Pain Management in the Emergency Department

A twenty-seven-year-old man presents to the emergency department after a motor vehicle crash. The paramedics relate that the mechanism was a rear end collision at approximately 20 mph. The patient was the restrained front-seat passenger, no airbags deployed, and there was only minor damage to the vehicle. The patient states he struck his knees against the dashboard and he is complaining of knee pain, chest pain, and abdominal pain where he was restrained by the belt. His exam is unremarkable; his x-rays, ultrasound, and CT scans are all negative. His hematocrit remains stable throughout his observation.

However, complicating the encounter is the fact that the patient has sickle cell disease and has been to the department many times in the past for pain crises. His hematologist follows him closely and he is not known to go to any other ED in the city. During his time in the ED, he initially receives 2 mg of morphine intravenously, followed by a repeat dose of 4 mg; afterward, his requests for more pain medication are denied and he is told that he has already received more pain medicine than would typically be given for this mechanism of injury. When the patient is discharged from the department he is instructed to use his regular pain medication (which he claimed he was out of) and no new prescription was provided. The next week, the department’s Medical Director receives a letter of complaint from both the patient and his hematologist; you are asked to provide a response explaining your (lack of) pain management strategy . . .

TThere is much in poetry and prose to commend pain. Athletes remember it as the gateway to prowess. Lovers cling to it as a hope or a memory. And musicians use it as their inspiration. This is all well and good, but is not reflective of life in the emergency department (ED). In the ED, pain is almost ubiquitous. It presents

**CME Objectives**

Upon completion of this article, you should be able to:

1. Recognize the importance of effective management of pain in the ED.
2. Understand the available tools at our disposal for the assessment of pain.
3. Understand the pathophysiology of pain and how it can help guide therapy.
4. Recognize that there are special populations with regard to pain management that may require a different approach.
5. Recognize that this is an area in need of improvement.
6. Utilize the concepts to design strategies for improving pain management at your institution.

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See "Physician CME Information" on back page.
acutely or chronically and accompanies almost every disease. It strikes anyone from infancy to elderly. While the poets may embrace it and wax eloquently, real people flee from it… to the ED.

While the ED may be the haven for those in pain, effective pain management strategies are often not implemented as part of the ED visit. Indeed, emergency physicians, as well as most other specialists, do not have an admirable record when it comes to managing pain – it is frequently an afterthought, overlooked, or encumbered by fears of creating addiction or supporting drug seeking behaviors.\(^1\)\(^2\)  

The truth is, the vast majority of ED patients are not “drug-seekers,” but seekers of pain relief. Failing to properly address and control pain can detract from a successful resuscitation, stabilization, or diagnostic intervention. Though not necessarily predictable of patient satisfaction, it can definitely promote satisfaction with the overall ED experience.\(^3\)\(^4\) This issue of *Emergency Medicine Practice* reviews the state of pain control in the ED, its complexities, therapeutic options, and current controversies.

### Critical Appraisal Of The Literature

An extensive literature search through the National Library of Medicine’s Pub Med database (limited to English language) and a review of the pertinent references was performed. The National Guideline Clearinghouse (initiative of Agency for Healthcare Research and Quality and U.S. Department of Health and Human Services) was reviewed to find the most recent guidelines on pain management. The Library of Congress’, THOMAS (database of congressional bills and resolutions), was reviewed to find current legislative initiatives related to pain management. In addition, the American College of Emergency Physicians (ACEP) Clinical Policies were reviewed for recommendations and guidelines pertaining to this topic.

*Table 1* details some available resources for policies and guidelines pertaining to pain management. In addition to the ones listed, there are treatments for specific entities (i.e. rizatriptan for acute migraine). The National Guideline Clearinghouse has 107 guidelines using key words ‘pain management’ and ‘emergency medicine’ that cover a range of entities, from ankle sprain to chest pain to burn management.

### Definitions: Oligoanalgesia

The term “oligoanalgesia” has been coined to describe the phenomenon of undertreatment of pain, and may result from multiple factors (*Table 2*).\(^5\)\(^7\)  

One of the first studies reporting oligoanalgesia in the ED was a retrospective chart review by Wilson and Pendleton in 1989.\(^1\) They reviewed 198 patients admitted to the hospital with 3 categories of pain; intra-abdominal, musculoskeletal and intrathoracic. All of the charts documented that patients had pain, but only 67% of charts had documentation regarding the degree of pain each patient was experiencing. Overall, 44% of patients received narcotic medication while in the ED, 60% received intramuscular (IM) doses. One-third of patients with documented severe or moderately severe pain received sub-optimal dosing of opioids; 69% of patients waited more than one hour for pain medication and 42% waited more than 2 hours. Thus, several problems were noted: pain assessment was lacking, suboptimal use and dosing of opioids existed, and patients experienced a delay in receiving pain medication.
Lewis et al in 1994, performed a retrospective review of ED acute fracture management from 8 hospitals; they found that oligoanalgesia was ubiquitous with no difference between urban versus suburban or teaching versus non-teaching hospitals. Only 30% of patients received analgesics during their ED visits. Neither fracture location nor patient age were found to significantly impact the decision to provide analgesia. This study has limitations in that its design was retrospective and pain scales were not used. Though it could be argued that those patients who did not receive pain medication were not experiencing significant pain, this study contributed to a growing body of evidence that physicians were failing to meet the analgesic needs of their patients.

Patients with fractures were twice as likely to get pain medication as patients without fractures, even when the level of reported pain was match controlled. This represents a bias that sprains are not as painful as fractures. Ducharme and Barber in 1995, performed a prospective blinded study on ED pain assessment and therapy. They described a lack of use of an objective scale or documentation of patient impression of pain, and a less than 25% rate of “intervention or medication” for pain. Similarly, in 1999, Tanabe and Buschmann documented only a 15% use of opioids in a prospective study on pain in the ED. In 2002, Singer and Thode reported that half of patients with burns did not receive analgesia while in the ED, and almost half of the patients did not have their pain severity assessed. It is apparent that oligoanalgesia and lack of pain assessment go hand in hand. It can be concluded that, if clinicians do not ask patients about their pain, it is unlikely that pain medications will be provided.

A prospective study by Kozlowski et al looking at analgesic use found that patients with isolated lower limb fractures seen by physicians were three times more likely to receive analgesia than those seen by physician assistants. This was a single institution study and the difference found in prescribing patterns between physicians and PAs cannot necessarily be extrapolated to other practice environments.

Todd et al in 2003, designed a study to assess pain etiologies, patient pain experiences, pain management strategies, and patient satisfaction using a questionnaire and a chart review. Only 50% of patients received an analgesic, including 63% of patients reporting severe pain. Despite 69% of patients reporting that ED staff discussed the importance of pain management with them, 88% of those patients who did not receive pain medication did not ask for analgesia. This may be due to a lack of expectation on the part of the patient for pain control.

Forty-eight percent of patients were in moderate or severe pain at discharge, yet the majority of patients were either satisfied or very satisfied with their pain management. These findings are surprising and may highlight the fact that patients have low expectations for pain control versus some other undetermined factors. In the study by Ducharme and Barber previously described, patient satisfaction was high despite a very low rate of pain intervention.

Oligoanalgesia in the elderly merits special men-

**Figure 1: ACEP Policy Statement**

Pain Management in the Emergency Department

The majority of emergency department (ED) patients require treatment for painful medical conditions or injuries. The American College of Emergency Physicians recognizes the importance of effectively managing ED patients who are experiencing pain and supports the following principles.

- ED patients should receive expeditious pain management, avoiding delays such as those related to diagnostic testing or consultation.
- Hospitals should develop unique strategies that will optimize ED patient pain management using both narcotic and non-narcotic medications.
- ED policies and procedures should support the safe utilization and prescription writing of pain medications in the ED.
- Effective physician and patient educational strategies should be developed regarding pain management, including the use of pain therapy adjuncts and how to minimize pain after disposition from the ED.
- Ongoing research in the area of ED patient pain management should be conducted.

**Table 2: Factors Contributing To Oligoanalgesia**

- A pre-occupation with the diagnosis and treatment of the underlying medical problem
- Concerns about masking symptoms
- Fears about contributing to or causing addiction
- Caregiver underestimation of pain experienced by patient
- Cultural differences in pain expression
- Poor communication
- Reluctance of patients to complain of pain or demand pain treatment
- A pain-free interval after acute traumatic injuries
- Inadequate training in the recognition and management of pain.
tion because emergency physicians have self-reported discomfort in managing this group.\(^\text{12,13}\) Elderly patients with hip fractures are less likely than their younger counterparts with fractures to receive analgesia,\(^\text{14}\) and patients with dementia have been reported to receive analgesia at rates below 25%, even when reporting pain.\(^\text{15,16}\) At the other end of the spectrum, neonates and young children with pain are also often undertreated for a variety of reasons, including barriers to communication. In one observational study of pediatric patients with a limb fracture, no patient was discharged with a prescription for pain medication.\(^\text{17}\) Complicating communication is the observation that parents may also underestimate clinically significant pain in their children; this is accentuated if the child has a cognitive impairment.\(^\text{18,19}\) When the cognitive impairment is severe, the parents tend to appreciate the child’s pain. However, when the cognitive impairment is mild, parents tend to believe their children are overreacting to painful stimuli.\(^\text{18}\) Without the parents’ advocacy for their child’s pain, physicians are at an even greater disadvantage when addressing pain control.

It is clear that the concept of oligoanalgesia is supported by the literature. It is present across all patient populations. Knowledge of this makes it imperative to design and develop strategies to improve our management of pain. Using pain scales that allow patients to rate their pain is an important first step.

**Epidemiology And Practice Patterns**

Pain relief is the reason for 20% of doctor visits, yet only 0.6% of the National Institutes of Health’s (NIH) budget is devoted to basic and clinical pain research.\(^\text{20}\) Studies on the prevalence of pain in the ED range from 52% to 78% of patients.\(^\text{10,21,22}\) Given the ubiquity of pain complaints amongst patients presenting to the ED, physicians may perceive that drug-seeking behavior is more common than it actually is. One study in an ED seeing 75,000 visits per year, estimated that less than 0.5% of patients requesting pain relief were “drug seekers.”\(^\text{23}\)

Economically, it is estimated that pain costs society $61.2 billion annually in lost productivity.\(^\text{24}\)

Acute pain and chronic pain are common complaints. Chronic pain is an epidemic and poses a daily challenge for the practicing emergency physician. Indeed, EMTALA identifies pain as an emergent condition, however, it is unclear how to address those with a chronic condition; there is limited data on the epidemiology of acute conditions superimposed on chronic states. There are no studies that document the frequency of patients coming to the emergency department out of frustration due to inadequate pain control for a chronic condition. That said, 50% or more of the general population self-reports being in chronic pain.\(^\text{25}\) Common etiologies of chronic pain include low back pain (40% of the population)\(^\text{26}\) and migraine (15% of the population).\(^\text{27}\) Patients with chronic conditions can have acute disease as well: patients with chronic low back pain can have an acute disc herniation, and patients with a history of migraine can develop a subarachnoid hemorrhage.

