AMERICAN COLLEGE OF EMERGENCY PHYSICIANS
SCIENTIFIC ASSEMBLY
1999

Pain Management in the Emergency Department

Pain is the most common complaint of patients presenting for acute care. Unfortunately, some physicians often do not provide adequate and timely relief. The lecturer will discuss both pharmacologic and nonpharmacologic methods to relieve pain efficiently and effectively. There will be an emphasis on recent advances, and algorithmic approaches to certain painful conditions will be discussed.

- Explain specific barriers to effective analgesia in the emergency department setting.
- Choose the appropriate regimen for pain control based on analgesic pharmacology, patient age, and source of pain.
- Compare various older and newer pharmacologic and nonpharmacologic therapies for pain control.

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FACULTY

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PAIN MANAGEMENT
IN THE
EMERGENCY DEPARTMENT

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PAIN MANAGEMENT IN THE EMERGENCY DEPARTMENT

I. OLIGOANALGESIA IN THE EMERGENCY DEPARTMENT

Pain is a more terrible lord over mankind than even death itself. We all must die. But that I can save him (my patient) from days of torture, is my great and ever new privilege.

Albert Schweitzer (1931)

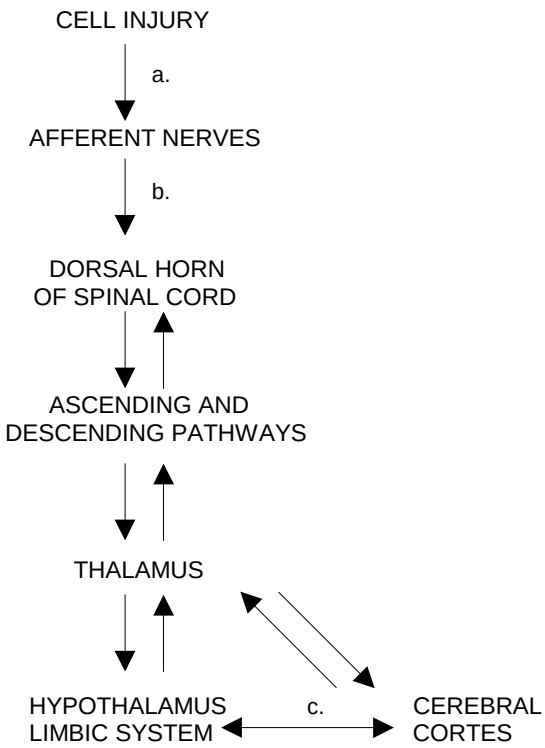
A. Sequelae of poor pain management

1. Unnecessary suffering
2. Delayed healing
3. Altered immune system
4. Altered stress response
5. Development of vegetative symptoms
6. Development of chronic pain syndrome

B. Studies continue to show that a substantial proportion of emergency department patients receive inadequate analgesia for acutely painful disorders. Young children and the elderly appear to be at greatest risk; in addition, hispanic patients and males, in general, also receive inadequate pain treatment. Purported reasons for this include the following:

1. Poor education of physicians and nurses in pain management
2. Poor communication between physicians and their patients
3. Inadequate pain assessment (measurement)
4. Personal bias

II. THE PATHOPHYSIOLOGY OF PAIN



a. Tissue cells are injured by direct trauma, extremes of temperature, ischemia, and inflammation. Injured cells release mediators of inflammation (ex. serotonin, histamine, prostaglandins, leukotrienes, etc) which stimulate afferent (nocioceptive) nerve endings. Thin, non-myelinated (rapid conducting) nerve fibers (C fibers) conduct painful stimuli to the spinal cord. The painful nerve impulses carried by C fibers can be blocked/diminished by:

1. **NSAIDs**
2. **Local anaesthesia**

b. Large, myelinated (slow conducting) nerve fibers (A fibers) conduct touch and vibratory sensations to the spinal cord. Both A and C fibers synapse in the dorsal horn region of the spinal cord. Stimulation of A fibers can diminish the perception of pain sensations conducted by C fibers. This can be accomplished by use of the following modalities:

1. Massage
2. Spinal manipulation
3. Acupuncture
4. Physical therapy
5. Tens units

c. Pain impulses then ascend through the spinal cord to the thalamus, and from there to the hypothalamus and limbic system (those areas of the brain that are responsible for the autonomic and emotional aspects of pain), as well as to the somatosensory cortex (which is responsible for the discriminatory and sensory aspects of pain). These areas give rise to descending spinal pathways that, at the level of the dorsal horn, release both excitatory neurotransmitters (to help remove the injured part from danger) and inhibitory neurotransmitters (to diminish pain sensation).

