



## **An Update on Community-Acquired Pneumonia**

The lecturer will present an update on the epidemiology, evaluation, and treatment of community-acquired pneumonias. An emphasis will be placed on the empiric use of antibiotics. A discussion of when a comprehensive workup should be obtained will also be presented.

- Review the epidemiology of community-acquired pneumonias.
- Discuss the recent recommendations for the diagnosis and treatment of pulmonary infections as outlined by IDSA and ATS.
- Discuss the empiric use of antibiotics for patients with community-acquired pneumonia.

MO-49  
Monday, October 11, 1999  
4:00 PM - 4:55 PM  
Room # N208  
Las Vegas Convention Center

*\*Research Grants: Ortho McNeil, Pfizer, Bayer*  
*Speaker: Ortho McNeil, Pfizer, Bayer, Roche*

### **FACULTY**

\*Gregory J Moran, MD, FACEP

Associate Professor, Medicine,  
Department of Emergency  
Medicine, Division of Infectious  
Diseases, Olive View/UCLA Medical  
Center, Sylmar, California

# What's Pneu in Pneumonia

Gregory J. Moran MD

Associate Professor of Medicine, UCLA School of Medicine  
Dept. of Emergency Medicine and Division of Infectious Diseases  
Olive View-UCLA Medical Center

## Pneumonia

3 million cases yearly  
500,000 hospital admissions yearly  
6th leading cause of death in U.S.  
Changes:

Pathogens  
New antibiotics  
Antibiotic Resistance  
AIDS

## Pneumonia ED Evaluation

- Establish diagnosis of pneumonia
- Determine most likely etiologies
- Determine presence of host factors that will influence hospitalization or antibiotic choice

## Pneumonia

### “Typical” vs. “Atypical”

#### Typical

*S. pneumoniae*, *H. influenzae*, etc.

#### Atypical

Mycoplasma, Chlamydia, Viral

**Impossible to differentiate with certainty!**

## ***Chlamydia pneumoniae***

- TWAR - named for isolates TW-183, AR-39
- Not a new organism - only newly recognized
- 3rd-4th most common cause of pneumonia  
-10%
- No change in infection rate since 1963

## **Prevalence of Ab to *C. pneumoniae***

- High prevalence of Ab to *C. pneumoniae*
- Virtually everyone is infected by young adulthood
- Remains high, indicating repeat infection

## **Incidence of Pneumonia**

- Incidence of clinical pneumonia higher in the elderly

## **Legionella**

- 1 - 5% of community acquired pneumonia  
(**> 20%** in some series)
- Often undiagnosed when not an outbreak
- Clinical features overlap with other bugs
- Culture difficult - requires DFA
- Rx - Erythro, Tetracycline, Rifampin  
Quinolones

## **HIV-Related Pneumonia**

- **Pneumocystis carinii (PCP)**
- **Bacterial** - *S. pneumoniae*, *H. flu*, etc.
- **Mycobacterial** - TB, MAC
- **Fungal** - *Cryptococcus*, **Histo**, Cocci
- **Kaposi's**, lymphoma
- **Viral** - CMV

## Pneumonia Pathogens<sup>16</sup> Series / 3,307 Cases

No pathogen is identified in 30-50% of cases!

S. pneumoniae	44%
H. influenzae	14%
Chlamydia (TWAR)	4%
Mycoplasma	7%
Legionella	5%
Gram-negatives	7%
Staph. aureus	6%
Viral	13%

(LaForce CID1992;14:S234)

## Pneumonia - Pathogens

Pathogen	Hospitalized (%) <sup>*</sup>	Outpatient (%) <sup>†</sup>
Unknown	33	25
S. pneumoniae	15	20
H. influenzae	11	18
Chlamydia (TWAR)	6	17
Mycoplasma	2	13
Legionella	7	?
Gram-negatives	6	
Staph. aureus	3	
Aspirated organisms	3	
Moraxella catarrhalis	-	7