The Canadian Association of Emergency Physicians held a consensus conference on emergency pain management in 1993 and published the proceedings as a consensus paper in 1994. After an extensive literature review, one of their findings was that health care workers often “underestimate patient suffering.”\(^\text{28}\) Since then, several studies have looked at this issue. In 1999, Singer et al prospectively assessed patient versus practitioner assessments of pain from commonly performed procedures and found that the correlation was poor to fair. This study highlighted the poor use of local anesthesia for common painful procedures such as nasogastric tubes and foley catheters.\(^\text{29}\)

In 2002, Guru and Dubinsky looked at patient versus caregiver perception of acute pain in the ED, as well as patient satisfaction. It was an observational, prospective study in which nurses, physicians, and patients rated pain levels using the VAS and NRS (see discussion of “pain scales” that follow). They found that nurse and physician ratings of pain were lower than the patient’s own rating of their pain. In this study, 68% of patients with severe pain received analgesic medication, with 49% of patients experiencing no pain relief. Interestingly, 50% of satisfied patients had no pain relief. There was no physician-documented objective pain scale and only one physician documented patient response to medication.\(^\text{30}\) Eder et al evaluated documentation of patient pain by a retrospective chart review of 261 ED patients and found that, while the majority of charts contained an initial pain assessment, only 23% of charts used a pain scale. Response to therapy was noted on 39% of charts; however, again, pain scale use was low at 19%. Patients with severe pain on arrival, those with chest pain, and those who required “powerful analgesics” were more likely to
receive a subsequent pain assessment. Nurses were 2.2 times more likely to document pain assessments after treatment than physicians. As with the study by Guru and Dubinsky, this study calls to attention the need for reassessment of pain after intervention. It is possible that physicians are reassessing, but these studies show that documentation is lacking. Pain assessment scales give patients the opportunity to express the level of pain they are experiencing and, thus, play a crucial role in providing appropriate pain treatment. Health care providers can become desensitized to a patient’s pain given the fact that the majority of patients seeking medical care in the ED have a pain-related complaint. Re-assessment allows the provider to remain aware of the patient’s level of pain. A pre-formatted chart with pain scales could facilitate re-evaluation and should be considered.

**Pathophysiology**

Pain is influenced by many factors. The American Academy of Pediatrics along with the American Pain Society, Task Force on Pain in Infants, Children, and Adolescents emphasizes that, “Pain is an inherently subjective experience and should be assessed and treated as such. Pain has sensory, emotional, cognitive, and behavioral components that are interrelated with environmental, developmental, sociocultural, and contextual factors.” Pain is influenced by age, race, gender, and culture. There are two categories of pain: Acute and chronic. Acute pain is usually associated with an injury or pathologic condition (i.e., sore throat) that generally resolves with the resolution of the inciting cause. Acute pain is mediated through nociceptors that fire in response to chemicals released during tissue damage, including leukotrienes, bradykinins, serotonin, histamine, and thromboxanes. Prostaglandins do not directly activate receptors; however, they act as a local mediator that enhances the sensitivity of the free nerve endings and produce pain and edema by their vasodilatory effect. Nociceptors can be found in the skin, periosteum, arterial walls, teeth, joint surfaces, and in the falx and tentorium of the cranial vault. Nociceptors propagate their impulses through the peripheral nerve to their cell body in the dorsal horn of the spinal cord to the spinal cord where Substance P (a neurotransmitter) is released, which then relays the signal to the cortex via higher order neurons and the spinothalamic tract. Pain functions as a biologic alarm system to signify tissue damage and prevent further injury.

Additionally pain can be divided into somatic, visceral and neuropathic types. Noting the type of pain will help not only in making the diagnosis, but also in choosing the best therapy. Table 3, describes these types of pain, their mechanisms and effective therapies. Somatic pain is often seen in the ED and is straightforward. Visceral pain is more complex and can be caused by ischemia, chemical stimulation and spasm, or overdistention of a hollow viscus. Afferent fibers from the affected organ converge on the same dorsal horn neurons as the somatic afferent fibers, which results in referred pain to the cutaneous area innervated at that level. Additionally, primary visceral pain afferents usually course along with autonomic nerve fibers. Thus, visceral pain is often accompanied by autonomic symptoms such as nausea, vomiting, hypotension, bradycardia, and sweating.

Neuropathic pain is initiated by an injury or dysfunction within the peripheral and/or central nervous system. Nociceptive and neuropathic pain can occur together. There are different types of pain that patients with neuropathic pain experience, see Table 4, page 7. In neuropathic pain, symptoms are initially experienced distal to the site of injury as opposed to nociceptive (somatic) pain, which is experienced at the site of injury or inflammation.

Reflex Sympathetic Dystrophy (RSD) or complex regional pain syndrome type I (CRPS I), is a pain syndrome thought to be of neuropathic origin. Given the complexity of this syndrome, the International Association for the Study of Pain (IASP) has introduced criteria for diagnostic purposes, see Table 5, page 7. Mechanisms that have been described to explain CRPS I include an excessive inflammatory response from peripheral sensitization and an increased responsiveness to input at the level of the dorsal horn neurons from central sensitization. Chronic pain is pain which lasts longer than would be expected for a given injury or pathologic condition. There are four types of pain seen in chronic pain conditions including: inflammatory, mechanical/compressive, neuropathic, and muscle dysfunction, see Table 6 on page 7. Determining the mechanism involved can facilitate effective treatment. Remember that more than one mechanism can be involved in a given patient. Approximately 50% of diabetics will develop...
neuropathy-related pain. Consequences of peripheral neuropathy in diabetics can be significant, including the development of a Charcot joint (hypertrophic arthropathy of the foot). Post-stroke neuropathic pain is seen in patients who develop pain in the same territory of the stroke. Skeletal muscle pain is a common cause of chronic pain and is a frequent diagnosis in pain clinics. Inflammatory pain involves inflammatory chemicals, e.g., prostaglandins, that directly stimulate the primary sensory nerves carrying pain information to the spinal cord. Mechanical or compressive pain is also a type of noiceptive pain in that mechanical pressure or stretching directly stimulates the pain sensitive neurons.

Early treatment of acute pain is important: repeated applications of noxious stimuli result in increased peripheral nociceptor responsiveness. A process known as “wind-up” occurs when there is a progressive increase in the output from dorsal horn neurons in response to repetitive inputs that are close together. This results in pain amplification. The initial response to a noxious stimulus is brief and causes a sharp, well-localized pain. Then, there is a more prolonged phase that is experienced as a dull, diffuse pain. A prolonged exposure to tissue injury can lead to sensitization of certain nerves in the pain pathways, which can lead to persistent pain after the initial condition has resolved.1 Beneficial symptom reduction may occur by preventing the initial neural cascade and thus eliminating the hypersensitivity produced by the noxious stimuli. This phenomenon has been named “preemptive analgesia.”44 The concept of preemptive analgesia has been studied in the context of post-operative pain management. A recent meta-analysis by Ong et al found that preemptive analgesia with epidural analgesia, local anesthesia, and NSAIDs resulted in consistent improvements in all three outcomes when results were combined for all three outcome measures (analgesic consumption, time to first rescue analgesic request, postoperative pain scores).45

### Prehospital Care

There is very little in the literature on pain control in the prehospital setting. A Pubmed search simply for the terms prehospital and pain only returned 293 English language articles since 1974. Very few of these articles were on the subject of pain control. Authors agree that pain is an important issue in the prehospital arena and that it is largely overlooked. Mclean made a conservative estimate that 20% of patients transported by EMS had moderate to severe pain.46 Prehospital care is an important window during which pain should be assessed and treated. When prehospital care has focused on pain control, patients have had a significant reduction in time to pain relief.47 Yet, there can be significant hesitation in giving prehospital analgesia. One study found that patients with femoral neck fractures were not likely to receive any analgesia, even when requested.48

There is disagreement as to whether or not children are less likely to receive prehospital analgesia, although no one argues the need for improvement in this population. A retrospective study in 2005 found that children and adults were equally likely (or unlikely) to receive prehospital analgesia for lower extremity fractures, and both groups had better rates of treatment in the ED.49 However, a second study found children were less likely than adults to receive prehospital treatment,50 and a New Zealand study reported that younger children are even more at risk for under-treatment.51

With much room for improvement, even

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### Table 3. Determining Mechanism of Pain

<table>
<thead>
<tr>
<th>Type of Pain</th>
<th>Location</th>
<th>Description</th>
<th>Mechanism of Pain</th>
<th>Clinical Examples</th>
<th>Most Responsive Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somatic Pain</td>
<td>Localized</td>
<td>Prickling, stabbing, or sharp</td>
<td>A delta fiber activity</td>
<td>Superficial laceration, burns, intramuscular injections, venous access, ear, nose, mouth, skin</td>
<td>Aetemizolam, lidocaine, ketamine, local anesthetic agent, NSAIDs, opioids, tachy stimulation</td>
</tr>
<tr>
<td>Visceral Pain</td>
<td>Generalized</td>
<td>Ache, or pressure, or sharp</td>
<td>C fiber activity involved in deep innervation</td>
<td>Pelvis, joints, muscles, colic and muscle spasm pain, sickle cell, appendicitis, kidney stone</td>
<td>Corticosteroids, intravenous local anesthetic agent, NSAIDs, opioids via any route, anticonvulsants, corticosteroids, intravenous local anesthetic agent, NSAIDs, opioids, via any route, tricyclic antidepressants</td>
</tr>
<tr>
<td>Neuropathic Pain</td>
<td>Radiating or specific</td>
<td>Burning, or pricking, or tingling, or electric shock-like, or lancinating</td>
<td>Dermal nociceptor (peripheral), non-dermal nociceptor (central)</td>
<td>Trigeminal, carpal tunnel, post-traumatic, peripheral neuropathy (diabetes, HIV), limb amputation, herpetic neuropathy</td>
<td></td>
</tr>
</tbody>
</table>

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1 Most postoperative patients experience A delta and C fiber pain and respond best to blocks of any route and NSAIDs.

2 Segmental distribution follows a dermatome chart. This traces the pathway of sensation to its nerve root. A dermatome map is available through the ICN Knowledge Products link in the “Support for Implementation” section of this guideline.

### Opioid responsiveness:

The following is a visualization of how different types of pain respond to opioids:

<table>
<thead>
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<th>V*</th>
<th>S</th>
<th>N</th>
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<tbody>
<tr>
<td>most responsive</td>
<td></td>
<td>least responsive</td>
</tr>
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</table>

* Colic and muscle spasm may be less responsive to opioids. Respond best to antispasmodics, NSAIDs, benzodiazepines, but not.

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simple interventions have been beneficial for patients. An educational intervention in Chicago was productive in raising awareness of pain, as measured by improved documentation amongst paramedics. Simple non-pharmacologic interventions may be useful. Active warming has reduced the discomfort of back pain during transportation without the risks or complications of medical intervention. Since EMS crews vary in their level of training by location, non-pharmacologic interventions have the advantage of being easier to implement across systems.

With regard to pharmacologic intervention, most studies have focused on the roles of morphine, fentanyl, and nitrous oxide. A retrospective chart review of 2129 patients from Colorado found that fentanyl was safe and effective in the field. However, the novelty of use by paramedics, the difficulty of broad implementation, the relationship between EMS crews and medical control, and expense will vary across systems and may be logistically difficult to duplicate. In addition, since morphine and fentanyl are equally efficacious in the treatment of pain, the cost of fentanyl over morphine would not outweigh the benefit in most prehospital settings.

Since the 1980s, authors advocated the use of 50% nitrous oxide by first responders as a safe and effective option for pain control when IV opiates are not an option. A few reviews and editorials have continued to advocate its use, but there are no current studies that assess its availability or breadth of use.

ED Management

Initial stabilization
Patients presenting to the ED in acute pain often look quite distressed. As mentioned previously, visceral pain is often accompanied by autonomic symptoms such as nausea/vomiting, hypotension, bradycardia, and sweating. Initial stabilization requires immediate assessment of the presenting symptoms and vital signs and consideration for placement of an IV for titration of pain medication. The type of pain dictates what is needed for stabilization; e.g., substernal chest pain in a diabetic would require an IV, oxygen and monitor, while a recurrent tension type headache might require nothing more than intramuscular medication.

An assessment and documentation of pain is a fundamental component of triage. While many acutely painful processes are not life-threatening, severe pain mandates a more urgent triage scoring.

