

Prehospital Pain Management for Adults, Children, and Special Populations



Updated October 2017



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Citation for Presentation

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- ***Suggested Citation:*** Pre-hospital Pain Management for Adults, Children, and Special Populations. University of Florida College of Medicine - Jacksonville Department of Emergency Medicine, Pain Management and Assessment Initiative (PAMI): A Patient Safety Project, [date retrieved]. Retrieved from <http://pami.emergency.med.jax.ufl.edu/>.

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Module Outline

- Learning Objectives
- Case Scenarios
- Pain in the Pre-hospital Setting: background
- Defining and Classifying Pain
- Patient Assessment
 - History
 - Pain assessment scales
 - Physical exam and reassessment
- Treatment of Pain
 - Nonpharmacologic
 - Pharmacologic
- Special Populations:
 - Pediatric, elderly, pregnancy, obesity, chronic pain or illness
- Specific Presentations:
 - Sickle cell, abdominal pain, fractures, burns
- Pain Management Guidelines and Algorithms
- Patient Safety Considerations
- Closing Case Scenario Discussion

Learning Objectives

- Review the importance of pre-hospital pain recognition and assessment.
- Review barriers to adequate EMS pain management.
- Discuss pharmacologic and nonpharmacologic pain treatment options.
- Determine patient safety and risk aspects of pain management in the field with particular emphasis on high risk populations such as children.
- Understand key documentation and communication elements related to pre-hospital pain management when relaying information to the receiving facility.

Case Scenarios



Case Scenario 1

During a rainy Saturday evening, a 28 year old male was speeding around a curve when he lost control and hit a tree at 45 mph. He was restrained with airbag deployment and denies loss of consciousness. When EMS arrives they find the patient alert and complaining of severe pain in the left thigh. Physical exam reveals a swollen and tender thigh. Any movement causes an increase in pain. The paramedic wonders if he should place an IV for pain medication or transport rapidly to the closest hospital which is 15 minutes away.



- **How would you approach this patient?**
 - Should you 'scoop and run'?
- **How would you assess or quantify the pain?**
- **Would you give this patient pain medications?**
- **What treatment options should you consider?**
- **How should you proceed if medications are administered?**

Case Scenario 2

You are called to the residence of a healthy 3 year old female who pulled a pot of hot coffee off the counter. She has first and second degree burns on the front and back lower legs but has no other injuries. She is screaming and running away from you.

Questions to Consider

- How would you assess her pain?
- Which pain assessment scale would you use?
- What are your options for treating her pain?





Background:

Pain in the Pre-hospital Setting

Pain in the ED and EMS Settings

Pain Management Barriers and Myths

Strategies to Overcome Barriers and Improve Pain Management

Emerging Challenges

Physiologic and Psychologic Effects of Pain

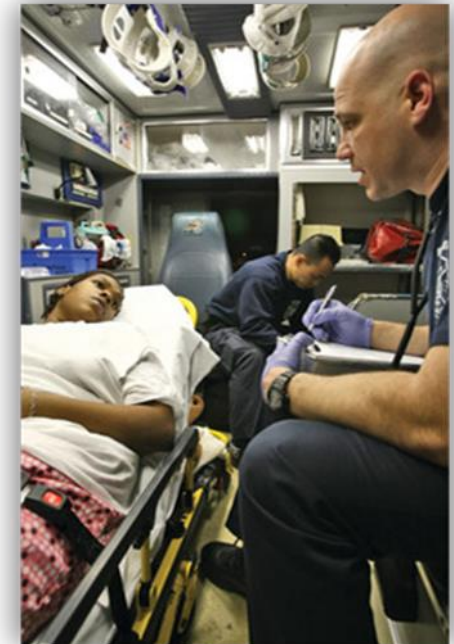
Why is EMS Pain Management Important



Background and Importance of EMS Pain Management

Tips

Timely management of pain and administration of analgesia effects the entire emergency medical experience and continuum and can have lasting effects on the patient and family's reaction to current and future medical care. This is especially true for children.



Pain in the ED and EMS Settings

- Pain is the most **common** reason for seeking health care and as a presenting complaint accounts for up to 78% of ED visits.
- Pain affects more Americans than diabetes, cancer, and heart disease combined!
- Acute pain is a common reason for 911 calls.
- The overall prevalence of prehospital pain is variable with ranges from 20-53%
 - A 2010 Paris study found 42% of patients experience pain in the prehospital setting with 64% characterizing pain as severe.
 - US studies have found that about 30% of all EMS transports have moderate to severe pain.
- Only 1 in 2 patients experience pain relief prior to ED arrival.
- The 1999 NHTSA funded Emergency Medical Services Outcomes Project I (EMSOP I) found that relief of discomfort was one of the most important outcome measures in pre-hospital medicine.
- EMSOP IV (2002) investigated the appropriate measurement of pain and discussed the need for further research in pre-hospital pain management.



Pain Management *Barriers* & Myths

Patients often receive inadequate analgesia in both the pre-hospital and emergency department settings. Several potential barriers and myths in the pre-hospital setting have been identified.

Barriers

- Other more emergent treatment priorities
- Difficult vascular access
- Concern for delayed transport
- Short transport time
- Fear of medication complications
- Perception of possible drug seeking behavior or addiction
- Dosing concerns, especially in high risk populations (elderly and pediatrics)
- Criticism from the receiving hospital
- Lack of pre-existing patient relationships or knowledge of past medical history
- Failure to recognize pain or differentiate pain from anxiety
- Lack of initial and continuing pain assessment and management education

Pain Management Barriers & *Myths*

Myths

- Common rhetoric of “treat first what kills first” or “pain is not life threatening”.
- Administration of pain medications may mask serious underlying disorders.
- 2 mg of morphine provides adequate analgesia in most healthy adults.
- Pain affects all people in the same manner.
- Use of opioids in acute pain field management leads to increases in addiction.
- Use of pain medications increases adverse events.
- Most patients exaggerate or over-report pain.
- Prior interactions do not affect provider’s ability to remain objective.

Strategies to Overcome Barriers and Improve EMS Pain Management



- ✓ Development of offline protocols/guidelines
 - Standing orders for adult and pediatric patients
 - Including pharmacologic and nonpharmacologic measures
- ✓ Targeted education and training specific to pain assessment and management with improvement of paramedic confidence and performance (self-efficacy)
- ✓ Ability to administer pain medication without the need to first start an IV in children
 - Nasal or other routes
- ✓ Availability of medical support and oversight
- ✓ Required pain assessment
- ✓ Coordination with and education of receiving facilities

Emerging Challenges

- DEA control requirements
- Provider diversion
- Unpredictable drug shortages requiring frequent and rapid formulary or concentration changes
 - Increases potential for medication errors



Physiologic and Psychologic Effects of Pain

Pain has many effects that can be both *physiologic* and *psychologic*.

- Pain can cause
 - tachycardia,
 - hypertension, and
 - increased myocardial oxygen consumption
- ***Uncontrolled acute pain may have a link to post traumatic stress disorder and if inadequately treated can lead to chronic pain.***
- Pain due to chest trauma may inhibit respiratory effort and therefore decrease oxygenation and ventilation.



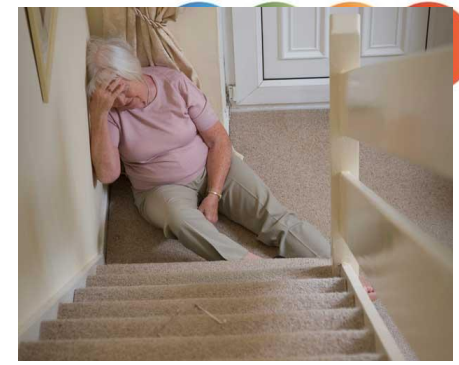
Why is EMS pain management important?

- Administration of pain medications and comfort measures by EMS significantly decreases waiting times for pain reduction or relief.
- With overcrowded EDs and wait times, many patients will have a delay in ED pain assessment and management while waiting to be seen.
 - Studies have shown pain treatment deferred to receiving facilities by EMS led to pain medication delays of up to 90 mins.
- Pre-hospital pain management aids in improved ED triage, patient comfort, vital signs, and patient assessment.
- Early management in the field also provides long-term benefits such as:
 - decreased incidence of post-traumatic stress,
 - decreased long-term sequela in children,
 - ***prevention of chronic pain*** through the development of hypersensitized pain pathways





Consider this Cruel Scenario.....



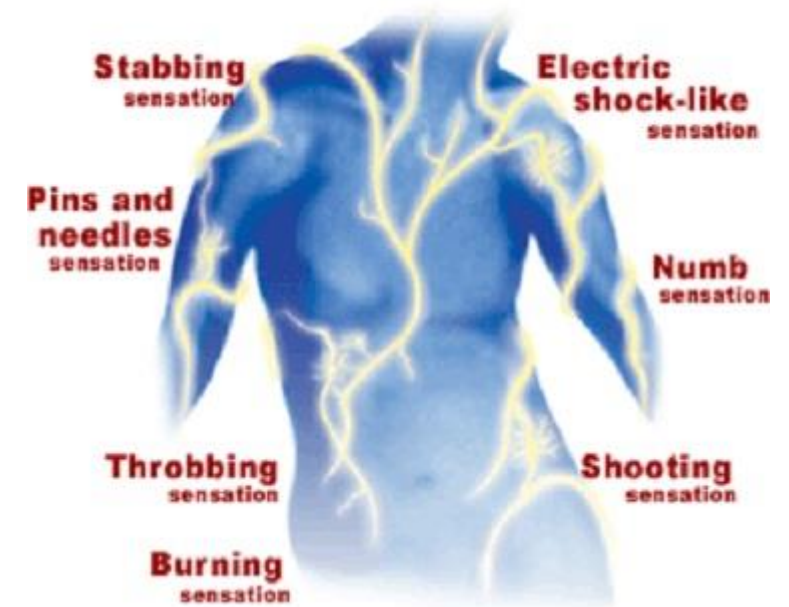
- Transporting an elderly grandmother after a fall with obvious fractures and....
 - Securing her to a hard plastic board
 - Wrapping a hard collar around her arthritic neck
 - Placing her in the back of your unit and driving over bumpy roads
 - Arriving at the hospital and leaving her on a backboard until ED physician evaluation is complete
 - Giving only 2 mg of morphine for pain relief
 - Not allowing family or caregivers to be present due to ED overcrowding or transport liability concerns

Defining and Classifying Pain

Defining Pain

- The following points are essential to developing a successful pain management plan:
 - ✓ determining the context
 - ✓ history of present illness
 - ✓ determining the type of pain
- There are **many types** of pain and factors that affect a patient's expression of pain and response to treatment(s).
- Assessing and evaluating the symptom(s) of pain must be done in a systematic fashion as would be done for any other chief complaint or abnormal vital sign (i.e., hemorrhage, hypertension, etc.)