The perception of "pain" by the brain is the result of a combination of numerous factors including the pain stimulus itself, the patient's current emotional state, the patient's previous experience and attitudes toward pain, and the extent of release of neurotransmitters. Medical interventions that have been shown to modify the perception of pain include the following:

1. Drugs
    a. **NSAIDs**
    b. **Opioids**
    c. Antidepressants
    d. Anticonvulsants
    e. Neuroleptics

2. **Nitrous Oxide**
3. Biofeedback
4. Psychotherapy
5. Hypnosis
6. Acupuncture
7. Placebo

III. PAIN MEASUREMENT

When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot express it in numbers your knowledge is of a meager and unsatisfactory kind. It may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of science.

William Thompson Lord Calvin

A. One must make an attempt to assess the intensity of a patient's pain in order to (1) determine the most appropriate treatment and (2) to determine to what extent that treatment has been successful. Self-report pain scales serve as very simple, useful and valid methods for assessing and monitoring painful conditions.

1. The *Numeric Rating Scale* ranges from 0 (no pain) to 10 (the worst pain imaginable). Patients are asked to pick a number that best describes their pain both before and after treatment.

2. The V*isual Analog Scale* is a 10-cm line, one end of which is labeled "no pain" and the other end "worst pain imaginable." The patient is asked to mark a point on the line that best describes his/her pain both before and after treatment.

3. The *Faces Pain Rating Scale* depicts 5 sketches of facial features ranging from a happy, smiling face to a sad, teary face. The patient is asked to choose the facial expression that best depicts how they feel. This scale is extremely helpful in assessing pain in both children and mentally-impaired adult patients.

IV. TREATMENT OF MODERATE TO SEVERE PAIN IN EMERGENCY DEPARTMENT PATIENTS

A. Opioids

1. **The best drug = morphine sulfate...why?**

In equally analgesic doses, morphine and meperidine have the same side-effect profile.

Normeperidine is a metabolite of meperidine that can cause CNS excitement (ranging from insomnia to seizures) in patients who are taking the drug orally and/or are given large doses in the ED. Patients with renal impairment (sickle cell patients, diabetics and the elderly) are at particular risk.

Meperidine is contraindicated in patients taking MAOIs.

The duration of action for morphine (1-3 hours IV and 4-6 hours IM) is longer than that of meperidine (1/2 - 2 hours IV and 1-3 hours IM) and requires less-frequent dosing.

2. **The best route of administration = IV...compared to IM injections, IV injections:**

Are less painful
Have a more rapid onset of action (1-5 minutes)
Can be easily titrated to affect
Do not result in "delayed" respiratory depression

3. **The correct dose = ENOUGH**

A patient's response to analgesic medication depends upon their present psychological state, their previous experience and attitude toward pain, the extent of neurotransmitter release, and the number of opioid receptors in their nervous system, and **not** primarily upon their age, sex or weight.

SUGGESTION: Begin with an initial dose (2-5 mg of morphine or 20-50 mg of meperidine) administered IV at a rate of 1-2 mg/min. Repeat this dosage every 5-10 minutes until the pain is relieved (usually a pain score of 2-3). Remember to check the patient's mental status, respiratory rate and blood pressure before and after each treatment.

4. **What about the agonist-antiagonists?**

These opioids include butorphanol (Stadol) administered in a dose of 2 mg IV or 4 mg IM; nalbuphine (Nubain) administered in a dose of 10 mg IV, IM or sub Q; and buprenorphine (Buprenex) administered in a dose of 0.3 mg IM or IV. These doses cause analgesia equivalent to administering 10 mg of morphine sulfate parenterally.