Table 4: Neuropathic Pain: Definitions
- Allodynia: Painless stimuli that are experienced as pain
- Hyperalgesia: An amplified response to a noxious stimulus
- Paresthesias: Spontaneous pins and needle sensation
- Dysesthesias: Unpleasant perception of sensory stimuli to skin

Table 5: IASP Criteria For Reflex Sympathetic Dystrophy (RSD) / Complex Regional Pain Syndrome Type I (CRPSI)
1. The presence of an initiating noxious event, or a cause of immobilization.
2. Continuing pain, allodynia, or hyperalgesia in which the pain is disproportionate to any inciting event.
3. Evidence at some time of edema, changes in skin blood flow, or abnormal sudomotor activity in the region of pain.
4. This diagnosis is excluded by the existence of conditions that would otherwise account for the degree of pain and dysfunction.

Table 6: Chronic Pain
- Inflammatory
  - Nociceptive pain
  - Arthritis, infection, tissue injury, and postoperative pain
  - Heat, redness, and swelling at the pain site
  - History of injury or known inflammation
- Mechanical/compressive
  - Nociceptive pain
  - Neck and back pain
  - Muscle/ligament strain/sprain, fracture, degeneration of disks or facets, or osteoporosis with compression fractures
- Neuropathic
- Muscle dysfunction
  - Fibromyalgia and Myofascial Pain Syndrome
  - Sore, stiff, aching painful muscles and soft tissues
  - Associated with fatigue, poor sleep, depression, headaches, and irritable bowel syndrome

and placement in the ED. Since early pain management may in fact break the cycle and limit the extent of pain ultimately experienced by the patient, early pain control is recommended. In addition, early pain control can often facilitate obtaining an accurate history and physical examination, see Table 7.

History

For patients presenting in pain, initial assessment focuses on whether or not an emergent condition exists: treatment of pain should not be overlooked during the initial evaluation and diagnostic work-up. A focused history should be obtained, including a thorough PMH. It is also important to assess the components of PMH that would affect the choice of medication, i.e., if a patient has a history of a bleeding ulcer, NSAIDs would not be a first choice. Another aspect in the evaluation of the patient in pain is the psychological component. Chronic pain has been associated with depression and a desire for a “hastened death.” It is important to consider the patient’s mood and affect, screening for signs of depression and suicidality as warranted. These emotional consequences of pain are also a reminder of the broad benefits to the patient when his pain is effectively controlled.

<table>
<thead>
<tr>
<th>Table 7: History and Physical</th>
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<tbody>
<tr>
<td>History</td>
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<tr>
<td>➢ History of present illness (HPI)</td>
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<tr>
<td>▪ Onset</td>
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<tr>
<td>▪ Duration</td>
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<tr>
<td>▪ Quality, character</td>
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<tr>
<td>▪ Ameliorating and provoking factors</td>
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<tr>
<td>▪ Patient rating if possible</td>
</tr>
<tr>
<td>➢ Current medications</td>
</tr>
<tr>
<td>➢ Medication allergies</td>
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<tr>
<td>➢ Past medical history</td>
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<tr>
<td>▪ Any past history of similar pain?</td>
</tr>
<tr>
<td>▪ What treatment has helped in the past</td>
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<tr>
<td>▪ What studies have been done</td>
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<tr>
<td>▪ Assess factors that would affect medication use</td>
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<tr>
<td>▪ Liver disease</td>
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<tr>
<td>▪ Renal disease</td>
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<td>▪ PUD</td>
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<tr>
<td>➢ Psychological assessment</td>
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<tr>
<td>➢ Social history</td>
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<tr>
<td>➢ Allergies</td>
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Physical Exam

➢ Vital signs: Before and after pain medications
➢ Pain score: Before and after treatment
➢ Focused physical exam: System specific depending on complaint
➢ Functional assessment

Physical

A focused physical exam includes vital signs, especially pulse, respiratory rate, and blood pressure. Stressing the importance of pain assessment, the American Pain Society has coined the phrase, “Pain: the 5th vital sign.” Studies have shown a correlation between pain and changes in vital signs, but even in acute pain the vital signs are not necessarily abnormal. Tousignant-Laflamme et al demonstrated an increase in resting heart rate with acutely painful stimuli. However, it is important to note that the upper limit of the 95% confidence intervals for patient’s heart rates even at the height of acute pain in this study were still less than 100 bpm (beats per minute). While there is typically a rise in heart rate with pain, the values need not be abnormal. Self-report should therefore be considered more indicative of the presence of pain. However, observation of a patient’s response to pain (i.e., facial expression, guarding) may be all you have to go on in a pre-verbal or cognitively impaired patient.

The extent of the physical exam depends on the type of pain; pain in an extremity directly related to an injury requires a limited exam while a patient with a nonspecific complaint of pain may require a comprehensive, systematic exam. Patients with a complaint of headache require a meticulous exam of cranial nerves II, III, IV, and VI; consideration should also be given to examining the temporal artery and assessing for vertebral or carotid dissection. A complaint of chest pain requires a careful assessment of the pulses, heart, and lungs specifically looking for evidence of pneumothorax, pulmonary embolus, pneumonia, pericarditis, and aortic dissection; a careful skin exam should be done looking for evidence of herpes zoster. The differential diagnosis of abdominal pain is extensive and the clinician must carefully perform a comprehensive evaluation in order not to miss diagnostic findings. A complaint of back pain requires a full neurologic evaluation with a focus on bowel and bladder function, motor, sensory, and reflexes.

Pain Assessment Tools

A number of pain assessment tools have been developed to help provide a quantitative assessment of pain and a mechanism to assess response to interventions, see Table 8. These tools have been shown to facilitate pain management. Silka et al studied the use of a verbal pain score in trauma patients. Prior to the start of the study, the nursing staff was educat-
ed on the use of the pain scale, the importance of relaying this information to the attending physician, and a column was added to the chart to facilitate documentation. Reminder memos to the physicians and nurses regarding the importance of documenting pain scales was done twice monthly during the study period. They found a 73% rate of pain assessment compared to their previous rate of 18.5%. Sixty percent of patients who had pain assessment scores received analgesics compared to 33% of patients without pain scores. They concluded that the use of a pain assessment tool increased the chance of analgesic use in patients with high levels of pain, although a Hawthorne effect probably accounted for some of this improvement.61

In 2001, Bijur et al tested the reliability of the VAS for the measurement of acute pain in the ED.62 Patients were asked to rate their pain on a 100 mm marked scale with extremes labeled as least possible and worst possible pain at 1 minute intervals, blinded to their first response. This was a prospective, convenience sample of 96 patients. They found that 90% of ratings were within 9 mm of one another, concluding that the VAS is highly reliable for the measurement of acute pain in the ED. Extrapolating these findings further, changes in pain intensity less than 10 mm may represent an error of the method and should be interpreted with caution.

Several studies have tried to quantify the clinically significant change in the VAS in an attempt to assess pain relief. “The minimum clinically significant difference in pain was defined as the mean change in pain associated with a rating of ‘a little more pain’ or ‘a little less pain’.”63 An initial study by Todd et al in 1996 found that 13 mm represents the minimally clinically significant difference.64 This was validated by a study by Gallagher in 2001.63 One additional study by Kelly in 1998 found 9 mm to be the clinically significant number;65 however, the confidence interval overlapped with the prior two studies.

The Visual Analog Scale (VAS) has been used extensively in clinical research and has been found to be reliable and valid in the ED setting.64 62 However, it requires the cognitive ability to translate a patient’s level of pain into a distance measure and adequate levels of visual acuity and motor function. The Numerical Rating Scale (NRS) can be administered verbally and is a familiar clinical tool. In 2003, Bijur et al compared the NRS to the VAS in the evaluation of acute pain in the ED. They found that the two measures strongly correlated with each other and concluded that the NRS could be substituted for the VAS.65 A Verbal Descriptor Scale (VDS) is useful for those patients unable to rate their pain on the NRS. NRS and VDS were validated in an ED population.

### Table 8: Pain Scales

<table>
<thead>
<tr>
<th>NRS = eleven point Numerical Rating Scale (0-10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 = no pain; 10 = unbearable pain (see Figure 2)</td>
</tr>
<tr>
<td>GRS = Graphical Rating Scale (see Figure 3)</td>
</tr>
<tr>
<td>VAS = Visual Analog Scale</td>
</tr>
<tr>
<td>Measurement of pain intensity for research purposes</td>
</tr>
<tr>
<td>100 mm (10 cm) line with &quot;no pain&quot; at left and &quot;maximal pain&quot; at right</td>
</tr>
<tr>
<td>Requires cooperation of patient</td>
</tr>
<tr>
<td>VRS = Verbal Rating Scale</td>
</tr>
<tr>
<td>Five pain levels in large print</td>
</tr>
<tr>
<td>No pain, mild pain, moderate pain, severe pain, unbearable pain</td>
</tr>
<tr>
<td>VDS = Verbal Descriptor Scale</td>
</tr>
<tr>
<td>No pain, mild, discomforting, distressing, horrible, excruciating (Tanabe)</td>
</tr>
<tr>
<td>CHEOPS = Children’s Hospital of Eastern Ontario Pain Scale (see Figure 4)</td>
</tr>
</tbody>
</table>

### Figure 2: Numerical Pain Scale

![Figure 2: Numerical Pain Scale](image)

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>No pain</td>
<td>[Worst pain imaginable]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Key Points

- Use a pain scale in the triage assessment of pain. Consider pre-printed pain scales on charts for compliance.

- The patient self report is the most reliable indicator of pain severity.

- The basics, such as cold pack/elevation/ splinting/positioning, are important components of effective pain management.

- Treat pain early: use oral medications for less severe pain and IV medications titrated to pain relief for moderate/severe pain. Re-assess after treatment and document the pain score at discharge.

- Develop, document, and provide a pain management strategy at discharge.
by Tanabe.10 In 1998, Berthier et al compared the VAS, the Verbal Rating Scale (VRS) and the NRS in measuring acute pain intensity in the ED.66 They found that the VAS and NRS closely correlated in both trauma and non-trauma patients. The VRS is less abstract, but had an 11% non-response rate and poor differentiation between severe and unbearable pain in trauma patients. The VAS had a high non-response rate (39%) in trauma patients. The NRS had a very low non-response rate, required only a verbal response, and was used successfully in 96% of patients. The authors concluded that the NRS is the preferable form of self-evaluation of pain in the ED.66

These various scales for pain assessment have been validated in the ED setting. Equally important is their value in assessing clinical improvement. An improvement of 13 mm on the VAS, as discussed above, has been shown to be the minimum change necessary to correlate to clinical significance. Likewise, a change of 1.39 on the NRS has been shown to correlate to the same minimum clinically significant change. In conclusion, while both scales are valuable in the initial assessment of pain, they are also valuable in the assessment of pain relief.67

In 2005, Fosnocht et al reported that, while there was a moderate correlation between the change in VAS and a verbal descriptor of pain, there was a wide variability of change in the VAS so they cautioned against the use of a change in VAS as an indicator of pain relief for individual patients.68 The VAS is not a true interval scale and a change in pain intensity at the lower range may not correlate with a similar change in the higher pain range. This was further evaluated by Bird and Dickson who reported that clinically significant changes in pain were not uniform along the entire VAS: “Patients with greater pain required a larger change in VAS score to effect a clinically significant reduction or increase in perceived pain.”69

Despite the availability of different assessment tools, it has been documented that they are underutilized. In 1995, Ducharme and Barber performed a prospective, blinded observational study on pain assessment in the ED.9 They found that none of the patients in the study had their level of pain documented in the chart and that there was no use of an objective pain scale. Ten out of 42 patients received some intervention for pain, but only four received an analgesic. Patients in severe pain waited an average of 66 minutes to be seen, then an additional 74 minutes for medication. Tanabe found that pain scales were not routinely used, unless the patient was complaining of chest pain.10

Various pain assessment tools are available for children who are old enough to communicate. Pain scales have been developed using numbers, colors, and facial expressions, see Figure 3.70 In preverbal children, several pain scales have been validated. The CHEOPS (Children’s Hospital of Eastern Ontario Pain Scale)71 is a well-validated tool for the assessment of pain in children, see Figure 4. It was initially developed for postsurgical patients, but has been used broadly since.72 The complete assessment includes a rating on verbalization and complaints, but the other five behaviors are appropriate for preverbal children. It quantifies pain by rating five behaviors: crying, facial expression, verbalization, activity of torso, touching, and extremity response, such as drawing up legs or squirming.