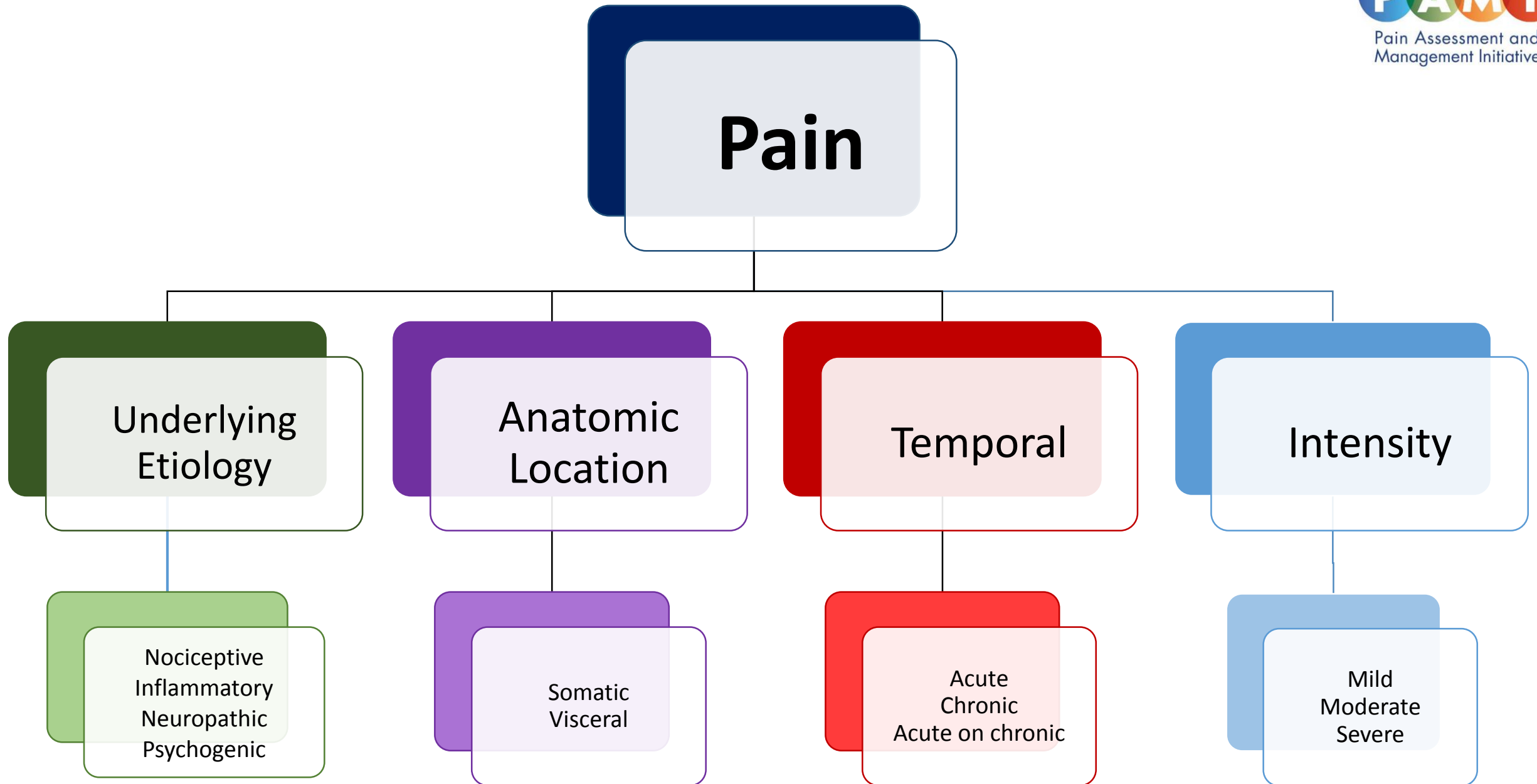
Types of Pain



Classification of Pain

- There are multiple ways in which pain may be classified. In this learning module, pain is broadly classified by:
 - **Underlying etiology** - source of the experienced pain.
 - **Anatomic location** - site of pain within the body and can be divided into somatic and visceral.
 - **Temporal nature** - duration of the pain.
 - **Intensity** - how much the pain experience hurts.

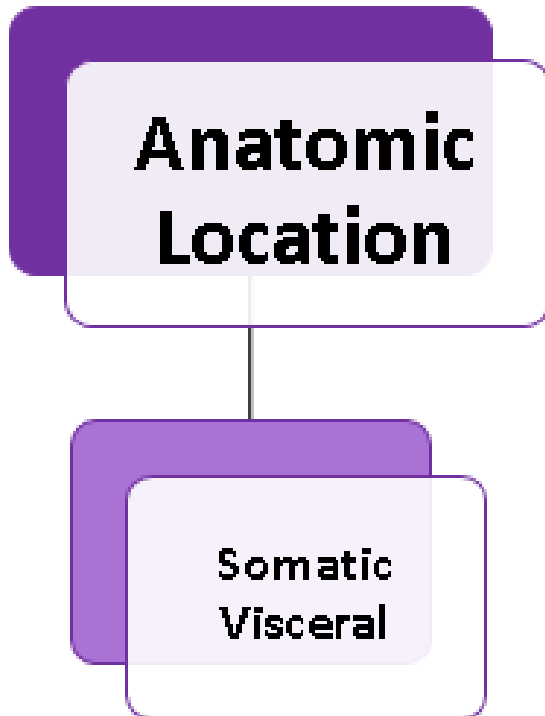
The next slides review the classifications of pain. For further details about the basics of pain review [Introduction to PAMI and Basic Principles of Pain Management and Treatment in the ED.](#)



Underlying Etiology

Nociceptive
Inflammatory
Neuropathic
Psychogenic

- **Nociceptive Pain** - direct tissue injury from a noxious stimulus.
 - Examples: bone fracture, laceration, and fresh burn injury.
- **Inflammatory Pain** - released inflammatory mediators that control nociceptive input and are released at sites of tissue inflammation.
 - Examples: appendicitis, rheumatoid arthritis, inflammatory bowel disease, and late burn healing.
- **Neuropathic Pain** - injury to nerves leading to an alteration in sensory transmission. It can be central or peripheral in nature.
 - Examples: diabetic peripheral neuropathic pain, post herpetic neuralgia, chemotherapy induced pain, and radiculopathy.
- **Psychogenic pain**, a rare entity, is a somatic manifestation of a psychiatric illness such as depression.
 - A reported 30% of patients with depression complain of chronic pain that resolves with successful treatment of their depression.
 - This is clinically distinct from the more common situation in which the severity of experienced pain is influenced by psychological factors such as previous pain experiences, coping mechanisms, beliefs about condition or medical treatment.



Somatic

- Pain occurs from injury to skin, muscle, bone, joint, connective tissue and deep tissues
- Typically pain is well-localized, sharp and worse with movement
- Examples: lacerations, fractures, and pelvic pain.

Visceral

- Internal pain and typically occurs from internal organs or tissues that support them
- Pain sensation is typically vague deep aches, colicky, and/or cramping
- Usually poorly localized
- Examples: appendicitis, peptic ulcer disease, diverticulitis, endometriosis, and ureteral stones.

Acute pain - lasting less than 3 months.

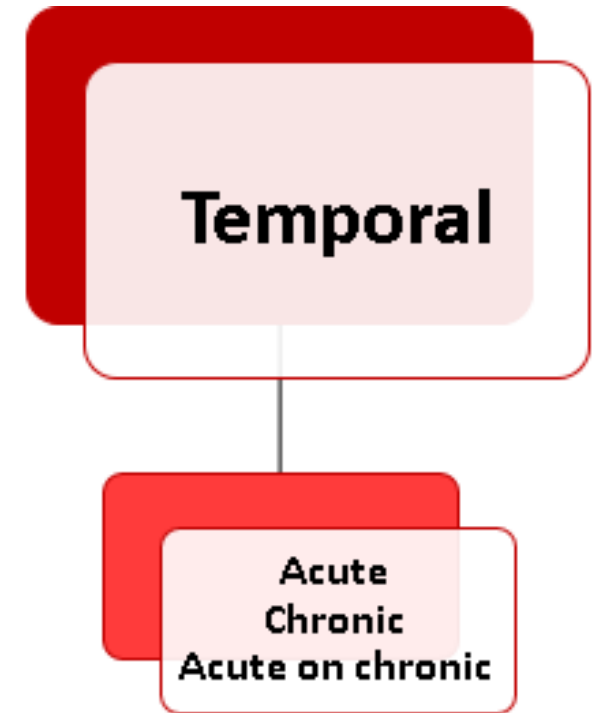
- A neurophysiological response to noxious injury that should resolve with normal wound healing.
- Examples: post-operative pain, fractured bones, appendicitis, smashing finger in door, labor pains.

Chronic pain - lasting more than 3 months or beyond the expected course of an acute disease or after complete tissue healing.

- Extends beyond the time of normal wound healing with the development of multiple neurophysiological changes in the central nervous system.
- Examples: low back pain, neck pain, and chronic pancreatitis.

Acute on Chronic pain

- This condition refers to times of acute exacerbations of a chronic painful syndrome or new acute pain in a person suffering from a chronic condition.
- Examples of both situations include a sickle cell exacerbation in a patient with sickle cell disease and a painful abscess in a patient with sickle cell disease.



Intensity

Mild
Moderate
Severe

Pain assessment scores, history, and physical exam are used to determine intensity which is subjective and may vary from one provider to another.

Remember that each pain scale has its own scoring range and levels for mild, moderate or severe pain intensity.

Pain intensity can range from:	Scores typically range from:
Mild	0-4
Moderate	5-7
Severe	8-10

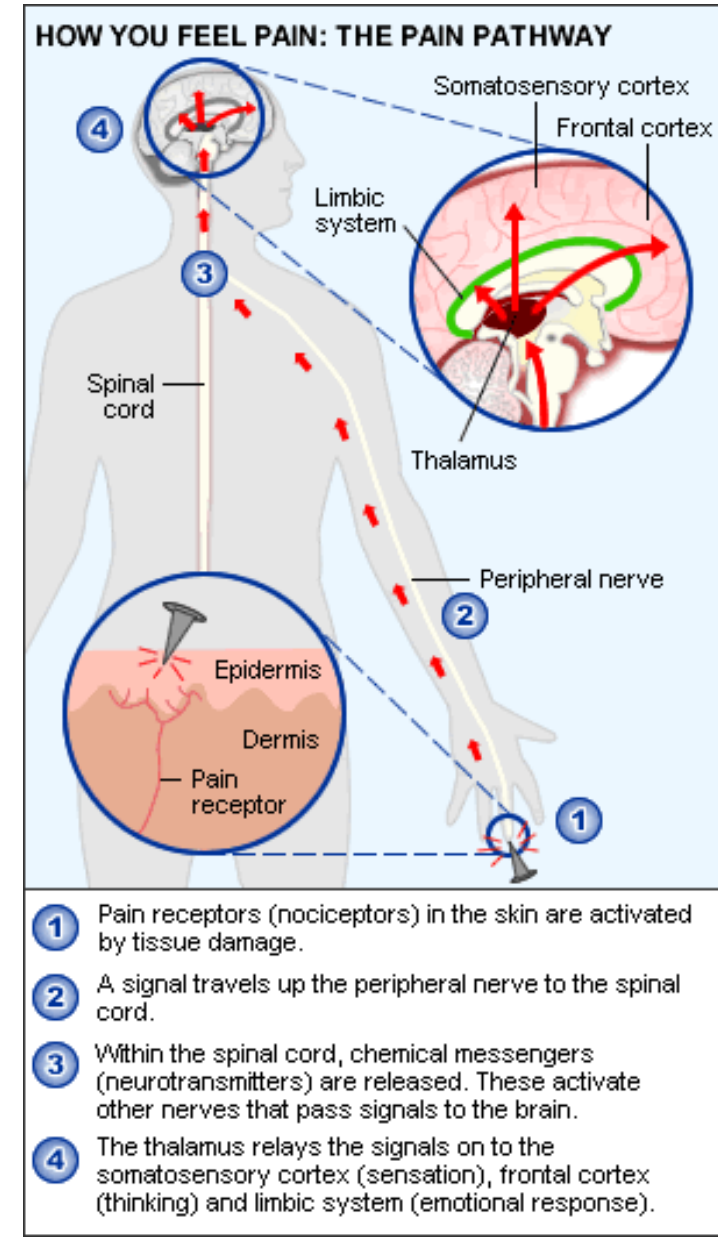
Types of pain, mechanism, and clinical examples



