administration was discontinued. Subjects rated pain and anxiety during the intravenous infusion on a VAS. After 15 minutes of gas washout, subjects again recorded baseline pain and anxiety, received a second respective gas for 120 seconds, had similar intravenous cannulation in the contralateral forearm, then gas was discontinued and pain and anxiety were rated. Ten subjects were calculated to detect a 12-mm difference in pain or anxiety with an SD of 10 mm, with an  $\alpha$  error less than .05 and a power of .92. Differences between baseline and treatment VASs were compared by matched 2-tailed  $t$  test.

Results: Eleven subjects were enrolled; 1 withdrew because of subjective dizziness while inhaling gas (NO<sub>2</sub>); there were no other adverse effects. Of the remaining 10 subjects, significant differences in pain between baseline and during cannulation (NO<sub>2</sub>/O<sub>2</sub> 14.5 mm, SD 18; O<sub>2</sub> 34.3 mm, SD 23.4;  $P < .01$ ) and anxiety (NO<sub>2</sub>/O<sub>2</sub> -7.9 mm, SD 7.8; O<sub>2</sub> 6.0 mm, SD 11.6;  $P < .02$ ) were detected.

Conclusion: NO<sub>2</sub>/O<sub>2</sub> provided significant reductions in pain and anxiety during intravenous cannulation. As such, NO<sub>2</sub> may be useful for facilitating minor noxious bedside procedures in ED patients who require brief analgesia and anxiolysis. A subgroup of potential patients may experience adverse perceptions while using NO<sub>2</sub>, limiting its utility. Further studies to define the role of NO<sub>2</sub> as an anxiolytic agent, as well as efficacy and cost-containment comparisons with intravenous conscious analgesia, are warranted.

### 343 Efficacy of Topical Analgesia With Diclofenac in Emergency Department Patients With Corneal Abrasion

Kupas DF, Rockett TD, Spencer SE, Dula DJ, Shovlin J/Geisinger Medical Center, Penn State Geisinger Health System, Danville, PA

Study objectives: Systemic narcotics have often been used to manage corneal abrasion pain, but a non-sedating topical analgesic would be more ideal. A previous study on patients with radial keratotomy suggested improved analgesia with ocular non-steroidal anti-inflammatory drugs. This study evaluates emergency department patients with corneal abrasion for the efficacy of diclofenac sodium ophthalmic solution for the treatment of pain.



**Methods:** This randomized, double-blind, placebo-controlled study recruited patients who had corneal abrasion diagnosed and treated in the ED of a university-affiliated teaching hospital. Patients were randomized to receive either diclofenac sodium 0.1% ophthalmic solution or placebo. All patients were treated with gentamicin ophthalmic solution and were given hydrocodone/acetaminophen tablets to be used as a rescue analgesic. Outcome measures were the number of narcotic rescue analgesics used and the pain reduction at 4 hours on a visual analog scale.

**Results:** Eighty-nine patients completed the study. Fifteen (34%) of 44 in the diclofenac group and 18 (40%) of 45 in the placebo group used rescue narcotic ( $\chi^2$ ,  $P=.564$ ). Pain rating at 4 hours on a visual analog scale, controlled for initial pain and hydrocodone use, was 25.9 mm for the diclofenac group and 29.3 mm for the placebo group (analysis of covariance,  $P=.499$ ). Other comparisons reported for the diclofenac and placebo groups, respectively, include 24-hour mean pain rating (11.3 versus 13.9,  $P=.476$ ), mean number of work hours missed (3.0 versus 4.1,  $P=.488$ ), and percent healed completely at 36-hour follow-up (48 versus 35,  $P=.256$ ).

**Conclusion:** Although there was a trend toward less rescue narcotic use, less pain at 4 hours, less mean pain over 24 hours, fewer hours of missed work, and improved healing at follow-up, diclofenac did not statistically improve the pain of corneal abrasion compared with placebo.

### 344 Prospective Evaluation of Intravenous Midazolam-Atropine-Ketamine for Conscious Sedation in the Pediatric Population: A Comparison of Emergence Phenomena by Age

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**Study objective:** A dissociative anesthetic with potent sedative, hypnotic, analgesic, and amnesic properties, ketamine may be the ideal agent for painful procedures in the pediatric emergency department. Despite a paucity of evidence, concern remains in the literature regarding ketamine's association with emergence reactions in older patients. We sought to prospectively evaluate the rate of emergence reactions occurring in younger (<10 years) versus older ( $\geq 10$  years) patients receiving intravenous ketamine.

**Methods:** We designed a prospective observational study. Participants were children aged 6 months to 18 years receiving intravenous ketamine sedation for painful procedures in a tertiary care pediatric ED. Ketamine was given in a standardized protocol with midazolam and atropine. Descriptions of behavioral reactions were recorded by the sedating physician and nurse immediately after the procedure. Demographic data were also obtained.

**Results:** One hundred seventeen patients were enrolled. Eighty-eight (75.2%) were younger than 10 years and 29 (24.8%) were 10 years or older. Mild emergence reactions described as not unpleasant occurred in 3 (3.4%) of 88 in the younger age group and 2 (6.9%) of 29 children in the older age group. Unpleasant reactions described as distressing to the patient, family, or caregivers occurred in 2 (2.3%) of 88 in the younger age group and 2 (6.9%) of 29 in the older age group. The mean duration for mild reactions was 16.4 minutes and 35.0 minutes for unpleasant reactions.

**Conclusion:** We observed a slightly higher rate of emergence reactions occurring in older children receiving ketamine sedation. We find that these reactions are uncommon and short-lived, and should not preclude ketamine's use in older children.

### 345 Effect of Ethnicity on Emergency Department Analgesia for Low Back Pain and Headache

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**Study objective:** To determine whether age, time of presentation, or ethnicity affect analgesia use for low back pain and headache.

**Methods:** This was a retrospective chart review of all patients seen during a 2-month period ( $N=499$ ) at a community teaching hospital (annual census 42,000) presenting with low back pain or headache. Data on age, shift of presentation, time to analgesia, total ED time, estimate of pain severity, type and route of emergency department analgesia and discharge pain medication were collected. Patients were further divided into Hispanic ( $N=140$ ) and non-Hispanic ( $N=359$ ) populations on the basis of surname.

**Results:** Age, shift of arrival, and pain severity estimates were similar for all groups as were time to analgesia (30.26 minutes [Hispanic] versus 39.93 minutes [non-Hispanic] in the group with low back pain;  $P$ more than .10) and 52.8 minutes versus 53.3 minutes, respectively, in the headache cohort;  $P$ more than .40). Total ED times (70.54 minutes versus 71.23 minutes, respectively) and parenteral narcotic use also

did not differ significantly. However, Hispanic patients with low back pain were much less likely to be discharged on narcotic drugs (Hispanic 8.7%, non-Hispanic 29.5%;  $P=.005$ ), and were also less likely to receive a discharge pain prescription (58.7% versus 78.0%;  $P<.02$ ) than were non-Hispanic patients.

**Conclusion:** Time to analgesia, total ED time, and ED analgesic use were similar for patients with low back pain and headache regardless of ethnicity. Hispanic patients, however, were less likely to be given discharge analgesics despite similar estimates of pain severity.

### 346 Sublingual Hyoscyamine Sulfate With Ketorolac Tromethamine Provides No Additional Benefit in the Management of Ureteral Colic Compared With Ketorolac Tromethamine Alone

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**Study objectives:** To evaluate the safety and efficacy of a single dose of hyoscyamine sulfate in combination with ketorolac tromethamine for the reduction of pain from ureteral colic in the emergency department.

**Methods:** We conducted a prospective, randomized, double-blinded study in 2 different tertiary care teaching centers with residency programs in emergency medicine. Patients included in this study were at least 18 years of age and presented to the ED with an initial history and physical examination consistent with ureteral colic. Patients were randomized to receive a single intravenous dose of 30 mg of ketorolac tromethamine (KT) with either a single sublingual 0.125-mg dose of hyoscyamine sulfate (HS) or placebo (P). After obtaining informed consent, baseline pain scores were obtained using a horizontal, 100-mm incremental visual analog scale (VAS). Repeat pain intensity scores were obtained at 10-minute intervals for 30 minutes using the VAS. If inadequate analgesia was noted at 30 minutes, patients were rescued with intravenous meperidine (1 mg/kg). All other treatments including intravenous fluids and antiemetics were standardized. Patients were continuously monitored for any adverse events. The main outcome measures were changes in pain intensity over time, pain relief scores, and patient satisfaction scores. Categorical variables were analyzed with Fisher's exact test, and continuous variables were analyzed using the Student's  $t$  test and a repeated measures analysis of covariance. The sample size was determined to provide an overall power of 90% with an  $\alpha$  level of .05.

**Results:** Seventy-two patients were evaluated for inclusion into this study. Of these, 29 patients were excluded from analysis for various protocol violations. Patient numbers and demographics were similar for each group. Baseline pain scores for each group (KT+P: 71.3 mm; KT+HS: 79.4) were not statistically different ( $P=.19$ ). Analysis of the remaining 43 patients with a confirmed ureteral calculi showed no difference in pain score using the VAS at any given time point. In addition, there was no significant difference in the rate of pain relief between the 2 groups over time. No adverse events were reported in either group.

**Conclusion:** HS does not appear to provide any additional pain relief from ureteral colic when administered with KT compared with KT alone.

### 347 Patients' Perception of Pain and Embarrassment During Internal Examinations in the Emergency Department: Effect of Physician Gender

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**Study objective:** This study was conducted to determine whether examiner's gender influences patients' perceived pain and embarrassment during an emergency department internal examination.

**Methods:** This was a prospective, comparative study performed at a university teaching hospital ED. The study population consisted of a convenience sample of female patients who required an internal examination as part of their evaluation. Immediately after the internal examination, the patient was asked to measure the pain and embarrassment of the examination using previously validated 100-mm visual analog scale. Patients were also asked to indicate their practitioner gender preference for internal examinations. Additional information gathered included patient and examiner demographics and final diagnosis. The influence of practitioner gender and level of training and patient age on pain and embarrassment was assessed using a  $t$  test or analysis of variance with significance defined as  $P<.05$ .

**Results:** A total of 279 women completed the study (mean age  $27.7 \pm 10.5$  years, range 13 to 70 years). Male practitioners performed 152 (55%) of the examinations. Final diagnoses were as follows: pelvic inflammatory disease/cervicitis 37, abdominal

pain 34, pregnancy 52, other condition 105. The mean pain score was similar for male (29.6 mm, 95% confidence interval [CI] 25.4 mm, 33.7 mm) and female (30.0 mm, 95% CI 25.0 mm, 34.9 mm) examiners ( $P=.9$ ). The mean embarrassment scores were also similar for male (17.8 mm, 95% CI 13.6 mm, 21.9 mm) and female (17.4 mm, 95% CI 12.8 mm, 21.9 mm) examiners ( $P=.9$ ). Post hoc power analysis revealed that the study had an 80% power to detect a 9-mm difference in either of these measurements. No differences were found in these measurements when patients were grouped by age (<25 years,  $\geq 25$  years) or practitioners were grouped by level of training (residents versus attending/mid-level provider). Overall, 173 (62%) patients had no practitioner gender preference, whereas 93 (34%) preferred women and 11 (4%) preferred men.

Conclusion: The results suggest that practitioner gender does not affect the way women perceive pain and embarrassment during ED internal examinations.

## 348 Etomidate and Emergency Department Procedural Sedation

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Study objective: To determine the safety and efficacy of intravenous etomidate for the sedation of patients undergoing painful procedures in the emergency department.

Method: We evaluated a prospective case series of consecutive ED patients undergoing a painful procedure who received etomidate for sedation. All patients undergoing painful procedures in the ED were considered, and selection of patients receiving etomidate occurred at the discretion of the emergency physician. At the completion of the procedure, the ED physician completed a data collection sheet. Data recorded included the dose of etomidate utilized per bolus, the number of boluses required to complete the procedure, type and dosage of analgesics used, complications encountered during the procedure, etomidate-specific side effects, physician-perceived adequacy of sedation, and patient recall of procedure.

Results: Intravenous etomidate was administered to 26 patients during the data collection period. Procedures included reduction of dislocation (17), electrical cardioversion (4), fracture reduction (3), foreign body removal (1), and abscess incision and drainage (1). An etomidate bolus dose of 0.1 mg/kg was used in 25 of 26 patients. The mean number of bolus doses required for all patients was 1.6 (range 1 to 3). Four patients received a total dose equal to 0.3 mg/kg. Adequate sedation was noted in 25 of 26 patients. Procedures were successful in 24 of 26 patients. No patients noted pain at the injection site as had previously been reported. Six complications were reported in 4 patients. Two patients experienced hemoglobin-oxygen saturation below 90% and both patients responded to oxygen by face mask. No patient required assistance with ventilation. Myoclonus was noted in 3 patients. None of these patients reported post-procedure myalgias. One patient experienced prolonged vomiting after the procedure.

Conclusion: Intravenous etomidate is an effective agent for sedation of ED patients during painful procedures. The incidence of clinically significant complications or etomidate-specific side effects appears infrequent.

## 349 Pain Assessment: Are Words Better Than Numbers?

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Study objectives: Both numerical rating scales (NRS) and word descriptor scales (WDS) are used in the emergency department to assess patients' pain intensity. The patients' preferred use of the NRS or WDS may enhance communication and treatment. Patient language or other factors may influence which scale they prefer to use. The goal of this study was to evaluate the effect of certain patient characteristics on patient preferences for either the NRS or WDS.

Methods: A convenience sample of English-, Spanish-, and Chinese-speaking patients were asked in their preferred language to rate their pain intensity using the NRS and WDS and to choose which scale they "preferred" to use. Demographic information including gender, age, and education was collected. The data were collected at the triage desk of an urban teaching hospital with annual census more than 75,000. The relationship between pain scale preference and patient demographics was analyzed using the  $\chi^2$  test.

Results: Ninety-five English-, 37 Spanish-, and 14 Chinese-speaking patients completed the study. As a total group, patients preferred the WDS ( $n=76$ ) over the NRS ( $n=61$ ) (NSD). However, Chinese-speaking patients preferred the WDS over the NRS by a ratio of 2:1 (WDS=12 versus NRS=5). No differences in scale preference as a factor of language, age, gender, or education were found.

Conclusion: All language groups preferred the WDS over the NRS to describe their pain intensity. This preference was not influenced by the patient's age, gender, or level of education. What may be most important, clinically, is that one of these scales is used to assess pain in the ED.

## 350 Propofol and Ketamine Sedation in the Pediatric Emergency Department: A Pilot Study

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Study objective: To demonstrate the efficacy and safety of intravenous ketamine-propofol sedation for reduction of forearm fractures in the pediatric emergency department.

Methods: This was a prospective, nonblinded observational pilot study of 20 children, 3 to 18 years, who presented to an urban pediatric ED with isolated forearm fractures requiring sedation for closed reduction. Patients reported pain using the Varni/Ryan Faces Scale on arrival, at sedation, after reduction, and at recovery. Ketamine (0.5 mg/kg IV over 30 seconds) and then propofol (1 mg/kg IV over 30 seconds 1 minute later) preceded orthopedic reduction maneuvers. Time intervals were measured from medication administration to adequate sedation, to reduction completion, to first purposeful response, and to suitability for discharge. Emergency physician and orthopedic residents independently rated ease of reduction and adequacy of sedation. A mail follow-up survey elicited patient recall, parental satisfaction, and delayed complications. Complications were also recorded during the procedure and at chart review.

Results: Twenty patients were enrolled over 1 month. Nineteen had successful reduction in the pediatric ED with 1 requiring open reduction and internal fixation. Median time from ketamine to reduction completion was 5 minutes (range 4 to 9 minutes), to first purposeful response 10 minutes (range 7 to 18 minutes), and to suitability to discharge 38 minutes (range 30 to 59 minutes). All patients recalled intravenous placement, but only 3 recalled reduction maneuver or cast molding. At discharge, only 1 child rated her pain during reduction greater than 0 (of 6), and in no case was the reduction reported to be the most painful aspect of ED visit. Emergency physicians and orthopedic residents rated sedation favorably with median scores of 5 (range 1 to 5) and 5 (range 3 to 5), respectively, on a 5-point scale, with ease of reduction at 4 (range 2 to 4) and 4 (range 1 to 4), respectively, on a 4-point scale. Parental satisfaction was favorable with median score of 10 (range 9 to 10) on a 10-point scale. The only complications included transient mild oxygen desaturation (2), postprocedural vomiting (1), and transient ataxia (1). No apnea, hemodynamic compromise, dysphoria, or injection pain occurred.

Conclusion: The combination of propofol and ketamine, in this pilot study, provided effective sedation with rapid recovery and no clinically significant complications for children requiring closed reduction of forearm fractures.

## 351 Management of Patients Attempting to Obtain Narcotics by Deception: A Physician Survey

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Study objective: To describe how emergency medicine teaching faculty identify patients attempting to obtain narcotics by deception (NBD), how these patients affect them, and education on NBD in their program.

Methods: We requested a list of teaching faculty from chairs of all 8 Ohio Accreditation Council for Graduate Medical Education emergency medicine programs. Confidential surveys, containing a \$2 bill, were mailed to the 155 identified faculty. A 2-week reminder and an 8-week repeat survey were mailed. The 20-question survey included items about demographics, satisfaction, education, and identifiers for NBD. Statistics are presented as means and proportions with 95% confidence intervals (CIs).

Results: One hundred twenty-three (79.4%) of 155 faculty members responded, averaging 10.6 years (95% CI 9.5 to 11.8) after residency; 103 (83.7%) of the 155 (95% CI 76% to 89.8%) were male. Only 2 said they had not seen a patient suspected of attempting to obtain NBD. Common indicators of NBD were history of obtaining NBD (97.6%), emergency department visits with narcotics prescribed (97.6%), threatening behavior (95.1%), nonnarcotic allergies (92.7%), and contacting other EDs (86.2%). Only 40 (32.5%) of 123 (95% CI 24.4% to 41.6%) used drug screens and 96 (78%) of 123 (95% CI 69.7% to 85.0%) used complaints of nonverifiable pain to identify these patients. Most (83/123, 67.5%; 95% CI 58.4% to 75.6%) report spending 1% to 5% of their time with these patients, and 15 (12.2%) of 123 (95% CI 7.0%

to 19.3%) spend more than 5%. Eighty-one (65.9%) of 123 (95% CI 56.8% to 74.2%) believed drug-seeking patients decreased their satisfaction with emergency medicine; 43.8% reported knowing that their program had lectures on this topic.

Conclusion: Despite strong endorsements for drug screening, few teaching faculty use screens to detect NBD patients. Also the lack of awareness of educational programs suggests we may not be optimally educating residents about this important clinical problem. Systematic approaches to identifying and managing NBD patients should be included in emergency medicine teaching programs.

## 352 Roles of p67 and Nitric Oxide on eIF2 $\alpha$ (P) Following Global Postischemic Cerebral Reperfusion

DeGracia DJ, O'Neil BJ, Konkoly LL, Krause GS, White BC/Wayne State University, Detroit, MI

Study objectives: Cerebral protein synthesis is inhibited during postischemic reperfusion as a result of a rapid and large increase in phosphorylated eukaryotic initiation factor 2 $\alpha$  (eIF2 $\alpha$ (P)). A 67-kDa glycosylated methionine aminopeptidase, p67, has been shown to protect eIF2 $\alpha$  from phosphorylation by eIF2 $\alpha$  kinases. Deglycosylation of p67 causes dissociation of p67 from eIF2 and subsequent eIF2 $\alpha$  phosphorylation. We thus investigated levels and glycosylation of p67, and the binding of p67 to eIF2 $\alpha$  following global ischemia and reperfusion. A recent report implicated nitric oxide (NO) in activation of eIF2 $\alpha$  kinases. Therefore, we also investigated the effect on postischemic eIF2 $\alpha$ (P) of 45-minute pretreatment with the nitric oxide synthetase (NOS) inhibitor L-NAME.

Methods: Five minutes of global brain ischemia was induced by cardiac arrest (thoracic compression method) in male Long Evans rats and resuscitation was by mechanical ventilation and chest compressions. Return of spontaneous circulation was defined as mean arterial pressure above 60 mm Hg. Experimental groups (n=3 per group) were as follow: (1) nonischemic controls (NIC), (2) 5-minute ischemia/5-minute reperfusion (5R), and (3) 5R + 30 mg/kg IV of L-NAME (5RN). Levels of eIF2 $\alpha$ , eIF2 $\alpha$ (P), p67, and glycosylated p67 were assessed by scanning densitometry of Western blots with antibodies to the respective species after sodium dodecylsulfate-polyacrylamide gel electrophoresis (SDS-PAGE). eIF2 $\alpha$ /p67 Binding was assessed by native PAGE followed by Western blot to localize eIF2 $\alpha$ , eIF2 $\alpha$ (P), and p67.