The assessment of pain in children unable to communicate, either because of age or cognitive impairment, is still more challenging for the clinician. The Non-communicating Children’s Pain Checklist assesses pain by scoring multiple parameters: vocal, social interaction, facial expressions, level of activity, body movements, or guarding and physiologic signs such as shivering, sweating, or breath holding.73

As in adults, self-reporting is the preferred method for assessment of pain in children. While even very young children can give some indication as to the pain they are experiencing, it is important to assess for competence, especially between the ages of three and seven, to describe their pain accurately. Observation should always accompany self-reporting and may be the necessary alternative when self-report is unavailable or unreliable.32

The American Geriatric Society (AGS) has published broad guidelines on the issues of pain management in older adults. Older patients, like all other patients, should self-report their pain and needs...
which should be considered the most accurate assessment of pain. Clinical assessments and surrogate reports should only be used when patients are unable to express their needs themselves. Communication difficulties can exist, especially in elderly patients who suffer from dementia or limitations from cerebral infarcts. Therefore, various descriptions for pain should be used, i.e., aching, burning, discomfort, etc., when questioning patients. In non-vocal patients, indicators of pain, including moaning and crying, should be taken as indicators of pain.74

The NRS has been in use in the ED for many years for the evaluation of chest pain. It is easy to administer and only requires a verbal response from the patient. Additionally, it does not require a special template to be reproduced on the chart. Given these facts and that it has been validated,66, 67 it is the authors’ preferred tool for assessment of pain in the ED. However, there are still some patients who will be unable to assign a number to their pain. Some patients require verbal prompting or even pictorial facial expressions to aid in their description of their pain. The key point is not to advocate one scale over the other, but to emphasize their consistent use in the ED and provide alternatives when a preferred method of assessment is not feasible for a given clinical encounter.

Management

The management of acute pain depends on the etiology of the pain. The initial approach after stabilization includes the basics: immobilizing a fracture, applying cold compresses, or placing an NG tube for a small bowel obstruction. Table 3 on page 6 outlines a methodology for approaching treatment based on the type of pain the patient is experiencing. While NSAIDs and opioids are the mainstay for managing the majority of types of pain, unique options exist for the treatment of neuropathic pain. As the pain message is processed, there is a release of endogenous opiates, enkephalin and dynorphin, serotonin, and norepinephrine. It is at this level that tricyclic antidepressants work by preventing the reuptake of serotonin and norepinephrine. While their exact mechanism is unknown, antidepressants also improve sleep, mood, and anxiety in addition to pain. Anticonvulsants or membrane stabilizers (e.g., carbamazepine, gabapentin) work at the peripheral nerve membrane, preventing the transmission of pain. Complaints of continuous burning may best respond to antidepressants, whereas lancinating complaints may best respond to anticonvulsants. The anticonvulsant gabapentin, however, has been used in the treatment of burning and episodic neuropathic pain.

Analgesics

Acute pain: There are many medications at our disposal for the management of pain in the emergency depart-

<table>
<thead>
<tr>
<th>Figure 4: CHEOPS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Behavior</strong></td>
</tr>
<tr>
<td>Crying</td>
</tr>
<tr>
<td>No crying</td>
</tr>
<tr>
<td>Moaning</td>
</tr>
<tr>
<td>Crying</td>
</tr>
<tr>
<td>Screaming</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Facial Expression</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composed</td>
<td>1</td>
</tr>
<tr>
<td>Grimacing</td>
<td>2</td>
</tr>
<tr>
<td>Smiling</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Verbalization</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>1</td>
</tr>
<tr>
<td>Other complaints</td>
<td>1</td>
</tr>
<tr>
<td>Complaints about pain</td>
<td>2</td>
</tr>
<tr>
<td>Both types of complaints</td>
<td>2</td>
</tr>
<tr>
<td>Positive</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activity of Torso</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral</td>
<td>1</td>
</tr>
<tr>
<td>Shifting</td>
<td>2</td>
</tr>
<tr>
<td>Tense</td>
<td>2</td>
</tr>
<tr>
<td>Shivering</td>
<td>2</td>
</tr>
<tr>
<td>Upright</td>
<td>2</td>
</tr>
<tr>
<td>Need for restraints</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Touching</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>No touching</td>
<td>1</td>
</tr>
<tr>
<td>Reaching</td>
<td>2</td>
</tr>
<tr>
<td>Grabbing</td>
<td>2</td>
</tr>
<tr>
<td>Need for restraint</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Response of Lower Limbs</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral</td>
<td>1</td>
</tr>
<tr>
<td>Squirming or kicking</td>
<td>2</td>
</tr>
<tr>
<td>Draws up or tensed</td>
<td>2</td>
</tr>
<tr>
<td>Standing</td>
<td>2</td>
</tr>
<tr>
<td>Need for restraint</td>
<td>2</td>
</tr>
</tbody>
</table>

*Minimum possible score is 4 points and maximum possible score is 13 points

Physicians are frequently concerned about the potential for addiction when prescribing opiates; however, there have been studies suggesting that addiction rarely evolves in the setting of painful conditions. There is a limited role of the IM route in acute pain management. Often, health care providers use the IM route with the thought that IM dosing provides a more rapid onset of action and has greater analgesic properties than oral dosing. However, the onset of action of IM and oral medications can be similar as seen with toradol. IM dosing is problematic as it exhibits variable absorption, is painful, is not easy to titrate and has the potential for hematoma formation. Additionally, it is more expensive than oral medication to administer and poses a needle-stick risk to the care provider.

Chronic pain: Chronic pain warrants special mentioning. As previously discussed, there are 4 types of chronic pain. Using the type of pain to guide therapy is prudent. See Table 11 outlining therapeutic options. Many patients with chronic pain have a primary care physician or a pain specialist involved in their care. Often these patients may have a "contract" with these physicians for the amount of narcotics that they use. It is reasonable to consult with that physician prior to prescribing narcotics if feasible.

Five percent lidocaine patches for post-herpetic neuralgia have been described in multiple articles. The patches have provided significant relief to patients without any more side effects than placebo. Lidocaine patches have been studied for neuropathic pain of other etiologies as well. In one study, patients with a variety of pathologies including diabetic polyneuropathy, post-surgical pain, and radiculopathy were treated with topical lidocaine patches after failing anti-depressant, anti-convulsant, anti-arrhythmic and opioid medications. Most patients had a reduction in their pain without significant side effects. Using lidocaine patches has not been shown to cause significant systemic absorption, serum lidocaine levels remained well below those that cause anti-arrhythmic effects. There was no report of local loss of sensation. Additionally, no toxicities were noted in either healthy volunteers, patients with post-herpetic neuralgia or in patients with acute herpes zoster.

### Table 9. Opioid Analgesics

<table>
<thead>
<tr>
<th>Drug</th>
<th>Equianalgesic dose</th>
<th>T3MBAD</th>
<th>Initial ADULT Oral Dose</th>
<th>Initial PEDI Oral Dose</th>
<th>Initial PEDI Oral Dose</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mephentermine</td>
<td>5 mg</td>
<td>10 mg</td>
<td>0.1 to 0.2 mg/kg/h</td>
<td>0.1 to 0.2 mg/kg/h</td>
<td>0.05 to 0.1 mg/kg/h</td>
<td></td>
</tr>
<tr>
<td>Meperidine</td>
<td>2 mg</td>
<td>1 mg</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.1 to 0.2 mg/kg/h</td>
<td></td>
</tr>
<tr>
<td>Morphine</td>
<td>2 mg</td>
<td>1 mg</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.1 to 0.2 mg/kg/h</td>
<td></td>
</tr>
<tr>
<td>Oxycodone</td>
<td>2 mg</td>
<td>1 mg</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.1 to 0.2 mg/kg/h</td>
<td></td>
</tr>
<tr>
<td>Propoxyphene</td>
<td>2 mg</td>
<td>1 mg</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.1 to 0.2 mg/kg/h</td>
<td></td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>2 mg</td>
<td>1 mg</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.1 to 0.2 mg/kg/h</td>
<td></td>
</tr>
<tr>
<td>Fentanyl</td>
<td>2 mg</td>
<td>1 mg</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.1 to 0.2 mg/kg/h</td>
<td></td>
</tr>
<tr>
<td>Oxycodone</td>
<td>2 mg</td>
<td>1 mg</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.1 to 0.2 mg/kg/h</td>
<td></td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>2 mg</td>
<td>1 mg</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.1 to 0.2 mg/kg/h</td>
<td></td>
</tr>
<tr>
<td>Propoxyphene</td>
<td>2 mg</td>
<td>1 mg</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.2 to 1 mg/kg/h</td>
<td>0.1 to 0.2 mg/kg/h</td>
<td></td>
</tr>
</tbody>
</table>

NA: not applicable

Caution: Modification of recommended doses may be necessary for patients with hepatic or renal insufficiency, or drug interactions.

Caution: Dosage

**Methadone:** Confer with pain specialist before parenteral use

**Meprobamate:** This was table was completed using the following sources:

### Transdermal Fentanyl Conversion

Remember 1:10:1: This ratio represents the absolute number equivalent doses for the number of mg's daily intravenous morphine, to the number of hourly mg's of fentanyl, to the number of mg's of daily oral morphine respectively.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 mg/day IV morphine = Fentanyl 50 mcg/hr q 3 days = 75 mg/day PO morphine</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Alternative And Adjunctive Therapies

In addition to the pharmacologic interventions discussed, there are important alternative therapies for the management of acute pain. These alternative therapies include physical, cognitive, and behavioral interventions, see Table 12. While some of these may seem difficult to execute in the ED, they are important to understand because of the potential application at home or upon admission.

When traditional therapies have failed or are otherwise undesirable, novel approaches need to be considered. Altieri et al have reviewed cases of patients up to sixty-six years of age with chronic neuropathic pain who have had initially promising results with methadone. All of the patients had failed to be controlled with conventional analgesics. They only reviewed thirteen cases and recognize that prospective studies are required to determine its efficacy in this patient population. Topical opioids have been used for the management of pain associated with open wounds.

Methadone powder for longer relief of wound pain has been described in case reports. Pain was better controlled in patients who had open, exudative wounds while those patients with eschars showed less response. Intraarticular (IA) injection of opioids has been used after arthroscopic knee surgery with relief of pain. IA injection of opioids has also been studied prospectively for pain control in osteoarthritis. Patients had relief up to seven days without any short-term or long-term side effects. Case reports have noted up to two weeks of relief with IA opioid injections in patients with chronic pain. Topical tricyclic antidepressants have shown promising results for the control of neuropathic pain in case reports and open label studies. However, two randomized, blinded, placebo-controlled studies have been done, one with topical doxepin and the other with topical amitriptyline.