TYPES OF PAIN	MECHANISM	CINICAL EXAMPLES	PHARMACOLOGICAL TREATMENT OPTIONS*
UNDERLYING ETIOLOGY			
Nociceptive	The result of direct tissue injury from a noxious stimuli.	Bone fracture, fresh surgical incision, and fresh burn injury.	May include both opiate and non-opiate medications depending on injury.
Inflammatory	The result of released inflammatory mediators that control nociceptive input.	Late stages of burn healing, neuritis, and arthritis	Anti-inflammatory agents
Neuropathic	The result of direct injury to nerves leading to an alteration in sensory transmission.	Diabetic neuropathy, peripheral neuropathic pain, and post-herpetic neuralgia.	Tricyclic, selective norepinephrine reuptake inhibitors, gabapentinoids, or antidepressants
Psychogenic	Somatic manifestation of psychiatric illness or exacerbation of pain severity due to previous experience, poor coping mechanisms, social history, etc.		Treating the psychiatric illness may help in certain cases where pain is truly a somatic symptom of depression.
Idiopathic	Unknown	Chronic back pain without preceding trauma or obvious inciting event.	May be difficult to adequately address pain since underlying etiology is unknown
ANATOMIC LOCATION			
Somatic	A-delta-fiber activity located in peripheral tissues	Superficial lacerations, superficial burns, superficial abscess	Topical and/or local anesthetics, opiates, non-opiates
Visceral	C fiber activity located in deeper tissues such as organs	Uterine fibroid pain, pyelonephritis, biliary colic	opiates
TEMPORAL NATURE			
Acute	A neurophysiological response to noxious injury that should resolve with normal wound healing.	Acute fracture, acute knee sprain	Opiate, non-opiates
Chronic	Pain that extends beyond the time for normal wound healing with resultant development of multiple neurophysiological changes	Chronic low back pain, fibromyalgia, arthritis	Depends on the nature of the pain. Please refer to the module on chronic pain for more detailed information.
Acute-on-chronic	An acute exacerbation of a chronic pain syndrome	Sickle cell disease, cancer, rheumatoid arthritis, acute injury in chronic pain patient	

***Nonpharmacological treatments can be considered at any time for any type of pain**

Pain is Complex and Multifactorial

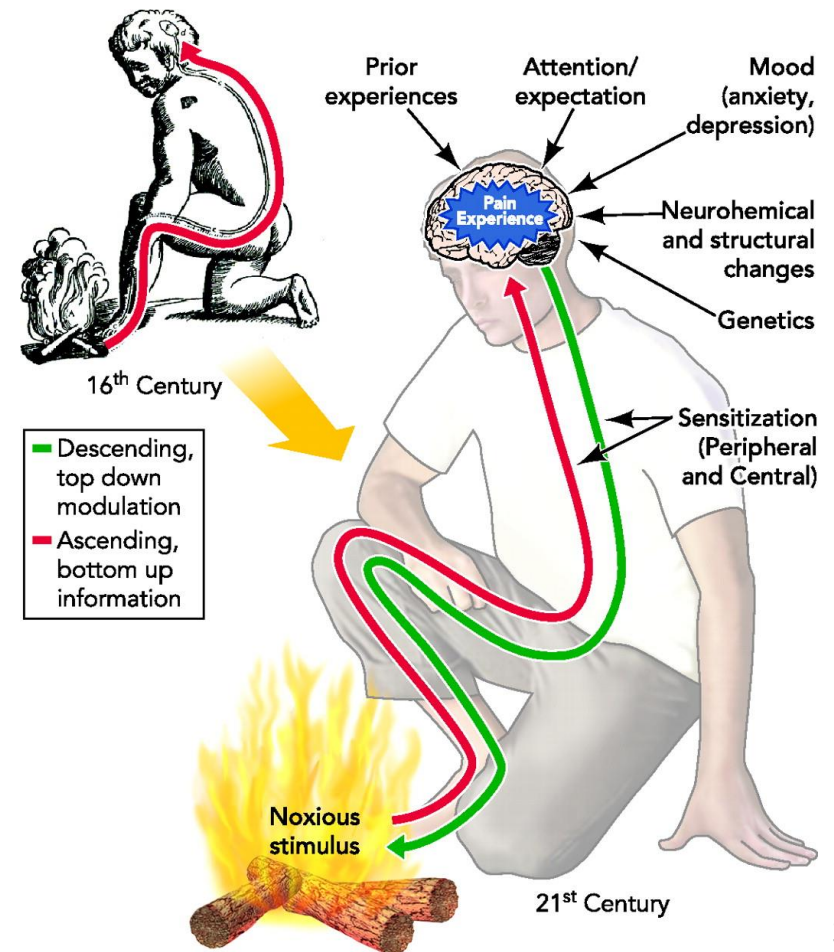


Pain is Complex And Multifactorial

Each patient responds differently to pain. How pain is **perceived** by an individual and how that individual **cope**s with their pain is influenced by several **patient factors**.

Examples:

1. Two patients are involved in an MVC. Patient 1 has multiple severe traumatic injuries but rates her pain as moderate compared to patient 2 who has minor traumatic injuries and complains of severe “pain all over.”
2. Two patients presenting with femur fractures after a fall. One patient rates pain as 10/10 and the other 6/10.



Factors Affecting Patient Response to Painful Stimuli

- Age, gender, ethnicity
- Socioeconomic and psychiatric factors
- Culture and religion
- Genetics
- Previous experiences
- Patient perceptions
- Patient expectations and perceived care by the treating provider(s)



Studies have noted that **Hispanic** and **black individuals** with long-bone fractures were less likely to receive analgesics than were non-Hispanic white individuals. **Children** are also less likely to receive analgesics when compared to adults with fractures.

Patient Assessment



Assessment in the Field

Pain assessment should be evaluated as part of general patient care in *every* child and adult. Assessment of pain should be performed early and re-assessed after an intervention is performed.

Consider all patients as candidates for pain management and comfort measures regardless of transport interval.



Patient Assessment: History

History

Pain Assessment Scales

Physical Exam and Reassessment

Pain Assessment in the Field

A thorough history and physical exam should be performed.
The OPQRST-ASPN method can be utilized to help with initial patient assessment.

O: Onset (when did it start)

P: Provocation or Palliation (what makes it better or worse)

Q: Quality (sharp, dull, crushing)

R: Region and Radiation

S: Severity (pain score)

T: Timing (type of onset, intermittent, constant)

AS: Associated Symptoms

PN: Pertinent Negatives

Pain Assessment: Medication History

- A medication history should be performed
 - Current pain medications (NSAIDs, opiates, OTC, herbal, etc.)
 - What has worked in the past
 - Last dose of pain medication
- History of allergies must be obtained prior to administering medications
 - Remember to discriminate between side effects and allergies. Many patients will endorse an allergy to a medication that is truly a common side effect. For example, a patient may report that previous opiates made them itch without hives or other signs of anaphylaxis.



For more information refer to [Introduction to PAMI and Basic Principles of Pain Management](#) and [Pharmacologic Treatment of Pain in The ED](#).

Patient Assessment: Pain Assessment Scales

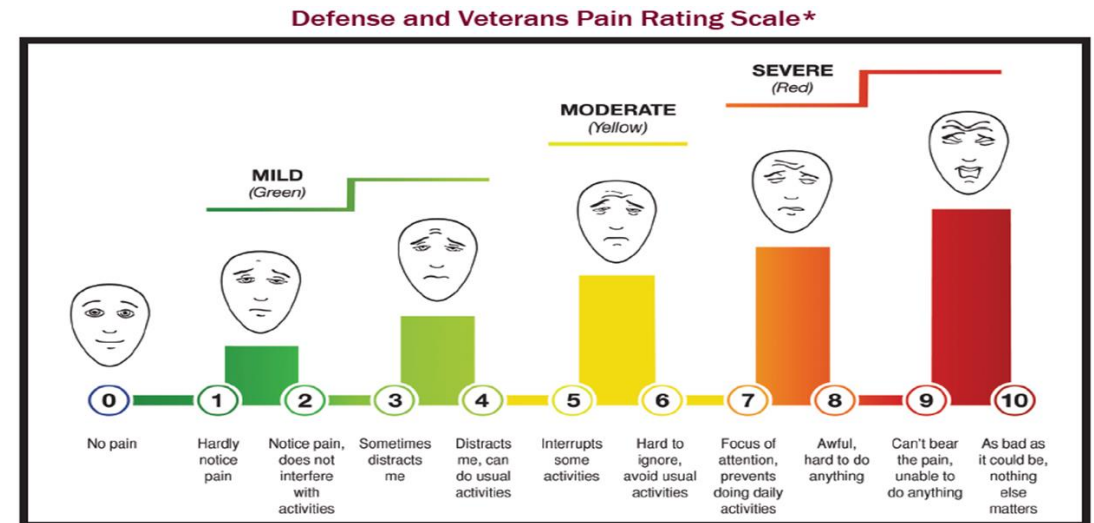
Overview of Pain Assessment Scales

Adult

Pediatric

Surrogate Reporting

Pain Reduction Clinical Outcomes



*The PMTF recommended a Department of Defense and VHA Pain Assessment Tool to improve actionable information for patient encounters across Military Treatment Facilities. (Line of Action 1, Standards and System Improvements)

Pain Assessment Scales

There is great emphasis placed on pain assessment and pain scales in the hospital setting as required by The Joint Commission and to improve HCHAPS patient satisfaction scores. Regardless of the healthcare setting, it is essential to know and understand which pain assessment tools and scales are part of your protocols.

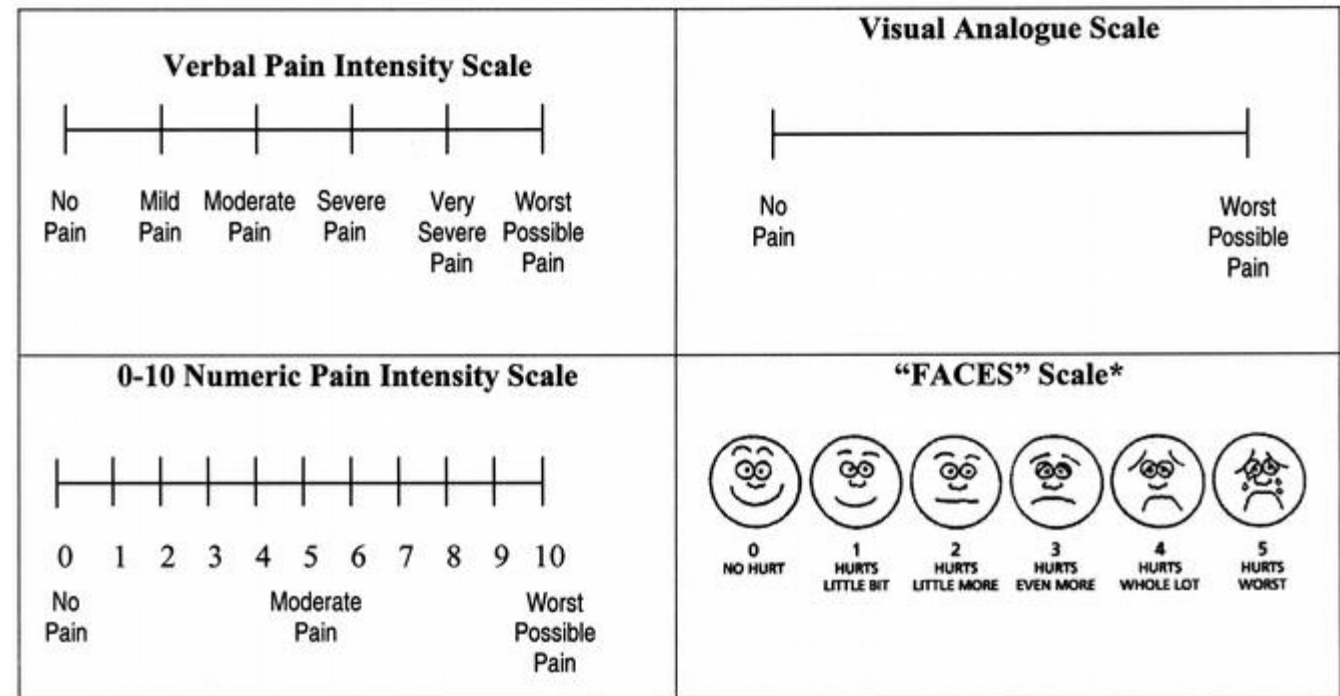
- Pain scales are typically applied to all pain types. However chronic and cancer related pain may require more complex evaluation tools. Although pain is multi-factorial, the majority of pain scales assess pain **intensity**.
- There are validated pain scales available for a variety of patient populations such as:
 - ✓ **adults**
 - ✓ **pediatrics**
 - ✓ **elderly**
 - ✓ **non-verbal**



There is minimal evidence in the pre-hospital setting to validate a particular scale, especially in children.

