A Guide to Prehospital Pain Management

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EMS providers routinely treat patients with pain; it's the most common reason patients seek medical attention in the ED. Providers who understand the physiologic mechanism that causes pain, the physiologic response to pain and the methods with which to control it are best equipped to care for these patients. Pain control is as much an art as a science.

Appropriately titrated doses and careful patient monitoring minimize the risk of harmful side effects from pain medications. However, studies show that patients consistently receive inadequate doses or no pain control during their interaction with the medical community.2 This is especially true in the pediatric trauma population as well as non-Caucasians, but many factors contribute to the undertreatment of pain.

Although recent concerns about the national opioid epidemic involving prescribed, non-prescribed and recreational opiates are creating a revision of practice guidelines for opiate medications, it's still widely believed that prehospital providers have a low risk of creating opioid abuse when using medications properly. This is especially true in the setting of obvious injury.

Prehospital providers may harbor concerns that aggressive pain management will delay or prohibit an accurate diagnosis by a receiving physician. To alleviate this concern, consider different causes of pain: A patient with an obvious extremity fracture shouldn't be denied pain medicine for fear of clouding another diagnosis.

The basic techniques taught in EMT and paramedic classes, such as splinting a painful fracture, still often provide the most pain relief. Photo Scott Oglesbee

The American College of Emergency Physicians issued a policy statement in 2015 recommending that all ALS-capable EMS systems should provide analgesia and sedation with appropriate physician oversight and quality improvement programs.

Providers should base pain management decisions on the underlying cause of the pain, the amount of pain and available resources. The goal of initial pain management isn't to extinguish pain, but to reduce the pain perceived by the patient to a tolerable level without causing serious side effects.
The Physiology of Pain

The physiology of pain is complex. Sensory nerve cells, or neurons, transmit impulses and function as receptors. They exist in almost every location in the body and receive information, such as pressure, pain and temperature. The neurons convert this information into electrical impulses that are relayed to the spinal cord. Ultimately, the sensory cortex of the brain perceives the pain.

Pain fibers are divided into two subcategories: fast and slow.6 The brain senses fast pain in about one-tenth of a second. This type of pain occurs when someone strikes their fingernail with a hammer. The person would describe the pain as intense or sharp. Slow pain takes about one second to register in the brain. Patients associate slow pain with aching, throbbing and chronic disease.

Pain-sensor distribution also affects pain perception. For example, the fingertips have a dense distribution of pain fibers and, therefore, are highly sensitive to pain. In contrast, the abdominal organs don't have an abundance of pain receptors and are more sensitive to stretch and pressure sensations, resulting in an achy, diffuse, nonspecific presentation.

However, when an inflamed abdominal organ touches the peritoneum, which is rich in pain fibers, the patient complains of excruciating pain with a more specific location. This physiology is best demonstrated in appendicitis, which classically starts with a diffuse, nonspecific of abdominal pain and then progresses to the right lower quadrant.

Also, the location of pain sensors plays a role in the clinical presentation of pain. Common nerve fibers running adjacent to each other may overlap the signal received in the brain and set up referred-pain patterns.

When a patient perceives pain in an area different from its point of origin, we call it referred pain. A common example: the radiation of ischemic heart pain to the left arm.

The Physiologic Response to Pain

The physiologic response to pain is also complex. The brain releases chemical mediators, such as endorphins, during stress to decrease pain. Endorphins, opiate-like mediators, bind to neurons' opiate receptors and decrease the transmission of the pain impulse. Numerous chemicals play smaller roles in pain modulation.

The clinical responses a patient displays in reaction to pain vary widely. Classically, the sympathetic nervous system releases epinephrine. This will often produce an increased pulse rate, increased blood pressure, increased respiratory rate and diaphoresis.

There are many factors that may alter a patient's response to pain. Beta-blockers, commonly taken for hypertension, may blunt tachycardia in a patient. Also, profound pain may acutely lead to a vagal response, leading to bradycardia and possibly hypotension.