Results: L-NAME had no significant effect on eIF2 $\alpha$  phosphorylation during reperfusion. There was no change in levels of p67. The densitometric ratio of glycosylated p67 to total p67 was as follows: NIC=2.61 $\pm$ 0.57 and 5R=3.67 $\pm$ 1.5 (mean $\pm$ SD,  $P$ =.08 by Student's  $t$  test) There was an inverse relationship between eIF2 $\alpha$ (P) and p67 localization by native PAGE in the 5R group not observable in the NIC group.

Conclusion: Our results suggest that the rapid and large postischemic phosphorylation of cerebral eIF2 $\alpha$  is not the result of either NO activation of eIF2 $\alpha$  kinases or a decrease in p67 concentration. We observed a trend toward increased p67 glycosylation at 5-minute reperfusion, consistent with our previous report of decreased eIF2 $\alpha$  kinase activity at 5-minute reperfusion. The decreased binding of eIF2 $\alpha$ (P) to p67 as revealed by native PAGE suggests that disruption of eIF2/p67 binding occurs in the postischemic brain.

## 353 Restoration of Cerebral Blood Flow Does Not Restore Function After Brain Ischemia

Little CM, Cairns CB/Colorado Emergency Medicine Research Center, University of Colorado Health Sciences Center, Denver, CO

Study objective: Most therapeutic strategies for cerebral ischemia target rapid restoration of cerebral blood flow. Postischemic blood flow recovery does not result in functional or oxidative recovery.

Methods: In 2 different species, 3 different models were used. The first was a swine cardiopulmonary resuscitation (CPR) model using microsphere blood flow measurements during CPR and resuscitation to directly measure cerebral blood flow. The second used occlusive balloon catheters in the aorta and right atrium of swine to completely block cerebral blood flow. Cerebral function was monitored with electroencephalography (EEG). The third model used near infrared spectroscopy to directly monitor cerebral cytochrome function in rats with complete carotid occlusion.

Results: Cerebral blood flow was markedly increased after resuscitation (N=7; 99.8 $\pm$ 29.9 mL/100 g per minute) compared with baseline (N=13; 39.1 $\pm$ 17.9;  $P$ <.05) or CPR (N=13; 4.9 $\pm$ 7.8") periods. With EEG monitoring, all animals lost EEG signal between 7 and 8 minutes of complete cerebral ischemia and had not regained signal by 90 minutes after reflow. Cerebral ischemia initially reduced HbO<sub>2</sub> ( $\Delta$ =0.07 $\pm$ 0.02 absorption units") and the cytochrome a,a<sub>3</sub> redox state ( $\Delta$ =0.10 $\pm$ 0.03" absorption

units). Within 10 minutes of ischemia, the cytochrome a,a<sub>3</sub> redox state became oxidized ( $\Delta$ 0.16 $\pm$ 0.03") despite no change in HbO<sub>2</sub>. An immediate increase occurred during reperfusion in HbO<sub>2</sub> ( $\Delta$ 0.13 $\pm$ 0.04"), but the cytochrome a,a<sub>3</sub> redox state did not further recover.

Conclusion: In 2 mammalian species, restoration of cerebral blood flow is not sufficient to restore either oxidative or electrical function. The therapeutic goal of immediate restoration of brain blood flow alone warrants reconsideration.

## 354 Postischemic Myocardial Bioenergetic Recovery With Inotropic Reperfusion: A Comparison of Epinephrine, Dobutamine, and Phenylephrine in the Perfused Heart

Gorsline RT, Angelos MG, Waite MD, Murray HN/The Ohio State University, Columbus, OH

Earlier work indicated phenylephrine was superior to dobutamine and epinephrine in improving postischemic left ventricular dysfunction in the perfused rat heart.

Study objective: To compare postischemic myocardial bioenergetic recovery after standardized inotropic reperfusion with dobutamine, epinephrine, and phenylephrine.

Methods: Sprague-Dawley rats (350 to 450 g) were anesthetized with pentobarbital. Hearts were rapidly excised and perfused at 85 mm Hg with Krebs-Henseleit bicarbonate buffer containing 5.5 mmol/L of glucose and 0.2 mmol/L of caprylic acid bubbled with 95%/5% O<sub>2</sub>/CO<sub>2</sub>. After 20 minutes of global ischemia, hearts were reperused for 30 minutes and then freeze-clamped. Reperfusion was with original solution alone (control group, n=8), or solution plus equipotent doses of epinephrine 1  $\mu$ mol (epinephrine group, n=8), dobutamine 0.3  $\mu$ mol (dobutamine group, n=8), or phenylephrine 50  $\mu$ mol (phenylephrine group, n=8). A group of 8 hearts without ischemia (no ischemic group) were freeze-clamped. Myocardial tissue concentrations of adenosine triphosphate (ATP), adenosine diphosphate (ADP), adenosine monophosphate (AMP), inosine, creatine, and creatine phosphate (CP) were measured using high-performance liquid chromatography. Between-group analysis was done using analysis of variance with a post hoc Tukey test.

Results: After reperfusion, there was a significant decrease in ATP, with preservation of CP in all groups compared with the preischemic group. Significant increases in ADP, AMP, and a significant decrease in inosine were seen with phenylephrine, but not dobutamine or epinephrine (Table).

Conclusion: In the early postischemic reperused rat heart, phenylephrine promotes regeneration of myocardial high-energy phosphates. This improved metabolic profile correlates with the improved functional recovery seen in phenylephrine-reperused hearts.

Table, abstract 354.

Group	ATP	ADP	AMP	Inosine	CP
No ischemia	17.07 $\pm$ 0.99	6.37 $\pm$ 0.42	0.99 $\pm$ 0.14	0.032 $\pm$ 0.048	93.01 $\pm$ 12.01
Control	4.21 $\pm$ 4.21*	3.14 $\pm$ 2.16	0.92 $\pm$ 0.80	3.46 $\pm$ 3.43	64.53 $\pm$ 36.11
Epinephrine	6.20 $\pm$ 2.26*	4.72 $\pm$ 1.07	1.76 $\pm$ 0.69	0.69 $\pm$ 0.64	86.41 $\pm$ 26.93
Dobutamine	4.80 $\pm$ 4.03*	3.42 $\pm$ 2.01	1.05 $\pm$ 0.81	2.75 $\pm$ 3.26	77.85 $\pm$ 33.35
Phenylephrine	5.79 $\pm$ 1.49*	6.04 $\pm$ 0.64†	2.57 $\pm$ 1.31†	0.35 $\pm$ 0.16‡	95.35 $\pm$ 19.11

Mean  $\pm$ SD.

\* $P$ <.005 compared with no ischemia.

† $P$ <.01 compared with control and dobutamine (ADP) and with no ischemia, control, dobutamine (AMP).

‡ $P$ <.05 compared with control.

## 355 Cardiac Function After Resuscitation in Human Cardiac Arrest

Hwang SO, Lee KH, Oh BJ, Cho JH, Lee SH, Yoon J, Choe KH/Wonju College of Medicine, Wonju, South Korea

Study objective: Reversible myocardial dysfunction or "stunning" has been observed after successful resuscitation of experimental animals from prolonged cardiac arrest. Whether myocardial stunning occurs after cardiac arrest is not known. The aim of this study was to assess the effect of prolonged cardiac arrest and cardiopulmonary resuscitation on cardiac function in human beings.

Methods: Eleven patients (7 male; mean age 47 years) successfully resuscitated

from nontraumatic cardiac arrest of noncardiac etiology were enrolled in this study. Invasive hemodynamic measurements were performed immediately and 1, 3, 7, 12, and 24 hours after return of spontaneous circulation, and transthoracic Doppler echocardiographic studies were performed immediately and 3, 12, and 24 hours after return of spontaneous circulation.

Result: None of the patients showed the regional wall motion abnormality on echocardiography. Average ejection fraction (EF) was not significantly changed during 24 hours. EF immediately after resuscitation was reduced (<50%) in 3 patients (27%); EF progressively deteriorated in 2 of them. Average cardiac index (CI), stroke volume index, pulmonary capillary wedge pressure, and systemic vascular resistance were not significantly changed during 24 hours. CI immediately after resuscitation was reduced (<2.6 L/min per meter squared) in 3 patients (27%). In 1, CI returned to normal level.

Conclusion: Our observations suggest that resuscitation after cardiac arrest does not cause severe cardiac dysfunction in human beings.

## 356 The Laryngeal Tube: Good Ventilation, Less Risk During Basic Life Support?

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Study objectives: The face mask has been the recommended airway device for basic life support (BLS), although it has been associated with a number of disadvantages such as gastric inflation and insufficient lung ventilation. The newly developed laryngeal tube (LT) might be an alternative, preventing aspiration by blocking the esophagus. It consists of a multiple-use, single-lumen silicone tube with 2 low-pressure cuffs (oropharyngeal and esophageal), and a ventilation outlet in between.

Methods: After approval of the institutional review board and written informed consent was obtained, the LT was tested in 20 patients undergoing routine urologic procedures. After a 3-minute preoxygenation and standardized induction of anesthesia (alfentanil, 15 µg/kg; propofol, 2.5 mg/kg), the slightly S-shaped tip of the LT was placed into the esophageal inlet. The oropharynx and esophagus were blocked by inflating both cuffs up to 70 mm Hg. Placement was controlled by intermittent fiberoptic revival. Ventilation settings were as follows: tidal volume, 7 mL/kg; respiration rate, 10 per minute;  $\text{FiO}_2$ , 0.4. Oxygen saturation ( $\text{SpO}_2$ ), end-tidal carbon dioxide ( $\text{etCO}_2$ ), and peak airway pressure (Paw) were recorded 2, 5, and 10 minutes after insertion of the LT. Additionally,  $\text{SpO}_2$  was measured before induction of anesthesia and after preoxygenation. A stethoscope was placed on the epigastrium to prove the absence of gastric inflation.

Results: Time of insertion ranged from 8 to 28 seconds (median, 22 seconds).  $\text{SpO}_2$  increased significantly ( $P<.001$ ) after preoxygenation and remained significantly higher ( $P<.01$ ) throughout the 10-minute ventilation with the LT as before induction of anesthesia. Paw and  $\text{etCO}_2$  did not show significant alterations during the 10-minute ventilation. No gastric inflation was observed.

Conclusion: Easy handling and sufficient ventilation without gastric inflation show the advantage of the LT compared with the face mask. Hence, the LT might be an appropriate, alternative airway device providing protection of aspiration for emergency airway management (eg, BLS ventilation).

## 357 Field Time Unrelated to Survival in Trauma Patients Having Laparotomy or Thoracotomy

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Study objectives: It is generally assumed in the United States that shorter field times (time from injury to arrival in the emergency department) result in improved outcome in trauma patients. This assumption is most likely to be true in patients needing emergency surgery. We evaluated the effect of field time on mortality in trauma patients who underwent laparotomy or thoracotomy within 24 hours of arrival.

Methods: We retrospectively reviewed data collected by the Pennsylvania Trauma Systems Foundation on all trauma 16 years or older having either laparotomy or thoracotomy within 24 hours of arrival at any of the 24 trauma centers in Pennsylvania during 1996 and 1997. Exclusion criteria were field time more than 6 hours, blood pressure of 0 on scene, and incomplete data. We performed regression analysis of mortality on field time and the TRISS score, which was used to control for severity of anatomic and physiologic injury as well as mechanism. Regression was repeated on the subgroup of patients with blood pressure less than or equal to 90 mm Hg on scene using the Injury Severity Score (ISS) as the severity measure.

Results: Three hundred eighty-seven patients met criteria and had complete data;

there were 334 survivors and 53 fatalities. Mean time from injury to ED arrival for survivors was  $42\pm 30$  minutes, fatalities  $47\pm 25$  minutes, total group  $43\pm 30$  minutes. Median time from injury to ED for survivors was 35 minutes, fatalities 43 minutes, total group 36 minutes. Regression of field time on mortality, controlling for injury severity (TRISS), failed to demonstrate a relationship between mortality and time to ED (standardized  $\beta = -.017$ ,  $P = .697$ ). TRISS was strongly related to mortality ( $\beta = .549$ ,  $P < .001$ ). Analysis of the subgroup with on-scene blood pressure less than or equal to 90 mm Hg ( $n = 121$ ) again showed that time to ED had no effect on mortality ( $\beta = -.012$ ,  $P = .891$ ). ISS was strongly related to mortality ( $\beta = .246$ ,  $P = .005$ ).

Conclusion: Field time appears to have little effect on mortality in trauma patients requiring abdominal or thoracic surgery when injury severity is controlled. Significant expenditure or effort to shorten existing field times may not be justified.

## 358 Thermodynamic and Initial Laboratory Evidence Supporting the Use of Perfluorocarbon Liquid Ventilation in the Treatment of Hypothermia

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Study objective: Severe hypothermia is often associated with hemodynamic instability and poor outcomes unless active internal rewarming techniques are instituted aggressively. Unfortunately, all such techniques currently available suffer from important drawbacks, including invasiveness and limited availability outside of specialized facilities, which are roughly in proportion to their efficacy. Partial liquid ventilation (PLV) with perfluorocarbon (PFC) liquids is a novel breathing strategy used in infants and adults with acute lung injury. It is a simple adjunct to, and compatible with, standard endotracheal intubation and mechanical ventilation, and involves instilling a volume of preoxygenated PFC into the respiratory tree. Our work with PLV led us to explore the potential role of PLV using warm PFC as a minimally invasive active internal rewarming technique in severe hypothermia.

Methods: Using available thermodynamic data, a mathematical model was derived to predict the rate of rewarming with PLV. This model was then tested in a swine model of hypothermia. Common swine ( $n = 2$ ) were intubated, anesthetized, and cooled to an aortic temperature of  $28^\circ\text{C}$ . Rewarming was then instituted by delivering either 5 or 10 mL/kg per minute of preoxygenated PFC. Five body temperatures were monitored during the cooling and warming process.

Results: The aortic temperature rose  $2.7^\circ\text{C}$  and  $4.5^\circ\text{C}$  in the first hour of rewarming, respectively. The predicted rates of warming were  $2.4^\circ\text{C}$  and  $4.4^\circ\text{C}$  using the derived equation, assuming rapid thermal exchange in the lung and rapid distribution of heat throughout the animal.

Conclusion: Available thermodynamic and preliminary laboratory data support the investigation of LV in severe hypothermia.

## 359 Fractal Dimension of Heart Rate in Emergency Department Patients With Chest Pain

Ruiz F, Ditto W, In V, Neff J/University of California—San Francisco, San Francisco General Hospital, San Francisco, CA; Georgia Institute of Technology, Atlanta, GA

Heart rate variability measured by stochastic measures is diminished in patients with unstable angina and is an independent predictor of mortality after myocardial infarction. Heart rate variability quantitated by fractal dimension, a nonlinear measure, is reduced in an animal model of coronary ischemia and in human subjects immediately preceding ventricular fibrillation arrest.

Study objective: We used the PD2i algorithm (suitable for nonstationary systems) to characterize fractal dimension in emergency department patients with ischemic and nonischemic chest pain in the setting of various comorbidities.

Methods: We digitally recorded 15 minutes of heart rate tracings in 33 acutely ill ED patients with chest pain. R-R intervals were precisely calculated using a computerized technique. Interval data were then subjected to dimensional calculation using the PD2i algorithm.

Results: The median fractal dimension in 11 patients with ischemia was 3.98 (interquartile range 3.69 to 4.93). In 22 patients with nonischemic chest pain, the median dimension was 3.8 (interquartile range 2.86 to 4.61). Low excursions (a transient drop in dimension to  $\leq 1$ ) occurred in 15 patients, but was not associated with ischemia, advanced age, or hypertension.

Conclusion: Low dimensional states in heart rate can occur in the absence of overt heart disease, possibly as a result of noncardiac autonomic stresses.



## 360 Fractal Versus Harmonic Components of Heart Rate in Atrial Tachyarrhythmias

Ruiz F, Ditto W, In V, Neff J/University of California—San Francisco, San Francisco General Hospital, San Francisco, CA; Georgia Institute of Technology, Atlanta, GA

Variability in heart rate has both harmonic (oscillating) and nonharmonic (fractal) components.

**Study objective:** We examined variability patterns in atrial tachyarrhythmias using coarse graining spectral analysis to characterize them as primarily fractal or harmonic and to generate hypotheses concerning the use of those patterns in clinical practice.

**Methods:** We digitally recorded 15 minutes of heart rate tracings in 14 acutely ill emergency department patients with narrow complex tachycardias. Three patients had paroxysmal supraventricular tachycardia (PSVT), 1 had atrial flutter (AFI), 6 had atrial fibrillation (AF), and 4 had sinus tachycardia (ST). R-R intervals were precisely measured using a computerized technique that allows visual confirmation of each peak. Interval data was then subjected to coarse-graining spectral analysis to separate fractal from harmonic components.

**Results:** Fractal components predominated in all 3 patients with PSVT (range 54% to 84%), all 4 patients with ST (range 75% to 88%), and a single patient with AFI (67%). Patients in AF displayed a broader range, from a low of 43% to a high of 76% fractal.

**Conclusion:** Heart rate variability patterns in ST, PSVT, and AFI were all primarily fractal and failed to distinguish between the groups. Heart rate variability in AF was mathematically heterogeneous, with harmonic components predominating in some patients, suggesting the possibility of distinct clinical subgroups.

## 361 Resuscitation From Prolonged Ventricular Fibrillation and Induction of Selective Brain Hypothermia via Extracorporeal Bypass

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Restoration of coronary perfusion by extracorporeal bypass may assist with the resuscitation of normal cardiac activity after prolonged cardiac arrest. However, the central nervous system is less likely to recover in this setting. One technique, which has shown promise in improving neurologic recovery, is the induction of postresuscitative brain hypothermia. This study was conducted to determine whether extracorporeal bypass is capable of assisting in the return of spontaneous circulation and induction of brain hypothermia in a pig model of prolonged cardiac arrest.

**Methods:** Ventricular fibrillation was induced in common swine ( $n=12$ ). After 20 minutes of cardiopulmonary arrest, femoral venous/arterial extracorporeal bypass was instituted at a rate of 50 mL/kg per minute. After 10 minutes of circulatory support, external defibrillation was attempted. On restoration of normal sinus rhythm, animals were randomized to receive either normothermia or selective brain hypothermia (SBH). Normothermic animals were maintained with ventilatory support and intravenous fluids for 24 hours. SBH pigs received 12 hours of femoral/carotid bypass at a rate of 5 mL/kg per minute at a temperature of 32°C. The bypass temperature was then increased 1 degree per hour until reaching 37°C and continued at this temperature until completion of the protocol.

**Results:** Normal sinus rhythm was restored in all animals at an average of 6.3 minutes after the venous/arterial bypass was started. Nasal temperature was used as a proven surrogate to direct brain temperature measurement. In control animals, nasal temperature was greater than 37.0°C throughout the 24-hour recovery period. SBH animals had a reduction of nasal temperature to 32.5°C 20 minutes after the institution of femoral/carotid bypass. This was maintained throughout the 12-hour cooling period without significantly affecting core temperature or hemodynamics. Nasal temperature slowly returned to normothermic levels during the second 12 hours of recovery. Pathology of the brains was then compared.

**Conclusion:** Extracorporeal bypass was useful in restoring spontaneous circulation and inducing selective brain hypothermia in pigs with prolonged ventricular fibrillation.

## 362 Legislation, When Enforced, Impacts Seat Belt Use in Urban Taxis

Milzman D, Sammadar R, Sammadar C, Janchar T, Zlidenny A/Georgetown University Medical School, Providence Hospital, Washington, DC

**Study objective:** Seat belt use in private vehicles currently approaches 60% and has been steadily increasing over the past 10 years, with enforcement resulting in

improved compliance. Few studies focused on the disparagingly low rates of safety restraint use in vehicles for hire.

**Methods:** This was a prospective randomized survey conducted on passengers disembarking from taxis at airport and train stations in a large urban setting over a 2-year period to include 1 year with and 1 year without enforcement of seat belt use for taxi riders. Responses were recorded using a 10-cm visual analog scale; researchers noted seat belt availability and use before questioning. Analysis included  $t$  test and  $\chi^2$ ;  $P<.05$ .

**Results:** Four hundred seventy-nine passengers were included; 50.1% were male, and mean age was 40.4 years (95% confidence interval [CI] 36.8 to 44.0). Actual belt use in taxis was 17%, not different from reported regular use of 23% ( $P=NS$ ), decreased from the reported use in private vehicles of 91.1% (95% CI 88.9 to 93.3;  $P<.01$ ). After 1 year of enforced seat belt laws, an additional 443 passengers were resurveyed, with rider usage increasing to 31% versus 17% ( $P<.01$ ). Use in private vehicles also increased to 95% versus 80% before legislation ( $P<.03$ ).