Pain Assessment Scales

- Not all pain scales are created equal and one should be chosen based on the patient's age and cognitive ability.
- The [Basic Principles of Pain Management](#) module has more detail on pain scales.
- [The National Association of EMS Physicians \(NAEMSP\)](#) made recommendations in 2013 for scales to be used in patients with acute traumatic pain.



Pain Assessment Scales

- An ideal pre-hospital pain assessment scale should be
 - ✓ quick,
 - ✓ easy to use, and
 - ✓ identify changes in pain intensity over time.
- Since no pain scale has been validated for pre-hospital use, the choice of scales is limited to those validated in the hospital setting. Most pediatric pain scales were originally developed to allow providers a way to measure procedural-related pain.
- Pain scales generally fall into 2 general categories: observational-behavioral and self-report
 - Observational-behavioral scales require the provider to assess the patient on multiple behaviors and rank them.
 - Self-report scales include selection of a face or color or number to represent pain.

Examples of pain scales by age categories and verbal or cognitive ability are listed on the next slides.

Examples of Pain Scales

Pain Scales*	Verbal, Alert and Oriented	Non-verbal, GCS <15 or Cognitive Impairment
<u>Adult</u>	<ol style="list-style-type: none"> 1. Verbal Numeric Scale (VNS)/ Numeric Rating Scale (NRS) 2. Visual Analogue Scale (VAS) 3. Defense and Veterans Pain Rating Scale (DVPRS) 	<ol style="list-style-type: none"> 1. Adult Non-Verbal Pain Scale (NVPS) 2. Assessment of Discomfort in Dementia (ADD) 3. Behavioral Pain Scale (BPS) 4. Critical-Care Observation Tool (CPOT)
<u>Pediatric</u>	<p>3 yo and older</p> <ol style="list-style-type: none"> 1. Wong Baker Faces 2. Oucher (3-12yrs) 3. Numerical Rating Scale (NRS) (7-11yrs) <p>8 yo and older</p> <ol style="list-style-type: none"> 1. Visual Analogue Scale (VAS) 2. Verbal Numeric Scale (VNS)/ Numeric Rating Scale (NRS) 	<p>Birth – 6 mos</p> <ol style="list-style-type: none"> 1. Neonatal Infant Pain Scale (NIPS) 2. Neonatal Pain Assessment and Sedation Scale (N-PASS) 3. Neonatal Facial Coding System (NFCS) 4. CRIES <p>Infant and older</p> <ol style="list-style-type: none"> 1. Revised Faces, Legs, Activity, Cry, and Consolability (r-FLACC) 2. Non Communicating Children's Pain Checklist (NCCPC-R) 3. Children's Hospital of Eastern Ontario Pain Scale (CHEOPS) (ages 1-7)

*This is a short list of pain scales. Determine which pain assessment tools are used by your agency or facility.

Pediatric Pain Scale Descriptions



Measurement Scale	Age Range	Description
Birth - 6 months		
Neonatal Infant Pain Scale (NIPS)	<i>Preterm and full term neonates</i>	Behavioral scale.
Neonatal Pain Assessment and Sedation Scale (N-PASS)	<i>Preterm and full term neonates</i>	Behavioral and physiologic scale.
Neonatal Facial Coding System (NFCS)	<i>32 weeks gestation to 6 months</i>	Facial muscle group movement, brow budge, eye squeeze, nasolabial furrow, open lips, stretch mouth lip purse, taut tongue, and chin quiver
CRIES	<i>32 weeks gestation to 6 months</i>	Behavioral and physiologic scale.
Infant and older (non-verbal children)		
Revised Faces, Legs, Activity, Cry, and Consolability (r-FLACC)	<i>2 months to 3 years, critically ill, cognitively impaired, and older than three years of age unable to utilize a self-report scale.</i>	Behavioral scale. Note: r-FLACC contains the same core components as the original FLACC therefore the revised scale is still appropriate for non-cognitively impaired children.
Non Communicating Children's Pain Checklist (NCCPC-R)	<i>3-19 years (with cognitive impairment)</i>	30 items that assess seven dimensions: vocal, eating/sleeping, social, facial, activity, body/limb, and physiologic signs
3 years and older		
Wong Baker Faces	<i>3 years and older</i>	Self-report scale. Please refer to specific references for those alternative face scales.
Oucher	<i>3 -12 years</i>	Self-report tool consisting of a vertical numerical scale and a photo scale with expressions of "hurt" to "no hurt."
8 years and older		
Visual Analogue Scale (VAS)	<i>8 years and older</i>	Self-report scale. Consists of pre-measured vertical or horizontal line, where the ends of the line represent extreme limits of pain intensity. Requires understanding of numbers, addition and subtraction.
Verbal Numeric Scale (VNS)/ Numeric Rating Scale (NRS)	<i>8 years and older</i>	Self-report scale. Eleven point scale that requires understanding of numbers, addition and subtraction.

Adult Pain Scales

Measurement Scale	Description
Verbal, Alert and Oriented	
Verbal Numeric Scale (VNS)/ Numeric Rating Scale (NRS)	Self-report scale. Eleven point scale that requires understanding of numbers, addition and subtraction.
Verbal rating scale (VRS)	Five pain levels are indicated in large print on a sheet give to the patient: no, pain, mild pain, moderate pain, severe pain, unbearable pain.
Visual Analogue Scale	A 100-mm rule with a movable cursor: “no pain” is written at he left end of the horizontal line along which the cursor is moved, and “maximal pain” at the right end.
Defense and Veterans Pain Rating Scale (DVPRS)	Self-report scale. Eleven point scale that requires the patient to identify pain by numerical rating, color intensity, facial expression, and pain disruption.
Non-verbal, GCS <15 or Cognitive Impairment	
Adult Non-Verbal Pain Scale (NVPS)	Behavioral scale. Based on FLACC scale and contain behavioral dimensions and physiology dimensions that are graded by severity.
Assessment of Discomfort in Dementia (ADD)	The ADD Protocol focuses on evaluation of persons with difficult behaviors that may represent discomfort. Assessment of pain and discomfort is addressed by the protocol. ADD encompasses physical, affective and social dimensions of pain.
Behavioral Pain Scale (BPS)	Behavioral scale. Three observational items (facial expression, upper limbs, and compliance with ventilation). Higher score, greater discomfort.
Critical-Care Observation Tool (CPOT)	Behavioral scale. Used for intubated and nonintubated critical care patients. Four domains (facial expressions, movements, muscle tension, and ventilator compliance). Higher score, great pain level

Pain Assessment Scales

The National Association of EMS Physicians position paper released in 2003 recommended the following pain assessment scales for ***all*** types of pain.

Pain Scale	Scale Description	Instructions to Patient
Numerical Rating Scale (NRS)	Patient verbally requested to rate their pain	<i>Rate your pain from 0 (no pain) to 10 (unbearable pain)</i>
Verbal Rating Scale (VRS)	Five pain levels are indicated in large print on a sheet give to the patient: no, pain, mild pain, moderate pain, severe pain, unbearable pain	<i>Choose the adjective best corresponding to your pain levels</i>
Visual Analog Scale (VAS)	A 100-mm rule with a movable cursor: “no pain” is written at the left end of the horizontal line along which the cursor is moved, and “maximal pain” at the right end	<i>Move the cursor along the line to indicate the intensity of your pain. The left end of the line represents “no pain” and the right end the most intense pain imaginable, i.e. excruciating and unbearable pain</i>

*Alonso-Serra HM. Wesley K. Position Paper: Prehospital Pain Management. Prehospital Emergency Care 2003; 7(4):482-488

*An Evidence-based Guideline for Prehospital Analgesia in Trauma: Pain Scales

From 2009-2013 a stakeholder group used the National Prehospital Evidence-Based Guideline (EBG) model process to develop a guideline for prehospital pain management in **trauma** patients. The guideline includes using an age-appropriate pain scale to assess traumatic pain as follows:

- **<4 years:** Consider using an observational scale such as Faces, Arms, Legs, Cry, Consolability (FLACC) or Children's Hospital of Eastern Ontario Pain Scale (CHEOPS)
 - Weak recommendation, very low quality evidence

- **4–12 years:** Consider using a self-report scale such as Wong Baker Faces, Faces Pain Scale (FPS), or Faces Pain Scale Revised (FPS-R)
 - Weak recommendation, very low quality evidence

- **>12 years:** Consider using a self-report scale such as the Numeric Rating Scale (NRS)
 - Weak recommendation, moderate quality evidence

Pain Assessment: Surrogate Reporting

- Surrogate reporting of a non-verbal patient's pain and behavior or activity changes can also aid in pain assessment.
- Surrogate reporting may be obtained from a parent, caregiver or loved one.
 - Try to determine who really provides the patient's daily care and is knowledgeable about their history, disease, and past pain management or experiences.



Pain Assessment and Scale Interpretation

- Once a pain scale is chosen, interpretation of the score is not so straightforward.
- There is no defined score or threshold for what score correlates to actual pain and to what intensity the pain is felt by the patient.
- Even using the same scale for two different patients doesn't allow for comparison of pain intensity.
 - For example, a patient with a score of 9 on the NRS may not be experiencing more pain than one with a score of 6 on the same scale.
- Remember that these scales do not take into account:
 - **patient genetics**
 - **past experiences**
 - **co-morbidities**
 - **other pain influencing factors**
- In patients with preexisting pain it is important to determine baseline pain level.
- When using a pain scale in a verbal adult it is best to ground the scale by providing context for the patient.
 - For example, ask the patient at which level on the pain scale would they take an over-the-counter pain medication? For chronic pain, what is their average daily level of pain?



Tips

Select a scale and be consistent!

The pain score is an attempt to start a conversation regarding the patient's pain.

Pain Reduction Clinical Outcomes

- The minimal clinically significant difference (MCSD) in pain severity has been found to be 1.5 on an 11 point NRS or a proportional change of 25%.
- It is important to determine if EMS and ED interventions significantly decrease pain severity over time.



One challenge in determining outcomes is translating the pain scale measurement(s) into a data point that can be tracked in EMS data systems or registries. This is complex because different scales have different point ranges from 6-13 points. Additionally, pain is often addressed in the narrative portion of the EMS report versus a separate data point.

Pain Assessment: Physical exam and Reassessment



Pain Assessment: Physical exam

- Vital signs such as blood pressure, heart rate, respiratory rate, O2 saturation, and temperature should be obtained.
 - *Be cautious in using vital sign abnormalities as a sole indicator of pain intensity. Patients can still be in a great deal of pain with normal vital signs.*
- Perform a thorough physical exam including skin exam to look for pain patches (fentanyl).
- Look for other subtle clues such as facial grimacing and patient position. For instance, patients with visceral pain will often lay in a position of comfort with legs drawn to their abdomen.



Pain Assessment: Reassessment

- Pain severity (0 - 10) should be recorded before and after medication administration (IV, IM, IN) and upon arrival at destination. Mental status, heart rate, blood pressure and respiratory rate should also be re-evaluated.
- Patients who have received analgesia should have their pain reassessed *every 5 minutes*.
- If the patient is still in significant pain consider giving a second dose of medication **at half the initial dose**.
- Evidence of sedation or other serious adverse effects (hypotension, hypoxia, anaphylaxis) should preclude further drug administration.