Additionally, every patient has a certain pain tolerance or pain level they can endure before the physiologic response is activated. Many things affect a person's pain tolerance, including:

- Training;
- Culture;
- Expectations;
- Overall health;
- Mental health;
- Drugs (prescribed chronic pain medications and illicit drugs, such as chronic heroin or other opioid use);
- Alcohol; and
- Sleep deprivation.

Assessment

Providers should assess a patient complaining of pain by finding their chief complaint. The pain source may be obvious, such as an acute injury. But, if the source of their pain is an illness, it may not be as easy to assess.

Obtain the patient's vital signs. Ask them the standard questions regarding pain evaluation. Table 1 contains a helpful mnemonic to use when evaluating pain.

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When evaluating the pain's severity, have the patient grade it on a scale from zero to 10–zero being no pain and 10 being the worst pain of their life. This is called the verbal analog scale. It allows the patient to continuously grade the pain as you intervene. Providers should document each response on the patient care report.

When interpreting vital signs, remember the golden rule of pain management: If the patient says they have pain, then the patient has pain—regardless of clinical presentation.

Pain Control

When considering pain control, the first thing many healthcare providers think of is medication, but that's only part of the picture. The basic techniques taught in EMT and paramedic classes, such as splinting a painful fracture, still often provide the most pain relief.

To illustrate, we'll use a pain model of musculoskeletal trauma involving an extremity. Table 2, below, contains a helpful pain-control mnemonic.

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For an extremity injury, pain management begins with immobilizing or splinting the extremity. Immobilizing the affected limb will significantly reduce the patient's pain. Often, the patient will require only the application of a splint for pain management. Proper immobilization not only controls pain, it also lessens the chance of neurovascular injury occurring during transport.

Lifting or elevating the immobilized extremity increases the venous flow from the extremity and decreases arterial blood flow. Elevation also limits tissue swelling, assisting in pain control.

Ideally the extremity should be raised above the heart level. However, if this isn't possible due to logistical reasons, simply elevate the immobilized extremity onto a pillow or blanket roll for therapeutic relief.

Providers also often overlook the application of ice to painful areas. Cooling an injured area decreases the pain information transmitted from the nerves, thereby lowering the patient's pain perception. Ice also helps limit the amount of swelling in the injured area. Swelling increases the tissue pressure in the area and, correspondingly, the amount of pain.

Patient Communication

Communication—an often under-utilized component of pain management—may be one of the most important tools in a provider's arsenal. A first responder who treats a patient confidently, with a professional demeanor and compassion, will help break the pain anxiety cycle. How a patient perceives the people caring for them and the way the personnel work dramatically influences the patient's suffering.

A professional demeanor inspires confidence and trust. In addition, acknowledging the patient's pain is crucial. If the patient must be moved before final immobilization takes place, the patient should be informed about the plan. The provider must explain every step of the process to the patient to alleviate—or at least control—the anxiety that accompanies acute illness and injury.

Distraction is another powerful communication skill. Providers should talk to their patients and attempt to distract them so they won't continuously concentrate on their pain. This is particularly important during protracted extrications.

Pharmacology

Providers must be familiar with the various medications available to treat a patient in pain and know the specific indications for each medication. For example, the first-line pain control medication for myocardial-related chest pain is nitroglycerin, not morphine. Here, we focus on the classic medications used to alleviate pain by sedation or analgesia.

The ultimate prehospital pain medication would have rapid onset, short duration of action and minimal or no side effects. Sadly, this agent doesn't exist. When using pain medications, providers must deal with the risks and benefits of each.

Anti-inflammatory medications function to inhibit different pathways of pain by reducing the signs of inflammation through inhibition of various proteins associated with pain signals. They are the mainstay of treatment of pain in the hospital and are commonly used as over-the-counter medications. They can also be used safely in the prehospital environment and may decrease the needs for narcotic pain medications.

IV anti-inflammatory medications such as ketorolac can be particularly helpful in patients who have nausea and vomiting or fever associated with their pain.

The opioids, classically morphine and fentanyl, are the mainstay medications for severe pain relief in medical care. Opioids relieve pain by binding to receptors that reduce the ability of the pain fibers to transmit impulses. They're extremely effective.