**Conclusion:** Without laws enforcing use, most taxi riders do not wear seat belts even though they practice fair compliance in their private vehicles. However, when laws were enforced, seat belt usage increased significantly not only in cabs but also in private vehicles.

## 363 The Influence of Skill Level on Snowboarding Injuries

Janchar T, Zlidenny A, Coury T, Milzman D, Paluska T/Georgetown University School of Medicine, Providence Hospital, Washington, DC

Snowboarding is one of most rapidly growing winter sports with a proportional rise in associated injuries. With several thousand people learning to snowboard each year, there is a wide range in the skill levels of riders on the slopes; these differences in skill level have a potential influence on both the location and frequency of injuries seen.

**Study objective:** To determine the influence of skill level on snowboarding injuries.

**Methods:** This study is a retrospective analysis of injuries seen at the medical clinic of Big Sky Resort (Big Sky, MT) over 2 years. Patients filled out study surveys after presenting to the clinic. Skill level was evaluated as beginner (first day or first week), intermediate (early intermediate or advanced intermediate), and expert (expert or extreme). Data were then analyzed by the authors using Epistat software.

**Results:** Over the 2 years, 539,000 skier/snowboarder days were reported with 812 patients presenting to the clinic for evaluation. Of these patients, 144 (19%) had injuries related to snowboarding. The average age of the injured snowboarder was 19.9 years with 73% being male. Of those injured, the skill levels were as follows: 48 (33%) were beginner, 23 (16%) were early intermediate, 41 (28%) were advanced intermediate, 26 (18%) were expert, and 6 (4%) were extreme. Wrist injuries predominated in the beginner group with 41% of injuries in this group being wrist-related versus 14% in the expert group ( $P<.05$ ) and 34% in the intermediates ( $P=NS$ ). Shoulder injuries predominated in the intermediate group with 38% of the injuries shoulder-related versus 21% in the expert group ( $P<.05$ ) and 26% in the beginners ( $P=NS$ ). Head injuries predominated in the expert group with 36% of the injuries in this group head-related versus 15% in the beginners ( $P=NS$ ) and 16% in the intermediate group ( $P=NS$ ). Age and gender data ranges were too narrow to draw any significant correlations between injury mechanisms.

**Discussion:** Overall, more injuries were seen in the beginner group. Comparisons drawn were the predominance of wrist injuries in beginners, shoulder injuries in the intermediate group, and head injuries in the expert group. The high rate of wrist injuries in beginners can be explained by the tendency for these riders to fall on outstretched arms to break falls. As riders' balance and skill improve, they move to more difficult terrain and are more likely to attempt more dangerous jumps and moves increasing the susceptibility to head injuries. Precautions that can be taken include more educational classes and lessons for beginners and the use of helmets and protective gear for all riders, especially those on more difficult terrain or attempting jumps or difficult moves.

## 364 Parental Report of Child Restraint Device Use in an Emergency Department Population

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**Study objective:** To survey parents regarding their use of child restraint devices (CRD) and knowledge of CRD recommendations.

**Methods:** Parents of children 14 years or younger presenting to a university tertiary care children's hospital emergency department from November 4 through December 3, 1998, were surveyed as a convenience sample. Parents were asked to provide demo-

graphic information (age, race, sex, marital status, education, income, and child's age). They answered questions regarding the family's restraint use and their understanding of CRD recommendations. The data were analyzed using  $\chi^2$  where appropriate.

Results: Surveys were completed by 313 adults, providing data on 541 children. Decreasing CRD use was reported with advancing child age (<1 year 95%; 1 to 4 years 91%; 5 to 9 years 88%; 10 to 14 years 78%) while parental restraint use remained constant (77%). Demographics were similar except that parents of 10- to 14-year-olds tended to be older with higher income. Optimal infant CRD position could not be identified by 27%, including 21 (25%) of 85 parents of infants. Incorrect answers were associated with single parents ( $P=.04$ ), lower income ( $P=.01$ ), less education ( $P=.02$ ), and older child age ( $P=.004$ ). Only 41% of parents correctly identified the age for mandatory car seat use. The majority (99.7%) identified the safest vehicle position for any child. No demographic variables were associated with correct answers.

Conclusion: CRD use decreases with increasing child age in this ED population. Many parents are unaware of CRD recommendations.

## 365 Comparison Between Frequency and Location of Skiing and Snowboarding Injuries

Zlidenny A, Janchar T, Coury T, Milzman D, Paluska T/Georgetown University School of Medicine, Providence Hospital, Washington, DC

During the past 2 decades, there has been a tremendous explosion in the number of alpine skiers and snowboarders. To attract ski enthusiasts in search of the ultimate extreme sport, ski resorts are developing steeper and more challenging terrain, such as snowboarding half-pipes. Although skis and snowboard equipment are now made of high-tech materials providing increased stability, they also promote higher speeds and riskier behavior. It is important that ski area acute health care providers be prepared to treat the most common injuries incurred by skiers and snowboarders of all skill levels. The purpose of this study is to compare the frequency and location of injuries in skiers and snowboarders.

Methods: Data were obtained from major western US ski resorts during the 1995-1997 ski seasons. Patients presented to ski area medical clinics and filled out surveys containing study data.

Results: There were a total of 539,000 skier days with a total of 803 injuries (649 skiers and 154 snowboarders). Skiers were older than snowboarders: 30.8 years versus 19.9 years ( $P<.03$ ). Genders also differed with skiers (48% men) and snowboarders (73% men;  $P<.05$ ). The snowboarders had an increased rate of head injuries at 10% compared with skiers at 5% ( $P<.05$ ). The snowboarders also had a higher rate of arm and wrist injuries compared with skiers (8% and 16% versus 2% and 3%, respectively;  $P<.05$ ). The skiers had a higher rate of thumb injuries in relation to snowboarders (8% versus 3%, respectively;  $P<.05$ ). The skiers also had a higher rate of leg and knee injuries than snowboarders (8% and 39% versus 1% and 10%, respectively;  $P<.05$ ). The snowboarders had a higher rate of ankle injuries than skiers (9% versus 3%, respectively;  $P<.05$ ).

Conclusion: Significant differences based on technique and equipment produce variations in injuries among skiers and snowboarders. Snowboarders injure their forearms and wrists because of a tendency to fall on outstretched arms, and injure their ankles more often because of softer, less stiff boots. Skiers, on the other hand, are more likely to injure thumbs because of the classic "gamekeeper's thumb" injury: falling while holding onto ski poles. Skiers are also more prone to knee injuries with the ability to move their legs independently, whereas the legs of snowboarders are held at a fixed position. Head injuries are more common in snowboarders because of a younger mean age contributing to riskier behavior and a greater predilection for attempting aerial maneuvers than their skiing counterparts.

## 366 The Influence of Race and Other Demographic Factors on Seat Belt Use

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Study objectives: To determine whether there are demographic factors associated with reported seat belt use among injured adults admitted to a trauma center.

Methods: A retrospective chart review was conducted including all patients admitted to a trauma center for injuries from motor vehicle crashes. Home zip code, age, sex, race, and seat belt use were obtained from the trauma registry using E-codes to identify all patients injured between January 1995 and December 1997. Zip code was

used as a proxy for income using 1990 census data. Forward logistic regression was used to identify significant predictors of seat belt use.

Results: Seat belt use was reported for 45% of patients younger than age 25, 52% of those 25 to 60 years, and 68% of those older than 60 years. Overall, seat belt usage was reported for 45% of men and 63% of women, as well as 57% of drivers and 43% of passengers. In addition, seat belt use was reported for 56% of whites, 34% of African Americans, and 40% of other races. Finally, seat belt usage was reported for 33% of those earning less than \$20,000 per year and 55% of those earning more than \$20,000. Logistic regression revealed that age (odds ratio [OR] 1.02 per year), driver (OR 1.68), female gender (OR 2.14), natural log of income (OR 1.55), and white race (OR 1.80) were all significant predictors of reported seat belt usage (62.3% accuracy of prediction).

Conclusion: These results show that seat belt use was more likely to be reported for older persons, drivers, women, individuals with greater incomes, and whites. Seat belt usage should be encouraged for everyone; however, younger people, passengers, men, individuals with lower incomes, and nonwhites should be targeted specifically.

## 367 Population-Based Survey of a Sample Community's Training and Knowledge in Basic Cardiopulmonary Resuscitation

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Study objectives: Basic cardiopulmonary resuscitation (CPR) continues to be performed infrequently. Although surveys of CPR trainees and health care workers (HCWs) have been conducted, population-based studies are lacking. Our purpose was to study the prevalence, demographics, and knowledge of CPR training in the general population.

Methods: A cross-sectional telephone survey of 476 adults (>18 years) was conducted over 2 weeks using a random selection process in a metropolitan county area (population 1.3 million).

Results: The response rate was 45%. The sociodemographics surveyed proportionately matched those of the general population except for a female/male ratio of 2:1. Only 12% were HCWs. The prevalence of CPR training was 48%. Of these, 226 (43%) had taken a course once, 37% 2 to 4 times, 13% 5 to 10 times, and 7% more than 10 times. Most (54%) had taken the course as a job or school requirement. Sixty-nine percent believed they could determine heart attack signs/symptoms, more than 90% could check for breathing or pulse, and 74% could clear an airway. Although those with CPR training tended to be white, unmarried, college graduates, homeowners, 30 to 39 years old, with incomes of more than \$40,000 per year, these differences did not reach statistical significance ( $P>.05$ ). Of the 226 individuals with CPR training, 60 (27%) reported having witnessed a cardiac arrest, with 18 having ever performed CPR.

Conclusion: CPR is performed infrequently, even though half of a sample population knows CPR and CPR elements. From this cross-sectional study, being trained to perform CPR does not appear to be related to sociodemographics, indicating the need for more advanced studies of the facilitators and barriers toward training and performing CPR.

## 368 The Epidemiology of Sport and Recreational-Related Injuries Treated in the Emergency Department

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Study objectives: Many injured patients are discharged from the emergency department and despite potentially serious consequences, much surveillance information is lost. This study examines the epidemiology of sport/recreational injuries presenting to the ED using a unique data set.

Methods: Data were derived from a cohort of all patients treated at 5 EDs in an urban Canadian health region over 1 year. Data were extracted from computerized abstracts coded similarly across all regional EDs. Sports and recreation codes are coded in 125 categories, as well as using *International Classification of Diseases—ninth revision* diagnostic and E-codes.

Results: A total of 288,948 ED encounters were recorded for the 1996-1997 fiscal year; 10,877 (3%) visits were for sports and recreational injuries. Males (70%) were more frequently injured; patients younger than 20 years old were involved in 58% of all cases. The most common injuries in patients presenting to the ED were after participation in the following activities: hockey 1,842 (18%) patients, soccer 956 (9%), playground 818 (8%), football/rugby 630 (6%), and cycling 879 (8%). Specific

injuries can be determined from the database. For example, 358 (3.3%) were for head injuries (HI) and the highest proportion of HIs occurred during ice hockey (21%), cycling (13%), and playground-related activities (8%). Four percent of all sports and recreation injuries required admission to hospital with wide intersport variation (eg, snowmobile 16% versus badminton 1%).

**Conclusion:** These results demonstrate the utility of an ED-based injury registry. The registry functions as a surveillance tool and research tool to focus prospective sport-specific research. Some sport and recreational injuries require immediate attention either because of their frequency (eg, ice hockey) or severity (snowmobiles).

## 369 Sledding and Tobogganing Injuries Presenting to the Emergency Department in a Northern Urban Center

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**Study objectives:** Sledding is a common recreational activity in northern communities. The objective of this study was to examine the frequency and nature of sledding injury (SI) presenting to emergency departments.

**Methods:** The data were derived from a cohort of patients treated at 5 EDs in an urban Canadian health region over a 1-year period. Data were extracted from computerized ED abstracts coded similarly across all regional EDs by medical records nosologists. SI was defined as any case where the sports injury code for sledding (110) appeared.

**Results:** A total of 288,948 patient encounters occurred during 1996-1997; 10,877 (3.8%) resulted from sport and recreation injuries with 231 patients coded as SI (2.1%). The mean age of those with SI was 14.7 years (SD=9.6) and 61% were male. Sixty-seven (29%) SIs involved the upper extremity, 62 (27%) were to the lower extremity, and 36 (16%) were to the head. Seventy-six SIs (33%) were fractures, 56 (24.2%) were contusions, and 41 (18%) were sprains/strains. Thirty-two (14%) of patients with SIs were admitted by ambulance versus 7.4% of other sports/recreation injuries ( $P<.01$ ). Twenty-three (10%) of patients with SIs were admitted to the hospital versus 4.3% of other sports/recreation injuries ( $P<.05$ ).

**Conclusion:** SIs are important wintertime injuries in northern communities, involving primarily younger patients, with a large preadolescent group. SIs treated in the ED appear to be more serious than other types of sport/recreation injury and injury prevention strategies are warranted.

## 370 Occupationally Related Hand Injuries in the Emergency Department

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**Study objective:** To analyze and compare occupational and nonoccupational hand injuries.

**Methods:** This was a prospective survey of all patients 18 years or older with isolated hand injuries presenting to an academic urban Level I trauma/hand referral center over a 2-month period in 1997. Data on epidemiology, mechanism/anatomy/type of injury, procedures, disposition, and occupational factors were obtained via questionnaires by research assistants on a 24-hour basis. Follow-up telephone calls 1 month after injury were obtained. Fisher's exact test was used for categorical variables and Student's *t* test was used for continuous variables.

**Results:** One hundred thirty-eight patients were enrolled in the study with a mean age of 36.4 years. Lacerations, machine injuries, and crush injuries comprised 68.1% of all the mechanisms of injury. The patients were divided into 2 groups, those with work-related (WR=49.3%) injuries and those with non-work-related (NWR=50.7%) injuries. More men (WR=97.1%, NWR=71.4%) than women (WR=2.9%, NWR=28.6%) were injured at work ( $P<.0001$ ). Injuries caused by machines occurred more in the WR (45.6%) than NWR (2.9%) group ( $P<.0001$ ). Of those with WR injuries, 77.4% did not wear protective gear and 59.7% did not receive safety training. Follow-up data demonstrated higher percentages in the WR group regarding disability in hand use (WR=81.5%, NWR=45.5%;  $P=.02$ ), impact on lifestyle (WR=77.8%, NWR=40.9%;  $P=.02$ ) and absence from work because of the injury (WR=95.7%, NWR=64.3%;  $P=.02$ ).

**Conclusion:** Occupationally related hand injuries are common, occur predominantly in young men, and cause more disability and long-term consequences. This may contribute to a possible outcome of increased medical costs, high compensation payments, and lost productivity. Machines are a significant mechanism of injury, and

preventative measures such as use of protective gear and safety training may help diminish some of these injuries.

## 371 Comparison of Helmet Use Between Bicyclists and Skaters

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**Study objective:** To determine which demographic factors are associated with helmet use in injured bicyclists or skaters.

**Methods:** A 1-year retrospective study of all persons injured on public roadways presenting to 1 of 3 hospitals in a metropolitan area was conducted. Charts of injured emergency department patients were reviewed to determine demographics, injury type, location, and injury circumstances. Information was aggregated to look only at helmet use among bicyclists and skaters (ie, roller blades, roller skates, and skateboards).

**Results:** A total of 438 injured bicyclists and 134 skaters presented to the 3 EDs. Of the 572 patients enrolled in the study, 30 were excluded because of missing helmet data. Overall 31% wore helmets: 35% of bicyclists and 16% of skaters ( $P<.001$ ). Thirty-nine percent of those injured in the suburbs versus 20% of those injured in the city wore helmets ( $P<.001$ ). Of the bicyclists, 47% of those injured in the suburbs versus 22% of those injured in the city wore helmets. Of the skaters, 24% of those injured in the suburbs versus 6% of those injured in the city wore helmets. Thirty percent of males versus 34% of females wore helmets ( $P<.399$ ). Of the bicyclists, 33% of males versus 43% of females wore helmets. Of the skaters, 16% of males versus 15% of females wore helmets. The mean age of helmet wearers was 15.0±12.6 years versus 21.3±15.2 years for nonwearers ( $P<.001$ ). Of bicyclists, the mean age for helmet wearers was 15.2±13.0 years versus 22.3±16.0 years for nonwearers. Of skaters, the mean age was 13.2±8.9 years for helmet wearers versus 18.2±11.6 years for nonwearers.

**Conclusion:** Helmet use is more common among injured bicyclists than skaters. Demographic factors associated with helmet use include suburban location and younger age. Gender had no association with helmet use. State law mandates helmet use for bicyclists younger than 5 years. Helmet use should be encouraged for everyone, but special emphasis should be placed on their use in adolescents and adults, skaters, and those in urban areas.

## 372 Occupational Exposure: Organizing Emergency Department Care to Determine Postexposure Prophylaxis Within Hours Instead of Days

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**Study objective:** In May 1998, the Centers for Disease Control and Prevention (CDC) announced in the *Morbidity and Mortality Weekly Report* (MMWR) the latest recommendations for the treatment of the occupationally exposed health care worker. These recommendations and suggestions include the use of the rapid HIV test to facilitate the rapid determination of need for prophylactic medical therapy. Emergency departments are frequently assigned the task of rapid evaluation after an exposure because they can provide 24-hour coverage. The incidence of HIV seroconversion after an occupational exposure is approximately 0.3%. Although the incidence of conversion is low, an occupational exposure creates emotional stress for the involved health care worker. It becomes important that the exposed health care worker be confident in the ability of the ED to be knowledgeable about the process of evaluating occupational exposures and the determination of the need for postexposure prophylaxis (PEP).

**Methods:** To comply with the latest recommendations, a multidisciplinary team comprised of the ED medical director, nurse coordinator, nursing directors, infection control nurse, pharmacist, and laboratory medical technologist developed an occupational exposure protocol packet. The packet collates all pertinent reference materials, consent forms, decision algorithms, and treatment guidelines to ensure that the health care worker is evaluated and treated in a comprehensive and timely manner. This includes the use of the rapid HIV test on the source's blood. A time of 2 hours was set as the target turnaround time from triage to determination of PEP need. This would meet the suggestions of the CDC for optimal prophylaxis time.

**Results:** In the first 6 months after initiating the packet, 11 patients were treated for an occupational exposure. The average turnaround time from triage to leaving the ED was 2 hours and 2 minutes (shortest time 22 minutes; longest time 4 hours and 17 minutes). PEP was initiated in only one instance and was later able to be discontinued once the source patient consented to HIV testing.

Conclusion: Interdisciplinary cooperation has been the key to the success of the packet. It has enabled the ED to initiate and complete rapid evaluation of the occupationally exposed worker. More importantly, rapid evaluation has allowed us to avoid unnecessary initiation of PEP. This enables the health care workers to avoid treatment that is expensive and is associated with a high incidence of side effects. Through increased communication, it has helped to control costs associated with these events by obtaining the appropriate test during the initial evaluation and eliminating duplication of tests.

### 373 Frequency and Relevance of Disparity Between Formula-Recommended and Actual Size of Pediatric Endotracheal Tubes

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Study objectives: There are few data evaluating the formulas commonly used to calculate pediatric endotracheal tube (ETT) sizes. The study's objectives were to analyze a series of pediatric patients undergoing helicopter emergency medical services (HEMS) transport to (1) ascertain frequency of "inappropriate" ETT size as defined by Pediatric Advanced Life Support (PALS) formulas, and (2) assess correlation between formula-defined inappropriateness and clinical need for ETT change at receiving hospitals.

Methods: This was a retrospective study of 216 consecutive (1994-1997) scene and interfacility pediatric (age <14 years) HEMS transports to 3 urban Level I academic centers, of patients intubated before or during flight by either HEMS crew, ground ALS, or referring physicians. PALS formulas (eg,  $0.25 \text{ age} + 4$ ) were used to calculate recommended ETT sizes; patients' actual ETT sizes were counted appropriate if they were within  $\pm 0.5$  mm of formula-recommended size. Hospital records were reviewed to determine if ETT sizes were changed at receiving centers. Multivariate logistic regression was used to analyze associations between the dependent variable—"actual ETT size  $\geq 1$  mm different from formula-recommended size"—and independent variables age, sex, transport year, scene/interfacility status, and intubator (HEMS crew, ground EMS, physician). Multivariate logistic regression was used to assess whether disparity between formula-recommended and actual ETT size was independently associated with ETT size change at receiving hospitals. For all tests,  $\alpha$  was set at the .05 level.

Results: Fifty-four (25.0%) of 216 ETTs' actual sizes were inappropriate (at least 1 mm off) as defined by the formula; 51 (94.4%) of 54 were too small and the other 3 were too large. ETT inappropriateness by formula was unrelated to sex, year, or initial intubator, but ETTs were significantly more likely to be inappropriate in interfacility transports (odds ratio 2.6,  $P=.011$ ) and with increasing patient age (odds ratio 1.3 for each 1 year age increment,  $P<.001$ ). However, there was no association between formula-defined ETT size inappropriateness and subsequent ETT size change at receiving hospitals (odds ratio 1.3, 95% confidence interval 0.4 to 4.2).