Treatment of Pain

Nonpharmacologic

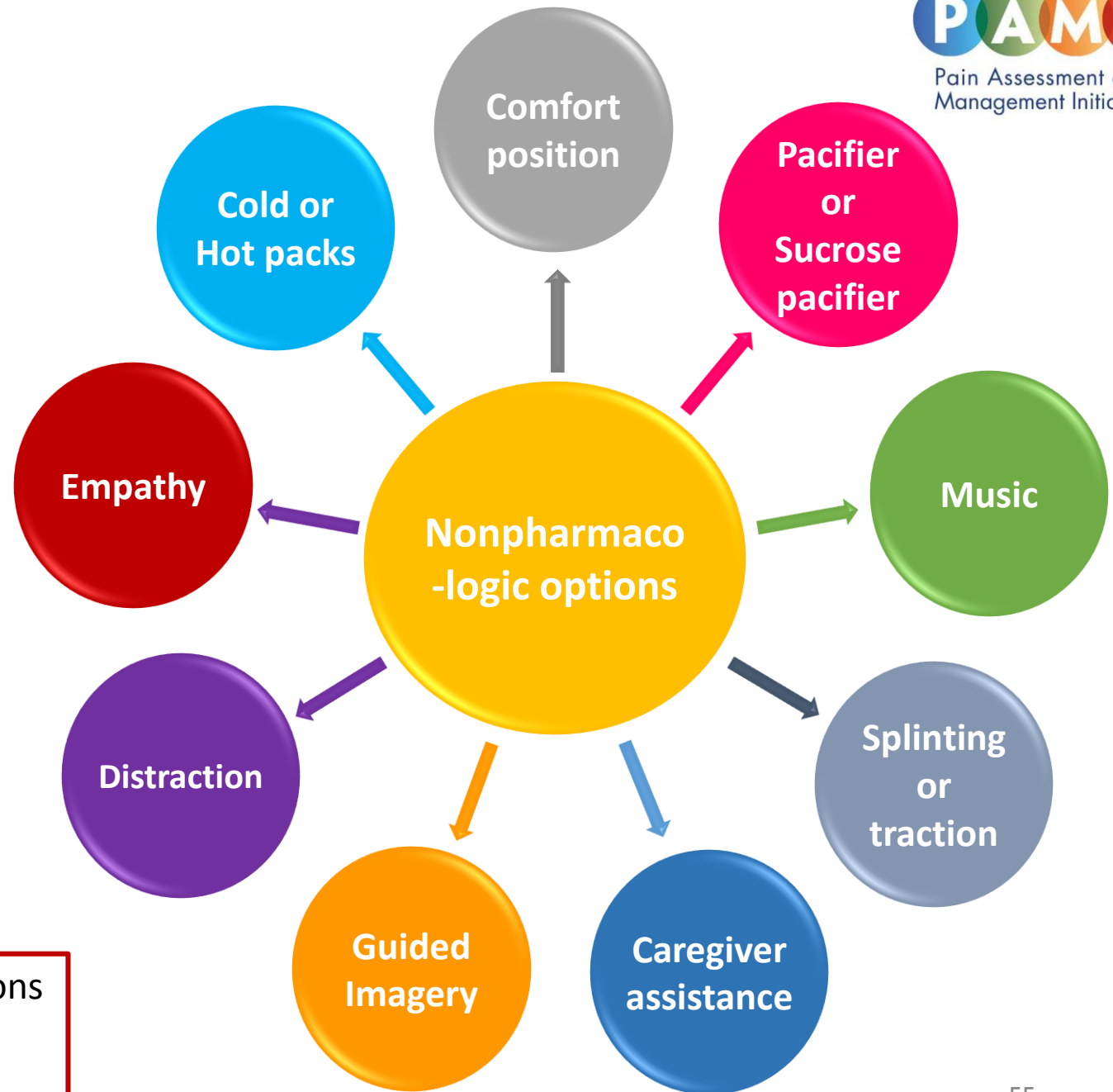
Pharmacologic

PAIN IS
INEVITABLE

SUFFERING IS
OPTIONAL

Here are nonpharmacologic options for managing pain. Most of these can be utilized in children and **adults**.

The next few slides will review nonpharmacologic options.



For more information about nonpharmacologic options review module [Nonpharmacologic Treatment and Management of Pain in the Emergency Setting](#).

Empathy

The ability to understand and share the feelings of others from their perspective.

- Why is this important?

When regularly working in the ED or EMS settings, empathy may be lost overtime due to desensitization. Reassuring patients and relieving even mild pain is an important aspect of care.

- [Optional Video: Cleveland Clinic – Empathy: Exploring Human Connection](#)

- <http://health.clevelandclinic.org/2013/03/empathy-exploring-human-connection-video/>



Comfort Positioning

Comfort positions are used to reduce stress and anxiety especially in children.

- Why use positioning for comfort?
 - Sitting position promotes sense of control for the child
 - Reduces anxiety which promotes better cooperation
 - Puts child in a secure, comforting hold
 - Promotes close, physical contact with a caregiver
 - Provides caregiver with an active role in supporting child in a positive way
 - Comfort positioning may be prohibited in trauma patients requiring neck or spine immobilization and during transport

For more information refer to the module [Nonpharmacologic Treatment and Management of Pain in the Emergency Setting.](#)



Used with permission from Wolfson
Children's Hospital

Immobilization/Traction/Splinting

Indications:

- Limb deformity or swelling

Contraindications:

- Pelvic injury

- Patella fracture or ligamentous knee injury

Traction splints have been a required item on ambulances for many years but recent literature shows they are rarely used. Traction splints significantly reduce pain of femur fracture by reducing muscular contraction. Make sure to check distal pulses, movement and feeling before and after splinting.

Musculoskeletal Injuries

Rest

Ice

Compression

Elevate

Splinting

Dressing

Positioning



Tips

Ice or cold packs reduce swelling and pain in strains, sprains and fractures. Do not put directly on bare skin.

Distraction Techniques

- This technique is most effective when a child's pain is mild to moderate (it is difficult to concentrate when pain is severe)
- Why Distraction?
 - Child does not require training
 - Works with infants and older children
 - Involvement of parents
 - Minimal training for staff
- What Works?
 - Music & humor
 - Non-procedural talk
 - Relaxation/breathing techniques (guided imagery)
 - Distraction "toolboxes"
 - *Not having parent hold child down*



"Toolbox" of distraction toys or supplies- must be easy to disinfect or disposable with no small parts.

Distraction technique
- blowing bubbles

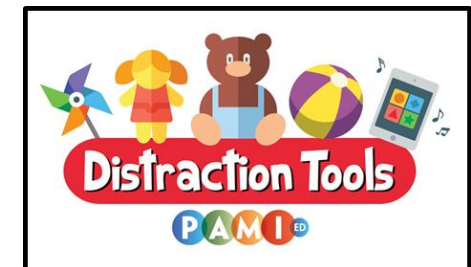


Distraction technique
with parents



Build a Distraction Toolkit!

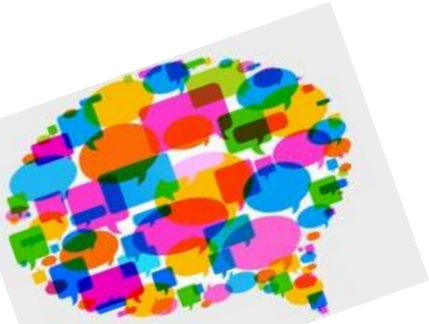
- There are several ways you can use distraction in your clinical practice. Creating a 'toolkit' of carefully selected tools allows for easy access when needed.



For more ideas and resources on how to build a toolkit visit

<http://pami.emergency.med.jax.ufl.edu/resources/new-approaches-to-pain-course/>

Conversation and Distraction in All Ages



Conversation is a proven method of patient management and helps reduce anxiety and pain through distraction. Pain can be reduced by up to 25% by distraction alone.

Distraction can change the physiological response of pain transmission in the spinal cord.

Interactive distraction is better for managing pain and anxiety than passive distraction.

Conversation topic ideas: family, hobbies, vacation, sports

To learn more visit

<http://www.jems.com/articles/print/volume-38/issue-7/patient-care/10-conversation-starters-alternative-pai.html>

Guided Imagery

Guided imagery helps children use their imagination to divert thoughts from the procedure to a more pleasant experience.

Suggestions:

- Help the child use imagination to create a descriptive story
- Ask questions about a favorite place, upcoming events, friends, or hobbies to keep the child engaged in technique
- Guide the child through an experience that will tell him/her what to imagine and what it will feel like (i.e., a magic carpet ride or a day at the beach)



Nonpharmacological Treatment of Pain by **Developmental Levels**

Infants

Toddlers

Preschool aged children

School aged children

Adolescences



Tips

Adapt therapies to setting.

Nonpharmacologic Therapies: Infants

- Swaddling
- Holding
- Rocking
- Sucking
 - Sucrose pacifier (Sweet-Ease 24% sucrose solution)
 - Non-nutritive sucking
- Dim lighting
- Music
- Picture reading
- Toys
 - Key chains
 - Rattles
 - Blocks



Nonpharmacologic Measures: Toddlers

- Provide distraction with music
- Provide a pacifier
- Provide light touch or massage
- Try repositioning, splinting
- Apply cold or hot pack
- Drawing with crayons and paper
- Encourage picture reading
- Encourage singing
- Blowing bubbles



Nonpharmacologic Measures: Preschoolers

- Provide the calmest possible environment
- Apply cold or hot pack
- Provide a position of comfort
- Provide light touch or massage
- Suggest music or video on mobile phone or iPad to entertain
- Play with distraction toy
- Look at or read storybooks
- Encourage singing or storytelling
- Engage in distracting conversation
- Coach child through the process and/or procedures



Nonpharmacologic Measures: School Age Child

- Provide the calmest possible environment
- Suggest new positions for comfort
- Suggest music, phone videos or apps
- Read books
- Coach child through the process and/or procedures
- Share jokes
- Provide light touch or massage
- Hold cold or hot pack
- Demonstrate relaxation techniques such as breathing exercises
- Use squeeze balls
- Encourage conversation about favorite things
- Play with electronic games



Nonpharmacologic Measures: Adolescent

- Apply cold or hot pack
- Suggest repositioning or positions of comfort
- Encourage talking about favorite places or activities
- Provide light touch or massage
- Listen to music or video
- Read
- Coach about EMS process and procedures
- Discuss preferred relaxation techniques
- Demonstrate relaxation techniques, if unfamiliar
- Use squeeze balls
- Encourage making choices
- Play with electronic games or tablets



Pharmacologic Treatment of Pain

Pain Management & Dosing Guide

Updated April 2023

Fain Assessment and Medical Initiative

<http://www.emergency.medic.va.gov/pain/>

Supportive Approach to Pain Management

1. Monitoring & Discharge Considerations

2. Monitoring & Discharge Considerations

3. Monitoring & Discharge Considerations

4. Monitoring & Discharge Considerations

5. Monitoring & Discharge Considerations

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100. Monitoring & Discharge Considerations

Pain Management and Dosing Guide Includes:

- Non-opioid Analgesics, Opioid Analgesics and Neuroleptic Sedation
- Non-opioid Analgesics, Opioid Analgesics and Neuroleptic Sedation
- General Binds, Neuroleptic and Muscle Relaxant Medications
- Refractory Indications and Dosing
- Special and Transdermal Medications
- Neuroleptic and other interventions