These studies have demonstrated mixed findings; one study found significant analgesia and the other found no difference compared to placebo. Acupressure and acupuncture are beyond the scope of this article. Literature on the benefit of these interventions continues to provide conflict-

### Table 10. Non-Opioid Analgesics

<table>
<thead>
<tr>
<th>Medication</th>
<th>Usual Adult Dose</th>
<th>Maximum Adult Daily Dose</th>
<th>Usual Pediatric Dose</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaminophen</td>
<td>650-3250 mg by mouth every 4-6 hr</td>
<td>4000 mg</td>
<td>10-15 mg/kg by mouth every 4-6 hr</td>
<td>-</td>
</tr>
<tr>
<td>ASA</td>
<td>650-1000 mg by mouth every 4-6 hr</td>
<td>4000 mg</td>
<td>10-15 mg/kg by mouth every 4-6 hr</td>
<td>-</td>
</tr>
<tr>
<td>Aspirin</td>
<td>650-1500 mg by mouth every 6-8 hr</td>
<td>4000 mg</td>
<td>10-15 mg/kg by mouth every 4-6 hr</td>
<td>-</td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td>1000-1500 mg by mouth every 6-8 hr</td>
<td>1000 mg</td>
<td>10-15 mg/kg by mouth every 4-6 hr</td>
<td>-</td>
</tr>
<tr>
<td>Codeine</td>
<td>150-300 mg by mouth every 4-6 hr</td>
<td>50-100 mg</td>
<td>5-10 mg/kg by mouth every 4-6 hr</td>
<td>-</td>
</tr>
<tr>
<td>Cotrimoxazole</td>
<td>480-960 mg by mouth every 6-8 hrs</td>
<td>480-960 mg</td>
<td>16-32 mg/kg by mouth every 6-8 hrs</td>
<td>-</td>
</tr>
<tr>
<td>Diclofenac</td>
<td>50-200 mg by mouth every 8 hr</td>
<td>150 mg</td>
<td>10-20 mg/kg by mouth every 8 hr</td>
<td>-</td>
</tr>
<tr>
<td>Diphenoxylate</td>
<td>100-200 mg by mouth every 6-8 hr</td>
<td>120 mg</td>
<td>10-20 mg/kg by mouth every 6-8 hr</td>
<td>-</td>
</tr>
<tr>
<td>Diphenhydramine</td>
<td>25-50 mg by mouth every 6-8 hr</td>
<td>250 mg</td>
<td>10-20 mg/kg by mouth every 6-8 hr</td>
<td>-</td>
</tr>
<tr>
<td>Ketoprofen</td>
<td>50-100 mg by mouth every 6-8 hrs</td>
<td>150 mg</td>
<td>10-20 mg/kg by mouth every 6-8 hrs</td>
<td>-</td>
</tr>
<tr>
<td>Ketorolac</td>
<td>60-120 mg</td>
<td>60-120 mg</td>
<td>60-120 mg</td>
<td>-</td>
</tr>
<tr>
<td>Lidocaine</td>
<td>100-200 mg by mouth every 6-8 hrs</td>
<td>200 mg</td>
<td>200 mg</td>
<td>-</td>
</tr>
<tr>
<td>Metronidazole</td>
<td>100-200 mg by mouth daily</td>
<td>200 mg</td>
<td>200 mg</td>
<td>-</td>
</tr>
<tr>
<td>Meperidine</td>
<td>50-100 mg by mouth every 6 hrs</td>
<td>100 mg</td>
<td>5-10 mg/kg by mouth every 6 hrs</td>
<td>-</td>
</tr>
<tr>
<td>Methylphenidate</td>
<td>50-100 mg by mouth every 6 hrs</td>
<td>100 mg</td>
<td>5-10 mg/kg by mouth every 6 hrs</td>
<td>-</td>
</tr>
<tr>
<td>Mepivacaine</td>
<td>50-100 mg by mouth every 6 hrs</td>
<td>50-100 mg</td>
<td>5-10 mg/kg by mouth every 6 hrs</td>
<td>-</td>
</tr>
<tr>
<td>Naproxen</td>
<td>400 mg by mouth every 12 hrs</td>
<td>1200 mg</td>
<td>15-30 mg/kg by mouth every 12 hrs</td>
<td>-</td>
</tr>
<tr>
<td>Naproxen sodium</td>
<td>500 mg by mouth every 12 hrs</td>
<td>1500 mg</td>
<td>20-40 mg/kg by mouth every 12 hrs</td>
<td>-</td>
</tr>
<tr>
<td>Selective COX-2 Inhibitors</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Caution:** Recommended doses do not apply to patients with renal or hepatic insufficiency or other illness that may affect drug metabolism and kinetics. Both traditional NSAIDs and COX-2 inhibitors have the potential for adverse cardiovascular effects, particularly in patients with chronic CHF or underlying renal insufficiency and should be used with caution.

*Contraindicated in presence of fever or other evidence of a viral illness.*

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ing results. Consequently, considerable controversy continues to exist and there is a need for definitive studies. A recent systematic review on acupuncture, analyzed 162 publications and concluded that “some findings are encouraging but others suggest that its (acupuncture) clinical effects mainly depend on a placebo effect”.96,97

Special Population Considerations

Pediatrics

There are important physiologic differences between children and adults that affect their response to pain medications.99 Metabolism and clearance of drugs are different throughout infancy. Liver metabolism reaches full function by one month of age. Due to the relatively large liver compared to body mass, metabolism may be increased from ages two to six years.99 Drug elimination is also affected by the difference in renal function. Renal blood flow, glomerular filtration rate, and tubular secretion are all reduced during the first year of life, after which renal function is similar to that of adults.100,101

Table 11. Pharmacologic Treatment of Neuropathic Pain

<table>
<thead>
<tr>
<th>Medication</th>
<th>Starting dose</th>
<th>Maximum dose</th>
<th>Titration</th>
<th>Side effects</th>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbamazepine</td>
<td>100 mg b.i.d.</td>
<td>1200 mg/day or presence of side effects</td>
<td>After 3-7 days may be increased by 200 mg/day</td>
<td>Seizures, agranulocytosis, drowsiness, fatigue, nystagmus</td>
<td>Sensitivity to TCAs; bone marrow suppression; impaired liver or renal function</td>
</tr>
<tr>
<td>Duloxetine</td>
<td>60 mg daily</td>
<td>60 mg daily</td>
<td></td>
<td>Apyrexia, mania, liver dysfunction</td>
<td>MADDs in last 14 days, suicidal or manic</td>
</tr>
<tr>
<td>Gabapentin</td>
<td>300 mg at bedtime</td>
<td>1800 mg/day divided b.i.d.</td>
<td>Add additional dose for each day up to three doses, then each dose may be increased to a max of 600 mg/day</td>
<td>Seizures, fatigue, abnormal thinking, accidental injury</td>
<td>Caution in elderly or renal dysfunction</td>
</tr>
<tr>
<td>Lidocaine patch 5%</td>
<td>Up to 3 patches to the painful area</td>
<td>Up to 5 patches for 12 hours in a 24 hour period</td>
<td>Localized skin irritation</td>
<td>Known sensitivity to amide anesthetics</td>
<td></td>
</tr>
<tr>
<td>Moxetine</td>
<td>150 mg every day</td>
<td>1200 mg/day</td>
<td>Every 5-7 days may increase frequency of dosing to a max of three times daily</td>
<td>Ventricular arrhythmia, fatigue, headache</td>
<td>Underlying arrhythmia</td>
</tr>
<tr>
<td>Pregabalin</td>
<td>50 mg three times daily or/75 mg twice daily</td>
<td>300 mg, twice daily</td>
<td>Increase to 300 mg/day after 7 days</td>
<td>CHF exacerbation, headache, ataxia</td>
<td>Caution in the elderly, impaired renal function, or CHF</td>
</tr>
<tr>
<td>Phenytoin</td>
<td>4-5 mg/kg/day</td>
<td>Limited by side effects</td>
<td>Adjust cautiously; nonlinear pharmacokinetics</td>
<td>Seizures, ataxia, incoordination</td>
<td>Known sensitivity to sensitivity</td>
</tr>
<tr>
<td>Noraxpine</td>
<td>10-25 mg at bedtime</td>
<td>150 mg/day</td>
<td>10-25 mg every 5-7 days (entire dose at bedtime)</td>
<td>QT prolongation, hypotension or hypertension, constipation or urinary retention</td>
<td>Glaucoma, arrhythmias, MADDs in last 14 days</td>
</tr>
<tr>
<td>Tramadol</td>
<td>50 mg twice daily</td>
<td>400 mg</td>
<td>Every third day dosing may be increased from two to three to four times daily. Then dose increased to a maximum of 100 mg/day</td>
<td>Seizure, respiratory depression, dizziness, diarrhea or constipation</td>
<td>CNS depressant use, renal or liver dysfunction</td>
</tr>
</tbody>
</table>

Besides the differences in metabolism and elimination, the bioavailability of the drugs is different in children. Children have less body fat; therefore, water-soluble drugs are comparably more available in the plasma. Similarly, since lipophilic drugs are redistributed to the fat in lesser proportion, they are available in higher concentrations in the plasma and for a longer duration.99 Drugs may affect the central nervous system in children more than in adults due to the fact that proportionately more of their cardiac output goes to the brain and more drugs and metabolites may cross the immature blood-brain barrier.99 Decreased protein binding is another factor contributing to a higher bioavailability of drugs in children. Drugs affected by protein-binding include opioids and local anesthetics.96,100,101

These differences are not just a review of second year physiology but are intended to alert the clinician as to why children need close monitoring when given medications. The dynamic changes in physiology throughout childhood make dosing difficult, even when following milligram per kilogram dosing formulas. In order to safely prescribe pain medications for children, drug references should be available for physicians to review, and patients should be carefully monitored for both therapeutic benefit and undesired side effects.102

Elderly

For over a decade, the National Hospital Ambulatory Medical Care Survey has tracked ED visits and the demographics of patients presenting to them. Patients over the age of seventy-five consistently have the highest number of visits, even as the overall population has grown in ED utilization. Visits from nursing home facility patients also continue to rise.103-107 Social issues may contribute to elderly patients choosing the ED for care. Reasons include the fact that they tend to have lower incomes, live alone, may be less educated, and have difficulty accessing care by other avenues.108 All of these factors complicate the issues of pain management in the elderly population.
Pain is a common problem affecting the elderly population. It has been estimated that 50% of independent-living senior citizens experience chronic pain and that 45 to 80% of patients living in long-term care facilities have pain. The elderly present to the ED with more conditions of high or immediate urgency, compared to younger patients. The elderly presenting to the ED have, not surprisingly, more co-morbid diseases and presumably more complex daily medical regimens. The addition of new medications in the ED makes for greater medical complexity for older adults. This has had a negative effect on patients understanding their medications. Pain medications were the second most commonly added medication, after antibiotics.

Elderly patients with a personal physician and those with health insurance of any kind, have a lower risk of severe pain; elderly patients who self-initiate treatment of their health problems have a lower risk of frequent pain. Conversely, those patients without a regular physician, without health insurance, and those relying on the physician for direction have been reported to be at risk for frequent or severe pain.

The American Geriatric Society has made several recommendations for the management of pain in elderly patients. They have recommended acetaminophen as the drug of choice for mild to moderate pain and opioids for moderate to severe pain. Acetaminophen has been used with satisfactory pain relief and has a lower side effect profile than non-steroidal anti-inflammatory drugs (NSAIDs).

Chronic Pain and Drug Seekers

Many EPs consider the management of pain in certain patients to be one of the more trying aspects of clinical practice. Different physicians may experience this frustration in different subsets of patients, but frequently it includes patients who have chronic pain, those who are thought to be drug-seeking, and those who choose the ED as their venue of choice to have their pain treated. There are various characteristics to the practice of emergency medicine that make it vulnerable to abuse by patients: Anonymity of patients, difficult access to medical records, multiple EDs within a given city, and an obligation to see and stabilize anyone complaining of pain.

Opiate-dependent patients are also a challenging population to care for. Because of their dependence, the patient may have a different response to painful conditions and may require higher doses of medication than physicians are accustomed to using. Suspicion of these patients may lead to a failure to diagnose significant conditions (e.g., epidural abscesses or necrotizing fasciitis), making management especially challenging. Confounding the care for these patients, is the high incidence of concurrent psychiatric disease; indeed, one study reported that patients with opioid-treated chronic pain and concurrent psychiatric disease have a 32% incidence of substance abuse. Intervention with a multidisciplinary team can improve pain scores and facilitate a comprehensive management strategy; however, this approach if often not feasible in a busy ED.