Conclusion: (1) Disparity between formula-derived and actually used ETT size was significantly more likely in older children and interfacility transports. (2) There was no indication that disparity between formula and actual ETT size corresponded to need for ETT change at receiving hospitals. (3) Because a substantial proportion (one-fourth) of actual ETT sizes were at least 1 mm different from formula recommendations, the importance of strict adherence to ETT size calculations should be deemphasized pending further study of the clinical validity of these formulas.

### 374 Out-of-Hospital Management of Foreign Body Aspiration in Children

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Study objective: To assess the morbidity and mortality associated with pediatric foreign body aspiration, to report the success of basic life support (BLS) versus advanced life support (ALS) maneuvers in the retrieval of aspirated foreign bodies, and to compare bag-valve-mask (BVM) versus endotracheal tube (ET) as the method of airway management for this subset.

Methods: Data from this abstract were obtained as a single subset of a previously described, randomized study of 830 patients requiring assisted ventilation with BVM versus ET from the emergency medical services system in Los Angeles and Orange counties in California. Data including type of foreign body, out-of-hospital treatment (BLS and/or ALS) provided, neurologic outcome, and survival were collected. A modified Pediatric Overall Performance Category Scale (POPC) was used to assign neurologic status. Cornfield statistical analysis was used to compute odds ratios (ORs).

Results: Twenty-two (2.65%) of 830 patients requiring airway management (BVM or ET) for foreign body aspiration were enrolled in the study. There were 14 boys and 8 girls. A total of 12 (55%) patients were survivors; 10 (45%) did not survive. Total good neurologic outcome (normal or mild disability) occurred in 9 (41%) patients, and total poor neurologic outcome (moderate to severe disability) occurred in 13 (59%). Foreign bodies encountered included superball (3), hot dog (3), marble (3), balloon (2), popcorn (2), grape (2), tooth (1), turkey meat (1), chicken meat (1), pasta (1), bolt (1), licorice (1). Back blows/chest thrusts were attempted 10 times with 1 reported success. The Heimlich maneuver was attempted 8 times with 1 reported success. Direct laryngoscopy and Magill forceps were used 11 times with 9 reported successes. For those patients with a pulse on presentation to the emergency department, median pulse oximetry was 93% ( $N=12$ ; interquartile range 97.5, 86.5) for survivors and 77% ( $N=3$ ; interquartile range 88, 68) for nonsurvivors. Using intention-to-treat analysis, BVM was associated with increased survival (OR 6.75, confidence interval 1.01 to 43.4) and was associated with good neurologic outcome (OR 8.17, confidence interval 0.939 to infinity).

Conclusion: This study confirms the high morbidity and mortality associated with pediatric foreign body aspiration. BLS maneuvers were rarely successful; however, direct laryngoscopy with Magill forceps was quite successful in foreign body retrieval. BVM was found to be superior to ET with respect to both mortality and neurologic outcome (although neurologic outcome was not statistically significant).

### 375 Hypoglycemia and ABC'S (Sugar) of Pediatric Resuscitation

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Study objective: The purpose of this study is to determine the prevalence of hypoglycemia and describe the clinical variables associated with hypoglycemia in children receiving resuscitative care.

Method: A cross-sectional study of consecutive children (birth to 20 years of age) receiving resuscitative care at a children's hospital emergency department was conducted. A rapid glucose test (RGT) was prospectively established as one of the initial resuscitative steps, and clinical variables were obtained from a retrospective chart review.

Results: Over a 1-year period, 49 non-trauma-related children received resuscitative care. Nine (18%) were hypoglycemic (glucose level  $\leq 40$  mg/dL). Age (<5 years), sex, and race were not significantly different between the hypoglycemic and nonhypoglycemic children. The rate of hypoglycemia for the following emergency disorders was status epilepticus 1 (3%), cardiopulmonary arrest 1 (17%), respiratory failure 6 (25%), altered consciousness 6 (60%), and cardiac failure 5 (83%). The cause of hypoglycemia was septic shock (4), adverse drug reaction (2), malnutrition associated with a life-threatening event (2), and endocrine disorder (1). Of the 10 children who died, 5 (50%) were hypoglycemic on presentation. The average time from arrival to RGT for the hypoglycemic versus nonhypoglycemic patients was 20.8 and 13.6 minutes. Endotracheal intubation in 2 of 7 intubated hypoglycemic patients would have not been needed if hypoglycemia had been diagnosed and treated earlier in the resuscitation. There were 35 paired RGT and serum glucose tests (SGT). The mean difference between the RGT and SGT for hypoglycemic versus nonhypoglycemic patients was 14.7 mg/dL and 11.8 mg/dL. One patient had a marginal hypoglycemic false-positive RGT result.

Conclusion: Hypoglycemia is common in children requiring resuscitative care. Therefore, the steps of pediatric resuscitation need to include not only airway (A), breathing (B), and circulation (C), but also sugar (S): ABC'S.

### 376 Emergency Department Visits for Acute Asthma by Pediatric Patients Who Ran Out of Their Inhaled Corticosteroids or Cromolyn

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Study objective: To determine the prevalence, patient characteristics, and possible effect of running out of inhaled corticosteroids or cromolyn before acute asthma presentation to the emergency department.

Methods: This prospective cohort study during 1997-1998 was part of the Multicenter Asthma Research Collaboration. Forty-four North American EDs enrolled 1,184 patients, age 2 to 17 years, with acute asthma. Parents of enrolled patients underwent a structured interview in the ED and another by telephone 2 weeks later. For the present analysis,



patients were divided into 3 groups: those who ran out of their preventive medications in the previous week (group 1), those who did not (group 2), and those not taking these medications (group 3).

Results: Among the 1,181 patients with asthma, only 3.8% (95% confidence interval, 2.8% to 5.1%) ran out of medication before coming to the ED, with 62% running out in the previous 2 days. Group 1 patients were slightly older than those in groups 2 and 3 ( $P=.04$ ), and least likely to be female (22%, 42%, and 40%;  $P=.03$ ). Group 2 patients were more likely to have a primary care physician ( $P=.004$ ) and private insurance ( $P<.001$ ), and used the ED less often as a source of asthma medications (27%, 21%, and 37%;  $P<.001$ ). Groups 1 and 2 had a longer duration of symptoms ( $P=.01$ ). Although groups did not differ by initial pulmonary index score, they differed significantly by admission status (20%, 28%, and 21%;  $P=.02$ ). Discharge medications differed by group for inhaled corticosteroids (19%, 27%, and 6%;  $P<.001$ ) and cromolyn (41%, 37%, and 4%;  $P<.001$ ), as did subsequent relapse (20%, 12%, and 7%;  $P=.002$ ).

Conclusion: Among ED patients with acute asthma, having recently run out of preventive medications (group 1) is uncommon. Nonetheless, patients who ran out of preventive medications were most likely to have a relapse event.

### 377 An Enhanced Method of Pediatric Urine Collection: Negative Pressure Bladder Catheterization

Ambroz K, Elbert W/Resurrection Medical Center, Mercy Hospital Medical Center, Chicago, IL

Bladder catheterization with a small-caliber feeding tube is an accepted method to obtain a sterile urine specimen in the pediatric patient; unfortunately, it often yields an inadequate specimen because of poor free flow of urine to gravity. Although collection can be enhanced by applied negative pressure with a syringe, it is believed that this method may cause bladder wall trauma.

Study objective: To evaluate the risk of bladder trauma in an urban pediatric population undergoing applied negative pressure bladder catheterization (NPBC).

Methods: Patients were randomized into 2 groups. The control group ( $n=24$ ) underwent catheterization with a lubricated 5-F standard pediatric feeding tube that was allowed to flow freely to gravity. The study group ( $n=40$ ) underwent similar catheterization with a small negative pressure applied by an attached 5.0-mL syringe. Negative pressure was applied by hand immediately on entrance of the catheter into the bladder and did not exceed 2.0 mL of intraluminal syringe volume. A 3- to 5-mL urine specimen was collected from each patient and sent for routine urinalysis, culture, and sensitivity. All specimens were processed using an AMES 200 urinalysis analyzer. Previous studies showed less than 3 RBCs per high-power field in subjects undergoing routine bladder catheterization and this value was used as a historical control.

Results: Sixty-four subjects, 39 male and 25 female, mean age 14.75 months were entered into the study. No significant difference was found between the 2 groups either with regard to mean age or sex or in the percentage of patients with more than 3 RBCs per high-power field.

Conclusion: No significant hematuria was produced by the NPBC method, nor did this method produce bladder wall trauma as defined by more than 3 RBCs per high-power field on routine urinalysis. This procedure is an effective and efficient means to obtain sterile urine specimens during bladder catheterization of the pediatric population.

### 378 Recognition of the Critically Ill Neonate With Ductal-Dependent Cardiac Lesions

Fields D, Weintraub A, Furman M, Paper M, Richard L/Mount Sinai Medical Center, New York, NY

Study objectives: Neonates with cardiac lesions dependent on the ductus arteriosus may not be recognized before discharge. These infants may present to the emergency physician in the first few weeks of life in circulatory collapse. The misdiagnosis of critical cardiac lesions as sepsis is a pitfall that might result in delays in treatment or adverse outcomes. This study was undertaken to determine how often these infants presented in shock, how often the diagnosis was made in the emergency department, and if appropriate treatment was begun.

Methods: This study was a retrospective review of charts of all infants who were admitted to an urban tertiary care medical center neonatal ICU with noncyanotic cardiac lesions between 1987-1997. This included neonates who presented at the medical center's ED and hospital affiliates.

Results: Two hundred fifty charts (two thirds of the total) have been reviewed. Of these, 15 neonates were identified with a diagnosis consistent with ductal-dependent lesions. The mean age of the mothers was 24 years. Fifty-three percent of the neonates were male and 47% were female. Seventy-one percent were born at term and 29% were preterm. The mean birth weight was 3,640 g. Eighty percent of the patients came from community hospitals. Eighty-three percent of the patients presented in shock. A cardiac diagnosis was considered in only 26% of the neonates. Prostaglandin was administered in only 1 case of the 15.

Conclusion: Preliminary data suggest that neonates with ductal-dependent lesions who commonly present to the ED in shock, are often misdiagnosed, and appropriate therapy is not started in a timely fashion.

### 379 Pediatric Afebrile Seizures: A Community Emergency Department Experience

Preciado G, Silva JC, Sloan EP/Resurrection Medical Center, Our Lady of Resurrection Hospital, University of Illinois, Chicago, IL

Study objectives: To review the emergency medical services (EMS) and emergency department evaluation and treatment of pediatric afebrile seizures.

Methods: A retrospective chart review of all pediatric patients presenting with afebrile seizures from June 1995 to December 1996 was conducted. Charts were identified by review of the ED admission logs for either admission complaint or discharge diagnosis of seizure.

Results: Chart review identified 93 patients; 42% were male, 48% Hispanic, and 25% had new-onset seizures. EMS was used in 79.6% of patients. Seizures during ED care were noted in 8 (8.6%) of patients, and 12 (13%) received diazepam, 7 (7.5%) phenobarbital, 19 (20%) phenytoin, and 1 patient was intubated. Status epilepticus was diagnosed in 7 (8.6%) of patients. No significant chemistry or urinalysis abnormalities were identified. Lumbar punctures were performed in 5 (5.2%) of patients without any abnormal values. Forty-six (49.5%) of patients were taking anticonvulsant medication and had levels determined; 21 (23%) had subtherapeutic values. Computed tomography scans were ordered in 42 (45%) of patients, including 93% of 25 patients with new-onset seizures; 6 (6.5%) had atrophy, 3 (3.2%) hydrocephalus, and 1 patient had an unexpected focal lesion. The amount of time spent in the ED averaged 3.17 hours for admitted patients and 2.5 hours for discharged patients. Admitted patients were younger than those discharged (6.1 versus 8.4 years,  $P<.05$ ). All 5 patients who received lumbar punctures were admitted, and patients with new-onset seizures were 5 times more likely to be admitted than those patients with prior seizures ( $P<.05$ ).

Conclusion: A considerable amount of time and resources are expended on pediatric seizure care. Patients at greatest risk for admission included those with new seizures, those in status epilepticus, and those who required specific ED interventions. Further study will prospectively clarify these risk factors.

### 380 Medical Resource Utilization by Children Requiring Psychiatric Consultation in the Pediatric Emergency Department

Santiago L, Mojica M, Foltin G, Tunik M/New York Methodist Hospital, New York University-Bellevue Hospital, Brooklyn, NY

Study objectives: To describe the epidemiology and medical resource utilization of children requiring emergency psychiatric consultation.

Methods: We performed a prospective cohort study of children (<18 years) presenting to an urban pediatric emergency department requiring psychiatric consultation. Medical evaluations were completed on all patients, and laboratory studies were obtained as medically indicated or as requested for admission. Descriptive data were collected and  $\chi^2$  analysis was performed on categorical data.

Results: Over 6 months, 210 patients required psychiatric evaluation. Seventy-two percent had a previous psychiatric history, 39% had prior psychiatric admission(s), and 40% were taking psychiatric medications. Patients spent an average of 5.7 hours in the pediatric ED and the admission rate was 49%; 207 (99%) patients were "medically cleared." One hundred nine patients required laboratory studies. Abnormal results were found in 25 of the 55 medically indicated studies and 5 of the 54 routine admissions ( $P<.001$ ). Forty-five patients (21%) displayed problem behaviors (defined as threatening behavior, attempted/successful elopement, or requirement of restraints). Hospital police monitored 52% of the patients, and 19 patients were transferred to the closed psychiatric emergency unit. Patients with a

previous psychiatric history, a history of past psychiatric hospitalization, or a presenting complaint of aggressive behavior were more likely to have problem behaviors ( $P<.01$ ). There was no association between problem behaviors and gender, age, or use of psychiatric medications.

Conclusion: Pediatric ED patients requiring psychiatric consultation have extended stays in the pediatric ED, often require admission to a psychiatric facility, and have a high incidence of problem behaviors requiring intervention. Early identification and appropriate evaluation of patients at risk for problem behavior may reduce medical resource utilization.

## 381 Survey on Clinical Management of Febrile Infants and Children, Birth to 24 Months of Age

Egland AG, McGuirk TD/Naval Medical Center Portsmouth, Portsmouth, VA

Study objectives: (1) To measure the effect of clinical guidelines on reported emergency department clinical practice, and (2) to compare evaluation and treatment reported by emergency medicine and pediatric physicians for 5 subclasses of febrile patients younger than 24 months.

Methods: Surveys on clinical practice were given to emergency medicine and pediatric staff and residents at a large military hospital. Patient classes were as follows: class 1: 28 days old or younger, temperature greater than or equal to 100.4°F; class 2: high risk, 28 to 60 days old, temperature greater than or equal to 100.4°F; class 3: low risk, 28 to 60 days old, temperature greater than or equal to 100.4°F; class 4: non-toxic, 2 to 24 months old, temperature greater than or equal to 102.2°F; and class 5: toxic-appearing, 2 to 24 months old, temperature greater than or equal to 102.2°F. Surveys were repeated 4 months after institution of clinical guidelines in the ED. Emergency medicine and pediatric staff and resident answers were compared. Fisher's exact test and paired *t* tests were used to analyze the data.

Results: Eighty (52%) of 152 surveys were returned. Emergency medicine resident physicians were more likely to order chest radiographs (class 3,  $P=.006$ ; class 4,  $P=.004$ ), parenteral antibiotics (class 5,  $P=.017$ ), and antipyretics (class 1,  $P=.005$ ; class 4,  $P=.003$ ; class 5,  $P=.004$ ). Pediatric staff was less likely to order chest radiographs (class 1,  $P=.0009$ ; class 2,  $P=.017$ ; class 3,  $P=.006$ ; class 5,  $P=.024$ ). There were no statistically significant differences among emergency medicine or pediatric staff or resident physicians in blood cultures, cerebrospinal fluid studies/cultures, stool culture, or admission. No differences were found on ED surveys before and after institution of clinical guidelines.

Conclusion: (1) Differences exist in evaluation and treatment of these patients by emergency medicine and pediatric physicians. (2) No impact of ED clinical guidelines was reported on repeat survey. (3) The effect on patient course or outcomes is unclear.

## 382 Pediatric Febrile Seizures: A Community Emergency Department Experience

Day M, Silva JC, Sloan EP, Macariola-Coad J/Resurrection Medical Center, Our Lady of Resurrection Hospital, University of Illinois, Chicago, IL

Study objectives: To review the emergency medical services (EMS) and emergency department evaluation and treatment of pediatric febrile seizures.

Methods: A retrospective chart review of all pediatric patients presenting with febrile seizures was conducted. Charts were identified by review of the ED admission logs for either admission complaint or discharge diagnosis of seizure from July 1995 to December 1998.

Results: Chart review identified 148 patients; 69.6% were male and 12.5% had new-onset seizures. Patients younger than 1 year of age, 1 to 3 years old, and older than 3 years accounted for 10.1%, 75.7%, and 13.4% of the study population, respectively. The mean age of the study group was  $1.6\pm 1.6$  years. Emergency medical services (EMS) care was used in 75% of patients. Seizure activity was noted during EMS care as 3.1% on EMS arrival, 1% at the scene, 2.1% on departure, and 2.1% during EMS transport. Only 1% of the patients were administered diazepam during EMS care. Seizures during ED care were noted in 7 (4.7%) of patients. Fevers of less than or equal to 40°C accounted for 56.8%. Computed tomography scans were ordered in 8 (5.4%) patients, and lumbar punctures were performed in 29 (19.6%) patients. No patients were diagnosed as having meningitis. The amount of time spent in the ED averaged  $3.44\pm 2.3$  hours. Discharge occurred in 115 (77.7%) patients, 28 (18.9%) were transferred, and 3 (2.0%) were admitted.

Conclusion: Febrile seizures are a common problem in the ED. Most patients can be managed without the need for extensive diagnostic testing or the use of antiepileptic drugs. A significant number of patients require admission, most often for observation after the occurrence of complex febrile seizures.

## 383 Outcomes of Interhospital Transfers of Critically Ill Pediatric Patients: A Comparison of Air and Ground Transport

Quinn-Skillings GQ, Brozen R/Maine Medical Center, Portland ME; Dartmouth Hitchcock Medical Center, Hanover, NH

The use of helicopters to transport critically ill patients has become widespread. Air transport (AT) has been shown to provide a time benefit in interhospital transport of critically ill patients from rural areas.

Study objective: To determine whether a difference exists in outcomes between critically ill pediatric patients transported by AT and ground (GT) to the pediatric ICU at our tertiary care center.

Methods: A retrospective, observational cohort study was performed by chart review. Three hundred sixty-eight patients, aged 1 month to 18 years, transported to the pediatric ICU between July 1993 and September 1996, were identified. There were 80 interhospital AT patients, and 288 GT patients. All of the AT group and 233 (81%) of the GT group had charts available for analysis. Factors evaluated were total transport time (time from initial call for transport to time of arrival at the pediatric ICU), distance of referring facility to the pediatric ICU, severity of illness (PRISM III score), length of stay in pediatric ICU (LOS PICU), length of stay in hospital (LOS H), final disposition of the patient, and mortality.

Results: Mean total transport time was 170 minutes faster for the AT group ( $P<.001$ ) with a similar mean distance to the referring hospital, 74.1 nautical miles (nm) for AT and 71.6 nm for GT ( $P=.48$ ). Thirty-six percent of AT patients were critically ill (PRISM III more than 10), compared with 19% of the GT patients ( $P<.001$ ). The mean initial PRISM III score for the AT cohort was 10.2 versus 5.5 for the GT group ( $P<.001$ ). There was no significant difference between the 2 groups for length of stay; the mean pediatric ICU LOS for the AT group was 93.9 hours versus 107.9 hours for the GT group ( $P=.45$ ). The mean LOS H for AT group was 8.1 days versus 8.4 days for the GT group ( $P=.87$ ). The final dispositions of study groups were also similar: 86% of the GT group were discharged to home, compared with 78% of the AT group ( $P=.08$ ). Analysis of mortality without controlling for severity of illness shows 5% mortality for the GT group and 16% mortality for the AT group ( $P<.001$ ).

Conclusion: At our tertiary care center, interhospital transports performed by AT were faster than GT over equivalent nautical mile distances. There was no difference in outcome measures between the 2 groups except mortality. The increased mortality of the AT group appears to reflect the increased severity of illness of AT patients.