## Chest X-Ray

Lobar consolidation

Interstitial pattern

Granulomas

Cavitation

Pleural effusion

## Sputum Gram Stain

Difficult to obtain good specimen

Sputum induction can be risky

Poor correlation with culture results

Correlation especially poor for gram-negative

Seldom influences empiric therapy

Target sickest patients – ICU, intubated

# Pneumonia - Other Tests

- Pulse oximetry or ABG
- CBC, Chemistry Profile
  - May identify underlying disease
- Blood Culture - ? Utility
- Specific Tests
  - Serologic tests
  - Immunofluorescence (Chlamydia)
  - Direct Fluorescent Ab (Legionella)
  - Urinary antigen (Legionella, Histo)
  - Silver stain (Pneumocystis)

## Low-Risk Pneumonia Patients

- Less than 50 years of age
- No history of cancer, CHF, cerebrovascular, renal or liver disease
- Normal mental status
- $P < 125$ ,  $RR < 30$ ,  $BP > 90$ ,  $T 35-40^{\circ}C$

Fine MJ. *NEJM* 1997;336:243.

## Pneumonia - Risk Assessment

### Demographic factors:

Age: Men	Age	
Women	Age-I	0
Nursing home resident		10

### Coexisting illness:

Neoplastic disease	30
CHF	20
Cerebrovasc. disease	10
Renal disease	10
Liver disease	10

### Physical exam findings:

Altered mental status	20
Respiratory rate $\geq 30/min$	20
Systolic BP $\leq 90mm$ Hg	20
Heart rate $\geq 125$	15
Temp $< 35$ or $> 40^{\circ}C$	10

### Lab & Xray findings:

pH $< 7.35$	30	Hct $< 30$	10
BUN $> 30$	20	pO <sub>2</sub> $< 60$	10
Na $< 130$	20	Pl. effus.	10
Gluc $> 250$	10		

Fine et al. *NEJM* 1997; 336: 243-50.

## Pneumonia Risk Stratification

Points	Mortality(%)	Site
None	0.1	Outpatient
71-90	0.6	Outpatient
		Inpatient (brief)
91-130	8.2	Inpatient
> 130	29.2	Inpatient

Fine et al. *NEJM* 1997; 336: 243.50.

## CAP Prediction Rule: Limitations

Enrolled lower risk clinic patients

Missing Data: 27%-49% of vitals

Initial Vital signs only, No pulse ox.

Outcome: Morbidity? Work days lost?

Not compared to MD judgment:

Rare conditions, vomiting, social, etc.

Fine MJ. *NEJM* 1997;336:243.

## Factors Influencing Empirical Inpatient Antibiotics for CAP

Severity of illness

Underlying disease

Allergies

Likelihood of DRSP or Pseudomonas

Possibility of aspiration

Epidemiology of *Legionella*

Possible concomitant meningitis

## Time to Antibiotics and 30-Day Mortality for CAP

Initial Antibiotics in < 8 hrs

Adjusted Mortality 75.5%

Odds Ratio 0.85 (0.75-0.96)

(p < 0.001)

Meehan TP. *JAMA* 278;2080.

## **Nursing Home Acquired Pneumonia - Effect of ED Antibiotic Initiation**

	<b>Location 1st Antibiotic Dose</b>	
	<b>ED (n=74)</b>	<b>Floor (n=16)</b>
Time to 1st dose:	3.1 hrs	14.1 hrs
Length of stay:*	5.5 d	6.3 d
Savings/patient	\$880	

\* Pneumonia, skin. and intra-abdominal infections

Bonaguro S. Ann *Emerg Med* 1997 (abstract).

## **CAP Treatment Guidelines**

American Thoracic Society - 1993

Less diagnostic evaluation

Empiric therapy

Infectious Diseases Society - 1998

More aggressive diagnostic evaluation

Pathogen-specific treatment

## **Pneumonia - Inpatient Rx**

### **ATS Guidelines**

2nd or 3rd gen. Cephalosporin  
or  $\beta$  lactamase inhibitor antibiotic  
plus  
macrolide

## **Pneumonia - Azithromycin IV**

500mg IV qd for 1 - 2 days

then 500mg po qd to complete 7-10 d

Higher serum levels IV than po

High tissue/sputum levels

No CSF penetration

# Quinolones for Pneumonia

In vitro activity vs.