Health Policy

Pain management has become an active issue in health care policy over the last decade. The Pain Relief Promotion Act of 2000 was drafted by the House of Representatives. There are two titles within this act: Title I, “Promoting Pain Management and Palliative Care” which amends the Public Health Service Act to require the director of the Agency for Healthcare Research and Quality to promote and advance scientific understanding of, and collect and disseminate protocols and evidence-based practices regarding pain management and palliative care …authorizes the Secretary of Health and Human Services to award grants, cooperative agreements, and contracts for the development and implementation of programs to provide education and training to health care professionals in pain management and palliative care.” Title II: “Use of Controlled Substances Consistent With the Controlled Substances Act” which amends the Controlled

Table 12

<table>
<thead>
<tr>
<th>Physical interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold therapy</td>
</tr>
<tr>
<td>Massage</td>
</tr>
<tr>
<td>Careful positioning of the affected area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cognitive interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional support and information</td>
</tr>
<tr>
<td>Imagination</td>
</tr>
<tr>
<td>Hypnosis</td>
</tr>
<tr>
<td>Music</td>
</tr>
<tr>
<td>Play</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Behavioral interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relaxation techniques</td>
</tr>
<tr>
<td>Coping techniques</td>
</tr>
<tr>
<td>Biofeedback</td>
</tr>
<tr>
<td>Breathing control</td>
</tr>
<tr>
<td>Distraction, such as television, materials to read, or toys for children</td>
</tr>
</tbody>
</table>

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Substances Act to declare that, for that Act and any implementing regulations, alleviating pain or discomfort in the usual course of professional practice is a legitimate medical purpose for the dispensing, distributing, or administering of a controlled substance that is consistent with public health and safety, even if it may increase the risk of death.”

More recently, the National Pain Care Policy Act of 2005 was introduced in the House of Representatives to “Declare adequate pain care research, education, and treatment as national public health priorities and for other purposes.” One of the goals is to establish within the NIH a National Center for Pain and Palliative Care Research. While both of these acts are still in committee, their existence highlights the recognition that pain management is an area in need of improvement that can only occur through research and education.

Regulations, acts, and laws have significant impact on the practice of medicine. The federal government does not directly control the practice of medicine; this is done by the states. However, the federal government does directly regulate controlled substances through other means. The Drug Enforcement Agency empowered by the Controlled Substances Act from 1970 is primarily concerned with the illicit use and diversion of controlled substances. The federal government also influences the practice of medicine indirectly through various agencies and laws, such as the Joint Commission on Accreditation of Healthcare Organization (JCAHO) standards and the enactment of Emergency Medical Treatment and Labor Act (EMTALA), both of which address issues of pain. The direct control of the practice of medicine is done by the states. It is important for physicians to be aware of their own state regulations and statutes, which differ with regards to the balance between admonition to providers to relieve pain and obligation through controlled substance legislation.

The pain relief act of 1996, which encouraged the necessary use of opioids for the management of pain, did not actually set regulations for the practice of medicine. It was intended to serve as a model for state legislators to follow. Many states have followed suit and have passed pain relief legislation that follows the model of the federal act. Generally, the various state acts encourage the use of pain management guidelines. The guidelines are not meant to serve as standards of care, but to protect physicians and other providers from prosecution when following the guidelines. However, this protection has only been minimally addressed in the courts. A few recent cases have treated pain management as an obligation by the provider. One family successfully sued a nurse and a nursing home who withheld pain medication from a terminally ill patient for fear that he would become addicted.

JCAHO has been committed to the improvement of pain management for some time. In 1999, they mandated that hospitals treat pain as the “fifth vital sign.” In 2001, they issued new standards requiring assessment and control of pain. These standards do not tell institutions how to manage pain, but require that a pain policy be in place and that pain assessment occur. They recommended that pain be assessed on initial contact, when care is transferred from one setting or provider to another, after any intervention, at regular intervals, and immediately before discharge. Additionally, they recommend the use of a pain scale appropriate to the patient population being treated.

In 2002, JCAHO teamed with the American Medical Association (AMA) and National Committee for Quality Assurance (NCQA) to “Develop a common set of evidence-based measures for evaluating the appropriateness and effectiveness of pain management.” Through convening an expert panel of pain management experts, their goal was to help health care institutions and practitioners determine how well they are managing individual’s pain.

Moreover, effective pain management has become a priority for our specialty. The American College of Emergency Physicians (ACEP) issued a policy statement in 2004. (Figure 1, page 3) Additionally, ACEP has established a clinical policy for the use of narcotic analgesia in patients with abdominal pain. While there is no specific guideline, they offer the option of providing narcotics to patients in the ED with abdominal pain. This topic is discussed further in the section on “Controversies in Pain Management.”

### Cutting Edge / Controversies

#### The Use Of Narcotics In Undifferentiated Abdominal Pain

The initial warning statement in Cope’s Early Diagnosis of the Acute Abdomen against the use of pain medication in patients with abdominal pain was not evidence-based, yet became dogma that has been hard to overcome. At the time, 1921, it was not unusual to use morphine in doses of 30 mg, thus,
it was more likely to render the patient difficult to arouse, let alone examine.\textsuperscript{126}

There are now multiple studies in the literature that contradict this dogma. Zoltie and Cust performed a prospective, double-blinded study in 1986 comparing buprenorphine sublingual versus placebo. The physical exam did change; however, in 18 of 50 patients studied with a change in exam, the change involved a localization of pain which facilitated the diagnosis. They concluded that buprenorphine can be safely given to patients with an acute abdomen.\textsuperscript{127}

In 1992, Attard et al conducted a prospective, randomized, placebo-controlled study evaluating intramuscular papaveretum (dose equivalent to morphine 12.5 mg) versus placebo. VAS and abdominal exam were done prior to medication and one hour later. The study assessed the examiner’s confidence in diagnosis and management decisions before and after treatment. Median pain and tenderness scores fell significantly after papaveretum versus placebo, with no change in localization of the tender area. Interestingly, there were six unnecessary operations in the placebo group and none in the study group. There were two patients in the study group who were discharged and subsequently diagnosed with appendicitis. The surgical registrar’s confidence in diagnosing and making management decisions were not altered by papaveretum. They concluded that early pain relief with papaveretum in patients with severe acute abdominal pain did not have any adverse effect on diagnosis.\textsuperscript{128}

In 1996, Pace and Burke evaluated IV morphine compared to placebo in patients with acute abdominal pain. They looked at changes in pain scores before and after drug administration and at the accuracy of the initial diagnosis compared with the final diagnosis. The morphine group reported significantly less pain. Treatment with morphine did not result in resolution of peritoneal signs. The primary and final diagnosis agreed in 80% of patients in the morphine group and in 61% of patients in the placebo group. Three patients in each group were misdiagnosed. The authors concluded that administration of morphine to adult patients with acute, atraumatic abdominal pain resulted in pain relief without altering the ability of emergency physicians to perform accurate evaluations.\textsuperscript{129}

In 1997, LoVecchio et al studied morphine (5 mg and 10 mg) compared to placebo in patients with abdominal pain. The study evaluated changes in the physical exam, including changes in tenderness from two or more quadrants to one, or loss of rebound tenderness, and vice versa. Their results showed a significant reduction in pain after both low and high doses of morphine. Nine of 19 patients changed their physical exam after high dose morphine, seven of 13 patients with low dose morphine, and only one of 16 patient in the placebo group. There was no morbidity or delay in patient care. The authors concluded that early administration of opiate analgesics is safe and effective in patients with acute abdominal pain in the ED. The authors theorized that the change in exam was due to muscular relaxation with decreased guarding with better localization.\textsuperscript{126}

Finally, in 2003, Thomas et al performed a prospective, randomized trial evaluating adult patients with undifferentiated abdominal pain, comparing placebo with morphine. They concluded that there was no “untoward effect” with early administration of morphine, and “No evidence supporting the contention that [morphine] administration was deleterious in any way.”\textsuperscript{130}

Despite the fact that these five randomized, double-blinded studies support the use of analgesics in non-specified abdominal pain, clinical practice has lagged. In 1999, Tanabe found that only 35% of patients with abdominal pain received an analgesic.\textsuperscript{10} A survey of surgeons by Graber et al in 1999 found that 53% of general surgeons “Believe that pain medications preclude a patient from signing a valid informed consent” and 67% believe that “Narcotics can hinder diagnostic accuracy.”\textsuperscript{131} Wolfe et al surveyed emergency physicians in 1997 and found that, while 85% of physicians felt that pain medication did not change “important physical findings,” 76% of physicians chose not to administer narcotics until the patient was seen by a surgeon. Factors associated with whether or not medication was given included: The degree of pain that the patient was experiencing (69%), the certainty of diagnosis (52%), and the length of time until surgical evaluation (58%).\textsuperscript{132}

In 2003, Kim et al surveyed pediatric emergency (PEM) physicians and pediatric surgeons and found that, in physicians with greater than 10 years experience, pediatric surgeons were less likely than PEM - physicians to give narcotics (61% vs. 38%), with PEM physicians citing disapproval by pediatric surgeons as the main barrier for prescribing analgesics.\textsuperscript{133} This did not hold true for physicians with less than 10 years experience. This likely speaks to the fact that physicians who have trained in the last 10 years trained during the time when the dogma of with-
holding pain medication in the evaluation of abdominal pain has been questioned and refuted. The availability and use of CT scan for the diagnosis of abdominal pain likely also contributes.

An audit by Tait et al in 1999 found that 43% of patients with abdominal pain were admitted to the hospital without receiving an analgesic in the ED and had an average wait time of 5.7 hours for pain medication. Similarly, a prospective observational study by Shabbir et al in 2004 of patients presenting to the ED with abdominal pain demonstrated that 67% of patients received pain medicine within one hour, but 22% waited from two to 14 hours. Those patients with less severe pain waited longer and female patients also had a longer wait than men, mean 129 minutes versus 69 minutes respectively.

These last two studies demonstrate that, while the literature supports the use of narcotic medication in the evaluation of abdominal pain, clinical practice has not yet changed. There are still a significant number of patients admitted to the hospital who do not receive pain medication, and patients who wait long periods of time prior to pain medication. Developing collaborative protocols for the management of acute, non-traumatic abdominal pain would seem prudent.

On a final note, capacity to give informed consent for potential surgical interventions occasionally emerges as a weak argument against initiating pain treatment prior to an evaluation by a surgeon. However, it can be argued that pain itself clouds judgment, that patients in severe pain can think of nothing but their pain and will agree to anything for the relief of pain. Hence, it would be coercive to withhold pain medication until informed consent has been signed. Physicians should document, when appropriate, the necessity of giving pain medications before consent and the patient’s cognitive state when deciding, or else document that the delay in pain control was necessary and tolerable in order to obtain proper consent.

**Intramuscular Ketorolac Versus Oral Ibuprofen**

NSAIDs inhibit prostaglandin synthesis and thus are especially useful in pain syndromes where pain is prostaglandin-mediated, such as dysmenorrhea, biliary colic, renal colic, arthritis, postoperative pain, pharyngitis, and soft tissue trauma. Some physicians prefer to use IM toradol rather than oral ibuprofen. However, IM dosing does not have a faster onset of action than oral dosing, and has several potential complications. Wright et al published a retrospective analysis of data collected during a prospective study on pain management in which ketorolac, 60 mg IM, was compared to ibuprofen, 800 mg PO. A VAS tool was used to assess pain pre- and post-treatment. There was no statistical difference in pain relief by change in VAS score or by descriptive assessment. In fact, approximately 40% of patients in both groups described pain relief as none or little.

In a randomized, prospective double-blinded study, Turturro et al compared IM ketorolac (60 mg) and oral ibuprofen (800 mg) in acute musculoskeletal pain using a VAS instrument. The level of pain was evaluated at baseline, 15, 30, 45, 60, 75, 90, and 120 minutes after dosing. Mean pain scores did not differ between the groups and they concluded that IM ketorolac and PO ibuprofen provides similar analgesia.