## 384 Academic Emergency Department Areas of Specialization: Results from the 1998-1999 SAEM Faculty Salary Survey

Kristal SL, Randall-Kristal KA, Thompson BM, Marx JA/Henry Ford Hospital, Grace Hospital, Wayne State University, Detroit, MI; Carolinas Medical Center, Charlotte, NC

Study objective: The Society for Academic Emergency Medicine (SAEM) commissioned an Emergency Medicine Faculty Salary and Benefit Survey for all 1998 Residency Review Committee—Emergency Medicine accredited programs using the SAEM fourth-generation survey instrument. The survey instrument included questions regarding departmental areas of specialization. Responses were collected by SAEM and blinded from the investigators. Seventy-one (59%) of 120 accredited programs responded yielding data on 965 full-time faculty among the 4 Association of American Medical Colleges regions.

Methods: Blinded program and individual faculty data were entered into a customized version of Filemaker Pro, a relational database program with a built-in statistical package. Program data were evaluated with regard to subspecialty areas provided at each program's facility.

Results: The study results are provided in the Table.

Conclusion: Although average total emergency department visits have increased since the last survey, mean numbers of pediatric and low-severity visits have declined, suggesting patient severity levels are rising. Approximately one third of RRC-EM accredited programs now operate an observation unit, but most cover the unit without creating separate observation unit shifts. This suggests an additional rise in faculty responsibilities during clinical shifts.

Table, abstract 384.

	1998	1995
<b>General</b>		
Mean total ED visits per year	62,904	61,130
<b>Pediatrics</b>		
Mean No. of pediatric visits per year	12,351	17,672
No. of programs with separate pediatric area	32/70 (46%)	33/76 (43%)
No. of programs with specialized pediatric staff	16/70 (23%)	30/76 (39%)
<b>Low-severity areas</b>		
Mean No. of low-severity visits per year	12,003	17,028
No. of programs with separate low-severity area	56/70 (80%)	56/76 (74%)
<b>Staffing of low-severity area by:</b>		
Physicians trained in emergency medicine	34/70 programs (49%)	
Physicians not trained in emergency medicine	15/70 programs (23%)	
Physician assistants	25/70 programs (36%)	
Residents	26/70 programs (37%)	
Other staff	7/70 programs (10%)	
<b>Observation units</b>		
Total No. of programs currently operating observation unit	24/70 (34%)	
Mean observation unit visits per year (at programs with observation units)	1,786	
No. of programs with separate observation unit shifts	2/70 (03%)	

### 385 Academic Emergency Department Funding Sources and Incentives: Results From the 1998-1999 SAEM Emergency Medicine Faculty Salary Survey

Kristal SL, Marx JA, Randall-Kristal KA, Thompson BM/Henry Ford Hospital, Grace Hospital, Wayne State University, Detroit, MI; Carolinas Medical Center, Charlotte, NC

**Study objective:** The Society for Academic Emergency Medicine (SAEM) conducted a survey of emergency medicine faculty salaries, benefits, work hours, incentives, funding sources, and department demographics for all 1998 Residency Review Committee—Emergency Medicine accredited programs. Seventy-one (59%) of 120 accredited programs responded yielding useable data on 70 programs from all 4 Association of American Medical Colleges regions.

**Methods:** Responses were collected by SAEM and blinded from the investigators. Program and faculty data were entered into a customized version of Filemaker Pro, a relational database program with a built-in statistical package. Program demographic data were evaluated with regard to departmental funding sources and incentive components contributing to individual salaries.

**Results:** The results are shown in the Table.

**Conclusion:** Collection of professional charges, as a percentage of total department funding sources, varies directly with salaries paid. Programs relying entirely on government support as a funding source pay salaries ~29% below those paid at the remaining programs. The 12 programs reporting no salary incentive components pay salaries only 2.6% below the remaining programs that do use incentives.

Table, abstract 385.

<b>Departmental funding sources</b>	
Collections of professional charges	53%
Hospital management contract	20%
University support	7%
Grants and other contracts	3%

Cont'd

Table, abstract 385. Cont'd

<b>Departmental funding sources cont'd</b>	
Graduate medical education allotments	3%
Government support	12%
Other sources	2%
<b>Salary incentive components</b>	
Clinical productivity	46/70 programs
Research productivity	41/70
Teaching evaluations	42/70
Administrative productivity	48/70
Departmental productivity	36/70
Hospital productivity	30/70
None	12/70

### 386 Minor Trauma: A Major Contributor to Emergency Department Workload

Tham KY, Seow E, Wong HP/Tan Tock Seng Hospital, Singapore

**Study objective:** To determine the epidemiology of minor trauma seen in the emergency department.

**Methods:** All consecutive patients older than 15 years who presented to the ED of an urban public hospital in Singapore with trauma-related complaints were surveyed. Interviews were conducted with a closed-ended questionnaire from December 1, 1998, to March 31, 1999. Data collected were those of demographic, nature of injury, ambulance care, ED care, and disposition.

**Results:** The total ED attendance was 35,653 and 8,071 (22.6%) were trauma-related complaints. Of these 8,071 patients, 72.6% were men, and the ethnic group breakdown was 60.5% Chinese, 17% Indians, 8.8% Malays, and 13.6% others. Singapore citizens and permanent residents represented 72.6%, Malaysians 5.5%, and other foreigners 21.8%. The mean age was 39.1 years (95% confidence interval [CI] 38.7 to 39.6). Although the mean time interval between injury and presentation was 0.96 days (95% CI 0.86 to 1.06), most patients (72.3%) sought treatment on the same day of injury. Blunt trauma contributed to 89.1%, penetrating 8.7%, and burns 0.8%. Workplace accidents represented 26.7%, home accidents 25.2%, road accidents 22.5%, accidents at common area (eg, parks) 16.4%, and sports accidents 3.7% of injuries. Falls of less than 2 m contributed to 35.6% of cases, low-impact trauma 26.8%, vehicle accidents 19.1%, domestic violence 2%, and other assault 8.1%. Of the trauma cases, 22% were brought to the ED by ambulance with 0.7% as "standby" cases. Most patients were discharged after treatment in the ED with only 21.6% admitted. Of those discharged, 43.7% sustained contusions, 24.5% had minor open wounds, 12.3% had abrasions, 9% had fractures or dislocations of the upper limb, 4.7% had fractures of the lower limb, and 1.1% had burns. Using the Abbreviated Injury Scale (AIS) 1990 version, the mean severity score was 1.16 (95% CI 1.15 to 1.17) for the discharged patients. A mean of 4.39 days (95% CI 4.29 to 4.49) of sick leave was given to the discharged patients. After discharge from the ED, 49% did not require review, 22.4% were referred to primary health care doctors, 22.2% were referred to the orthopedic outpatient clinic, and 6.2% to other specialist outpatient clinics.

**Conclusion:** Trauma-related complaints contributed to more than one fifth of the ED workload. Most of these were minor trauma with low AIS score. After treatment in the ED, more than 75% of patients were discharged. Of those discharged, almost half did not require any review. The injuries of this group of patients probably could have been treated successfully by primary health care doctors without requiring ED services.

### 387 Documentation Deficiencies in the Evaluation of Nontraumatic Abdominal Pain: Effects of a Structured Template

McMahan SD, Buderer NF, King RW, Plewa MC/ St. Vincent Mercy Medical Center, Toledo, OH

**Study objectives:** To compare the completeness of documentation of emergency physician records of patients with acute, nontraumatic abdominal pain before and 1 month after instituting the use of a structured template charting system.

**Methods:** A retrospective records review of 165 (before) and 113 (after) patients age older than 5 years with a chief complaint of acute, nontraumatic abdominal pain treated in an urban teaching hospital emergency department. Excluded were patients with chronic or recurrent abdominal pain or evaluation by non-emergency physicians.

ED records were reviewed for documentation completeness for 29 historical and physical examination criteria selected by an expert panel. Documentation rates and total scores before and after use of the template were compared by evaluating the 95% confidence intervals.

Results: Documentation rates (before; after) of 18 of 29 criteria (62%) improved significantly after the template was established, including site (85%; 95%), radiation (27%; 95%), type (51%; 81%), severity (17%; 77%) and progression (28%; 86%) of pain, aggravating factors (24%; 86%), relieving factors (15%; 79%), vomiting (85%; 95%), anorexia (38%; 81%), stools (84%; 97%), micturition (82%; 97%), previous surgery (54%; 96%), vaginal bleeding (50%; 74%), bowel sounds (72%; 91%), rebound (72%; 87%), guarding (72%; 87%), mass (65%; 88%) and rectal examination (58%; 82%). Documentation rates did not improve for 9 criteria, including duration of pain (85%; 92%), pain medication use (21%; 16%), last menstrual period (59%; 73%), vaginal discharge (66%; 76%) vital signs (90%; 90%), scars (4%; 3%), location of tenderness (94%; 90%), genitourinary examination (62%; 66%) and inguinal examination (36%; 18%). Documentation worsened for 2 criteria (not present on the template), including distention (35%; 2%) and rigidity (78%; 0%). There was significant improvement in the total scores (percent of documented criteria) from 56% to 74% after use of the template.

Conclusion: Use of a structured template significantly improved documentation of the ED evaluation of patients with acute, nontraumatic abdominal pain. Future studies should address whether this improvement in documentation correlates with diagnostic accuracy or patient outcome.

## 388 Is a Trauma Service a Financial Winner for the Hospital?

McPherson MK, Wilson AG, Blair H, Howells GA, Jackson RE/William Beaumont Hospital, Royal Oak, MI

Study objective: To determine whether reimbursement exceeds costs for admitted trauma patients at our suburban American College of Surgeons Level I trauma center.

Method: This was a retrospective review of all patients who were the subjects of Level I or II trauma team activations from January 1, 1996, to December 31, 1997, at a 90,000-visit suburban emergency department. Reimbursement was defined as payment received. Direct hospital costs were defined as including labor and supplies and indirect included all overhead. Professional reimbursement and costs were not included.

Results: Of 594 patients identified, complete data were available on 564. Of these 564, 474 were admitted and 90 were treated and released from the ED. For admitted patients, reimbursement exceeded cost by \$3,200 (net income). Net income for the 446 admitted blunt trauma patients was \$3,385, and was \$598 for the 28 patients admitted with penetrating trauma. For the 90 patients treated and released, cost equaled reimbursement. For 180 admitted patients of blunt vehicular trauma, the per patient net income was \$8,053. Under our state's no-fault insurance law, hospitals are reimbursed as a percentage of charges.

Conclusion: With our criteria for trauma team activation, our payer mix, and particularly with respect to our state's no-fault insurance laws, hospital reimbursement for trauma patients care exceeds hospital costs.

## 389 Documentation of Domestic Violence in the Emergency Department Record

Moscatti R, Trippi D, Bailey GB, Krasnoff M/State University of New York at Buffalo, Buffalo, NY

Study objective: To evaluate emergency department providers' documentation of domestic violence (DV) as a factor in the current ED visit before and after implementation of a new DV identification and treatment protocol.

Methods: The study was conducted at a public, urban, teaching, Level I trauma center. The initial phase consisted of a retrospective review of a randomized sample of 3% charts from all women between the ages of 18 and 65 years who presented over a 1-year period. Charts were categorized as documenting DV (DV-positive), not documenting but suspicious for DV (DV-probable), or not suggestive of DV (DV-negative). All physician and nursing staff subsequently had in-service training in a new DV protocol that emphasized DV recognition, documentation, and victim linkage with social service support in the ED. All charts of women between the ages of 18 and 65 were reviewed prospectively by the same reviewer and categorized as in the retrospective review. ED providers were given feedback on compliance with the protocol. Prospective and retrospective review results were compared by  $\chi^2$ .

Results: The retrospective review included 492 charts with 8 DV-positive, 2 DV-probable, and 482 DV-negative. Extrapolating this random sample to a full review

would result in 16,400 charts represented, with 267 DV-positive, 67 DV-probable, and 16,067 DV-negative. The prospective review included 15,000 charts, which were categorized as 270 DV-positive, 43 DV-probable, and 14,687 DV-negative. There was no significant difference between the review results ( $P>.05$ ).

Conclusion: Implementation of a DV protocol emphasizing increased DV awareness, documentation, and care made no difference in documentation of the presence of DV over a 1-year period. The slight decrease in the number of DV-probable charts likely represented better documentation of non-DV causes of injury. The incidence of DV was well below that expected in this setting.

## 390 Practice Variation in a Community Emergency Department Asthma Consortium

Rydman RJ, Walter J, McDermott, MF, Catrambone C, Weiss K/Cook County Hospital, Rush University, University of Chicago, Chicago, IL

Study objectives: Prospective assessment of emergency department asthma patient care practices among Chicago area hospitals (Community Emergency Department Asthma Consortium [CEDAC]).

Methods: This was a cross-sectional study with longitudinal features; we conducted a chart review of asthma patient care practices over a 4-month baseline period (March to June 1998). A random sample of N=740 charts were abstracted from 21 hospital EDs. Measurements included documentation of ED asthma: assessment type, treatment type, discharge medication type, discharge education elements administered; and follow-up linkage to physicians after discharge.

Results: With patients as the unit of analysis (sample means and 95% confidence intervals [CIs] are reported): 78.6% (75.2% to 80.0%) were administered a peak flow during assessment, and 60.8% (56.6% to 64.7%) had a peak flow both documented and repeated; 71.6% (68.4% to 74.9%) were administered more than 1  $\beta$ -agonist; and 82.7% (79.4% to 86.0%) of eligible patients (>1  $\beta$ -agonist) were given systemic steroids. Of those eligible, 76.3% (72.2% to 80.4%) had oral steroids prescribed at discharge and 36.9% (32.2% to 41.6%) of those eligible had inhaled steroids prescribed or continued. Asthma patient education at discharge varied: 90% (87.4% to 92.6%) were given information on medication dosing and frequencies; 28.1% (24.2% to 32.0%) were instructed on differences in medication types; 64.6% (60.5% to 68.7%) given some type of action plan for worsening symptoms; 34.7% (30.6% to 38.8%) were given education on metered-dose inhaler (MDI) use; 17.3% (14.1% to 20.5%) documented MDI use competency; and 48.5% (44.2% to 52.8%) received education on asthma triggers. For 93.4% (91.4% to 95.4%) of patients, a plan for ambulatory follow-up care was documented, and 80.7% (77.4% to 84.0%) had an appointment time specified. Individual hospital performance varied with 57% to 76% of EDs meeting or exceeding 95% CI around each variable mean score.

Conclusion: Assessment of practice variation is useful in providing networked hospitals a perspective for targeting both specific and measurable improvements in ED asthma care.

## 391 Leading Change in the Emergency Department Admission Process Through an Interdisciplinary "Quality Team"

Nester B, MacKenzie R, Panik A, Richardson D, Rosenau A/Lehigh Valley Hospital and Healthcare Network, Allentown, PA

Study objectives: Delays in emergency department admissions can be frustrating for the patient as well as the ED staff. This ED led study sought to dissect the effect of a hospital-sponsored "Admission Rule" (AR), and shape the process for ensuring its success.

Methods: This "before and after" study occurred at a nonteaching, community ED. The AR stated that all ED admits should be transported within 30 minutes of the bed assignment. Five time points were prospectively recorded on a convenience sample of admitted patients before (PRE group) and after (POST group) the implementation of the AR. These 5 time points defined 4 subprocesses (patient workup, admissions, registered nurse contact, and transfer), which served as the basis for the emerging quality team. A convenience sample of problem admissions was also obtained in the POST period to correlate ED perceptions with actual data.

Results: Seventy-four PRE-rule, 69 POST-rule, and 58 Problem/POST-rule admissions were evaluated between August and October 1998. There was no statistically significant difference in the average ED length of stay (LOS) between the PRE (3 hours 59.4 minutes) and POST (3 hours 49.1 minutes) groups. Although not statistically significant, the Problem/POST group had the shortest ED LOS (3 hours 35.5 minutes). Interestingly, this group had the longest registered nurse contact time (22% of the admit period versus 17% and 13% for the POST and PRE groups, respectively).



Conclusion: (1) The AR failed to improve the ED admission process. However, the identification of subprocesses and associated time ownership has resulted in the establishment of an interdisciplinary quality team (emergency physician, admissions director, emergency and in-house registered nurse staff and hospital administration) charged with developing strategies for success. (2) ED perceptions for delays in the admission process were not supported by the time data.

## 392 State-to-State Variation in Statutes Regarding the Reporting of Medically Impaired Drivers

Aschkenasy MT, Drescher MJ, Ratzan R/University of Connecticut School of Medicine and Hartford Hospital, Farmington, CT

Study objective: In general, standards of medical practice apply nationally. In the rare cases where the standard is set by state statute, there is the potential for significant interstate variation. Physician obligation to report medically impaired drivers is such a case. We undertook a study to determine the extent to which statutory physician obligation to report medically impaired drivers varies from state to state.

Methods: A literature search was performed to identify previously published articles on the subject in the medical literature. The division of legal services for state departments of motor vehicles, as well as a legal literature search, were consulted. Material was also obtained from the Epilepsy Society of America pertaining to medical reporting laws and liability protection. Pertinent statutes were identified. State statutes were divided into 3 categories: mandatory reporting, permissive reporting, and no statute relating to reporting. The permissive reporting category included statutes with "may" or "discretionary" in their wording or statements that a physician was protected from liability or prosecution if he/she should choose to report.

Results: Of the 50 states, District of Columbia, and Puerto Rico, 7 (13.5%) had mandatory reporting laws in which the physician could be subject to criminal charges and fines for not reporting medically impaired drivers. Of the remainder, 16 (30.7%) had permissive reporting laws, whereas 29 (55.7%) had no laws pertaining to a physician's responsibility to report medically impaired drivers.

Conclusion: No national standard exists pertaining to medical reporting of impaired drivers. The ethical implications of such an action involve a conflict between patient-doctor confidentiality and physician responsibility for public health. Perhaps reflecting this, statutes dealing with physician reporting vary from state to state. Emergency physicians must take into account both global ethical principles and the local legal environment when dealing with the potentially impaired driver.

## 393 Do Demographics Influence Selection of Emergency Medicine Residents?

Feingold SA, Blackburn P, Rowley B, Bay C/Maricopa Medical Center, Phoenix, AZ

Study objective: A common perception among faculty and students alike is that demographics are important in emergency medicine residency program selection. We attempted to debunk or validate this prejudice.

Methods: We stratified our total pool of eligible US residency applicants (n=1,070) for the academic years 1997-1998 and 1998-1999 by home region, region of medical school, and whether or not they had rotated in our institution or attended medical school in Arizona. We then compared the percentage of applicants in the above categories who were on our rank list (n=126) with those not on the rank list (n=944).

Results: A far higher percentage of students who attended medical school in the West (19.1%), claimed the West as their home region (17.5%), or rotated with us (30.7%) were on our rank list compared with the percentage on our rank list from the total cohort (11.8%) or from other subgroups. These results were all statistically significant ( $P<.001$ ). Analysis of where students on our rank list matched demonstrated that generally students had no geographic preference. However, students in the West were an exception: a very high percentage of students attending medical school in the West (69.8%) or claiming it as their home region (72.4%) stayed in the West for residency.

Conclusion: Our program and students from the West exhibited demographic bias, selecting from and staying in their home region. However, generally students showed no bias. Because our program may attract a nonrepresentative subset of students from other regions that do not exhibit geographic bias, students and programs from non-Western regions could nevertheless exhibit the bias. Further study is needed to validate and generalize or refute these findings.

## 394 Recidivism in an Urban Emergency Department

Miller P, Weiss SJ, Ernsse AA, Russell S/University of California-Davis Medical Center, Sacramento, CA

Study objectives: Previous studies of recidivism have focused on trauma cases only. The purpose of this study was to identify emergency department recidivism in our population, identify specific demographics, and compare chief complaints.

Methods: This study is a population-based, retrospective cohort study. Data for this study were obtained from computerized registration files in an urban, university-affiliated ED with an annual census of approximately 60,000 visits. Recidivism was defined as a prior visit within 2 months. The recidivist group was composed of patients who presented more than once for care between October 1, 1998, and December 31, 1998. The comparison group was patients with only one visit to the ED during the same period. Demographics extracted from the database were age, sex, chief complaint, total number of visits, and insurance status. A  $P$  value less than .05 was considered statistically significant.

Results: There were 3,278 (17%) patients who were recidivists and 16,382 (83%) patients who were seen only once. Recidivists accounted for 8,534 (34%) of all visits. When the recidivists were compared with nonrecidivists, there were no differences in age or sex between the 2 groups; however, there were significantly more recidivists with public insurance (58% versus 49%, difference 9%, 95% confidence interval [CI] 8% to 11%) and significantly fewer with private insurance (32% versus 37%, difference 5, 95% CI 3% to 7%) or no insurance (9% versus 14%, difference 5%, 95% CI 4% to 6%). Seventy percent of recidivists were seen 2 times, 18% were seen 3 times, and 12% were seen 4 or more times. Of the recidivists, 753 (23%) were seen at least once for chief complaint of trauma. Other visits by these trauma patients were primarily for non-trauma-related chief complaints (654/753, 87%).