The **advantages** of these drugs over narcotics include:

1. Less euphoria (less abuse potential)
2. Few GI side effects
3. A "ceiling effect" wrt respiratory depression
4. Less histamine release (less hypotension)
5. Less biliary spasm

The **disadvantages** of these drugs compared to narcotics include:

1. Less euphoria (a nice adjunct in pain relief)
2. Induction of dysphoria (2-10%)
3. Precipitation of withdraw in patients dependent upon opioids
4. A "ceiling effect" wrt analgesia

Note: Pain management experts rarely use these agents.

B. Adjunctive medications used with opioids

1. **Hydroxyzine** (Vistaril) appears to potentiate the analgesic effect of opioids. However, administering hydroxyzine with meperidine increases the cost of treatment by 30-40%, causes increased sedation, and precludes IV administration (due to the possibility of causing hemolysis).

2. **Phenothiazines** (ex. Phenergan) possess **anti-analgesic** properties, are of no proven benefit in diminishing the GI side-effects associated with opioid administration, cause sedation, and can result in hypotension and/or dystonic reactions.

RECOMMENDATIONS:

If and "anti-anxiety" effect is desired, it can be accomplished by administering morphine as the analgesic. If morphine is not used, or an additional anti-anxiety effect is desired, diazepam (Valium) or lorazepam (Ativan) can be administered orally or IV, hydroxyzine (Vistaril) can be given orally, or nitrous oxide can be administered via inhalation.

If nausea develops, a small dose of prochlorperazine (Compazine) or metoclopramide (Reglan) can be given IV.

C. Nonopioid analgesics

1. **Ketorolac (Toradol)** has an anti-prostaglandin effect that diminishes the ureteral spasm and increased peristalsis that is associated with the passage of kidney stones. A dose of 30-60 mg IV has been shown to cause significant pain relief in 50-75% of patients within 20-30 minutes. Placing the patient on an oral NSAID diminishes the frequency and severity of recurrent attacks of ureteral colic.

RECOMMENDATIONS:

1. Use parenteral ketorolac to treat acute renal colic. **However**, do not withhold adjunctive treatment with opioids from patients who are in significant distress and/or who do not respond to ketorolac within a brief period of time.

2. Do not "over-hydrate" patients with urolithiasis, since this will increase their degree of distress.

3. Prescribe oral NSAID's for 3-4 days.

2. **Local anesthesia**...don't forget:

Acute, painful conditions of the hands and feet are best treated with regional nerve blocks following a brief neurosensory exam.

Elderly patients with hip fractures can often be adequately treated with femoral nerve blocks, thus avoiding the complications associated with opioid use in the elderly.

Patients with painful joint effusions who receive an arthrocentesis for evaluation can obtain substantial relief if bupivacaine (Marcaine) is instilled before the needle is withdrawn.

V. CONTROVERSIES IN ED PAIN MANAGEMENT

A. Migraine Headache

1. The ideal treatment of acute migraine headache would be:

Based on sound physiological principles
100% effective
Rapid acting and long lasting (up to 72 hours)
Without side effects
Cheap

2. The ideal treatment of acute migraine headache does not yet exist (see attachment A, page 17).

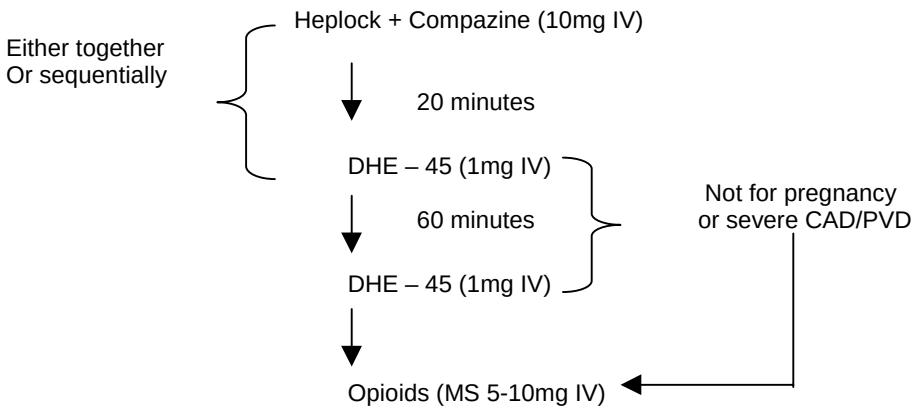
3. Regarding specific migraine headache medications:

Opioids are no longer recommended by most authorities for the first-line treatment of migraine headache because of their brief duration of action, side effects, and potential for habituation

Sumatriptan is best used on an outpatient basis to prevent expensive visits to the ED

DHE - 45 should be used in conjunction with an anti-emetic

RECOMMENDED APPROACH:



B. Painful Sickle Cell Crisis

The problem = there are no good objective markers to determine whether a patient with sickle cell disease is actually experiencing a painful crisis. ED personnel often feel that patients with apparent sickle cell crisis are actually exhibiting drug-seeking behavior.

RECOMMENDED APPROACH:

1. Understand the "bell-shaped curve" concept
2. Appreciate the plight of the patient with sickle cell disease
3. Give individual patients the "benefit of your doubt"
4. Develop a team approach to dealing with sickle cell patients who use the ED frequently

    Identify frequent users of the ED
    Develop a team to work with these patients and their families
    Develop a standardized treatment and follow-up plan for all sickle cell patients who visit the ED
    Have the patients "contract" to follow the treatment plan

C. Acute Abdominal Pain

The problem = in 1921, Sir Zachary Cope published a book entitled *Early Diagnosis of the Acute Abdomen* in which he warned surgeons that administering morphine to patients with acute abdominal pain could "mask" symptoms, delay necessary surgery, and ultimately cause significant patient morbidity and /or mortality. Despite significant advancements in the practice of medicine, some surgeons still believe that "pain is good."

RECOMMENDATIONED APPROACH:

1. Appreciate the difference between the practice of medicine in 1921 and today.

2. Read the only three clinical studies that have ever been published addressing this issue. All show that administering small doses of parenteral opioids to a patient with acute abdominal pain relieves the patient's distress without inhibiting (and sometimes actually facilitating) clinical diagnosis.

3. Read the recommendations in the latest addition of Cope's text and develop a joint QI project with the Department of Surgery at your institution to address "time delays in administering analgesia to patients in significant clinical distress."

D. Placebo

A placebo is a form of medical therapy, or an intervention designed to simulate medical therapy, which at the time of use is believed not to be a specific therapy for the condition for which it is offered, and that is used for its psychological effect, or to eliminate observer bias in a experimental setting.

Brody (1977)

RECOMMENDATIONS:

1. Placebo should **not** be used to determine whether a patient's pain is "real"...approximately 30% (range 24-74%) of patients with real pain will respond to placebo (usually a short-lived response with an analgesic effect similar to that caused by 4-6 mg of morphine).

2. Placebo should **not** be used when standard treatment has not been effective...inadequate analgesia is almost always the result of undermedication.

3. Placebo should **not** be used in patients who are felt to be "undeserving"...a physician's assessment regarding the presence of real pain and/or the degree of a patient's discomfort has been shown to be unreliable, particularly when dealing with patients who suffer exacerbations of chronic pain syndromes (migraine headache, sickle cell disease, chronic low back pain, and cancer).

Research has shown that the patients who are most likely to respond placebo are self-sufficient, highly-educated, and responsible individuals who are suddenly placed in a position of disability and dependency.

4. The inappropriate use of placebo can hurt the doctor-patient relationship by destroying the patient's trust in his or her physician.

5. The **best** placebo is a physician who is friendly, empathetic, professional, and viewed by the patient as honest and optimistic regarding treatment outcome...this is probably the only placebo that should be used in the emergency department.

VI. OUTPATIENT PAIN MANAGEMENT

There is medical literature available to support the use of almost any oral analgesic to treat almost any painful condition in the outpatient setting. The following guidelines are offered in an attempt to help you make a "rational" choice.

A. Mild pain

RECOMMENDATIONS:

1. While no NSAID has been found to be a significantly more effective analgesic than aspirin or acetaminophen "in blinded studies", a patient's preconceived notion regarding the effectiveness of a medication has an impact (probably through placebo effect) on the effectiveness of treatment. Knowing this, one should probably either explain this phenomenon to the patient before prescribing either aspirin or acetaminophen **or**, alternatively, prescribe another NSAID.