A third study looking at IM ketorolac and oral ibuprofen was done by Neighbor and Puntillo. It was a prospective, randomized, double-blinded study of patients with moderate to severe pain using a NRS tool to assess pain at baseline, 15, 30, 45, 60, 90, and 120 minutes after treatment. Supplemental analgesics were allowed. No difference was noted between the two groups. An additional study by Shrestha et al compared IM ketorolac and oral indomethacin in the treatment of acute gouty arthritis. This prospective, randomized, double-blinded, controlled study found no difference in pain relief.

There has been concern that the above studies failed to control for the presumed placebo-effect that an IM injection has on a patient’s perceived pain relief; however, this would only further favor the use of oral dosing over IM. Regardless, one study did attempt to control for this potential placebo effect by using saline injections in the group receiving oral ibuprofen and starch tablets in the group receiving IM ketorolac; no difference in pain relief between oral and IM dosing was found.

It can be concluded from these studies that there is no significant pain relief benefit of using IM ketorolac instead of oral ibuprofen. In that IM dosing has theoretical risks and is more expensive, the use of oral ibuprofen is clearly the best choice. However, when the parenteral route is required (i.e., the patient is vomiting), there is a role for IM toradol.

**Cox-2 Inhibitors**

Cox-2 inhibitors were developed and introduced in an attempt to find an anti-inflammatory drug that would not carry the anti-thrombotic properties of the non-specific cyclooxygenase inhibitors. From the time of...
their introduction, refocoxib (Viox™ from Merck) and celecoxib (Celebrex™ from Pfizer) grew to incredible popularity. In 2003, Cox-2 inhibitors were the seventh largest selling class of drugs, with over five billion dollars in annual sales.141 Eric Topol published a now famous challenge to the safety of Cox-2 inhibitors in JAMA in 2001 asserting that Cox-2 inhibitors did not share the same anti-thrombotic properties of non-selective Cox inhibitors, and that there was an increased risk of cardiovascular events.142 Upon review of the studies submitted to the FDA for approval of the Cox-2 inhibitors, he discovered that patients treated with refocoxib in the Viox™ Gastrointestinal Outcomes Research Study (VIGOR; 8076 patients) had an increased risk of adverse cardiovascular events, including myocardial infarction and ischemic stroke, than patients treated with naprosyn. The Celecoxib™ Long-term Arthritis Safety Study (CLASS; 8059 patients) did not find an increased risk of adverse cardiovascular events when celecoxib was compared to ibuprofen and diclofenac (Voltaren™).143 The difference in the VIGOR study and the CLASS study accounts for the difference in the legal troubles that have been faced by Merck and Pfizer.

While this has made headlines many times over, what goes unaddressed is the problem facing patients who had found the COX-2 inhibitors to be a great source of pain relief. It remains unclear what are the best alternatives for these patients; several authors have recommended the use of traditional NSAIDs with gastro-intestinal protection either with a proton-pump inhibitor or a histamine-2 receptor antagonist (H2RA).145,146 Elliott has suggested that treatment with a H2 receptor antagonist is a cost effective way to communicate the benefits of NSAID pain relief to patients while minimizing the risks of gastrointestinal complications.145 Other authors have advocated the continued use of COX-2 inhibitors in select patients after careful screening. Given the current medico-legal climate, this could leave the prescribing physician in a precarious legal position and careful documentation of counseling is recommended.

Disposition

Emergency physicians are well attuned to the need to make a diagnosis whenever possible, the need to arrange for admission or follow-up, and the need to inform and educate the patient. Concurrent with these familiar necessities, emergency physicians must also consider whether or not the patient’s pain has been adequately controlled and develop a strategy for pain management if the patient is discharged home.

McIntosh and Leffler looked at the management of pain after ED discharge for common acute orthopedic injuries. A telephone questionnaire was done seven to 14 days after discharge. Patients were questioned about the type of medication received or prescribed from the ED, the filling of prescriptions, side effects of medications, interventions by other health care professionals, and the adequacy of pain relief in the ED and after discharge. Additionally, they were questioned regarding the operation of vehicles while taking their prescribed medications. Seventeen percent of patients did not fill their prescriptions; one-half of non-steroidal anti-inflammatory drug prescriptions were not filled; 7% of patients drove while taking their medications. This study reports a high level of satisfaction with pain control, with 67% to 92% of patients describing their pain control as adequate. The least satisfied were those patients who did not fill their prescriptions, while those who were most satisfied were discharged with a “starter pack” of 5 tablets of acetaminophen/oxycodone.145 Not all patients leave the ED satisfied: Johnson et al reported that the majority of patients presenting with pain leave the ED with “unresolved or worse pain.”21 The discrepancy between Johnson’s study and McIntosh’s most likely is due to the type of pain studied and highlights the need for developing appropriate pain management discharge strategies including follow-up.

Re-assessment of pain should occur at discharge. Keep in mind that there might be an early pain free period with acute injury and that a patient who initially was fine, may subsequently benefit from an analgesic. It is best to write a prescription for a pain medication even if the patient is not experiencing pain, as it will likely be needed later. NSAIDs, when combined with aspirin or alcohol, may predispose to peptic ulcer disease (PUD) and should only be used in certain patients with caution.146 If patients are not already on prophylaxis for PUD, it should be considered when using NSAIDs.147 Although renal function is not always checked in the ED before prescribing NSAIDs, prostaglandin inhibition decreases vascular flow to the kidney and the glomerular filtration rate (GFR).147 Baseline renal function should be considered for elderly patients, especially if a high or standing dose of NSAIDs is being considered.148 Authors have suggested NSAIDs only be used with caution in asthmatics and in patients taking angiotensin converting enzyme (ACE) inhibitors,
angiotensin II receptor blockers (ARBs), or diuretics, since they may already have compromise to their renal function. The suggestion is not based on interaction between the medications but on limiting the iatrogenic insult to renal function.\textsuperscript{147, 149}

Acetaminophen, previously mentioned in the discussion of elderly patients, as a drug of choice for treatment of mild pain in the elderly population has a low side effect profile. However, at high doses, acetaminophen can cause an elevation in the international normalized ratio (INR) in those patients taking coumadin. Hylek et al found that patients taking coumadin had a ten-fold increase in their risk for supratherapeutic INR when taking over 9100 mg/week of acetaminophen.\textsuperscript{150} When patients are discharged with acetaminophen, discharge instructions should include close follow-up with a recheck of their INR. Additionally, should a patient be discharged on an opiate/acetaminophen combination, education regarding the avoidance of additional acetaminophen products should occur.

Opiates can be effective for treating moderate to severe pain, but complications should be considered and anticipated. Constipation is a frequent side effect. A bowel regimen should be initiated when analgesics are prescribed, including: adequate fluid intake, exercise, and consideration of an osmotic, stimulant, or motility agent in some patients. Patients should be instructed to avoid bulking agents. In discharge instructions, patients should be advised of potential constipation and encouraged to seek follow-up evaluation. Patients should also be cautioned not to drive while taking narcotics, and warned about the risk of falls. Additionally, medication-induced pruritis can be treated with an anti-histamine and nausea with an anti-emetic agent.\textsuperscript{148}

In geriatric patients, pain should be evaluated in the context of their overall physical functioning.\textsuperscript{74} Patients may already have a compromised ability in their activities of daily living and may be more severely restricted by painful conditions. Patients who previously lived independently may not be able to care for themselves effectively nor safely with new painful symptoms. Involvement of family members or social workers may be necessary to facilitate the discharge of an elderly patient. It is also important to understand that pain is not only undertreated in the ED, but oligoanalgesia is ubiquitous in the medical community. When discharging an elderly patient back to a nursing facility, a multidisciplinary assessment and management approach should be encouraged.\textsuperscript{74} While such assessments are outside of the typical practice in the ED, it can be an important (continued on page 22)

**Cost Effective Strategies**

**Inform patients about generic options.**

Many pharmacies will automatically substitute a generic drug (i.e., oxycodone/acetaminophen when Percocet™ is prescribed) while filling a prescription; however, patients may not know to look for generic brands of over-the-counter drugs. It is a common habit to refer to Tylenol™ or Motrin™ when speaking to patients, but reminding them that acetaminophen and ibuprofen are the same medications can save them money when they purchase their medications.

**Consider using oral medications instead of IV.**

When patients are intolerant to oral medication there may be no option but to use IV or IM medications. However, if a patient can tolerate oral medications, their administration is less expensive than the parenteral routes. Additionally, it allows assessment of the effectiveness of oral pain control for discharge planning and may decrease return visits to the ED.

Consider using a traditional NSAID and GI protection instead of a COX-2 inhibitor.

It is increasingly difficult to prescribe a COX-2 inhibitor since refocoxib has been withdrawn from the worldwide market and valdecoxib has been withdrawn from the market in the United States. Celebrex™ is still available, although physicians should weigh carefully two factors before prescribing the medication. First, is it safe for this patient to use? Even though there has not been the same evidence on celecoxib increasing cardiovascular risk as has been publicized on refocoxib – the potential risks should still be strongly considered. Patients may be better served by taking a traditional NSAID and either a proton-pump inhibitor or H2-blocker for gastrointestinal protection. Secondly, physicians should also consider their own liability when prescribing a COX-2 inhibitor, given the legal climate that has surrounded the two drugs no longer available.
1. “The patient had abdominal pain, but I didn’t give any pain medication because I did not want to mask the exam.”

Pain control should be considered in every encounter, even in patients with abdominal pain. When the patient is more comfortable, the abdominal exam can yield more information. The signs of serious pathology will not become unrecognizable, and it is still possible to follow the evolution of the pain.

2. “The vital signs were normal, so even though he said he was in pain there wasn’t any evidence that it was true.”

Vital signs may be normal and yet patients may still be in significant pain. Common medications, such as beta-blockers, may interfere with the normal stress response. And even in the absence of interfering medications, vital signs are not a reliable predictor of pain severity. A patient’s own reporting is the most reliable means of assessing the intensity of pain.

3. “I didn’t give narcotics because I was afraid he would get addicted.”

There is no evidence that patients treated for acute pain with narcotics are at increased risk of addiction. The trends in federal and state legislations have also pushed the standard of care toward an obligation to treat, and the liability may be greater for not treating than for being lean on pain control.

4. “The patient was not in pain at the time of discharge, so pain control did not need to be addressed.”

Patients may not experience the most intense pain for their conditions at the time of presentation. Some processes, such as the inflammatory response, may increase after the time of discharge. The progress of the patient’s condition should always be considered and the patient should be discharged with pain medication.

5. “The patient was an IV drug abuser; I knew he was just looking for pain medications, so I sent him right out.”

Patients who abuse IV drugs are at risk for very serious pathology, such as epidural abscess and necrotizing fasciitis, both of which typically present with complaints of pain. Regardless of a patient’s experience with narcotics, he will need to be evaluated every time he is seen in the ED.

6. “The parents did not think the child was in pain, so I stopped thinking about pain control at that point.”

Parents underestimate the pain their children experience just as badly as physicians do. It is important to look for signs that parents may not notice, such as grimacing, guarding, drawing up their legs, or squirming. Certainly, any child complaining of pain needs to be taken seriously.

7. “She was an IV drug abuser, so I gave her the pain meds I would have given anyone else. When her pain wasn’t controlled I told her that was her problem.”

Patients who are tolerant of opiates, either because of recreational use or from chronic pain treatment regimens, may require more medication than opiate-naive patients. The actual doses should not be the primary concern, but rather the balance of therapeutic benefit and the risks of higher doses.

8. “I made the diagnosis, which is my priority. What difference does it make if I treated their pain?”

Making the diagnosis is one of the most important services provided by emergency physicians, but there is still an obligation to stabilize the patient’s pain. Many patients’ reporting of satisfaction is based not only on accurate diagnosis and treatment but also on the overall patient-provider interaction, including pain control.