*S. pneumonia*, *H. influenzae*, *M. catarrhalis*, Mycoplasma, Chlamydia, Legionella

**Spatfloxacin** 400mg po, then 200 X 10 d

**Grepafloxacin 600** mg po qd X 10 d

**Trovafloxacin** 200mg IV or po qd X 7-14 d

**Levofloxacin** 500mg (IV/po) qd X 7 - 14 d

## Newer Quinolones

	T	1/2 IV	Anaer- obes	Chlam- ydia	Photo- tox.	QT	Dizzy
Spar	20	-	-	-	+	+	
Grepa	15	-	-	+	-	+	-
Trova	11	+	+	+	-	-	+
Levo	6	+	-	+	-	-	-

## Trovafloxacin - Liver Toxicity

2.5 million prescriptions as of May, '99

14 cases of acute liver failure

4 liver transplants (1 died)

5 other deaths

2 AIDS, 1 BM trans, 1 advanced cancer,

1 elderly diabetic on 6 wks trova

Limit to "Serious Inpatient Infections"

# DRSP - Increasing Prevalence Multi-Drug Resistance

*Streptococcus pneumoniae* 1997-1998

	% Resistant		
Penicillin	S	I	R
Amoxicillin - Clav	0.0	5.9	66.7
Ceftriaxone	0.0	1.2	23.0
Cefuroxime	0.0	46.3	98.0
Clarithromycin	5.9	42.6	68.2
Levofloxacin	0.1	0.3	0.0

Thornsberry C et al. ICAAC 1998, Abstract E-22.

## Does DRSP Affect Mortality?

504 Spanish adults with pneumococcal pneumonia (29% PCN-resistant)

Mortality: 38% PCN Resistant  
24% PCN Sensitive

### No significant difference

when adjusted for other predictors of mortality

Pallares et al. New *Engl J Med* 1995;333:474.

## Does DRSP Affect Mortality?

No significant difference in mortality

For those treated with PCN or Ampicillin:

- PCN resist. vs. PCN sensitive

For those treated with 3rd gen ceph.:

- PCN resist. vs. PCN sensitive
- ceph. resist. vs. ceph. sensitive

Pallares et al. New *Engl J Med* 1995;333:474.

## “Resistance” MICs vs. Antibiotic Levels

	Resistance Breakpoint	Achievable Serum Peak (μg/ml)
Penicillin G	≥ 2	16
Ceftriaxone	≥ 2	150
Cefotaxime	≥ 2	100
Erythro. IV	≥ 4	11-30
TMP/SMX	≥ 4/76	9/100
Chloramphen.	≥ 8	11

## DRSP -Alternate Antibiotics

- DRSP may be important for life-threatening infections
- Susceptibility to quinolones and **vanco** unrelated to PCN susceptibility
- **Vanco** resistance not yet encountered
- Newer quinolones more active vs.  
*S. pneumoniae*

## IDSA Guidelines - Inpatient

Ceftriaxone or Cefotaxime + macrolide  
or  
Quinolone

Alternatives:

Cefuroxime + macrolide  
**Azithromycin** (alone)

# Severe Pneumonia

RR > 30, Severe respiratory failure,  
Intubated, Shock, Multiple Lobes

- 3rd gen. Cephalosporin  
(? Antipseudomonal)  
-or  $\beta$  lactamase inhibitor
- Plus macrolide or quinolone
- Consider adding Aminoglycoside
- or – Vancomycin + Cipro

## IDSA Guidelines - Outpatient

Macrolide  
Quinolone  
or Doxycycline

Alternatives:

Amoxicillin/clavulanate  
Cefuroxime, Cefpodoxime, or Cefprozil

## The Future of Pneumonia

- Outpatient Treatment
- New Antibiotics
- Antibiotic Resistance
- Rapid Testing

### Suggested Reading

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Gregory J. Moran MD  
Assistant Professor of Medicine  
UCLA School of Medicine  
Dept. of Emergency Medicine  
and Division of Infectious Diseases  
Olive View - UCLA Medical Center  
14445 Olive View Drive  
Sylmar, CA 91342  
tel 818 364 3110  
fax 818 364 3268  
email gmoran@ucla.edu

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