

# Pain Management in the Prehospital Environment

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“Care more for the individual patient than for the special features of the disease.”

*William Osler, 1899*

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Pain is the leading complaint among individuals presenting to emergency departments, with up to 70% of emergency department patients having pain as part of their chief complaint.<sup>1</sup> Therefore, pain is also a major reason why individuals seek care from prehospital providers. In fact, McLeanetal<sup>2</sup> found that at least 20% of prehospital patients reported moderate or severe pain. Multiple other studies<sup>3–7</sup> have also demonstrated that prehospital providers and emergency physicians fail to adequately recognize, assess, and treat pain. These inadequacies in prehospital pain management have resulted in recommendations to incorporate assessment scales and treatment protocols, and to undertake further pain research.<sup>6–9</sup> Despite these recommendations, many emergency medical services (EMS) systems still lack protocols that adequately address and treat pain in the prehospital setting.

In addition to inadequate protocols, there are many obstacles to adequate pain assessment and management in the unique prehospital environment. Some of these obstacles are agent availability, provider education level, controlled substance regulation, transport time, possible delay in transport, and lack of education and research.<sup>6,9,10</sup> This article presents a review of the current literature addressing some of these pain assessment and management obstacles in the prehospital setting, and provides possible suggestions and solutions for future directions in pain education, assessment, and management in the prehospital arena.

## HISTORY

The introduction of an ambulance service into the United States Army in the early 1860s led to the first uses of prehospital analgesia. Many of these early ambulances carried “medicinal” brandy or other liquors for pain management. Civilian ambulances saw their first use of analgesia practice after the Civil War. In addition to providing liquors, these civilian ambulances carried

rudimentary splints. Although not fully recognized as doing so at the time, these rudimentary splints also provided a measure of pain relief for the patient. In fact, most protocols during the early period of prehospital care involved only on-scene treatment, with transportation back to the patient’s home. As medical care continued to evolve and hospital-based care gained more prominence, little attention was given to the prehospital medical care of the patient throughout most of the twentieth century. This unfortunate trend of prehospital medical treatment is exemplified by the fact that even in the 1960s at least half of these “ambulances” in the United States were hearses.<sup>6</sup> During this time, the acceptable protocols were to transport the patient to the hospital without providing on-scene or in-route medical care.

The recognition, assessment and treatment of patients’ pain has recently gained much focus and importance in the management of prehospital patients.<sup>6,9</sup> Pain has been termed “the fifth vital sign” after receiving increased attention from the Joint Commission on Accreditation of Health Care Organizations (JCAHO).<sup>11</sup> The National Association of EMS Physicians (NAEMSP) has also issued a position paper on prehospital pain management, addressing the importance of the recognition, assessment, and treatment of prehospital pain.<sup>6</sup>

## PROTOCOLS

One area that will help improve pain assessment and treatment in the prehospital setting is the development of pain protocols. Currently, many systems require that the paramedic contact a base hospital physician before administering any pharmacological analgesia. This can lead to a delay in the delivery of analgesia to the patient in pain.

In one study,<sup>8</sup> a protocol allowing paramedics to administer morphine sulfate to patients who have extremity injuries without on-line medical control led to patients receiving their first dose of pain medication several

minutes earlier. On many occasions, the patient received the pain medications before transport. Interestingly, the total amount of morphine sulfate given per patient and the number of patients receiving prehospital medication did not change when compared before and after implementation of the protocol. Also, there were no adverse events noted in this study.

Many factors need to be included in the development and implementation of these prehospital pain protocols. Protocol components are listed in Box 1.