2. If you choose to use **aspirin**, consider the following:

   a. Avoid aspirin in children and adolescents (Reye's syndrome).

   b. The analgesic effect of aspirin increases as a single dose is increased to 1200 mg. The maximum recommended daily dose is 4 gm. Higher doses result in increased side effects without added analgesia.

   c. GI side effects occur in 20-50% of patients taking oral aspirin. Enteric-coated tablets and encapsulated granules (Ecotrin, Encaprin, etc) are slightly more expensive but have substantially less side effects.

   d. Aspirin and acetaminophen have additive analgesic effects.

3. If you choose to use **acetaminophen**, consider the following:

   a. Acetaminophen is less effective than aspirin in treating painful inflammatory disorders (ex. arthritis).

   b. The analgesic effects of acetaminophen increases as the dose is increased to 1200 mg. The maximum recommended daily dose is 4 gm. **However**, a dose of only 4 gm/day has been associated with fatal hepatic necrosis in alcoholics with underlying liver disease.

4. If you choose to use other **NSAIDs**, consider the following:

   a. The choice of NSAID should be based upon a patient's history (what has and has not worked in the past...don't forget the previously mentioned placebo effect), the side effects associated with each drug, and the cost of each medication. Considering all of these factors, **ibuprofen (Motrin)** is the most common first-line choice.

   b. How long do you want to wait for a maximum analgesic effect? Approximately 5 half-lives are required to achieve a steady-state serum concentration of any drug with first-order kinetics (including NSAIDs). This will take 10 hours for ibuprofen (Motrin), 60 hours for naproxen (Naprosyn), and over 6 days for piroxicam (Feldene), with half-lives of 2, 12, and 30 hours, respectively.

   c. Individual patients may have a better response to one NSAID than another. If one has not worked for a patient in the past, choose another (see Attachment B, page 18).

   d. NSAIDs should be avoided in the following patients:

      Patients at risk for NSAID-induced *GI toxicity*: age > 60 years, history of PUD, and heavy cigarette/alcohol use.

      Patients at risk for NSAID-induced *renal toxicity*: age > 60 years, preexisting renal disease, diabetes mellitus, and significant vascular disease.

B. Moderate pain

Treatment options for moderate pain include the use of NSAIDs, the addition of codeine to either aspirin or acetaminophen, or the use of hydrocodone (Vicodin).

GUIDELINES:

1. **Aspirin or acetaminophen with codeine** will cause GI upset (nausea and/or constipation) in 20-40% of patients. Acute nausea and vomiting caused by codeine has been successfully treated with IV naloxone. Elderly and/or bedridden patients who are given codeine should also have a laxative prescribed.

2. **Hydrocodone** has been shown to be as or more effective than aspirin or acetaminophen with codeine and only causes GI upset in 5% of patients.

3. Prescribing a drug by its *generic name* will usually (and often significantly) diminish the cost to the patient.

4. Skeletal muscle relaxants have been shown to have additive analgesic effects when used in conjunction with NSAIDs to treat post-traumatic musculoskeletal pain. However, they increase the cost of treatment and are often associated with sedation. Diazepam (Valium) is probably the most "cost-effective" muscle relaxant.

Skeletal Muscle Relaxants

Trade Name	Generic Name
Soma, Rela	carisoprodol
Soma Compound	carisoprodol, phenacetin, and caffeine
Paraflex	chlorzoxazone
Parafon Forte	chlorzoxazone and acetaminophen
Robaxin	methocarbamol
Robaxisal	methocarbamol and aspirin
Norflex	orphenadrine citrate
Norgesic	orphenadrine citrate, aspirin, phenacetin and caffeine
Valium	diazepam

C. Severe pain

Severe pain due to acute, self-limiting disorders is probably best treated with a combination of a central-acting agent (opioid) and a peripheral-acting agent (NSAID).

RECOMMENDATIONS:

a. Many **opioids** are rapidly metabolized during their "first pass" through the liver and, as a result, require fairly large doses to effect adequate analgesia.