General Analgesics*

Generic	Adult	Pediatric	Comments
Acetaminophen	650 mg PO q 4-6h PRN	10-15 mg/kg PO q 4-6h PRN	Do not exceed 4g/day
Ibuprofen	400 mg PO q 6-8h PRN	10 mg/kg PO q 6-8h PRN	Do not exceed 3200 mg/day
Naproxen	250 mg PO q 12h PRN	5-10 mg/kg PO q 12h PRN	Do not exceed 1250 mg/day
Aspirin	325 mg PO q 4-6h PRN	5-10 mg/kg PO q 4-6h PRN	Do not exceed 4g/day
Codeine	30 mg PO q 4-6h PRN	1-2 mg/kg PO q 4-6h PRN	Do not exceed 120 mg/day
Hydrocodone	5 mg PO q 4-6h PRN	0.2 mg/kg PO q 4-6h PRN	Do not exceed 30 mg/day
Oxycodone	5 mg PO q 4-6h PRN	0.2 mg/kg PO q 4-6h PRN	Do not exceed 30 mg/day
Morphine	2-4 mg PO q 4-6h PRN	0.1 mg/kg PO q 4-6h PRN	Do not exceed 120 mg/day
Fentanyl	25 mcg PO q 4-6h PRN	0.05 mg/kg PO q 4-6h PRN	Do not exceed 100 mcg/day
Remifentanyl	0.1 mg PO q 4-6h PRN	0.01 mg/kg PO q 4-6h PRN	Do not exceed 10 mg/day
Propofol	1-2 mg IV q 4-6h PRN	0.5 mg/kg IV q 4-6h PRN	Do not exceed 100 mg/day
Etomidate	0.1 mg IV q 4-6h PRN	0.05 mg/kg IV q 4-6h PRN	Do not exceed 10 mg/day
Midazolam	0.5 mg IV q 4-6h PRN	0.05 mg/kg IV q 4-6h PRN	Do not exceed 10 mg/day
Alprazolam	0.5 mg PO q 4-6h PRN	0.05 mg/kg PO q 4-6h PRN	Do not exceed 10 mg/day
Clonazepam	0.5 mg PO q 4-6h PRN	0.05 mg/kg PO q 4-6h PRN	Do not exceed 10 mg/day
Lorazepam	0.5 mg PO q 4-6h PRN	0.05 mg/kg PO q 4-6h PRN	Do not exceed 10 mg/day
Temazepam	0.5 mg PO q 4-6h PRN	0.05 mg/kg PO q 4-6h PRN	Do not exceed 10 mg/day
Zolpidem	0.5 mg PO q 4-6h PRN	0.05 mg/kg PO q 4-6h PRN	Do not exceed 10 mg/day
Zaleplon	0.5 mg PO q 4-6h PRN	0.05 mg/kg PO q 4-6h PRN	Do not exceed 10 mg/day
Eszopiclone	0.5 mg PO q 4-6h PRN	0.05 mg/kg PO q 4-6h PRN	Do not exceed 10 mg/day
Suvorexant	0.5 mg PO q 4-6h PRN	0.05 mg/kg PO q 4-6h PRN	Do not exceed 10 mg/day
Doxepin	0.5 mg PO q 4-6h PRN	0.05 mg/kg PO q 4-6h PRN	Do not exceed 10 mg/day
Tramadol	50 mg PO q 4-6h PRN	0.5 mg/kg PO q 4-6h PRN	Do not exceed 400 mg/day
Tapentadol	50 mg PO q 4-6h PRN	0.5 mg/kg PO q 4-6h PRN	Do not exceed 400 mg/day
Buprenorphine	0.5 mg PO q 4-6h PRN	0.05 mg/kg PO q 4-6h PRN	Do not exceed 10 mg/day
Naltrexone	0.5 mg PO q 4-6h PRN	0.05 mg/kg PO q 4-6h PRN	Do not exceed 10 mg/day
Acetylsalicylic Acid	325 mg PO q 4-6h PRN	5-10 mg/kg PO q 4-6h PRN	Do not exceed 4g/day
Salicylic Acid	325 mg PO q 4-6h PRN	5-10 mg/kg PO q 4-6h PRN	Do not exceed 4g/day
Salicylic Acid	325 mg PO q		

The guide provides treatment options for opioids, non-opioids, procedural sedation, nerve blocks, and IV/IM/IN/topical administration. It includes a step-wise approach to pain, patient safety considerations as well as nonpharmacologic interventions. To take a tour of the dosing guide, [click here!](#)

IMPORTANT

The medications discussed in this section represent those used by EMS providers across the nation and are not necessarily approved for use by your medical director. They are included here for educational purposes and are not meant to replace the protocols approved by your medical director(s) or agency.

Treatment of Pain by Pre-hospital Providers

A strong recommendation has been made to consider all patients with acute traumatic pain as candidates for analgesia, regardless of transport time

Mild to Moderate Pain*
NSAIDS

Moderate to Severe Pain*
Consider an opioid analgesic
or ketamine
+/- NSAIDs or
nitrous oxide

*if no contraindications exist and if supported by your local protocols

Mild-to-Moderate Pain NSAIDs

Indications:

Mild-to-moderate pain such as mild pain from musculoskeletal sprain

Contraindications:

- Inability to swallow or take medications by mouth
- Respiratory distress
- Persistent vomiting
- Allergy to NSAIDs
- History of peptic ulcer disease or GI bleeding, renal failure, congestive heart failure, < 6 months of age
- Use with caution in elderly patients

Mild to Moderate Pain

NSAIDs

NON-OPIOID	INDICATION	DOSE/ROUTE*	MAX DOSE	COMMENTS
Ketorolac IV or IM (Toradol)	Mild-moderate pain	<u>Adult:</u> 30mg IV, 60 mg IM if < 65 yo and > 50 kg 15mg IV or 30mg IM if >65 yo or <50 kg <u>Peds:</u> 0.5-1 mg/kg IV/IM (>6 mo)	<u>Adult:</u> 120mg/d <u>Peds:</u> 30mg/dose IM; 15 mg/dose IV	Advantages Inhibits prostaglandin-induced nociception Risks Nausea, vomiting, ulcers, platelet dysfunction, liver toxicity
Ibuprofen PO (Motrin®, Advil®)		<u>Adult:</u> 400-800 mg q 6-8 hr <u>Peds:</u> 10mg/kg q 6-8 hr	Max dose : 40 mg/kg/day or 2400 mg/day	

Moderate to Severe Pain

Opioids

Indications: patients in moderate to severe pain

Cautions: Reassess mental status and breathing

- Use **naloxone** for respiratory depression

Contraindications:

Hypersensitivity or known allergy to the medication morphine or fentanyl

Uncorrected respiratory distress or hypoxemia ($\text{SpO}_2 < 90\%$) refractory to supplemental oxygen

Uncorrected hypotension, defined as a persistent systolic pressure < 90 mmHg.

GCS less than 15

Signs of hypoventilation

Condition preventing administration (blocked nose, no IV/IO access)

Exclusion Example.

12 yo with fall from tree, abrasions to forehead and right arm and bruising to wrist. Patient is not opening eyes except to verbal stimuli (GCS 13). She is moaning in pain.

This patient should be excluded based on GCS<15

Moderate to Severe Pain Opioids

OPIOIDS	INDICATION	DOSE/ROUTE*	ONSET	DURATION	MAX DOSE	COMMENTS
Morphine (Roxanol®)	Moderate - severe pain	<u>IV, SC, IM*</u> <6mo: 0.05-0.1 mg/kg ; 6 mo-12yo: 0.1 mg/kg >12yo: 0.1 mg/kg or 4- 10 mg	5-15 min	3-4 hr	10-15 mg or local protocol	Advantages Moderately rapid and predictable onset. Consider for patients who need prolonged pain control (e.g., fracture reduction, multiple trauma, sickle cell disease) Risks Respiratory depression, hypotension, bradycardia, CNS depression

- Administer 0.1 mg/kg, maximum single dose allowed may vary based on local protocol (range 10-20 mg).
- Reassess in 5–10 minutes. If pain remains moderate to severe, then administer a second dose of morphine 0.05 mg/kg to a maximum additional dose of 10 mg.
- Obtain on-line medical direction for additional doses, if required.

Moderate to Severe Pain Opioids

OPIOIDS	INDICATION	DOSE/ROUTE	ONSET	DURATION	MAX DOSE	COMMENTS
Fentanyl (Sublimaze)	Moderate - severe pain	<u>IV</u> 1 mcg/kg initial dose (slow push over 3-5 minutes)	1-2 min IV	30-60 min IV	2 mcg/kg/dose	Advantages Rapid onset, short duration, potent analgesic; preferred for renal patients
		<u>IN</u> 1.5-2 mcg/kg (divide dose equally between each nostril)	10 min IN use with an atomizer	60 min IN		Risks Respiratory depression, apnea may precede alteration of consciousness chest wall rigidity if given too rapidly
		<u>IM</u> Not preferred	7-15 min IM	1-2 hr IM		

- Administer 1 mcg/kg to a maximum initial dose of 50 mcg for pediatric patients or 100 mcg for adults- may vary and be higher based on local protocols.
- Reassess in 5–10 minutes. If pain remains moderate to severe, then administer a second dose of fentanyl at half the initial dose.
- Obtain on-line medical direction for additional doses, if required.

Controversies in Opioid Administration

- Many sources recommend 1-2 mcg/kg of fentanyl or 0.1-0.2 mg/kg of morphine
- The dosages in this module are based on national guidelines however, patients with severe injuries may require a higher initial dose or a second dose.
- Analgesic selection and dosages must be determined based on the individual patient, protocols, transport time and other factors.
- Nasal administration of analgesics and anxiolytics should be considered in pediatric patients or patients with difficult IV access.



**Consider intranasal administration of pain medications when IV access is not available.
Make sure to use an atomizer!**

Intranasal*			
Medication	Dose	Max Dose	Comments
Ketamine⁺	0.5-1.0 mg/kg Large range	Limited data	Use with caution until further studied
Fentanyl	1.5-2 mcg/kg q 1-2 h	3 mcg/kg or 100 mcg	Divide dose equally between each nostril
Midazolam (Versed)	0.3 mg/kg	10 mg or 1 ml per nostril (total 2 ml)	Divide dose equally between each nostril

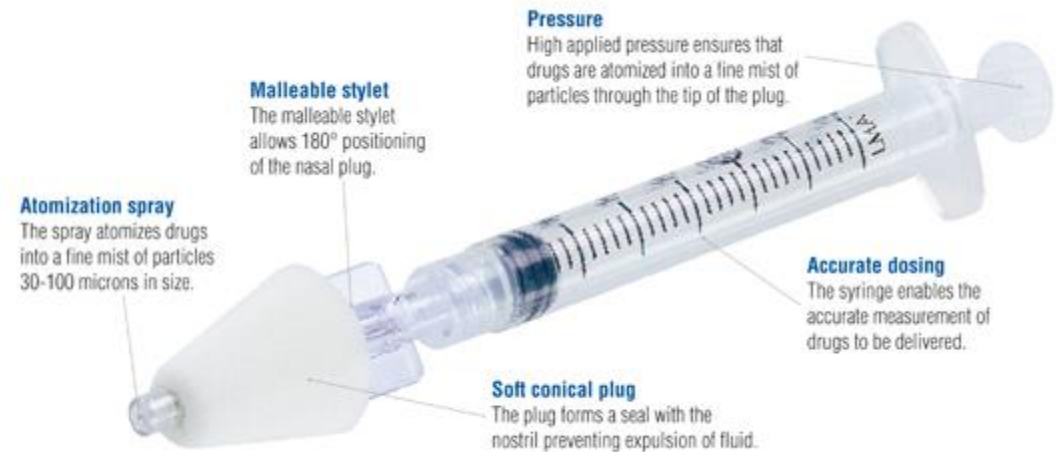
*Always use the MOST concentrated form of the medication available and always use an atomizer.

+ Dosing range not well established. Studies have used 0.5-9 mg/kg.

+Not well established

Intranasal Medications

- Use the most concentrated solution available
 - Ketamine 50 mg/ml
 - Fentanyl 50 mcg/ml
 - Midazolam 5mg/ml
- Use an atomizer
 - if > 1ml divide between nares



Opioid Side Effects

- Constipation
- Bowel ileus
- Central nervous system sedation
- Respiratory depression
- Dizziness
- Drowsiness (continues for the duration of medication)
- Nausea
- Urinary retention
- Itching (may be treated with diphenhydramine)



Side Effects

Over-sedation (CNS and respiratory depression) may require stimulation, airway maneuvers, or use of the reversal agent **naloxone (Narcan)**.

If respiratory status does not improve with stimulation or BVM, administer naloxone IV titrated as needed and notify online medical control.