During the development of pain protocols, it is best to have a multi-disciplinary approach. Use of local medical expertise, not only during the development of pain protocols, but also during ongoing assessment, will help improve and standardize pain assessment and treatment, especially in unique populations such as pediatric, chronic, obstetric, elderly, and trauma pain patients.<sup>6,9</sup>

Once established, pain protocols should address assessment, indications for medications, and complications associated with analgesia administration. Some potential complications from treatment include respiratory depression, apnea, hypotension, nausea, vomiting, and allergic reactions. Pain management protocols should also require adequate documentation and monitoring of patients who receive prehospital analgesia. Ongoing patient assessment of pain and therapy is another necessary component of a successful protocol. Communication to the receiving medical provider of the patient's pain assessment, treatment, and re-

sponse to treatment needs to be addressed as well. Finally, pain management protocols and outcomes should be part of the EMS quality improvement and assurance process.

## MYTHS

There are many assumptions or "myths" held by medical providers that have served as barriers to effective prehospital pain management.<sup>12,13</sup> Some of these are listed in Box 2.

One common myth is the belief that providers already do a good job of providing adequate pain control; however, as cited above, there are many studies to the contrary. Another belief is that administration of pain medications before arriving at a definitive diagnosis may alter presenting signs and symptoms or mask a serious underlying disorder.<sup>12</sup> Pain medications do not affect peritoneal signs or cause fractures to heal before further evaluation. Effective pain management also alleviates some of the patient's duress and anxiety, allowing for a more accurate evaluation.<sup>14-16</sup>

Another belief is that any amount of narcotic administered should provide adequate analgesia. If analgesia is provided, often the doses used are inadequate,<sup>1,5,6,12,17</sup> giving 2mg of morphine to a healthy adult provides little relief. The normal dose can start at 0.1mg/kg as a bolus and be titrated up to effect. Accompanying this myth is the belief that administering any narcotic can lead to chronic dependence. One study has shown that only 4 patients out of almost 12,000 developed possible opioid dependence patients.<sup>13</sup> Providers also believe that use of any agent is effective for adequate pain relief. These beliefs are more prevalent in the pain management of the elderly or pediatric population.<sup>4,18-20</sup>

### Box 1. Prehospital pain management protocol components

- Assessment and documentation of patient's pain
- Valid and reliable measurement tools for assessment
- Treatment indications and contraindications for pain
- Possible pharmacological and nonpharmacological recommendations
- Possible complications from medications and the treatment recommendations for complications
- Adequate patient monitoring and ongoing assessment during transport
- Use of local expert input for special situations; i.e., pediatric pain, chronic pain, trauma pain, and so on
- Communication of information to receiving medical personnel
- Adequate quality improvement tools to ensure protocols are appropriate, effective, and followed

*Modified from Alonso-Serra, Wesley K. Position paper: Prehospital pain management. Prehosp Emerg Care 2003;7:482; with permission.*

### Box 2. Common provider "myths" about patients' pain

- Care providers currently do a good job providing adequate assessment and treatment of pain. Pain medications may mask serious underlying disorders.
- Two mg of morphine provides adequate analgesia in all healthy adults.
- Pain affects all people in the same manner.
- Use of narcotics in acute pain leads to increase in addiction.
- Use of pain medications increases adverse events. Patients often exaggerate or over-report pain.
- Prior interactions do not affect care provider's ability to remain objective.

The myth that all people experience pain in the same manner is also detrimental. The meaning and treatment of pain can be affected by the culture, age, ethnicity, and gender of the patient.<sup>6</sup> Culture has a powerful effect on the beliefs about, behavior under, and meaning of pain.<sup>21</sup> Studies have also shown that there is provider bias and under treatment of pain in patients of different culture, gender, age, and ethnicity.<sup>22–28</sup>

Another belief held by healthcare providers is that increased adverse effects will occur with analgesia use. It is true that care providers require close monitoring and additional training in analgesia use to prevent adverse events;<sup>8</sup> however, many studies have reported few to no complications in prehospital analgesia administration.<sup>8,29,30</sup>

Finally, the patient's and care provider's perception of current pain also affects the adequate management of pain. When the patient says that his pain is a 15 on a scale of 1 to 10, is he exaggerating to get medication or is his pain that severe? The lack of a concrete measurement and the reliance on patient self-reporting of pain level often leads to disbelief by the provider. The myth that patients are unable to adequately self-assess their pain must be overcome through provider education.<sup>6,8,9</sup>

## PAIN ASSESSMENT

After protocol development, adequate pain management in the prehospital setting begins with effective assessment of pain. Articles in this issue by Todd on the measurement of pain and by Bauman et al on pediatric pain discuss the assessment and measurement tools available for pain in depth; however, the unique and often challenging prehospital environment requires some discussion and recommendations.