Morphine sulfate has been used in the field for more than 40 years to treat chest pain that doesn't respond to nitroglycerin. However, in many systems, morphine is limited to this role exclusively. Fear of the drug's potential side effects—including respiratory depression, nausea, vomiting and hypotension—prevents many systems from using it for other types of pain control. However, if morphine is carefully administered in a slow, controlled manner with frequent re-evaluation of the patient's pain and vital signs, it's safe to use.

Hemodynamically, opioids don't affect cardiac contractility. However, morphine's vasodilating effect may decrease blood pressure. Morphine also causes the release of histamine, which may lower blood pressure in some patients. Any medication that controls pain or anxiety can lower blood pressure by lessening the sympathetic drive as the pain is controlled.

Fentanyl, a synthetic opioid, is used often in the hospital. Many of its properties make it attractive for prehospital use. It has a short half-life, doesn't cause the release of histamine and has few vasodilatory properties.

Another feature that makes opioids favorable for use in the prehospital setting: Narcan (naloxone) readily reverses their effects. This can be important if respiratory depression occurs in a patient who's oversensitive to an opioid or who inadvertently receives a higher-than-normal dose.

Opiate Addiction

In the United States, there's an alarming number of patients who are addicted to opiate pain medications. There's been a significant increase in the number of deaths and near-death experiences involving narcotic medications that include those prescribed by a clinician, those obtained illegally by patients as well as illegal street drugs, chiefly heroin.

Signs of opiate abuse may come in several ways. Recurrent encounters with the same patient always involving a complaint of pain, patients who receive narcotic pain prescriptions from several different healthcare providers, and patients describing allergies to all pain medications that aren't narcotics may represent the hiding of a chronic overuse of opiate medications and/or drugs. Such patients may

also have high tolerance levels for narcotic pain medications.

Physical exam findings that may be consistent with opiate use can include constricted pupils, and, if injecting the opiates, there may be chronic scarring of the injection sites that follow the paths of veins (track marks). Most commonly, track marks occur in the arms and the feet, occasionally in the groin.

While prehospital care providers shouldn't automatically withhold narcotic pain medications to those suspected of or admitting to chronic use, it's prudent to limit the medications and be particularly vigilant for signs of untoward effects such as respiratory depression.

In cases of obvious major traumatic injury such as open fractures, burns, etc., there's rarely a reason to withhold pain medications.

Summary

Even the experienced field provider may find pain control a challenge, and research on prehospital methods to control pain remains scarce.

Simple interventions, such as splinting, applying ice and talking to patients, can assist in the control of the patient's pain and anxiety. These methods are available to all provider levels and should be implemented routinely.

Advanced providers have had opioid analgesia to control pain for many years and have begun to include anti-inflammatory agents to their pain control regimens. An increase in research and education of providers and medical directors can expand the arsenal of methods available to control pain in the field.

Concerns for chronic opioid abuse may be uncovered in the history or physical exam and should prompt the EMS provider to be extra concerned for signs of serious side effects of opiate medications should they be administered.

References

1. Chang HY, Daubresse M, Kruszewski SP, et al. Prevalence and treatment of pain in EDs in the United States, 2000 to 2010. Am J Emerg Med. 2014;32(5):421–431.

2. Rupp T, Delaney KA. Inadequate analgesia in emergency medicine. Ann Emerg Med. 2004;43(4):494–503.

3. Rutkowska A, Skotnicka-Klonowicz G. Prehospital pain management in children with traumatic injuries. Pediatr Emerg Care. 2015;31(5):317–320.

4. Pletcher MJ, Kertesz SG, Kohn MA, et al. Trends in opioid prescribing by race/ethnicity for patients seeking care in US emergency departments. JAMA. 2008;299(1):70–78.

5. American College of Emergency Physicians policy statement. Out-of-hospital use of analgesia and sedation. Ann Emerg Med. 2016;67(2):305–306

6. Guyton AC, Hall JE: Textbook of medical physiology. Elsevier Saunders: Philadelphia, 2006.

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