Conclusion: Recidivists accounted for 17% of patients and 34% of all visits to our ED. There is a significant difference in the financial class for patients who return to the ED within 2 months. Recidivists presenting with trauma are very likely to be seen at other times for non-trauma-related problems. The opportunity for intervention to prevent future ED visits should be considered in all patients presenting to the ED.

## 395 Laceration Length: A Comparison of Visual Estimation, Ruler Measurement, and Suture Measurement

Rosenbaum RA, Godshall DE, Dore JP, Lentz BK, O'Connor RE/Christiana Care Health System Newark, DE

Study objective: Compensation for laceration repair is based on the exact measurement of the laceration; however, these measurements are often reported based on rough estimates. The accuracy of estimation versus measurement of various lacerations and whether estimation errors result in incorrect billing was examined.

Methods: Lacerations were created on 10 pig feet with sizes ranging from 1.9 cm to 10.6 cm and included linear, curvilinear, jagged, and stellate-shaped lacerations. The lacerations were measured independently by all 4 authors and the mean was used as the actual size. A convenience sample of 36 physicians and 4 physician assistants affiliated with a single emergency medicine residency program completed the study. Participants were queried on whether they routinely estimated or measured laceration size. They viewed all 10 lacerations individually and estimated their size, then measured all lacerations with a ruler (without referring back to their estimate). Finally, they were shown a new technique using a piece of suture to trace the laceration shape then measuring the length of the suture. Participants then measured all 10 lacerations using this technique. Statistics included repeated measures analysis of variance and Pearson's correlation coefficient. *International Classification of Diseases-ninth revision*, codes were used to determine ranges and associated charges for laceration repairs.

Results: Of the 40 participants, 35 (87.5%) did not routinely measure laceration size. Estimated length and ruler measurements were less than the actual length on all 10 lacerations (error range -0.01 to -0.93 cm). The suture measurement was closest to the actual size on 9 of the 10 lacerations (error range -0.31 to +0.19 cm). The differences between estimated length and suture measurement could have resulted in decreased charges on 2 of the 10 study lacerations (average \$249 lost). The differences between ruler-measured length and suture measurement could have resulted in decreased charges on 1 of the 10 study lacerations (by \$259). None of the suture measurements would have resulted in incorrect charges.

Conclusion: The technique of laceration measurement using a piece of suture allows for improved accuracy and precision compared with estimation or ruler measurement of laceration size. The extra effort and time needed is marginal and can result in improved reimbursement for the repair of the laceration.

### 396 Clinical Presentation of Acute Aortic Dissection in the Emergency Department: Who Is At Risk for Missed Diagnosis?

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Aortic dissection (AD) is an uncommon disease that can be difficult to diagnose and often results in sudden deterioration and death.

Study objectives: (1) To determine what clinical presentations are associated with misdiagnosis of AD. (2) To determine whether establishing the diagnosis of AD in the ED affects the outcome of patients.

Methods: Retrospective review of all patients within a 100-mile radius who presented to the emergency department without a prior diagnosis and were shown to have AD by objective tests. These tests included computed tomography scan, transesophageal echocardiography, aortography, magnetic resonance imaging, surgical intervention, or autopsy.

Results: Forty patients met the inclusion criteria; 20 of the 40 were diagnosed in the ED. Of the 20 patients nondiagnosed, 9 patients were admitted to hospital services and diagnosed, 5 were admitted to the hospital and discharged without diagnosis, 4 died in the ED without diagnosis, and 2 were discharged from the ED without diagnosis. The mean age of the diagnosed group was 13 years less than the nondiagnosed group (range 59 to 87) ( $P=.003$ ). Thirteen of 20 (65%) patients diagnosed in the ED were found to have a pulse deficit on physical examination compared with 4 (20%) of 20 of nondiagnosed patients ( $P=.01$ ). Sixteen of 20 patients diagnosed in the ED had cardiovascular complications, whereas 8 of 20 nondiagnosed patients had the same findings ( $P=.022$ ). Only 4 of 16 patients diagnosed in the ED died in the hospital compared with 12 of 20 nondiagnosed patients who died in the hospital ( $P=.022$ ).

Conclusion: These data suggest that establishing a diagnosis of AD in the ED affects patient outcome. The absence of a pulse deficit, lack of cardiovascular complications, and older age are associated with increased likelihood of missing the diagnosis of AD in the ED.

### 397 Outcome in Adult Seizure Patients Treated in the Emergency Setting

Sloan EP, Silva JC, Rosenberg MS/University of Illinois, Our Lady of Resurrection Hospital, Resurrection Medical Center, Chicago, IL

Seizures are a common neurologic disorder initially treated in the emergency department. Optimizing the current treatment strategies and minimizing morbidity for this emergency condition can be enhanced by case series that establish relevant clinical benchmarks.

Study objective: To describe the outcome of acute seizure patients who are initially diagnosed and treated in the ED. The study institution is a comprehensive ED from an urban, community hospital staffed by board-certified emergency physicians.

Methods: This was a retrospective chart review of 535 consecutive adult ED seizure patients (age >15) treated in 1997.

Results: The mean age was  $44 \pm 17$  years, 64% were white, and 71% were male. A seizure history was noted in 73%, and 87% presented by ambulance. The most common time of presentation was between 8 AM and 4 PM (48%). Over the 1-year study period, 535 seizures were treated among 30,236 ED patients for a 1.8% rate. During emergency medical services (EMS) treatment, 8.2% of patients had seizures, 2.3% received dextrose, and 5.4% received diazepam. In the ED, 1.5% of patients arrived during a seizure, and 13% had a seizure at any time during the ED stay. The most common causes of seizure were ethanol (27%), noncompliance (24%), and new-onset (21%). Fevers were noted in 4.1% of patients. Benzodiazepines were given in 32% of ED seizure patients, and phenytoins in 50%. Admission was required in 38% of patients, and was 5.2 times more likely in new-onset patients, and 3.6 times more likely when benzodiazepines were given in the field or in the ED ( $P<.001$ ).

Conclusion: A significant number of seizure patients who present to the ED require both acute therapies and hospitalization. Active seizures in the EMS setting and at the time of ED presentation, as well as recurrent seizures in the ED, all necessitate determining optimal therapies in clinical trials.

### 398 Fever in the Elderly: Are Rectal Temperatures Indicated?

Varney SM, Manthey DE, Culpepper V, Creedon J/Wilford Hall Medical Center, Lackland AFB, San Antonio, TX; Brooke Army Medical Center, Ft. Sam Houston, TX; US Army Research Institute of Environmental Medicine, Natick, MA

Study objectives: (1) To determine if oral and tympanic temperatures correlate with rectal temperatures in identifying fevers ( $\geq 100.4^\circ\text{F}$ ) in elderly patients when the chief complaint suggests an infection. (2) To determine if detection of a fever alters patient evaluation, management, or disposition.

Methods: This cross-sectional study of urban Level I trauma center emergency department patients aged 60 years or older whose chief complaint suggests infection used a convenience sample of 95 patients enrolled between December 1998 and March 1999. A positive finding is any afebrile ( $<100.4^\circ\text{F}$ ) patient measured orally or tympanically but febrile ( $\geq 100.4^\circ\text{F}$ ) rectally by greater than or equal to  $1^\circ\text{F}$ . Patients were excluded for an initial temperature greater than  $102^\circ\text{F}$ , or neutropenia with a documented fever greater than or equal to  $100.4^\circ\text{F}$ . The data were evaluated using frequency, percent, and 95% confidence intervals, as well as odds ratios and correlation coefficients.

Results: Rectal thermometry identified a fever in 13 (13.7%) of 95 patients afebrile orally, and in 12 (13.3%) of 90 patients afebrile tympanically. Six (6.7%) of 90 patients were febrile rectally but afebrile by both oral and tympanic thermometry. Detection of a fever altered management in 2 (15.4%) of 13 febrile patients by initiating an infectious workup.

Conclusion: Rectal thermometry identified fevers missed orally and tympanically in elderly patients whose presentation suggested infection. Oral and tympanic thermometry provided unreliable data and should not be used. The data suggest a trend that fever detection may alter management. Data collection is ongoing.

### 399 Sudden Death Following Injury: Analysis of the "Talk and Die" Scenario

Mandavia DP, Greenspan J, Pritchard BJ/Los Angeles County—University of Southern California Medical Center, Los Angeles, CA

Study objective: The "talk and die" trauma patient is associated with high emotional and medicolegal concern by health care providers yet little is known about them. The objectives of this study were to determine common mechanisms of injury and to evaluate trauma scoring in these patients.

Methods: A health records survey was conducted of all injury-related deaths in the emergency department or within 24 hours of admission over a 2-year period at an inner-city Level I trauma center. Patients with a verbal score of 3 or greater on the Glasgow Coma Scale in the prehospital setting or on arrival to the ED were defined as "talking" and included. Medical records with operative, autopsy, and coroner reports were reviewed.

Results: During the study period, a total of 768 trauma patients died, of whom 498 patients died within 24 hours of admission. Ninety-five patients met the "talk and die" criteria. The majority of patients were male (82.1%) and the average age was 38.7 years (range 15 to 80 years). Penetrating trauma was the most common injury mechanism comprising 58.9% of all cases. Gunshot wounds were more likely (48/95) than stab wounds (10/95). Other mechanisms included motor vehicle accidents (16.8%), auto versus pedestrian (12.6%), burns (3.2%), and major falls (3.2%). The average Injury Severity Score was 32.9 and the average TRISS score was 68.6%. More than three quarters (72) had a TRISS probability of survival of more than 50%.

Conclusion: In this study, penetrating trauma was the most frequent cause of the "talk and die" trauma patient. TRISS methodology did not predict fatal complications in the majority of patients. Further work needs to address issues relating to survivability in this group of patients.

### 400 Gastrointestinal Hemorrhage and the Critical Decision Unit: Which Patients Are Appropriate?

Tokarski GF, Amponsah D, Rader K, Wright V, Ben-Menachem T, Nowak R/Henry Ford Hospital, Detroit, MI

Acute gastrointestinal hemorrhage (GIH) is a common reason for hospital admission, even when no evidence of ongoing hemorrhage or hemodynamic instability exists. The role of the clinical decision unit (CDU) in minimizing admissions of stable patients with recent GIH is unknown.

**Study objectives:** To determine whether ED assessments of stable patients with GIH can predict those who will require hospital admission (HA) versus CDU care.

**Methods:** We conducted a retrospective observational study conducted by performing chart reviews of patients treated for GIH in the ED/CDU at an urban tertiary care facility from 1996-1998. Historical (demographics, comorbidities, alcohol use, medications, previous GIH) and ED data (initial vital signs, orthostasis, laboratory, ED therapies) were obtained. Subjects were grouped according to final CDU disposition (HA versus discharge) and collected variables analyzed for their ability to predict the need for HA.

**Results:** The ED/CDU records of 215 patients were reviewed. Forty-eight patients (29%) required HA, whereas 167 (71%) were discharged from the CDU. Four variables significantly predicted admission (Table). Location of hemorrhage, use of alcohol or nonsteroidal antiinflammatory drugs, other comorbidities, initial vital signs, and other ED therapies did not have a predictive power for HA.

**Conclusion:** Advanced age, low hemoglobin level, need for blood transfusion, and presence of orthostasis help predict which ED patients with stable GIH may not be candidates for CDU pathway management. Other historical data and ED managements are not predictive of CDU outcome. Prospective trials are needed to better stratify stable GIHs as to appropriate disposition to the CDU or inpatient unit.

**Table, abstract 400.**

	Age (y)	Initial Hemoglobin (g/dL)	Orthostasis (%)	Blood Transfusion (%)
HA	67.3±13.6	10.7±2.2	60.0	34.0
Discharge	56.1±19.3	12.3±2.6	34.7	13.3
P value	<.001	<.001	.02	.001

## 401 "Medical Clearance" in the Psychiatric Patient Presenting to the Emergency Department: Is It Necessary?

Korn CS, Currier G, Henderson SQ/Los Angeles County–University Southern California Medical Center, Los Angeles, CA

**Study objective:** To evaluate the necessity for comprehensive "medical clearance" (history/physical/laboratory/radiography) in patients presenting to the emergency department with isolated psychiatric complaints.

**Methods:** We conducted a retrospective chart review over a 5-month period of all patients 16 years or older requiring a psychiatric evaluation for new or established psychiatric complaints before their discharge from the ED. Data included patient age, sex, initial complaint, past medical and psychiatric history, laboratory and chest radiography results, and final disposition. The number of patients that could have been referred to a psychiatric unit after a history and physical and without additional laboratory or radiographic studies was determined.

**Results:** Two hundred twelve patients met the criteria and 100% of the charts were available for review. Eighty (38%) patients presented with isolated psychiatric complaints coupled with a documented psychiatric history. All received a comprehensive "medical clearance" in the ED followed by a psychiatric consultation. None of the patients had positive screening laboratory or radiographic results. All were discharged home or to the psychiatric ED. The remaining 132 (62%) patients presented to the ED with medically based chief complaints or medical history requiring further medical evaluation in the ED before disposition.

**Conclusion:** The initial complaints of the patients in our study directly correlated with the need for laboratory and radiographic "medical clearance" in the ED. Patients with a primary psychiatric complaint coupled with a documented psychiatric history may be referred to psychiatric services without the use of ancillary testing in the ED.

## 402 Lumbar Puncture in the Emergency Department: Complications and Their Costs

Sternfeld D, Trott A/University of Cincinnati College of Medicine, Cincinnati, OH

**Study objective:** Postdural puncture headache (PDPH) is a common complication of lumbar puncture (LP), with a reported incidence of 5% to 40%, depending primarily on the study population and technique of dural puncture. However, there are no

published studies documenting the frequency of PDPH, or any other complications, in patients receiving LP in the emergency department. The goal of this study is to (1) determine the incidence of the complications of LP, including PDPH, in patients receiving diagnostic LP in the ED, and (2) determine the financial burden of the complications of LP.

**Methods:** This is a retrospective, chart review study of consecutive patients who received diagnostic LP in an urban trauma center in calendar years 1996 and 1997. Patients who were admitted to the hospital after LP were excluded from the study. The medical records of patients who were discharged after their LP were reviewed for return visits to the ED for complications related to LP.

**Results:** Of the 488 patients included in the study, 44 returned to the ED, for a total of 54 visits, with a complication related to LP. The overall incidence of PDPH was 8.0%. No statistically significant differences between the patients developing PDPH and sex or race were present in this study. However, age approached significance at the  $P=.06$  level. The average additional cost per visit for patients returning to the ED with an LP complication was \$950.

**Conclusion:** With only 5 exceptions, PDPH comprised the majority of complications of LP. The 8.0% incidence of PDPH is concerning; however, no clear causal or associative factors emerged. The cost of the additional visit for treatment of LP complications was significant, nearly doubling the cost of care. A prospective study is required to clarify the true incidence and possible risk factors of PDPH.

## 403 An Emergency Department Protocol for Management of Nonverifiable Pain

Schuckman H, Gaffney P, Wilber ST, Gerson LW, Blanda M, Powell C/Summa Health System, Northeastern Ohio Universities College of Medicine, Akron, OH

Substance-abusing persons may attempt to obtain drugs by presenting to emergency departments with nonverifiable pain (NVP). NVP is subjective, relying on the patient's history to determine its presence and severity.

**Study objective:** To describe findings from our protocol for NVP management. This prospective, observational study was conducted at 2 university-affiliated community teaching hospital EDs (89,000 visits per year).

**Methods:** Criteria for protocol inclusion are NVP patients unwilling or unable to take nonnarcotic analgesics for whom controlled drugs are considered. Patients enrolled from August 1, 1997, to May 31, 1998, were included. The study intervention was for emergency physicians to identify patients and obtain written informed consent, self-reported drug use in the past 30 days, and a urine drug screen (UDS). Data are presented as means and proportions with 95% confidence intervals (CIs).

**Results:** Seventeen (68%; 95% CI 47% to 85%) of 25 attending physicians used the protocol on 148 patients. Seventy-seven (53%; 95% CI 44% to 60%) of 148 patients were male, 112 (76%; 95% CI 68% to 73%) of 148 were white and mean age was 40 years (95% CI 38 to 41). Forty-six (31%; 95% CI 24% to 39%) of 148 patients complained of backache, 31 (21%; 95% CI 15% to 28%) of 148 headache, and 18 (12%; 95% CI 7% to 17%) of 148 toothache. Thirteen patients refused consent. One hundred fifty-seven screens were done on 134 remaining patients; 105 (67%; 95% CI 59% to 74%) of 134 patients claimed narcotic use, 32 (20%; 95% CI 14% to 27%) of 134 benzodiazepines, 11 (7%; 95% CI 4% to 12%) of 134 marijuana (THC), and 3 (2%; 95% CI 0.4% to 5%) of 134 cocaine. Unclaimed drugs were found in 55 (35%; 95% CI 27% to 43%) of 134 UDS. including narcotics in 33 (60%; 95% CI 46% to 73%) of 55, cocaine in 16 (29%; 95% CI 18% to 43%) of 55, butalbital in 9 (16%; 95% CI 8% to 29%) of 55, benzodiazepines in 7 (13%; 95% CI 5% to 24%) of 55, and marijuana in 4 (2.5%; 95% CI 0.7% to 6.4%) of 55.

**Conclusion:** This ED protocol identified prescription and illegal drug use and detected unclaimed drugs in patients with NVP. Its use allows drug discussions, intervention if needed, and aids in the management of NVP.

## 404 Emergency Physician Management of Musculoskeletal Low Back Pain: Are We Following Published Guidelines?

Velendzas D, Weiner A/University of Connecticut Medical Center, Farmington, CT

**Study objectives:** In 1994, the Agency for Health Care Policy and Research (AHCPR) published guidelines for the initial evaluation and management of patients with musculoskeletal low back pain (MSLBP). This study looks at the compliance of the emergency medicine practitioner with the AHCPR guidelines.

**Methods:** Patients evaluated for MSLBP in our university-based emergency department, between June 1, 1998, and October 31, 1998, were identified retrospectively by their *International Classification of Diseases—ninth revision (ICD-9)* code. Patients were

excluded if their medical records were not available for review, if they had been coded incorrectly for MSLBP, or if they were admitted to the hospital. The authors reviewed the charts for the ED treatment and discharge instructions.

Results: Two hundred ten patients were identified by their ICD-9 codes; of these 180 were eligible for inclusion into our study. Four percent of patients had further testing despite the absence of documented red flags. One hundred percent of patients were recommended transient rest and activity modification. Twenty-three percent of patients were given a trial of nonsteroidal anti-inflammatory drugs (NSAIDs) before narcotics. Seventy-one percent of patients were given a prescription for narcotics and/or muscle relaxants with or without NSAIDs. Thirty percent of patients had narcotics and/or muscle relaxants alone without NSAIDs.

Conclusion: Testing, bed rest, and activity modification follow the conservative approach recommended by the AHCPR guidelines. However, there seems to be a more aggressive approach in the medicinal treatment of MSLBP with an emphasis on narcotics and muscle relaxants rather than NSAIDs. Are these guidelines applicable to the ED setting? To answer this question, there is a need to better delineate the natural history of MSLBP encountered in the ED.

## 405 Acute Stroke Treatment in the Rural Emergency Department: Effect of Helicopter Transport Coordinated Care Track

Duldner JE Jr, Mikesell KA, Kiomento DJ, Barile AM, Emerman CL, Kovach B, Hanna JP, Fallon WJ/Akron General Medical Center, Akron OH; MetroHealth Medical Center, Samaritan Hospital, Case Western Reserve University, Cleveland, OH

Study objectives: Patients suffering acute stroke in rural areas may not have access to health care providers or institutions capable of providing care necessary for use of thrombolytic therapy. Evaluation in rural emergency departments with links to stroke centers may be an alternative, and helicopter transport can provide this link. We developed an acute stroke helicopter coordinated care track (HCCT).

Methods: This was a prospective pilot study with clinical intervention. The study hypothesis was that a rural ED can improve stroke care and accurately assess patients who are candidates for thrombolysis. The study was conducted in a rural community hospital and urban, university-affiliated stroke center. Study subjects were 10 consecutive patients presenting with focal neurologic deficit. ED staff were trained on acute stroke evaluation, management, and the HCCT.

Results: This rural ED serves a county population of 47,507, covering 399 square miles, and has more than 20,000 annual ED visits. Distance between EDs is 51 nautical and 57 statute miles. Helicopter transport time is 22 minutes, and ground transport ranges from 60 to 90 minutes. Mean study patient age was 68.6 years (range, 53 to 78). Symptom onset time to ED triage was 115  $\pm$  136 minutes (mean  $\pm$  SD). Triage to computed tomography (CT) scan time was 13.2  $\pm$  9 minutes. Average time to CT result availability after radiologist review was 71  $\pm$  50 minutes. Telephone stroke team consultation was obtained 73  $\pm$  53 minutes after triage, and helicopter request was 30  $\pm$  28 minutes after consultation. Presenting median National Institutes of Health Stroke Scale (NIHSS) was 10. Four patients had resolving or mild deficit (NIHSS  $\leq$  4). Three required antihypertensive therapy, and 1 had early CT infarct changes. During the pilot, 1 patient (NIHSS=14) was treated with tissue plasminogen activator and transported. NIHSS at discharge was 0. Five patients have been successfully treated thus far.