To be adequate, assessment of patient's pain should be individualized, comprehensive, continuous, measured, monitored, and documented.<sup>9</sup> Pain is unique to each individual, and is influenced by several factors, including age,<sup>28</sup> race,<sup>24,27</sup> gender,<sup>22,25,26</sup> culture,<sup>21</sup> emotions, cognitive state, expectations, and prior experience.<sup>6,9</sup> Despite this knowledge, current evidence has shown lack of assessment and treatment of pain by prehospital providers in regards to those factors.<sup>3–6,9</sup> Also, the focus on assessment has resulted in better documentation of patients' pain without better treatment of pain.<sup>29</sup>

Determining the ideal measurement tool used to properly assess pain also presents a challenge for the prehospital healthcare provider. The lack of objective measurement can be frustrating for the healthcare provider. Patient self-reporting is considered the “most reliable indicator of the existence and intensity of pain.”<sup>31</sup> So how does one measure such self-reporting? As other authors in this issue have stated, pain is complex and multidimen-

sional, and cannot be as easily quantified as one-dimensional parameters such as blood pressure or pulse rate. Pain involves psychological, behavioral, physiological, and emotional components.<sup>1,6,9</sup> The interactions of these components explain why there is variation in patients' response to pain and perception of pain. Also, the degree of injury or tissue damage alone is an inefficient method for determining a patient's appropriate pain intensity.<sup>32</sup> Finally, many patients in the prehospital setting are unable to self-report pain level.<sup>29</sup>

The ideal tool for pain measurement and assessment should include the acknowledgment, intensity, and continued measurement of the pain in regards to therapy and time. This multidimensional tool should also account for all the factors that influence a patient's pain perception and intensity. Also, the tool should remain unbiased with regards to culture, age, cognitive state, ethnicity, gender, and previous pain experiences. Because of the complexity required for the ideal multidimensional measurement tool, one-dimensional pain scales were developed for use in the acute pain setting.<sup>9,33</sup> The three common one-dimensional adult pain scales are the visual analog scale (VAS),<sup>34,35</sup> the numeric rating scale (NRS),<sup>36</sup> and the verbal or adjective rating scale (VRS/ARS).<sup>37–39</sup> These are briefly described below:

- Visual analog scale (VAS): a 100mm line with “no pain” at the beginning, and “worst pain” at the end. Patients place a mark to estimate their pain, and the distance from the origin (no pain) is measured.
- Numeric rating scale (NRS): patients rate their pain with numbers, from no pain (0) to worst pain (10 or 100).
- Verbal or adjective rating scale (VRS/ARS): patients chose the best adjective that describes their pain — none, mild, moderate, severe, or unbearable.

There are also unidimensional scales used in the pediatric population to measure and assess pain.<sup>40–43</sup> Children have limited cognitive ability to use most of the adult scales; however, the VAS has been used with success in children older than five. Children under five have used modified VAS scales, color scales, and the Faces Pain Scale with some success.<sup>44,45</sup> These scales may also be helpful in adult patients who lack the cognitive ability to communicate. The article on pediatric pain by Bauman et al., in this issue describes other one-dimensional pediatric scales and neonatal pain scales that may be used to assess children's pain. No studies have been conducted in the prehospital setting to evaluate pediatric pain scales.