Drug	**Oral Dose***	**Duration of Action(hrs)**
Morphine solution or tablets	30-60 mg	3-4
Morphine slow-release tablets	30-60 mg	8-12
Meperidine	300 mg	2-4
Methadone	20 mg	4-7
Hydromorphone	7.5 mg	3-5
Codeine	200 mg	3-5
Oxycodone/acetaminophen	3 tabs	3-5
Oxycodone/aspirin	3 tabs	3-5

*Equivalent to 10 mg of morphine sulfate administered IM.

b. **Propoxyphene (Darvon)** and propoxyphene with aspirin (Darvon compound) have been found to be no more effective than aspirin alone as analgesics. However, propoxyphene has the potential for addiction, and in overdose can cause severe CNS depression that can be difficult to treat. There appears to be no reason to recommend the use of this "dangerous placebo" when so many other treatment options exist.

VII. CHALLENGES IN PAIN MANAGEMENT

A. Pain management in the elderly

The challenge = the presence of dementia (5% of patients over 65 years of age and 20% of patients over 85 years of age), a high incidence of depression, and numerous physiologic changes (including diminished renal function and changes in the volume of distribution of drugs) makes both the diagnosis and treatment of pain in the elderly quite difficult.

RECOMMENDATIONS:

1. Recognize the fact that there is no "perfect" pain medication for use in the elderly.

2. **Mild pain** should probably first be treated with **acetaminophen**. However, make sure that the patient is not already taking an acetaminophen-containing product (either prescribed or over the counter).

3. **Moderate pain** should probably be treated with acetaminophen with codeine. This should be accompanied by a prescription for a bulk laxative and instructions regarding both the maintenance of normal hydration and the importance of activity in avoiding constipation.

4. **Severe pain** should be treated with **morphine sulfate**. All elderly patients who are treated with an analgesic should be provided with close follow-up to monitor both the adequacy of treatment and the development of side effects.

5. All elderly patients who are treated with an analgesic should be provided with close follow-up to monitor both the adequacy of treatment and the development of side effects.

B. Chronic pain

The challenge = one in three people will experience some form of chronic pain that will require medical treatment during their lifetime. The pathophysiology and treatment of chronic pain differs from that of acute pain, and its treatment often requires multiple modalities that address both the patient's psychologic and physiologic needs.

RECOMMENDATIONS:

1. Patients who exhibit exacerbations of chronic pain do not invariably manifest symptoms of autonomic hyperactivity (ie. may not "appear" to be in distress). As a corollary, physicians are notoriously poor in assessing whether the pain in such patients is "real." Give the patient the "benefit of your doubt."

2. The treatment of an exacerbation of a chronic pain syndrome should be directed by a patient's primary care provider. If that individual is unavailable for consultation, the patient should be provided with a short course of "adequate analgesia" in conjunction with immediate referral for follow-up. When such patients present to the ED repeatedly for pain management a "care plan" should be developed similar to that previously described for patients with sickle cell disease.

C. Cancer pain

The challenge = almost 90% of patients with advanced cancer complain of pain, and over 90% of these patients can be effectively treated. In 1986, the World Health Organization (WHO) released a set of guidelines that described a "three-step analgesic ladder" for approaching the treatment of cancer pain. Unfortunately, studies have shown that many cancer patients still receive inadequate analgesia and die in considerable pain.

RECOMMENDATION:

Be aware of the WHO analgesic ladder for cancer pain management, use it when appropriate, and determine the most best referral sources for such patients at your institution.

D. Drug-seeking behavior

The challenge = the doctor-patient relationship is occasionally exploited by individuals exhibiting drug-seeking behavior, either for personal use or for drug-trafficking purposes. They may complain of exacerbations of chronic pain syndromes (sickle cell disease, migraine headache, or back pain) that cannot be disproved on clinical grounds, or they may exploit old surgical scars or orthopedic injuries (non-union of fractures, compression fractures of vertebrae, etc) to obtain drugs.