9. “The patient was too demented to even know if he was in pain, he didn’t need medication.”

Non-verbal patients may be in significant pain despite their inability to communicate it. Physicians should be attuned to other signs of pain, such as moaning, crying, or writhing.

10. “She was allergic to everything but meperidine, that’s when I knew she was a drug-seeker.”

Patients may not understand what constitutes a true allergy. Itching is common when taking narcotics because of the histamine release. When patients list allergies, physicians should explore what is meant. Sometimes, medications may be listed because of misunderstanding. Even if the patient insists on allergies to all other medications, she should still be evaluated for pathology and a need for real pain control.
recommendation on discharge paperwork.

It is important to treat a patient’s pain, relying on their self-report and erring on the side of pain relief. However, it becomes apparent over time with certain patients that their visits are highly suspicious for drug-seeking behavior. This can become obvious when a patient has multiple visits for either multiple different painful conditions or multiple visits for the same complaint. Some EDs keep a file on “frequent fliers” or have a system for posting special concerns. Red flags can also include documentation of calls from a pharmacy to confirm prescriptions, calling to light that a patient may be filling prescriptions from multiple physicians. In these cases, discharge time may be the best time to notify the patient that the ED is best used to manage patients with acute pain and that further management of their chronic pain is best managed by a pain specialist. A referral to a pain center for further follow-up is recommended.

Future Directions: Improving ED Pain Management

Education
There is little formal education on pain management as noted by Selbst and Clark in 1990. Astonishingly, Bonica, in a 1985 text, reviewed 25,000 pages in 50 major textbooks for medicine, surgery, pediatrics, and emergency medicine and found only 54 pages devoted to the management of pain. Additionally, few medical schools include acute pain control in their core curriculum.

In 1998, Chan and Verdile looked prospectively at patient satisfaction with pain control by 48-hour follow-up surveys. This study was done approximately three years after the institution of an annual one-hour lecture on pain management for emergency medicine residents and four required sessions annually for staff physicians and nurses on patient satisfaction, focusing on awareness and treatment of pain. They found a high (91%) satisfaction rate and a high rate of analgesic prescriptions (95%). These rates are higher than that previously described in the literature. Education of staff and residents may be the difference.

In 1999, Jones prospectively assessed a pain education program for EM residents. A study including a questionnaire and serial VAS scores was conducted before and after the institution of a four-hour pain management program for the residents. There was an improvement in patient’s 30-minute pain reduction from 65% to 92% of patients.

The problem with pain control in the pediatric population is not the difficulty of controlling pain, but the inconsistency with which analgesia is offered. Patient assessment, which addresses pain, can prompt the treatment of pain. Pain is consistently reduced when there are supportive measures in place and when pediatric-focused annual nurse competencies are used.

It is clear that this is an area in need of development. Better education of resident physicians, staff physicians, and nurses on the issues surrounding pain management is paramount to improving patient’s pain relief with the added benefit of probable improved patient satisfaction.

Conclusion

The patient in the case vignette had sickle cell disease and had become tolerant to narcotics. He received oligoanalgesia for his pain and the treating physician failed to put his acute presentation in context with his chronic disease. The complaint from the patient went both to the ED medical director and to the patient’s hematologist who forwarded a second complaint that he had not been informed of the patient ED visit or consulted on how to best manage the pain and ensure next day follow-up. The system failed and, in this case, the patient paid the price.

Many physicians have been too quick to label patients as “drug-seekers” when the patients are really seeking relief. Many physicians have under-treated pain or have not become knowledgeable about the variety of therapies available. While pain relief may not be perceived as the primary mission of the ED, there exists a great opportunity and many resources to intervene and assist the patient in need. Pain control must take place along side diagnosis, intervention, and education. Even as the stresses of crowded departments and sick patients bear down on emergency physicians, if pain control is kept in mind, patients will “Cry out in good earnest, ‘At last I yield to an effective science.’” (Michel De Montaigne)

References

Evidence-based medicine requires a critical appraisal of the literature based upon study methodology and number of subjects. Not all references are equally robust. The findings of a large, prospective, random-
ized, and blinded trial should carry more weight than a case report.

To help the reader judge the strength of each reference, pertinent information about the study, such as the type of study and the number of patients in the study, will be included in bold type following the reference, where available.


5. Todd KH, Sloan EP, Chen C, Eder SC, Wamstad K. Survey of national, weighted, sample of ED encounters) (Prospective, cross-sectional study, 1,665 patients)


23. Trotter G. Calling other emergency departments about suspected cases. 2nd ed. Tucson, AZ: Galen Press; 1995. (Book chapter)


35. Kelly AM. Does the clinically significant difference in visual analog scale pain scores vary with gender, age, or cause of pain? *Acad Emerg Med*. Nov 1998;5(11):1086-1090. (Prospective, descriptive study, 152 patients)


41. Ribbers GM, Geurts AC, Stam HJ, Mulder T. Pharmacologic


84. Gamaitoni AR, Alvarez NA, Galer BS. Pharmacokinetics and safety of continuously applied lidocaine patches 5%. Am J Health Syst Pharm. Nov 15 2002;59(22):2215-2220. (Randomized, controlled trial, 20 patients)


116. An Act to amend the Controlled Substances Act to promote pain management and palliative care without assisted suicide and euthanasia, and for other purposes. Hyde H, trans. 106th ed; 1999. (Congressional bill)

117. To declare adequate pain care research, education, and treatment as national public health priorities, and for other purposes. (MI) R, trans. 109th ed; 2005. (Congressional bill)


119. Estate of Henry James v. Hillhave Corp.: Super. Ct Div 89CV564, Hertford County (NC); 1990. (Court case)


125. Silen W. Cope's Early Diagnosis of the Acute Abdomen. Vol 5. 17
1. Oligoanalgesia means:
   a. Health care providers manage pain in their own style.
   b. Not every patient in pain requires pain medication.
   c. Patients in pain are often under-treated.
   d. Patients in pain minimize their symptoms.
2. The following statements regarding pain are true, EXCEPT:
   a. Pain is prevalent in the ED and ranges from 52 to 78% of patients.
   b. Reassessment of pain is extremely important in the management of pain in the ED.
   c. Pain is a common problem affecting the elderly population.
   d. Untreated pain can result in increased pain through the upregulation of nerve fibers leading to an increased stimulation of the pain pathway.
   e. Patients with chronic pain do not require assessment and treatment in the ED.
3. A patient's level of pain or pain experience:
   a. Is not related to the circumstances of injury
   b. Is multi-factorial
   c. Is Irrelevant as long as the correct diagnosis is made.
   d. Is unrelated to the type and extent of injury
   e. Doesn’t involve the physical and emotional state of patient.
4. Chemicals involved in the pain pathway include:
   a. Leukotrienes
   b. Bradykinins
   c. Serotonin
   d. Histamine
   e. All of the above

5. RSD (reflex sympathetic dystrophy) or complex regional pain syndrome type I (CRPS I):
   a. Is a type of neuropathic pain
   b. Pain is often proportional to inciting event
   c. By definition, an initiating traumatic event is required
   d. Pain is experienced proximal to the site of injury
   e. There are never physical findings associated with this diagnosis

6. Visceral pain:
   a. Is never accompanied by autonomic symptoms such as nausea/vomiting, hypotension, bradycardia and sweating.
   b. Can be caused by ischemia, chemical stimulation, spasm or overdistention of a hollow viscus.
   c. Mediated through nociceptors found in the skin.
   d. Is rarely encountered as a source of pain in the ED.
   e. Should not be treated with analgesic.

7. Important tools available for the assessment of pain include:
   a. Physician impression of pain
   b. Numerical Rating Scale
   c. Visual Analog Scale
   d. Interpretation of vital signs
   e. B and C

8. Reassessment of pain is important and should be done:
   a. Only at the initial contact with patient.
   b. Only if a family member or the patient requests it.
   c. Only at the time of transfer of care to another setting or provider.
   d. After any intervention.
   e. No more than twice because the ED is busy.

9. The best route for pain medication administration and titration is:
   a. Intravenous
   b. Intramuscular
   c. Oral
   d. Transdermal
   e. Sublingual

10. Neuropathic pain:
    a. Is not seen in diabetic patients.
    b. Often responds to standard therapy.
    c. May respond to treatment with tricyclic antidepressants.
    d. Does not respond to anticonvulsant therapy.
    e. is best treated with opioids.

11. NSAIDs:
    a. Are rarely used in the ED.
    b. Inhibit prostaglandin synthesis.
    c. Should not be used in the treatment of dysmenorrhea, biliary colic, renal colic, or arthritis.
    d. IM toradol has been shown to be more effective than oral ibuprofen.
    e. Have no contraindications to their use.

12. The following statements regarding intramuscular administration of medications are true EXCEPT:
    a. It is easy to titrate pain medication with the IM route.
    b. It poses a potential needlestick risk to the health care provider.
    c. It is more expensive.
    d. Its onset of action is similar to the oral route.
    e. Its primary indication is if a patient cannot tolerate oral medication secondary to vomiting.

13. Which statement is true regarding the use of narcotic medications in patients with abdominal pain in the emergency department?
    a. Narcotics can result in a change in exam, and the change often makes the diagnosis more difficult.
    b. There are no studies in the literature that contradict the dogma of withholding narcotics in the evaluation of abdominal pain in the ED.
    c. Narcotics should be used in patients with abdominal pain in the ED while being evaluated.
    d. Most patients admitted to the hospital with abdominal pain have received pain medication.
    e. ACEP has not addressed this issue with a clinical policy.

14. ACEP’s Policy Statement on Pain Management in the Emergency Department includes all EXCEPT:
    a. ED patients should receive expeditious pain management, except for necessary delays such as those related to diagnostic testing or consultation.
    b. Hospitals should develop unique strategies that will optimize ED patient pain management using both narcotic and non-narcotic medications.
    c. Effective physician and patient educational strategies should be developed regarding pain management, including the use of pain therapy adjuncts and how to minimize pain after disposition from the ED.
    d. Ongoing research in the area of ED patient pain management should be conducted.
    e. ED policies and procedures should support the safe utilization and prescription writing of pain medications in the ED.
15. What can we do to improve our management of pain?
   a. Continue what we are doing now.
   b. Educate our staff, residents, and medical students about assessment and management of pain.
   c. Assess and reassess patient’s pain.
   d. Understand that pain is present in some form in nearly every disease and recognize its importance.
   e. All but a.

16. Which statement is true regarding pain relief and patient satisfaction?
   a. Pain relief means that the patient is satisfied with their medical care.
   b. Patient satisfaction means that the patient received adequate pain relief.
   c. Patient/physician interaction is not a factor.
   d. They are not synonymous.
   e. The level of reassurance that a patient has experienced is unrelated to their level of satisfaction.

Class Of Evidence Definitions

Each action in the clinical pathways section of Emergency Medicine Practice receives a score based on the following definitions.

Class I
- Always acceptable, safe
- Definitely useful
- Proven in both efficacy and effectiveness
- Case series, animal studies, consensus panels
- Occasionally positive results

Level of Evidence:
- One or more large prospective studies are present (with rare exceptions)
- High-quality meta-analyses
- Study results consistently positive and compelling

Class II
- Safe, acceptable
- Probably useful

Level of Evidence:
- Generally higher levels of evidence
- Non-randomized or retrospective studies: historic, cohort, or case-control studies
- Less robust RCTs
- Results consistently positive

Class III
- May be acceptable
- Possibly useful
- Considered optional or alternative treatments

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Target Audience: This enduring material is designed for emergency medicine clinicians.

Needs Assessment: The need for this educational activity was determined by a survey of medical staff, including the editorial board of this publication; review of morbidity and mortality data from the CDC, AHA, NCHS, and ACEP; and evaluation of prior activities for emergency physicians.

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