There are also several multidimensional tools available for pain assessment that incorporate some of the

factors listed above associated with pain;<sup>6,9</sup> however, these tools are time-consuming and require extensive education to administer and evaluate. The role of multidimensional tools in the prehospital environment may be limited to EMS systems that require lengthy or specialized transport. The use of these tools would require much education and a dedicated multidisciplinary approach.

Although not ideal, the use of one-dimensional tools in the prehospital environment is usually recommended for pain assessment because of their ease of use and logistic feasibility.<sup>6,9,33</sup> For adult patients, the ARS and NRS are recommended for prehospital pain assessment.<sup>6,9</sup> Because literature is lacking regarding out-of-hospital assessment for pediatric pain, medical directors must decide which instrument may work best in his environment. Emergency Medical Services Outcomes Project (EMSOP) IV pain measurement in out-of-hospital outcomes research<sup>42</sup> tentatively recommends the Oucher Scale for assessment in children above three years of age, while awaiting further research.<sup>9</sup> It is also important that the medical director consider including a pain assessment tool in the protocol for other special populations such as the elderly and trauma, obstetric, and chronic pain patients. Another goal, if possible, is to incorporate the same pain measurement tool used by receiving providers and facilities. Also, one must remember that it is important to assess all pain, despite the level of ability to communicate with the patient. As described, there may be behavioral and physiological changes that accompany pain and could be used to aid in therapy.<sup>46</sup> Although observational measures may be inferior to self-report, this may be the only means of assessment in some patients. Finally, pain management does not end with proper assessment. Focus for provider education should be on the adequate treatment and relief from unnecessary suffering for the patient, not just on the initial assessment.

#### **PHARMACOLOGIC INTERVENTIONS**

There are few studies available that look at the safety and efficacy of prehospital analgesia. Most analgesia studies are retrospective and are considered Class III or IV levels of evidence.<sup>47</sup> One study<sup>48</sup> revealed only 38 randomized control trials relating to prehospital care since 1989, and none were related to pain assessment or management. The available literature does; however, report many options for prehospital analgesic use, and reports few adverse events.<sup>29,30</sup> One French observational prehospital study<sup>29</sup> did report a 2% cardiac-arrest-without-death rate and a 12% arrhythmia rate in critically ill, intubated patients; however, because these patients underwent rapid sequence intubation (sedation) and were

critically ill, these side-effects cannot be linked directly to analgesia use alone.

The appropriate analgesic in the prehospital environment would be one that is safe, easily administered, and that possess rapid onset, short duration, and low abuse potential. The following agents are some of the more commonly used analgesics found in the prehospital environment.

#### **MORPHINE SULFATE**

Morphine sulfate is advocated in many prehospital protocols for cardiac chest pain not relieved with nitrates. Also, morphine is finding increasing acceptance in managing hip and long bone fractures.<sup>2,5</sup> Morphine should be administered intravenously, and its effect can be titrated. The onset of action is in minutes, with a half-life of two to three hours. It can also be given intramuscularly to patients whose situation precludes the immediate placement of an intravenous (IV) feed; however, this route of administration has a delayed onset of action of about five minutes, and is more difficult to titrate. When administered intramuscularly, the effects will last for three to five hours.

The dose for both routes is 0.05 to 0.3mg/kg. An added benefit of morphine sulfate is the fact that undesired effects such as respiratory depression and apnea can be reversed with naloxone. Naloxone has proven to be safe in the prehospital environment and is readily available for many providers.<sup>49</sup>

#### **FENTANYL**

Another opioid that is used in the prehospital environment is fentanyl. Its rapid onset and potency are major advantages. It is given intravenously in doses of 1 to 4mcg/kg. An onset of action of thirty seconds to two minutes provides faster potential relief than morphine sulfate. Its duration is thirty minutes to one hour, requiring more frequent dosing by the prehospital provider. A small study in Australia<sup>50</sup> noted that intranasal fentanyl can provide significant pain relief in children; however, this study involved a small number of patients and was conducted in an emergency department. Oral fentanyl has also been used with success with few side-effects.<sup>51,52</sup> Respiratory depression may be seen in fentanyl use, but is a less common when compared with morphine sulfate; however, a rare side-effect of fentanyl, chest wall rigidity, may not be relieved by naloxone, and may require paralysis to ventilate a patient. Some organizations may be reluctant to use opioid medications, because these medications present administrative difficulties. Also, federal and state regulations may limit certain systems' and providers' type, route, dose, or use of these controlled substances.