Conclusion: An HCCT for treatment of ischemic stroke can be effectively implemented and can benefit stroke patients in rural areas.

## 406 Duration and Causes of Delay in Seeking Care Among Patients Hospitalized for Acute Chest Pain

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Study objectives: To design effective education programs promoting prompt care for chest pain requires understanding patient beliefs. Our purpose was to determine the duration and causes of patient delay when seeking care for acute chest pain.

Methods: This was a prospective cross-sectional, face-to-face standardized survey. Subjects were 80 consecutive emergency department chest pain patients admitted to a telemetry unit for suspicion of acute coronary syndromes. The study was conducted at a large urban public teaching hospital ED.

Results: Mean age was 51 years (SD 14); 38 (48%) patients were male. Racial composition was as follows: African American 67 (84%); white 5 (6%). The mean delay from onset of chest pain to arrival in the ED was 115 hours. The majority of that delay, 90% (103 hours), was deciding to seek care; 25% decided to seek care in less than 2 hours, 36% by 6 hours, 45% by 12 hours, 54% by 24 hours. Delay related to social

duties such as caring for children, jobs, or obtaining transportation amounted to a mean of 12 hours but affected only 8% of patients. Mean travel time was 0.7 hours (SD 0.49). The most frequent reasons for delaying care were as follows: 66% thought it was "not serious" or would go away, 9% cited financial concerns, and the remainder cited a wide variety of reasons. The decision to finally seek care was precipitated by persistent pain in 61%, worsening pain in 25%, and a new symptom in 19%. Only 6% traveled by ambulance and 16% even considered calling one. When asked when they should call an ambulance, 76% of patients said they would call an ambulance only if they thought they would die, 19% if they could not walk, and 16% only if they had no other means of transportation. When asked to cite the benefits of ambulances, 73% knew they could receive treatment in the home or en route, but only 38% believed it was a faster method of reaching the hospital.

Conclusion: The majority of delay in seeking care among urban patients who have acute chest pain is related to the decision to seek care rather than social constraints or trouble in obtaining transportation. It is, therefore, amenable to patient education efforts. In addition, the delay in seeking care may affect the usefulness of standard biochemical markers for myocardial necrosis. The patient sample was from a single hospital. A source of potential bias is that the majority did not travel by ambulance. The same patients with more severe symptoms might call an ambulance and receive transport to the closest community hospital and thus, not be sampled at our inner-city hospital.

## 407 Do Women With MIs Have a Delay in Time to Treatment With Angioplasty?

Kugler D, Lee DC, Ryan JG, Pancu D, Ward MF, Rudolph GS, Rao S, Chu K, Sama AE/North Shore University Hospital, Manhasset, NY

Study objective: To determine whether women presenting with acute myocardial infarctions (AMI) have a delay in time for percutaneous transluminal coronary angioplasty (PTCA) compared with men.

Methods: This is a retrospective cohort pilot study of consecutively enrolled patients (November 1995 to January 1997) presenting with AMI in a 50,000-visit academic emergency department where PTCA is the primary treatment for all AMI. Patients were documented to have AMI by symptoms and ECG. Charts were reviewed for age, sex, presentation time, and inflation time of PTCA balloon.

Results: Ninety-four patients met inclusion criteria with 5 excluded for insufficient data. Mean time for "door-to-balloon" in all patients was 118  $\pm$  48 minutes. Mean times were as follows: women 129 minutes (SD 56 minutes, n=27), men 113 minutes (SD 44 minutes, n=61). This was not statistically significant using Wilcoxon rank sum test. However, there was a statistically significant difference in ages of these 2 groups, women 66 years (SD 11), men 59 years (SD 12) ( $P=.01$ ).

Conclusion: Although there was a trend for longer delays in women with AMI compared with men, this was not statistically significant. In our prior studies, we have shown that there is a greater delay with older patients with AMI, which may be a confounding factor. A larger study is under way to assess whether sex influences PTCA times.

## 408 Thrombolytic Therapy and Helicopter Transport of Acute Ischemic Stroke

Duldner JE, Kiomento DJ, Barile AM, Katzan I, Furlan AJ, Landis DM, Kovach B, Fallon WJ/Akron General Medical Center, Akron, OH; MetroHealth Medical Center, Metro LIFEFLIGHT, Case Western Reserve University, Cleveland, OH

Study objectives: Helicopter transport (HT) provides a critical link to facilities with advanced resources and technology. Although HT has been successful in myocardial infarction and trauma, its role in acute stroke is unknown. Because thrombolytic therapy for acute stroke requires expertise not available at every hospital, HT can play an expanding role for acute stroke treatment. Clinical aspects related to use of tissue plasminogen activator (tPA) and HT are addressed.

Methods: We conducted a retrospective chart review of hospital-based helicopter transport service. Sixteen patients received HT in conjunction with tPA.

Results: Mean patient age was 65.2 years (range, 46 to 81 years); 36% were female. Mean time of helicopter arrival after symptom onset was 164 minutes (range, 77 to 266 minutes). There were 3 receiving hospitals with flight distances ranging from 5 to 51 nautical miles. Mean HT flight time was 13.5 minutes. Median Glasgow Coma Scale score at HT and at the receiving ED was 14 (range, 10 to 15). Initial National Institutes of Health Stroke Scale (NIHSS) data were not available on all patients. tPA was administered to 13 patients before HT, and 3 received tPA at the receiving ED. Systolic blood pressure at HT team arrival was 158.6  $\pm$  22.17 mm Hg (mean  $\pm$  SD). Diastolic blood pressure was 77.8  $\pm$  26.6 mm Hg. No patients required antihypertensive



medication before administration of tPA. One patient received therapy in-flight for a blood pressure reading of 180/98 mm Hg. Three additional patients should have received antihypertensive medication for elevated blood pressure per protocol. No patients required intubation and had in-flight neurologic deterioration. Discharge NIHSS demonstrated 12 patients with no or mild deficit (NIHSS  $\leq 4$ ), 3 had moderate deficit (NIHSS  $\geq 5$  and  $< 13$ ), and 1 had a fatal intracerebral hemorrhage.

Conclusion: HT is rapid and safe. It may extend the use of tPA to acute stroke victims in community and rural settings who require specialized care. Additional training of flight crews is necessary.

## 409 Acute MI Triage Scores for Emergency Medical System Bypass to Cardiac Centers

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The prehospital triage of patients for bypass from community hospitals to cardiac centers may improve cardiac survival.

Study objective: To examine the prognostic value of 3 ECG-based scoring methods for patients with acute myocardial infarction (AMI).

Methods: This was a retrospective study of 280 AMI patients transported by ambulance during 1996-1997 to community hospitals or cardiac centers. Inclusion criteria were age older than 18 years, chest pain or dyspnea, ECG findings of 0.1 mV of ST-segment elevation in 2 leads or positive creatine kinase isoenzyme (CPK-MB). All first performed ED ECGs were interpreted and scored by a reader blinded to clinical outcomes. The Aldrich MI score was assigned using ST elevation, abnormal Q waves, and tall T waves; QRS distortion was present or absent based on morphologic characteristics of the terminal QRS; TIMI classification of "low risk" was modified for prehospital signs. Cardiac mortality was determined using triconty death index.

Results: The mean age of 280 AMI patients was 67.6 years (SD 14.5), with 60% male, and 58.6% white, 27.9% black, and 13.5% other; 31.8% of patients were treated with thrombolytics and 29% with primary angioplasty. The 2-year cardiac mortality rate was 27.9%. On univariate analysis, only the TIMI score was associated with cardiac mortality ( $P=.069$ ). A multivariate model incorporated the TIMI score with an odds ratio of 1.96 ( $P=.082$ ), but not the Aldrich MI score or the terminal QRS.

Conclusion: The TIMI risk score has the strongest association with cardiac mortality and may be suitable for identifying higher-risk AMI patients in the prehospital setting.

## 410 Prophylactic Aspirin Use in an Emergency Department Population

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Aspirin (ASA) has been shown to decrease cardiac events in people with preexisting cardiovascular disease. The use of ASA as primary and secondary prevention of myocardial infarction (MI) has been found to range from 17% to 56% in community and primary care settings. To our knowledge, the use of ASA in an emergency department population has not been described.

Study objective: We designed this study to determine the frequency of ASA use in an ED population.

Methods: This was an observational study of 486 patients 40 years or older who presented to 2 urban, university EDs between May 8 and August 1, 1998. Data were collected on a structured closed-question data sheet. Prophylactic ASA was defined as not more than daily nor less than every other day use. The following were tested as predictors for ASA use: known coronary artery disease, coronary artery disease risk factors, contraindications to ASA use, and identified primary care provider (PCP). Data were analyzed using  $\chi^2$  with significance defined as  $P<.05$ .

Results: Twenty-eight percent of patients queried used prophylactic ASA at the time of this ED visit. Predictors of ASA use were previous MI (73%), coronary artery disease (62%), cholesterol more than 200 mg/dL (46%), diabetes (46%), hypertension (37%), and family history of coronary artery disease (34%) ( $P<.001$  for all). A PCP was associated with increased prophylactic ASA use (36%,  $P<.001$ ). Cigarette use was not associated with increased prophylactic ASA use (28%,  $P>.05$ ). Forty-five percent of subjects reported a contraindication to ASA use; however, 24% of these patients used prophylactic ASA.

Conclusion: Prophylactic ASA use in this ED population was similar to that previously described in community and outpatient settings. The use of prophylactic ASA increased with all risk factors of coronary artery disease except cigarette use. Nearly

half of patients reported a contraindication to ASA use, but many still used it regularly. A PCP was associated with increased use of prophylactic ASA.

## 411 Coronary Triage Unit Utility in an Indigent County Population

Henderson SO, Ostrzega E, Genna T, Korn C, Ildefonso C, Garan-Martinez K/Los Angeles County—University of Southern California Medical Center, Los Angeles, CA

The utility of chest pain units in private insured settings has been described. In July 1997, a chest pain evaluation unit was established at our facility, a Level I trauma center serving a local population of 1.5 million, with an average annual ED census of approximately 147,000, many of whom are indigent. Infectious disease, drug, alcohol, and psychiatric problems are disproportionate in this patient population. The unit was developed in an effort to more rapidly triage, treat, and discharge patients with low-risk chest pain, syncope, stable arrhythmias, or mild exacerbation of congestive heart failure. Traditional management of these patients involved multiple day admissions to intensive care or telemetry type settings. The unit was jointly managed and staffed by emergency medicine and cardiology physicians, and patient workups could include medical therapy, bedside echocardiography, or on-site exercise stress testing.

Objective: To review the performance of a chest pain or coronary triage unit (CTU) in a hospital with a large indigent population.

Methods: This is a retrospective case review of all patients sent to the CTU during a 20-month period. Data collected included total census, time to rule out myocardial infarction from arrival to the CTU, total length of stay, number of patients discharged, and number of patients admitted to routine, step-down, and intensive care settings.

Results: The total CTU census for the months of August 1997 to March 1999 was 2,747 with an average monthly census of 137 (range 110 to 169). Time to rule out myocardial infarction while in the CTU averaged 7.8 hours, and the mean total stay in the unit was 19.7 hours (range 18 to 25.5 hours); 1,510 (55%) of the patients were discharged home. Of the 1,113 patients admitted to the hospital, 325 went to a cardiology setting (29% of those admitted), and 62 (6% of those admitted) went to the intensive care setting. One patient suffered a respiratory arrest, and there were no cardiac arrests. Patient diagnosis unique to this population included a high number of patients with chest pain associated with cocaine and ethanol use, psychogenic causes, and unique infectious disease etiologies such as Chagas' disease.

Conclusion: Admission to a CTU is an effective, relatively low-risk method of rapidly evaluating, testing, and diagnosing low-risk cardiac patients (chest pain, cardiac arrhythmias, mild congestive heart failure). Length of stay is decreased and staffing may be tailored to the unique needs of this population. CTU utility easily translated to an urban inner-city facility serving a largely indigent population.

## 412 Knowledge of Risk Factors for Coronary Artery Disease: Comparison Among Gender and Races

Diercks DB, Ernst AA/University of California—Davis Medical Center, Sacramento, CA

Study objective: To determine emergency department patients' baseline level of knowledge of cardiac disease risk factors and to compare differences among races and gender.

Methods: A survey administered to a convenience sampling of adult ED patients. Questions were asked about knowledge of risk factors of coronary artery disease (CAD). One-way analysis of variance and  $\chi^2$  testing was used to compare ages and answers among races and gender for knowledge of risk factors: age older than 60 years, family members with CAD (FHx), hypertension (HTN), high cholesterol, diabetes (DM), and smoking. A  $P$  value of less than .05 was considered statistically significant.

Results: A total of 433 participated in the study over a 3-month period. Questionnaires were completed in 416 participants; 211 were male and 205 female. There were 212 (51%) white, 57 (14%) Hispanic, 105 (25%) African American, and 42 (10%) other races. Only 47% of participants identified age older than 60 years as a risk factor, 48.3% identified DM as a risk factor, 78.4% identified HTN as a risk factor, 68.2% identified FHx as a risk factor, 70.9% identified high cholesterol, whereas 79% of the participants identified smoking as a risk factor. White patients knew more frequently than African Americans that age older than 60 was a risk factor for CAD (50.9% versus 35.2%,  $P=.008$ ). White patients knew high cholesterol was a risk for CAD more often than the group defined as other races (76.9% versus 54.8%,  $P=.003$ ). There was no difference among races regarding the knowledge that HTN, DM, and tobacco use increased risk for CAD. Knowledge base among genders was similar. Participants with a risk factor such as HTN, high cholesterol, DM, and FHx were

aware that each is respectively a risk factor for CAD, but were not more aware of risk factors in general.

Conclusion: Baseline levels of knowledge about CAD risk factors are low in this ED-based population. There are significant differences in knowledge among races.

## 413 Demographics, Descriptions, Diagnosis, and Disposition of 1,677 Chest Pain Patients in an Indigent Acute Care Hospital

Henderson SO, Ostrzega E, Genna T, Matayoshi D, Alcocer L/Los Angeles County–University of Southern California Medical Center, Los Angeles, CA

Traditionally, descriptive studies of chest pain focus on sentinel events, such as myocardial infarction. In addition, chest pain in the African-American and white population has been well described, whereas the indigent and immigrant population has been largely ignored. Our facility is a Level I trauma center serving a multicultural urban community. Although our community is 70% Hispanic, our hospital also sees many other immigrant populations. A disproportionate number of patients are indigent and less than 5% have private insurance.

Study objective: To evaluate the demographics, presentation, diagnosis, and final disposition of this underreported, primarily Hispanic, socioeconomically depressed, urban population of patients with the chief complaint of chest pain.

Methods: We conducted a retrospective case review of all emergency department patients with chief complaint of chest pain from January 1 through June 30, 1998. Data included patient demographics and chief complaint, cardiac risk factors, first ECG, first troponin (TnI), intoxicant history and levels, final diagnosis, and disposition from the ED.

Results: There were 1,677 patients with the chief complaint of chest pain; 885 (53%) were men. The mean age was 53 years (range 12 to 93 years). Fifty-five percent of patients were Hispanic, 25% African-American, 10% white, 8% Asian, and 2% other; 41.9% of patients were from the United States and 29.2% from Mexico with more than 48 other countries of origin represented. A total of 1,165 (70%) of the patients presented with the classical precordial description (left-sided, substernal, and so on) of chest pain. Of the 1,677 patients, 52% had hypertension, 20.5% had a family history of heart disease, 24.2% were diabetic, 37.6% had a past cardiac history, 36% used tobacco, 16% of those tested used cocaine, and 14.2% had known cholesterolemia. Two hundred thirty-six (15.6%) of the patients were discharged directly home. Of the 1,419 (84.4% of the total patients) patients who were admitted to the hospital, 697 (42% of those admitted) went to the chest pain unit, 405 (24%) went to the ICU/coronary care unit, 285 (17%) went to a routine medical unit and 22 (0.5%) died in the ED. The final diagnosis for this cohort included 4.5% acute myocardial infarctions, 1.4% cardiac arrests, 35.5% with atypical chest pain with no cardiac etiology found, 11.0% with congestive heart failure, 6.3% with unstable angina, 4.0% with pleuritic chest pain, 8.1% with dysrhythmias, 0.7% with endocarditis or pericarditis, and 25.7% of the patients had other final diagnosis. By race, Asians had the highest incidence of myocardial infarctions at 6.35%, compared with 2.53% in African-Americans, 4.76% in whites, and 4.38% in Hispanics.

Conclusion: Our Hispanic population had similar chest pain, risk factors, and chief complaints as other populations. Smoking and hypertension rates were higher and the average age was relatively low. For acute myocardial infarction, Hispanics had a higher incidence than African-Americans but similar to whites.

## 414 Evidence of Myocardial Complement Activation Following Hemorrhagic Shock and Resuscitation

Craig K, Washington RA, Huang J, Younger JG, Lucchesi BR/University of Michigan Medical Center, Ann Arbor, MI

Evidence supporting myocardial malfunction after hemorrhagic shock and resuscitation has been limited and controversial. Complement has been shown to play a role in the in vitro and in vivo myocardial ischemia reperfusion (IR) injury model. Similarly, complement activation may occur during hemorrhagic shock and resuscitation and contribute to cardiac dysfunction.

Study objectives: This investigation measured cardiac performance after hemorrhage and examined cardiac tissue for histologic evidence of injury.

Methods: A fixed-pressure model of hemorrhage was performed on New Zealand White rabbits to a mean arterial pressure of 35 to 40 mm Hg for 1 hour. After 3 hours of resuscitation with shed blood and normal saline, rabbit hearts were placed on a Langendorff apparatus, paced, and perfused with warmed, oxygenated modified Krebs-Henseleit buffer at a constant flow. Cardiac performance was gauged by coronary perfusion pressure (CPP), left ventricular end-diastolic pressure (LVEDP), and left

ventricular developed pressure (LVDP). After Langendorff perfusion, cardiac tissue was analyzed histologically by (1) hematoxylin-eosin (H&E) staining, (2) propidium iodide (PI) staining to assess cell viability, or (3) immunohistochemistry for membrane attack complex (MAC).

Results: There was no statistically significant difference between the hemorrhage and control groups in regard to CPP ( $P=.60$ ), and LVEDP ( $P=.63$ ). Hemorrhage and resuscitation resulted in a significantly lower LVDP ( $48 \pm 16$  mm Hg) versus control ( $77 \pm 16$  mm Hg;  $P=.01$ ). Review of H&E slides suggested a greater degree of myocardial damage in the hemorrhage group versus control as evidenced by increased capillary engorgement, interstitial edema, and loss of nuclei. PI uptake appeared more diffuse in the hemorrhage group compared with the controls, with the former also positive for MAC.

Conclusion: Changes in cardiac function induced by hemorrhagic shock and resuscitation is associated with histologic evidence of myocardial injury and complement activation.

## 415 The Clinical Presentation of Emergency Department Patients Who Are Evaluated for Acute Cardiac Ischemic Syndromes

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Study objective: Most research on predictors of acute cardiac ischemic syndromes (ACIS) focus only on patients who present to the emergency department with chest pain. We attempted to measure the frequency of ED presentations of all patients thought by clinicians to need an evaluation for ACIS.

Methods: This was a prospective descriptive study design using a close-ended ACIS questionnaire. The study included all patients 30 years or older with symptoms less than or equal to 48 hours who were admitted for a routine "rule out myocardial infarction" protocol or who were discharged home from the ED with the plan for an outpatient ACIS evaluation (usually an exercise tolerance test).

Results: Among the first 100 patients enrolled in the study, 64% were male. The median age was 61 years (interquartile range 49 to 71). Seventy patients (70%, 95% confidence interval [CI] 61% to 79%) presented with substernal or left chest pain: 29 (29%, 95% CI 20% to 38%) without radiation, 25 (25%, 95% CI 16% to 34%) with radiation to the left arm/shoulder or neck/jaw, or both. Thirty patients (30%, 95% CI 21% to 39%) presented with non-chest pain as their chief complaint: shortness of breath/dyspnea on exertion 9, syncope/presyncope/weakness 6, palpitations/arrhythmia 6, pain (non-chest) 3, other combinations 6. The median onset of symptoms before ED arrival was 3.5 hours (interquartile range 2 to 8 hours). Forty-five patients (45%, 95% CI 35% to 55%) had a history of previous ACIS; 86 patients (86%, 95% CI 79% to 93%) were admitted to the hospital. Based on data available in the ED, study team members (all physicians) estimated that 25% of these 100 patients had more than a 15% chance of having an ACIS at that presentation.