Adult dose: 0.4 - 2 mg IV/IM/SC

Pediatric dose: 0.1 mg/kg IV/IM/SC

- maximum initial dose: 2 mg



Additional Cautions

Use opioid analgesia with caution in the management of the multiple trauma patient. Observe for evidence of hypotension and correct as needed with fluid boluses. Reassess vital signs after administration of the medication.

Use opioid analgesia with caution in the management of patients with altered mental status. Observe for respiratory depression and take steps as needed to ensure a stable airway.

Ketamine (Ketalar®)

- A N-methyl D-aspartate (NMDA) receptor antagonist that blocks the release of excitatory neurotransmitter glutamate and provides anesthesia, amnesia, and analgesia.
- Because of its high lipid solubility, ketamine rapidly crosses the blood-brain barrier, provides quick onset of action (peak concentration at 1 minute-IV) and rapid recovery to baseline (duration 5-15 minutes after IVP).
- Ketamine has long been used in ED and ICU settings for procedural sedation via dissociative amnesia and analgesia. In this setting higher doses are used than for analgesia alone
 - Range of 0.5-2 mg/kg IV or 4-6 mg/kg IM
- Ketamine is now being used in ED, EMS, and military settings in subdissociative doses of 0.1-0.5 mg/kg, either as an adjunct to opioid analgesics or as a solo agent analgesic.
- A more recent use of Ketamine is the treatment of delirium.

Ketamine (Ketalar[®])

- Provides good analgesia while preserving airway patency, ventilation, and cardiovascular stability.
- Small doses may increase the analgesic potency of opioids. These features have increased the popularity of ketamine in patients with opioid-resistant pain (vaso-occlusive pain crisis in sickle cell disease or patients with chronic pain) or trauma patients who are hemodynamically unstable.
- Can be given by intravenous (IV), intramuscular (IM), intranasal (IN) and oral (PO) routes.
- When reviewing the literature it is important to determine if the goal was dissociative or procedural sedation or analgesia only. There are large dosing ranges reported and further studies are ongoing.
- The properties of ketamine are thought to play a role in the reduction of PTSD by blocking glutamate via NMDA receptor blockade.

Subdissociative Ketamine Pain Studies

- “Subdissociative IV ketamine administered at 0.3 mg/kg provides analgesic effectiveness and apparent safety comparable to that of intravenous morphine for short-term treatment of acute pain in the ED”.

Motov S, Rockoff B, Cohen V, Pushkar I, Likourezos A, et al. Intravenous subdissociative-dose ketamine versus morphine for analgesia in the emergency department: A randomized controlled trial. Ann Emerg Med. 2015; Sep;66(3):222-229.e1. doi: 10.1016/j.annemergmed.2015.03.004.

- “Low-dose ketamine is a viable analgesic adjunct to morphine for the treatment of moderate to severe acute pain. Dosing of 0.3 mg/kg is possibly more effective than 0.15 mg/kg, but may be associated with minor adverse events. Future studies should evaluate additional outcomes, optimum dosing, and use in specific populations.”

Beaudoin FL, Lin C, Guan W, Merchant RC. Low-dose ketamine improves pain relief in patients' receiving intravenous opioids for acute pain in the emergency department: Results of a randomized, double-blind, clinical trial. Acad Emerg Med. 2014;21:1194–1202. doi:10.1111/acem.12510

Ketamine for Pain and Agitation in EMS

Many EMS agencies, including those in Florida, are now using Ketamine to treat both pain and acutely agitated patients (Excited Delirium Syndrome).

- Indications:
 - Acute or adjunctive pain management
 - Sedation for patients with agitated delirium
- Agitation/Delirium dosing: 4-5 mg/kg IM or 0.5-1 mg/kg IV
- Sub-dissociative dose for pain:
 - Literature ranges from 0.2-1.0 mg/kg but a safe starting dose is 0.1 to 0.3 mg/kg IV (max initial dose 10 mg)

A summary table of Ketamine indications and dosages is available on the next slide and the [PAMI Dosing Guide](#).

Ketamine (Ketalar®) Indications

Indications	Starting Dose
Procedural Sedation	IV: <u>Adult</u> 0.5-1.0 mg/kg, <u>Ped</u> 1-2mg/kg; IM: 4-5 mg/kg
Sub-dissociative Analgesia	IV: 0.1 to 0.3 mg/kg, <i>max initial dose</i> ≤ 10 mg IM: 0.5-1.0 mg/kg; IN*: 0.5-1.0 mg/kg
Excited Delirium Syndrome	IV: 1 mg/kg; IM: 4-- 5 mg/kg

*Dosing not well established. Studies have used 0.5-9 mg/kg.

Moderate to Severe Pain

Nitrous Oxide

- The National Association of Emergency Medical Services Physicians NAEMSP published a position paper on the pre-hospital use of nitrous oxide in 1990.
- The NAEMSP reports that use of a 50:50 mixture of nitrous oxide and oxygen is within the scope of EMS medical directors and is safe for treatment of **mild to moderate** pain when used by well trained EMS providers.



Moderate to Severe Pain

Nitrous Oxide

Indications:

Moderate pain from musculoskeletal injury, burns

Contraindications:

Patients unable to understand verbal instruction

BP < 90 mmHg or RR < 8/ min*

Intoxicated patients

Head injuries with impaired LOC or mentation

Pneumothorax or COPD patients with blebs

Bowel obstruction or severe abdominal pain with distention

Use caution in first and second trimester pregnancy

*Although hypotension and respiratory depression are sometimes listed as contraindications by some EMS protocols, a review of the literature did not show these effects to occur during treatment with NO.

Anxiolysis and Sedation

Benzodiazepines

Often patients may be experiencing anxiety along with pain.

For example, a restrained child from a MVC with a stabilized fracture is still in distress after an appropriate dose of morphine. His parents were also injured and are being transported by another service to a trauma center. Consider if administration of a sedative might be beneficial if no contraindications exist.

Contraindications:

- Hypersensitivity
- Shock
- Coma
- Acute alcoholism
- Depressed vital signs

	Dose	Comments
Diazepam	0.1 mg/kg IV (max 5mg/dose) every 5-10 min	May cause respiratory depression. Give by slow IV push over 3-5 min. May also cause hypotension.
Midazolam	0.05- 0.1 mg/kg IV/IM/IO 0.3 mg/kg IN use with an atomizer. 10 mg or 1 ml per nostril (total 2 ml)	

Special Populations

Pediatric

Elderly

Pregnancy

Obese

Chronic pain patient

Special Populations: Pediatrics

- Often untreated or under dosed
- **Common barriers to pediatric pain management include:**
 - Difficulty assessing pain and lack of pain score documentation
 - Wide range of developmental stages and responses to pain
 - Difficulty obtaining vascular access
 - Fear of addiction
 - Short transport times
 - Provider discomfort with administering opioids to small children



Special Populations: Pediatrics



Tips

Tips for assessing pain in the pediatric population

- ✓ Speak calmly and gently
- ✓ Get down on their level
- ✓ Use the child's name
- ✓ Help the parents remain calm
- ✓ Use age-appropriate pain scales

Did you know?

Inadequate pain management and sedation can lead to the creation of a **pain memory** and worsen future responses to painful or even non-painful procedures. Furthermore, there is evidence that even minor painful procedures, such as needle sticks, can affect a child's longer-term emotional well-being.

Special Populations: Pediatrics

Current guidelines recommend the use of an age appropriate pain scale to assess pain.

Difficulty assessing pain in children is a common barrier to appropriate pain relief in pediatric patients. Therefore, it is important to become familiar with these pain scales and treat pain when appropriate.

Less than 4 years old:

Consider using an observational scale, such as

- Faces, Legs, Arms, Cry, Consolability (FLACC)
- Children's Hospital of East Ontario Pain scale (CHEOPs)

4 to 12 years old:

Consider using a self-report scale, such as

- Wong Baker Faces, Faces Pain Scale (FPS)
- Faces Pain Scale Revised (FPS-R)

Greater than 12 years old:

Consider using a self-report scale, such as

- Numeric Rating Scale (NRS)
- Visual Analog Scale (VAS)

Click on Images to Learn How to Observe Pain in Pediatric Patients



Infant



Preschooler



Toddler



School-age and Adolescent

Perform Behavioral Observation in **Infant**

When performing an infant behavioral observation, be aware of:

- Facial expressions
- Extremity activity and tone
- Guarding, splinting
- Position and tone
- Irritability, crying
- Poor feeding
- Poor sleep quality

Facial Expression

- Bulged brow
- Tightly shut eyes
- Nasolabial furrow
- Stretched mouth
- Taut tongue



Perform Behavioral Observation in Toddler

When performing a toddler behavioral observation, be aware of:

- Anger
- Tantrums, regression
- Facial expression
- Extremity activity and tone
- Guarding, splinting
- Position of comfort
- Irritability, crying
- Restless or unusually quiet



Perform Behavioral Observation in a **Preschooler**



When performing a preschooler behavioral observation, be aware of:

- Stalling/delaying
- Magical thinking explanations
- Behavioral regression
- Facial expression, grimacing
- Extremity activity and tone
- Guarding, splinting
- Position of comfort
- Irritability, anxiety
- Change in appetite or sleep quality

Perform Behavioral Observation in School-age and Adolescent



When performing a school-age and adolescent behavioral observation, be aware of:

- Stalling/delaying
- Flat affect
- Facial expression
- Extremity activity and tone
- Guarding, splinting
- Position of comfort
- Irritability, anxiety
- Change in appetite or sleep quality

Pharmacologic Safety in Pediatric Patients

- Many medications are metabolized in the liver via **cytochrome P450 subtypes** which are not fully developed in newborns
 - Liver enzymes reach full maturity at varying rates but generally at 1-6 months of age
- Newborns have a higher percentage of body water compared to adults resulting in a higher volume of distribution for water soluble drugs
- Newborns also have reduced albumin which may alter drug binding in the plasma, or increased drug levels
- Glomerular filtration rates typically do not reach normal clearance rates until 2 weeks of age leading to decreased elimination of medications
- Due to immature respiratory symptoms infants may develop apnea or periodic breathing when given even small opioid doses.



Does the appropriate use of analgesics in pediatrics make evaluation more difficult?

- Literature review indicates there is no evidence that pain management masks symptoms or clouds mental status, preventing adequate assessment and diagnosis, including abdominal pain
- Analgesics in pediatric abdominal pain usually makes the exam and diagnostic testing easier and more comfortable aiding in diagnosis
- In pediatric multisystem trauma, small titrated doses of opiates can be used without affecting clinical exam or neurologic assessments.

Special Populations: Elderly

- Older patients have been shown to receive less analgesia than younger patients.
 - One study showed only 28% of patients ≥ 60 years of age with a hip fracture received analgesics by EMS. Those who did had a nearly 5 point drop in their numeric rating score (7 to 2.8) upon arrival the ED.
- It is important to elicit a past medical history from all patients but especially the elderly.
- Many co-morbidities such as renal failure or hepatic failure may change the elimination of pain medications and necessitate a lower dose.



Medication Safety in the Elderly

Decreased Renal Function

- Renal function may be reduced 50% or greater leading to increased risk of accumulation
- Changes in renal function may not be evident in the patients serum creatinine level due to the loss of muscle mass accompanied by aging
- Use special caution in opioid naïve patients

Medication Considerations

- Anti-cholinergic agents
 - Avoid due to concerns of delirium
- Long acting benzodiazepines (i.e. diazepam)
 - Undergo hepatic oxidation which reduces with aging potentially leading to over sedation and increased fall risk.

Special Populations: Pregnancy

- Pain management in pregnancy can be complex and poses several challenges.
- Because of physiological changes, pregnant patients metabolize medications differently. Additionally, when caring for pregnant patients providers are potentially treating two patients.
- Thus medication effects on the fetus must be considered when selecting treatment options.
- An estimated 5% – 20% of pregnant patients are involved in trauma. Most of these cases are the result of motor vehicle collisions and falls with about 5% of patients affected by major trauma.