## **NALBUPHINE**

Nalbuphine has been shown to be safe and effective for use in the prehospital environment.<sup>53-55</sup> Nalbuphine is a mixed narcotic agonist-antagonist with minimal respiratory and hemodynamic side-effects. Naloxone can be used to reverse any adverse side-effects. One retrospective case review of 10 patients<sup>56</sup> did show an increased opiate requirement in patients admitted to the emergency department. Because nalbuphine is not regulated by the Controlled Substances Act and may have a lower abuse potential than pure opioids, it may be another option for the prehospital provider.

## **NONSTEROIDAL ANTI-INFLAMMATORY DRUGS**

Although nonsteroidal anti-inflammatory drugs (NSAIDs) are a group of medications that can be readily available to the pre-hospital provider, few systems use them. Certain NSAIDs, such as ketorolac, can provide meaningful pain relief for certain conditions, including renal colic. Ketorolac can be administered intravenously and intramuscularly. Although many types of NSAIDs are available over the counter and therefore assumed safe by many people, these medications can have serious side-effects when used chronically.

## **NITROUS OXIDE**

Nitrous oxide can be inhaled to produce sedation and analgesia, and was first used in the prehospital setting in 1970.<sup>57</sup> It has been safely used in the prehospital environment with excellent results.<sup>58</sup> Advantages include self-administration and an onset and duration of action of three to five minutes. Supplemental oxygen should be administered while a patient is receiving this intervention. Additionally, the mask used to administer this medication should be equipped with a demand valve, and the mask should not be secured to the patient's face. As adequate analgesia is obtained, the mask will fall from the patient's face, preventing over sedation and possible hypoxia. Minor side-effects such as nausea and vomiting have been reported.<sup>47,57</sup> Also, because nitrous oxide is a gas, it should not be used in patients who have suspected pneumothorax or bowel obstruction. Some limitations of nitrous oxide use include regulations concerning use of a gas in an enclosed space, and its high abuse potential by providers.

## **TRAMADOL**

Tramadol has been looked at in the prehospital setting as an alternative to morphine, and has been compared with nitrous oxide.<sup>59,60</sup> Tramadol is a centrally acting analgesic that has been shown to be useful in the treatment of many pain disorders.<sup>61,62</sup> Tramadol has a unique mechanism of action that combines mu-opioid activity with in-

hibition of serotonin/norepinephrine uptake. A few prehospital studies that involved pain management in trauma patients<sup>59,60</sup> found that tramadol's analgesia and physiological effects were similar to those of other opioids, with a 30% nausea rate.

## **OTHER MEDICATIONS**

Additional pharmacological agents that have been used in the prehospital environment include ketamine, midazolam, lorazepam, and valium. Ketamine is commonly used in emergency departments for pediatric sedation. Currently, there are no published articles on its routine use in the prehospital environment. Benzodiazepines such as midazolam, lorazepam, and valium are not analgesics, but sedatives or anxiolytics. These medications can treat the anxiety or agitation that often accompanies pain. Great care should be used when giving a patient one of these medications, because anxiety or agitation could be an indication of a more ominous condition, such as hypoxia. Also, these medications should not be used in lieu of pain medication, because benzodiazepines do not provide pain relief. Finally, caution should be used when combining benzodiazepines with opiates, due to their synergistic effect of lowering patient's blood pressure and producing respiratory depression and apnea.<sup>63</sup>

## **LOCAL AND REGIONAL ANESTHESIA**

There are limited data on the use of local and topical anesthetics in the prehospital setting. The use of local or topical anesthesia may be a consideration in special populations or in populations requiring long transport. Other articles in this issue describe the use and techniques of local and topical anesthetics for pain management.