RECOMMENDATIONS:

1. Appreciate the possibility of drug-seeking behavior in patients who:

    a. State that they are from out-of-town
    b. Claim that their prescription has been lost or stolen
    c. Visit the ED during nighttime hours or on weekends
    d. Create an unrealistic sense of "urgency"
    e. Do not permit a medical history or physical examination
    f. Request a specific drug rather than treatment of symptoms
    g. Presents with a long list of drugs to which they are allergic or that have been ineffective in treating their problem

2. Develop policies for dealing with suspected drug-seeking behavior

    a. Request identification (driver's license or social security number)

    b. Attempt to contact the patient's physician to confirm the medical history
    c. Request to see bottles of previous medications, and then check with the pharmacist who dispensed them
    d. Perform a complete medical history and physical examination (note signs of drug abuse)
    e. When possible, use pharmacies that maintain computer profiles of their patients

3. When in doubt...

    a. Give the patient the "benefit of your doubt"
    b. Have someone follow up with the patient's private physician
    c. If a drug-seeking problem is identified and documented, add the patient's name into your "frequent visitor" file

GENERAL PROPERTIES OF NSAIDs

Chemical Class	Drug	Trade Name	Half-life (hrs)	AWP*
Acetylated Salicylates	aspirin	Generic	2-4	0.02
	enteric-coded aspirin	Generic	2-4	0.03
				0.03
		Bayer aspirin	2-4	0.06
	enteric-coded aspirin	Ecotrin		0.06
Nonacetylated Salicylates	Diflunisal	Dolobid	12	1.00
Acetic Acids	indomethacin	Generic	4-5	0.23
		Indocin	4-5	0.85
	sulindac	Generic	8-16	0.97
		Clinoril	8-16	0.97
	tolmetin	Generic	1-6	0.69
		Tolectin	1-6	0.95
Propionic Acids	ibuprofen	Generic	2	0.04
	ibuprofen (200)	Motrin	2	0.18
		Advil	2	0.09
		Nuprin	2	0.08
	fenoprofen	Generic	3	0.45
		Nalfon	3	0.48
	ketoprofen	Generic	3-5	0.88
		Orudis	3-5	0.99
	naproxin	Generic (250)	12-13	0.68
		Naprosyn (375)	12-13	1.00
		Aleve (200)	12-13	0.09
Oxicams	piroxicam	Generic	30	1.50
		Feldene	30	2.13
Fenamates	meclofenamate	Generic	2-4	0.48
		Meclomen	2-4	0.74
Pyrazolone	phenylbutazone	Generic	50-60	
		Butazolidin	50-60	

*AWP = average wholesale price per tablet

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DRUGS USED TO TREAT MIGRAINE HEADACHE

SEROTONIN AGONISTS					
Drug	Dose	Effectiveness	Rebound HA	Side Effects	*Cost/Dose
1. DHE - 45	1mg IV	60-90%	26-50%	1. Nausea 2. Vasoconstriction	$8-12 (plus cost of antiemetic
2. Sumatriptan	6mg SQ	75% (1 hr.) 85% (2 hr.)	40-50%	1. Flushing 2. Chest Pain (5%)	$35
DOPAMINE AGONISTS					
Drug	Dose	Effectiveness	Rebound HA	Side Effects	Cost/Dose
1. Chlorpromazine (Compazine)	.1mg/kg IV	50-90%	<10%	1. Orthostatic Hypotension (20%) 2. EPS (5-10%)	<$1 (plus $80 for IV + fluids)
2. Prochlorperazine (Compazine)	10mg IV	80%	<10%	1. EPS (5-10%)	<$1 (plus $2 for heplock)
3. Metaclopramide (Reglan)	10mg IV	46-68%	?	1. EPS (5-10%)	<$1 (plus $2 for heplock)
OPIOIDS					
Drugs	Dose	Effectiveness	Rebound HA	Side Effects	Cost/Dose
1. MS 2. Demecol	10mg IV 100mg IV (may require more)	100%	60-80%	1. Nausea 2. Drowsiness 3. Respiratory Distress 4. Habituation	<$1

*(1) This is the *cost* to the hospital, not the charge to the patient (which is highly variable among institutions and may be many times the amount listed).

(2) This cost does not include the *indirect costs* related to the time (MD, RN, ED bed occupancy) taken up during treatment, or the cost of "rescue medications" that are often necessary to maintain HA relief until the migraine episode has passed (4-72 hrs.).