Conclusion: Given the conventional wisdom and clinical teachings within at least one institution, 30% of patients presenting to the ED and thought to need an evaluation for ACIS presented without chest pain. This has implications for inclusion criteria for research attempting to identify predictors of ACIS among undifferentiated ED patients.

## 416 Bedside Cardiac Markers and the Emergency Evaluation of Chest Pain

Henderson SO, Chan KM, Genna T, Alcocer L, Conforto A/Los Angeles County–University of Southern California Medical Center, Los Angeles, CA

Study objective: To evaluate the efficacy of bedside cardiac markers in the initial evaluation of patients presenting with chest pain and without ECG evidence of an acute myocardial infarction in the setting of a 24-hour coronary triage unit (CTU).

Methods: This was a prospective study approved by the institutional review board. All patients admitted to the CTU (18 to 65 years, onset of chest pain within 72 hours, no active chest pain, no acute ST-/T-wave ECG changes) were consented and enrolled. A bedside troponin I (TnI) assay (Spectral Inc) was performed (positive cutoff more than 1.5 ng/mL), as well as a TnI in the central core laboratory (batched to run every 4 hours). Agreement between the 2 specimen results was recorded, as well as time savings that would have resulted had the bedside test been used in isolation.

Results: Ninety-eight patients were enrolled. The bedside TnI had a specificity of 98% (95% confidence interval [CI] 89 to 100) and a sensitivity of 50% (95% CI 9 to 99). Time savings that would have occurred had the bedside TnI been used in isolation were 216 minutes (3.6 hours). Although there was concordance of 97% between the 2 meth-

ods, the use of a bedside qualitative test in isolation would have resulted in a delay in diagnosis of 12 hours in 1 patient and misdiagnosis in 2 patients compared with the central laboratory value.

Conclusion: Bedside TnI testing in the low-risk chest pain patient is an alternative method of ruling out myocardial infarct. Benefits from the bedside tests include time savings in the form of shorter stays in a CTU or ED. Risks include false-negative results and delayed diagnosis if the first TnI falls below the manufacturer cutoff.

## 417 Types, Benefits, and Follow-up of Social Worker Consultations for Emergency Department Patients

Olishaker J, Green Y, Jerrard D/University of Maryland Medical Center, Baltimore, MD

Study objective: To study types, benefits, and follow-up of emergency department social worker (SW) consultations.

Methods: This was a prospective observational study of all SW consultations in an urban university adult ED over a 4-month period. Data were collected on patient age, sex, reason for ED visit, reason and outcome of SW consult, and agreement to and results of 2-month telephone follow-up.

Results: Eighty-six patients were seen by the SW during the study period. SW consultations were initiated by physicians in 36 (42%) cases, nurses 21 (25%), patients 15 (17%), and by the SW 14 (16%). Most common reasons for ED visits were illness 52 (60%), injury 15 (17%), and domestic violence 6 (7%). Most common reasons for SW consults were inability to afford prescriptions 45 (52%), social crisis counseling 6 (7%), domestic violence counseling 6 (7%), and shelter placement 5 (6%). Forty-three patients (96%) were successfully helped to fill prescriptions. Twenty-eight (33%) patients agreed to 2-month follow-up; 15 were reached. All remembered the SW consultations and believed the interaction was helpful initially. Eleven felt the SW consultation brought benefits 2 months later, the most common reason being the acquisition of regular pharmacy assistance benefits.

Conclusion: SW consultations are helpful to many ED patients, although telephone follow-up is difficult to attain on most patients.

## 418 Focused Abdominal Sonography for Trauma: Evaluation of a Half-Day Curriculum

Mandaviah DP, Bistrain J, Chan L, Chan D/Los Angeles County—University of Southern California Medical Center, Los Angeles, CA; University of California—San Diego Medical Center, San Diego, CA

Study objectives: Bedside ultrasound (US) by emergency physicians and surgeons is rapidly being integrated into trauma care yet minimum training requirements for competency have not been well defined or tested. This study evaluated image interpretation after a 4-hour trauma US course.

Methods: A standardized trauma US curriculum based on Society for Academic Emergency Medicine (SAEM) guidelines was administered to emergency physicians and surgeons over 4 hours. Lectures with syllabus material and videotapes were used to cover the fundamentals of trauma US over 2 hours. The following standard views were taught: Morison's pouch, splenorenal recess, paracolic gutters, suprapubic views, and the subcostal view of the heart. Subsequently each student received 2 hours of hands-on US instruction using normal models and peritoneal dialysis models as positive controls. At the beginning and end of this curriculum, participants received 12 trauma US images for interpretation including positive, negative, and nondiagnostic scans. Mean changes in scores were calculated using the paired *t* test.

Results: A total of 44 emergency physicians and surgeons underwent standardized training and testing. From a maximum score of 12, the mean pretest score was  $5.52 \pm 3.01$  and the mean posttest score was  $9.25 \pm 1.43$  ( $P < .001$ ). The mean of changes was  $3.73 \pm 2.55$  (95% confidence interval 2.95 to 4.51).

Conclusion: A standardized 4-hour trauma US course significantly improves the ability of emergency physicians and surgeons to interpret US images. Further prospective studies need to evaluate this curriculum in the clinical setting.

## 419 Developing a New Model for Transmitting Advance Directives From Long-Term Care Facilities to Emergency Departments

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Study objectives: To identify and describe health care providers' ideal model for transmitting a patient's treatment preferences from long-term care facilities to emergency departments.

Methods: This qualitative study used semistructured focus group interviews and content analysis. Emergency medicine, emergency medical services, and long-term care providers were asked to describe their experiences with the transfer of long-term care residents to EDs and to identify barriers that prevent residents' treatment wishes from being transferred with them. Participants were then asked to describe their ideal model for transferring residents' treatment wishes. The interviews were transcribed and a grounded theory methodology was used to identify key themes. All compatible themes were incorporated into a single model. Participants were recruited from the teaching hospitals that are affiliated with the Joint Centre for Bioethics at the University of Toronto, the Toronto Ambulance Service, and long-term care facilities that transfer patients to the EDs of these hospitals. Thirty-five participants were recruited from 5 health care provider groups: emergency nurses, emergency physicians, paramedics, long-term care nurses, and long-term care physicians.

Results: Participants believed a general, less specific directive was preferable to a highly detailed one because of concerns that patients may make poorly informed choices, or may make choices that have unintended effects if the directive is too detailed. All focus groups agreed that information about resuscitation and advance care planning should be provided to patients and families as early as possible, either before or at the time of admission to a long-term care facility. It should be done in a sensitive manner, using different methods such as videos and booklets, and with little pressure to make an immediate decision. The documentation of residents' decisions should be standardized, prepared well in advance of time of transfer, and easily accessible.

Conclusion: Our participants emphasized the importance of education and discussion rather than a specific transfer form. To improve the transmission of residents' treatment wishes from long-term care facilities to EDs, greater efforts should be made to educate residents and families about resuscitation and advance care planning. These efforts should begin as early as possible, even before the time of admission to a long-term care facility.

## 420 Direct Nurse Triage to a Respiratory Therapist Does Not Decrease Time to Treatment of Patients Presenting With Dyspnea

O'Connell J, Drescher MJ, Hartman J, Smally AJ, Perez A/Hartford Hospital, University of Connecticut School of Medicine, Hartford, CT

Study objective: Recently Goldberg et al described the positive effect of a nurse-driven critical pathway on resource utilization in the emergency department. We undertook this study to assess the effectiveness of a protocol allowing respiratory therapists (RT) to evaluate and treat select patients, in decreasing patient waiting time to treatment with bronchodilators.

Methods: Exemption from review was received from the institutional review board. The setting was an urban teaching hospital with a census of approximately 65,000 adult patients annually. A protocol by which patients meeting criteria would be treated with bronchodilators by RTs before physician evaluation. The study design is a prospective before and after study in which a convenience sample of patients were evaluated in the 2 months before the intervention ( $n=150$ ) and in the 2 months after the intervention ( $n=117$ ). Inclusion criteria were patients older than age 16, presenting with dyspnea, with stable vital signs, history of chronic obstructive pulmonary disease or asthma, no history of chest pain, or 3 of the following: increased work of breathing, peak flow less than 50% of predicted or personal best, severe cough, or history of mucociliary clearance problem. Exclusion criteria included unstable vital signs, patient with chest pain, or clinical congestive heart failure. Time until seen by the RT and time until first treatment was received was recorded by the RT caring for the patient.

Results: The mean time from triage to RT evaluation in the preprotocol group was 27 minutes and for the postprotocol group was 22.7 minutes. The mean time to first bronchodilator treatment was 32 minutes for the preprotocol and 26 minutes for the postprotocol group.

Conclusion: Instituting a protocol whereby RTs initiated treatment before physician evaluation of the patient did not achieve a clinically significant decrease in time to treatment of stable patients with difficulty in breathing. This finding reinforces the need to assess the effectiveness of treatment protocols such as this after their implementation. Our intention was to enroll a consecutive sample of patients meeting criteria, but do not have a method to measure compliance by the RT on duty and therefore do not know the characteristics of patients who were not enrolled. An additional limitation is our inability to generalize our findings to other institutions where time to physician evaluation, availability of RT support, nurse to patient ratio, and patient cen-

sus may all be different. Further study will be needed to evaluate whether a similar protocol is significant in affecting patient outcome, patient satisfaction, and resource allocation.

## 421 Delays in Diet Initiation for Emergency Department Patients Impacts Clinical Outcome

Milzman D, Meyer J, Zlidenny A, Moskowitz L, Tim Janchar T/Georgetown University School of Medicine, Providence Hospital, Washington, DC

It should not require a study to find that delaying enteral or parenteral nutrition from the emergency department worsens patient's outcome.

**Study objective:** This study will find if delays exist for admitted ED patients until they receive proper diets and the effect on hospital outcome. The study was conducted in an urban ED with 38,000 annual visits in a community teaching hospital.

**Methods:** A retrospective review of all ED admissions for a 30-day period excluded the following patients: those intubated on admission, those on no oral intake status, or those with do-not-resuscitate order. The interval from admission until first diet order for either enteral or parental feeding was noted, and time till actual feeding administered. Intravenous fluids were not counted as feedings unless more than 150 g glucose plus supplement was administered in 24 hours. Data were analyzed using  $\chi^2$ , Student's *t* test with  $P < .05$ .

**Results:** A total of 485 ED admitted patients, excluding 8.9%, with a mean age of  $64 \pm 4.8$  years (52% female) waited 5.7 hours (range 1 to 17.8 hours) for admission and had a mean hospital stay of 6.4 days. The mean time from admission to first diet order was 23.5 hours, with mean actual first feeding occurring in 40.3 hours; 36.4% did not receive any nutrition for more than 24 hours after admission. Twenty-two percent of patients with poor nutrition (albumin  $< 2.8$  mg/dL) had increased hospital stay: 14.8 versus 5.4 days for ED patients with normal albumin ( $P < .01$ ). No difference was found for geriatric patients ( $> 65$  years) versus patients younger than 65 years for first feedings ( $P = \text{NS}$ ). The 36.4% patients without diet more than 24 hours from admission had increased hospital stays versus patients first fed less than 24 hours: 8 versus 5.1 days, respectively ( $P < .03$ ).

**Conclusion:** There exist unacceptable delays for most ED patients receiving any nutrition on hospital admission, without even consideration of diet adequacy. Poor baseline nutrition and delay in hospital nutrition affect hospital stays, and improvements in ED treatments are needed.

## 422 EMGuidelines: A Web-Based Index of Clinical Guidelines for Emergency Medicine

Kim JJ, Rothenhaus T/Boston Medical Center, Boston, MA

Clinical guidelines are powerful tools to aid clinicians in day-to-day practice. However, their dissemination and adoption have been poor. Countless clinical guidelines have been published on the Internet, but they are difficult to find, and only a subset pertain to emergency medicine.

**Study objective:** To perform a comprehensive survey of clinical guidelines available on the Internet, and to create a database-backed, Web-based resource to index and make available clinical guidelines relevant to emergency medicine.

**Methods:** We performed a comprehensive search for clinical guidelines on the Internet using an automated Web search tool (Copernic 99, Agents Technologies Inc, Quebec, Canada) using the search terms "clinical guidelines" and limiting the results to the 1,000 best matches. After selecting clinical guidelines relevant to emergency, we created a database (ACCESS 97, Microsoft, Inc, Redmond, WA) to catalog these guidelines by medical subject heading (MeSH), emergency medicine core curriculum heading, author, and sponsoring organization. We then created an HTML-based user interface to link this database via our department's Web server to the World Wide Web.

**Results:** Of 1,000 Web sites found in the search, 250 were chosen for their applicability to emergency medicine. The database provides a uniform framework for cataloging and maintaining pointers to Web-based clinical guidelines, allowing users to browse guidelines by subject, emergency medicine core curriculum headings, author, year, and sponsoring organization. The Web site also provides automated links to the National Library of Medicine's PubMed database for searching practice guidelines published in the medical literature.

**Conclusion:** Web-based clinical guidelines represent a heterogeneous and poorly accessible resource for emergency medicine. Our Web site provides an easy-to-use resource, making clinical guidelines readily available to emergency clinicians.

## 423 Incorporating College Students Into a Departmental Research Program

Henderson SO, Korn CS, Genna T, Esekogwu VI/Los Angeles County–University Southern California Medical Center, Los Angeles, CA

**Study objective:** Clinical research based in an academic environment regardless of institutional size, residency affiliation, or demographic location has added the additional element of required scholarly activity to an already complex scenario. We evaluated the increase in research productivity in an urban emergency department by incorporating undergraduate premedical students as research associates (RAs).

**Methods:** A program using premedical undergraduate students as additional research support in the ED of a Level I trauma center was developed and implemented to increase research productivity. Nine sophomore students from the University of Southern California were initially recruited and oriented to all issues relating to volunteering in the ED including an introduction to clinical research, patient confidentiality, and ethical issues. Each RA served 6 hours per week performing duties ranging from patient enrollment and chart reviews, to data collection and entry. The RAs were monitored by the ED research facilitator and the study primary investigator and completed a questionnaire after participation in the program.

**Results:** Twenty-seven students have participated in the program over the past 18 months. Patient enrollment has increased from 73% to 93% over that time. Data collection and entry has saved 90 hours per week for the researchers and residents in departmental studies. RA satisfaction with the program was very positive as reflected by their comments on the questionnaire and exit interview.

**Conclusion:** An RA program using premedical college students is one method by which research productivity may be increased.

## 424 A Comparison of Conscious Sedation Practices in Emergency Medicine Residency Teaching Programs

McCormick JJ, Henderson SO, Chiang L, Newton K/Los Angeles County–University of Southern California Medical Center, Los Angeles, CA

**Study objectives:** To determine how much conscious sedation (CS) teaching is incorporated into emergency medicine curriculum and if differences exist between programs offering formal instruction and those that do not.

**Methods:** Residency directors at 110 approved emergency medicine training programs received a mail survey. The medication options, presence or lack of formal resident training in CS, levels of monitoring used, and perceived satisfaction were analyzed.

**Results:** Eighty-eight (80%) of the 110 programs responded. Formal didactic instruction was provided by 65 (74%) of the programs responding. Twenty-one (24%) of programs do not have formal CS curriculum. Medication options included midazolam, fentanyl, sufentanyl, etomidate, methohexital, thiopental, propofol, chloral hydrate, and Demerol, Phenergan, and Thorazine. Monitoring options included none used, pulse oximetry, intravenous placement, ECG, end-tidal  $\text{CO}_2$  detection, and supplemental oxygen. No statistical differences were found in the number of medication choices or the level of monitoring when the 2 groups were compared. The perceived satisfaction by the residency director of CS in the groups was similar and not statistically different. In the didactic group, 78% (51/65) believed the CS provided to their adult population and 66% (43/65) believed the pediatric CS was satisfactory. There were 2 nonrespondents in the adult group and 12 in the pediatric group. In the non-didactic group, 18 (86%) of 21 provided to the adults and 17 (81%) of the pediatric group believed their CS was satisfactory. There were no nonresponders in the adult and 1 nonrespondent in the pediatric group.

**Conclusion:** There was no statistical difference in reported practice, monitoring, or satisfaction of CS between programs with or without didactic training in procedural sedation. It appears that current policy guidelines provided by the Joint Commission on Accreditation of Healthcare Organizations, local hospitals, and specialty societies may ensure adequate education and monitoring.

## 425 Documentation by Physicians and Nurses in Cases of Intentional Assault

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Emergency department records are an important source of injury surveillance data. However, documentation regarding mechanisms of injury may be suboptimal. The purpose of this study was to analyze and compare physician and nurse documentation of intentional assaults, in terms of assailant, place, and object.

**Methods:** The ED log of an urban Level I trauma center was retrospectively



reviewed to identify eligible patients presenting consecutively from November 23 to November 30, 1996. All acutely injured patients not involved in a motorized vehicle crash were included.

Results: Sixty-one patients were identified as intentional assault victims; we were able to locate both physician and nurse charts for 59 (97%). Fewer than half of the charts indicated the identity of the assailant or the date of the assault. Physicians were significantly more likely than nurses to document the identity of the assailant (29% versus 10%;  $P=.011$ ), as well as the date of assault (46% versus 17%;  $P=.001$ ). There was no difference between physician and nurse documentation of place of assault (14% versus 10%;  $P=.569$ ). All charts had documentation of object use; however, 11 charts (9%) had a discrepancy in the type of object documented.

Conclusion: Although the ED commonly treats assaulted patients, basic surveillance data are often omitted from the chart. Physicians document more than nurses, but both physicians and nurses are poor overall at documenting information regarding assaults. Structured charting may provide more complete data collection.

## 426 Advanced Cardiac Life Support Training: Comparison of Brazilian Versus North American Student Responses

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A nationally coordinated effort has recently begun to teach advanced cardiac life support (ACLS) to health care professionals throughout Brazil. Under the direction of FUNCOR of the Brazilian Heart Foundation Society of Cardiology, these courses have carefully followed the American Heart Association's ACLS guidelines. ACLS materials (English) were available before the course for each student. Data on student preparation and end of course evaluations have been prospectively gathered and comparisons made between the first 122 Brazilian students and a similar 1997 student cohort from the University of Arizona ( $n=31$ ). Students evaluated the different course aspects as unsatisfactory, satisfactory, or superior. No differences in ratings concerning course schedule, course dynamics, or content were detected with both groups giving each of these categories approximately a 45% "superior" rating. Significantly more Brazilian students rated "superior" course organization (62% versus 42%;  $P<.02$ ) and duration (10% versus 27%;  $P<.05$ ) than did the Arizona students. Instructors were rated similarly high and "superior" by both student groups (57% versus 48%;  $P<.5$ ). Likewise, no differences were found in course materials (56% versus 45%;  $P<.3$ ) or knowledge gained (50% versus 50%;  $P<.9$ ). Brazilian students did rank facilities (54% versus 26%;  $P<.01$ ) and mannequin use (44% versus 20%;  $P<.02$ ) higher than the Arizona students. Both groups of students appear to prepare equally well, with 33% versus 50% reading a majority of the ACLS text before the course ( $P<.3$ ). The vast majority claimed their treatment of cardiac arrest victims would be drastically altered from having attended the ACLS course (95% versus 90%;  $P<.4$ ). Finally, in both countries there was unanimous agreement that the course was worthwhile and should be recommended for all health care professionals.

## 427 A Breast Screening Behavior Survey in an Urban Emergency Department

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Study objective: It is well known that screening mammography is the best way to detect early breast disease. Women themselves detect 90% of their own breast cancers. In this study, we wanted to determine whether women presenting to our emergency department practiced behaviors that might increase their rate of detecting early breast disease. Our null hypothesis is that behavior will be the same across age, race, income, and insurance type.

Methods: Between February and April 1999, we administered a 1-page convenience sampling of women in the ED treatment and waiting areas at the University of California–Davis Medical Center aged 18 and older. Participation was strictly voluntary. During this time, 200 completed surveys were collected. We studied whether women performed breast self-examination (BSE) and if they had received a mammogram by age, race, income, and insurance type.

Results: A total of 68.5% of the women performed BSE. Women who were older ( $>40$  years old) were significantly more likely to perform BSE than younger women ( $P<.001$ ). Higher-income ( $>\$20,000$  per year) women were significantly more likely to perform BSE than lower-income ( $<\$20,000$ ) women ( $P<.01$ ). There were no differences between races and by type of insurance.

Of the women older than 40 years, 87.8% had received a mammogram. Higher-income women were significantly more likely to receive a mammogram than lower income women ( $P<.01$ ). There were no differences between race or by type of insurance.

Conclusion: BSE and mammography to detect early breast changes was higher than expected in this ED population of women. Lower-income and younger women performed less BSE than higher-income women and lower-income women received less mammography. The ED may be an important site to educate young and lower-income women about BSE and mammography.