The use of regional anesthesia or "blocks" is also described in detail in other articles in this issue. Regional anesthesia has been used with success in the wilderness and austere environments.<sup>64,65</sup> With the proper training and education, these techniques used in the right environment may improve pain management for these select patients.

## **NONPHARMACOLOGICAL INTERVENTIONS**

Appropriate therapy for patients in pain should not be limited to analgesia or anesthesia. Although pharmacologic approaches are important, there are many nonpharmacological interventions recommended to enhance pain management.<sup>6,66-68</sup> Also, because of provider level, medication allergies, medication availability, and possible access issues, pharmacological therapy may not be available. Nonpharmacological therapy can be assigned to three broad categories:

- Cognitive: music, guided imagery, distraction, positive reinforcement, decentralization, hypnosis

- Behavioral: relaxation techniques, biofeedback exercises, breathing control
- Physical: heat and cold application, massage or touch, position and comfort, temperature regulation, transcutaneous electrical nerve stimulation, acupuncture, chiropractic, immobilization

Although not scientifically proven, several cognitive, behavioral, and physical interventions have been shown to be effective.<sup>68</sup> To understand the possible mechanism of action for these nonpharmacological therapies, a basic understanding of the gate-control hypothesis is necessary. The gate-control hypothesis has been one proposed mechanism for the effectiveness of these nonpharmacological interventions.<sup>66</sup> This hypothesis postulates the presence of blocking or gating mechanisms along the pain pathway that prohibit pain from reaching the brain through stimulation of inhibitory neurons. These neurons can be stimulated and close the “pain gates” through stimulation of nonpainful receptors or excitatory messages from the brain itself.<sup>69</sup> A more thorough discussion of the pathophysiology of pain and this hypothesis can be found in the chapters on pathophysiology by Hansen and on chronic pain also by Hansen, elsewhere in this issue.

#### **COGNITIVE**

Music, guided imagery,<sup>66</sup> distraction,<sup>70</sup> and hypnosis<sup>71–74</sup> are examples of cognitive therapies that have been shown to be effective in reducing patient’s pain. The use of cognitive interventions may help distract the patient and improve control over his pain, and may even contribute to endorphin release.<sup>69</sup> For cognitive interventions to be successful, they require patient cooperation and provider education.

#### **BEHAVIORAL**

Behavioral techniques have also been used with success in pain management. Some of the interventions include: relaxation techniques, biofeedback exercises, and breathing control.<sup>75–78</sup> These techniques also aid in distracting the patient and shifting the focus from his pain; however, these interventions also require education for the provider and patient to be effective.

#### **PHYSICAL**

Most prehospital providers probably provide physical interventions as part of their routine management to patients in pain; however, there are several techniques that are probably neglected or are not fully used. Some of the physical strategies that have been proven to be useful include heat and cold application,<sup>79,80</sup> massage or touch,<sup>79</sup> position and comfort (splinting),<sup>81</sup> temperature regulation,

acupuncture,<sup>82–85</sup> and transcutaneous electrical nerve stimulation.<sup>86,87</sup>

#### **MONITORING AND CONTINUED ASSESSMENT**

After undertaking a pain management strategy, it is important to continually reassess the patient. The prehospital patient treatment form should document any clinical or subjective improvement of the patient. In addition, any clinical or technical problems encountered when administering the medication should be accurately documented. Monitoring a patient’s level of sedation and pain control, particularly when using pharmacological agents that can cause physiologic change, is important for patient safety.<sup>61</sup> Many of the medications used for pain management can produce respiratory or hemodynamic changes.

Simple manual observation is not enough, however. Noninvasive methods already employed to monitor prehospital patients also need to be used. Following the effects of pain control interventions on parameters such as blood pressure and pulse oximetry are essential. If available, noninvasive end tidal CO<sub>2</sub> monitoring is another potentially important parameter to follow. All physiologic changes as well as response to therapy need to be documented and investigated by the prehospital provider.

Ongoing education for prehospital providers will improve their ability to use interventions, and to interpret, monitor, and respond to changes in the patient’s condition. Prehospital pain management education should be accomplished using a multidiscipline approach incorporating not only appropriate assessment and treatment of pain techniques, but also continued assessment for changes in patients’ pain and physiology.

#### **QUALITY IMPROVEMENT**

Once a prehospital pain management protocol is established, it has to be continually evaluated. Quality improvement measurement in pain management is complex and is constantly evolving. A thorough evaluation of the quality of pain care in the prehospital setting should include the measurement of practice patterns and patient outcomes.<sup>88</sup> Quality control programs can increase provider awareness in pain management and improve compliance to pain protocols.<sup>29</sup> Box 3 lists quality assessment markers.

Provider practice pattern evaluation begins with proper education and training, with attention to identification, assessment, treatment, reassessment, documentation, and reporting of pain. Specific end points and benchmarks need to be established and communicated on a regular basis to the providers, with continued flexibility for improvement.<sup>6,88</sup> All forms of therapy, pharmacologic and nonpharmacologic, need to be reviewed and evaluated for effectiveness and incidence of adverse events. Provider

documentation needs to be reviewed to ensure protocol compliance and appropriate treatment. Open communication among providers and institutions should occur on a regular basis to assess appropriateness and adequacy of pain control in the prehospital setting.

Measurements of patient's outcomes are also essential for quality improvement. Gordon and associates<sup>88</sup> review several studies that have looked at pain management outcomes in hospitalized patients as a means to measure and improve quality pain control. Some of the outcome measures applicable to the prehospital setting are: adequate assessment of pain is documented, pain is reassessed at regular and frequent intervals, pain is treated with analgesia and other modalities when appropriate, complications and prevalence of side-effects associated with pain management are documented and addressed, patients are informed about pain management, and patient satisfaction with pain treatment and the quality of pain management across points of care transition are evaluated.

#### SUMMARY

Pain measurement and relief is complex, and should be a priority for prehospital providers and supervisors. The available literature continues to prove that we are poor pain relievers, despite the high prevalence of pain in the out-of-hospital patient population. Lack of education and research, along with agent availability, controlled substance regulation, and many myths given credence by healthcare providers, hinder our ability to achieve adequate pain assessment and treatment in the prehospital setting. Protocols must be established to help guide providers through proper acknowledgment, measurement, and treatment for prehospital pain. Nonpharmacologic therapies must also be taught and reinforced as important adjuncts to pain management. Finally, formation of quality improvement pain programs that evaluate patient outcomes and provider practice patterns will help EMS systems understand the pain management process and provide areas for improvement. Only through emphasis on pain education, research, protocol, and program monitoring development will the quality of pain assessment and management in the prehospital setting improve.

### **Box 3. Quality improvement markers for prehospital pain management**

#### *Provider practice pattern*

1. Education and training in identification, assessment, treatment, reassessment, documentation, and reporting of pain
2. Pain end points and benchmarks need to be established and known
3. Frequent review of pain modality effectiveness
4. Chart review for documentation and protocol compliance
5. Need for continued patient assessment and identification of adverse events
6. Open communication with providers and institutions about pain management

#### *Patient outcomes*

1. Adequate assessment of pain
2. Reassessment of pain at frequent and regular intervals
3. Effectiveness of pain management with pharmacologic and nonpharmacologic modalities
4. Prevalence and adverse events associated with pain management therapy
5. Patient satisfaction with treatment of pain
6. Evaluation of the quality of pain management at transition points of care

*Modified from Gordon DB, Pellino TA, Miaskowski C, et al. A 10-year review of quality improvement monitoring in pain management: Recommendations for standardized outcome measures. Pain Manag Nurs 2002;3(4):116–30; with permission.*

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