Special Populations: Pregnancy

- **Assessment** of pregnant patients is similar to that of non-pregnant adults. However, additional considerations should be taken such as assessing gestational age, pregnancy related symptoms (abdominal/pelvic pain, vaginal bleeding/fluid, etc.).
- In cases of trauma the patient is traditionally kept supine to stabilize the spine. However, this positioning is not ideal as blood flow to the fetus may become compromised.
 - Left lateral decubitus positioning is ideal. The backboard can be tilted to the left or the uterus can be displaced to the left by placing a wedge under the right side.
 - Placing the patient in the right lateral decubitus can also be done if left lateral positioning can not be performed.

Special Populations: Pregnancy

Treatment: Nonpharmacological options for treating pain should be tried first to reduce risk to the fetus. However, pharmacological medications should be used when needed after a careful evaluation of risks.

- **Ketamine** – Limited evidence has shown that it may increase uterine tone and decrease uteroplacental perfusion; increase maternal blood pressure and pulse up to 40%; and cause neonatal depression. *Currently the teratogenicity of ketamine is unknown.* Given the conflicting and limited studies, ketamine may be used in pregnant patients however better options exist.
- **NSAIDs** should not be used for routine pain control in pregnancy. They should not be administered to third-trimester pregnant patients because of the increased risk of fetal cardiovascular, brain, kidney, lung, skeleton, and gastrointestinal tract defects, as well as miscarriage. Ibuprofen (category B), indomethacin (B), naproxen (B), and ketorolac (C) may be options in first and second trimesters of pregnancy.

Category	Description
A	Adequate, well-controlled studies in pregnant women have not shown an increased risk of fetal abnormalities.
B	Animal studies have revealed no evidence of harm to the fetus, however, there are no adequate and well-controlled studies in pregnant women. or Animal studies have shown an adverse effect, but adequate and well-controlled studies in pregnant women have failed to demonstrate a risk to the fetus.
C	Animal studies have shown an adverse effect and there are no adequate and well-controlled studies in pregnant women. or No animal studies have been conducted and there are no adequate and well-controlled studies in pregnant women.
D	Studies, adequate well-controlled or observational, in pregnant women have demonstrated a risk to the fetus. However, the benefits of therapy may outweigh the potential risk.
X	Studies, adequate well-controlled or observational, in animals or pregnant women have demonstrated positive evidence of fetal

Medscape

Special Populations: Pregnancy

- **Opioids** are considered category C when used for short term treatment.
- Medications used during **procedural sedation** are unlikely to result in significant adverse pregnancy outcomes given the short duration of treatment. The lowest effective dose should be given to further reduce risk.

Category	Description
A	Adequate, well-controlled studies in pregnant women have not shown an increased risk of fetal abnormalities.
B	Animal studies have revealed no evidence of harm to the fetus, however, there are no adequate and well-controlled studies in pregnant women. or Animal studies have shown an adverse effect, but adequate and well-controlled studies in pregnant women have failed to demonstrate a risk to the fetus.
C	Animal studies have shown an adverse effect and there are no adequate and well-controlled studies in pregnant women. or No animal studies have been conducted and there are no adequate and well-controlled studies in pregnant women.
D	Studies, adequate well-controlled or observational, in pregnant women have demonstrated a risk to the fetus. However, the benefits of therapy may outweigh the potential risk.
X	Studies, adequate well-controlled or observational, in animals or pregnant women have demonstrated positive evidence of fetal

Medscape

Special Populations: Obese patients

- Body Mass Index (BMI) can influence drug absorption, distribution, metabolism, and excretion.
- Most medications used for sedation are lipophilic (distributed widely in fat) and may exhibit significant differences in peak blood concentrations in obese patients compared to non-obese patients.
- These pharmacokinetic differences can lead to longer sedation recovery and conversely higher incidences of sedation failure.
- Furthermore, obese patients, particularly those with obstructive sleep apnea, are at higher risk for sedation-related complications. Thus patients receiving medications that may potentially cause sedation should be monitored closely.



Example. Midazolam is lipophilic with a high volume of distribution. Administered based on ideal body weight, and not accounting for the distribution into fat, could lead to sedation failure due to a relative under-dosing.

Special Populations: Patients with Chronic Pain Experiencing Acute Pain

- Prehospital providers play an important role in the recognition and management of chronic pain. Patients with chronic pain regularly frequent the emergency department and many of these patients utilize emergency medical services.
- **Assessment:** Evaluation of chronic pain should begin with a thorough and relevant history and physical exam.
 - Is there a change in the patient's pain pattern?
 - What typically controls the pain (what and how much)?
 - Any changes to their pain regimen (Low on medications? Medication changes?) Is the pain breakthrough pain?
 - Is the pain interfering with activities of daily living?

Special Populations: Patients with Chronic Pain Experiencing Acute Pain

Assessment: Traditional 10-point pain scales assess *severity* of pain and may not provide an accurate picture in patients suffering with chronic pain. Determining how pain is affecting a person with chronic pain can be challenging. How that pain is affecting their daily function may be a more helpful indicator.

Treatment: Because of physiologic changes, patient's with chronic pain will require higher doses of opioids to achieve the same analgesic effect as those without chronic pain. Breakthrough pain typically requires doses between 10%–15% of a patient's total daily dose. Higher initial dosing and repeat dosing may be necessary to adequately control pain.

Considerations: It is important to take into account potential drug interactions as patients with chronic pain may be on multiple types of medications to treat their pain. Seek medical consultation for further guidance when needed.

Pain Management By Specific Presentations

Abdominal pain

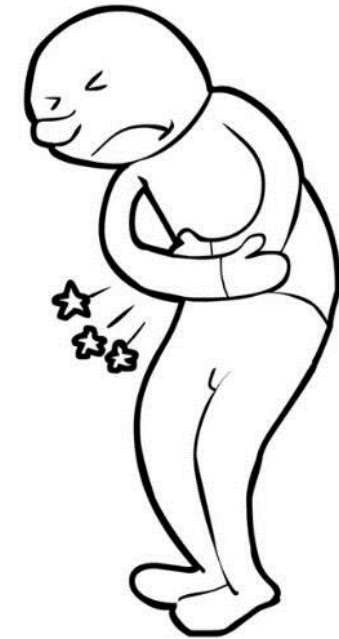
Fractures

Burns

Sickle cell crisis

Abdominal Pain in the Prehospital Setting

- Opioid analgesia was historically contraindicated in the prehospital setting for abdominal pain of unknown etiology.
 - It was thought that analgesia would hinder the emergency physician's or surgeon's evaluation.
 - It was common to withhold administration of opioid medications in abdominal pain patients due to fear of masking a serious surgical disease.
- Several studies have shown that prehospital opioids do *not* impede diagnosis or management of abdominal pain.



Abdominal Pain in the Prehospital Setting

- A 2011 Cochrane Review compared six randomized controlled trials contrasting opioid analgesia with no analgesia in adults with abdominal pain. These studies included 699 patients who were given either 5–15 mg of morphine or equivalent amounts of normal saline.
- The studies found no significant differences in the groups in terms of accuracy of diagnosis, alterations in physical presentations or mistakes in treatments.
- Two of the studies measured patient comfort and found significant improvements with opioid analgesia. Other studies have resulting in similar findings in the pediatric and geriatric populations. Thus, while opiate administration may alter the physical examination findings, these changes result in no significant increase in management errors.

Opioid pain medications for the treatment of severe acute abdominal pain in the field is appropriate.

Fractures in the Prehospital Setting

Patients with acute fractures often do not receive adequate prehospital pain control. A study of 1,073 patients found only 1.5% received analgesia in the prehospital setting.

First line pharmacological treatment should be IV opioids if no contraindications exist such as suspected head injury or low GCS.

Nonpharmacological measures such as immobilization/traction/splinting should also be employed. Remember to immobilize and splint not only the fracture site but the joints above and below the injured site.



Burns in the Prehospital Setting

Multiple studies have shown inadequate pain control of burn victims in the prehospital setting. Burns can cause significant pain.

Opioids should be given IV if no contraindications exist. Burn patients may require high doses to achieve relief. Consult with the receiving providers to discuss opioid doses especially during long transport times.

1. Stop the burning. Remove any clothing, jewelry, etc.
2. ABCs and vital signs
3. Airway management and appropriate oxygen therapy. If patient has signs of airway involvement be prepared to intubate
4. Vascular access
5. Initiate fluid resuscitation if indicated by BSA%
6. Administer **IV opioid medications** if no contraindications exist
7. Initial burn care: cleanse and debride loose tissue, cover burn with dry sterile dressing.
8. Consider aeromedical intercept for direct transport to a Burn Center

Sickle Cell Vaso-occlusive crisis in the Prehospital Setting

- 60% of patients with sickle cell disease will experience a vaso-occlusive crisis episode annually.
- The management of these episodes in the pre-hospital setting should **focus on** supporting the patient's airway, breathing, circulation, and pain.
- Establish IV access and hydrate as needed
- Consider opioids for **moderate-to-severe** pain. Morphine is considered first-line treatment. If IV access is not obtainable administer nitrous oxide or intranasal/IM opioids.
- Monitor patient closely for sedation and respiratory depression.

[For more information on sickle cell management refer to module on the Acute Pain Management in Emergency and Acute Care Settings.](#)

Pain Management Guidelines and Algorithms

Pain Management Guidelines

- In an effort to standardize pain management in the pre-hospital setting, evidence based guidelines were created. The implementation of these guidelines have shown to improve patient care in a safe manner.

- Due to the lack of research in the area of pre-hospital pain management, many of these guidelines are based on general consensus. Local EMS systems and medical directors may use such guidelines to develop protocols and decrease need for on line medical control.

Evidenced-Based Guideline for Prehospital Analgesia and Trauma

- Can be extrapolated to other pain inducing states or diseases
- Oligoanalgesia is still a common reality for trauma patients
- Between 25-50 % of pediatric EMS calls are for traumatic injury

**This protocol excludes patients who are allergic to narcotic medications
and/or who have altered mentation**
(GCS < 15 or mentation not appropriate for age).

1

- ABCs and vital signs.
- Apply a pulse oximeter and administer oxygen as needed to maintain a SPO2 of 94-99%.
- Place patient on cardiac monitor per patient assessment
- Establish IV of normal saline per patient assessment

2

Assess pain as part of general patient care in children and adults.
Consider all patients as candidates for pain management,
regardless of transport interval.
(Strong recommendation, low quality evidence)

3

Use an age-appropriate pain scale to assess pain:
(Weak recommendation, very low quality evidence for patients < 12 yrs,
Moderate quality evidence for patients > 12 yrs)

Age <4 yrs: Consider using an observational scale such as FLACC or CHEOPS
Age 4-12 yrs: Consider using a self-report scale such as FPS, FPS-revised, or Wong-Baker Faces
Age >12 yrs: Consider using a self-report scale such as NRS

4

Use narcotic analgesics to relieve moderate to
severe pain.
Analgesics proven safe and effective are:

IV Morphine (0.1 mg/kg), or
IV or IN Fentanyl (1mcg/kg)
(Strong Recommendation, moderate quality evidence)

5

Reassess every 5 minutes.
(Strong recommendation, moderate quality evidence)

Evidence of serious adverse effects should
preclude further drug administration.

6

If still in significant pain, redose at half the original
dose.
(Strong recommendation, low quality evidence for repeat doses.
Weak recommendation, very low quality evidence for redosing at half the
original dose)

7

Transport in position of comfort
and reassess as indicated

4

- If available, consider use of
nonpharmaceutical pain
management techniques
- Placement of the patient
in a position of comfort.
 - Application of ice packs
and/or splints for pain
secondary to trauma.
 - Verbal reassurance to
control anxiety.

Serious Adverse Effects

GCS < 15
Hypotension
SpO₂ < 90% on 15L O₂
Hypoventilation
Allergy
Condition preventing administration
(blocked nose, no IV)

(Weak recommendation, very low quality
evidence)

Adapted from
https://www.nasemso.org/Projects/ImplementationOfEBG/documents/Implementation-of-an-EBG-General-Toolkit_V1.0.pdf

Patient Safety Considerations



Patient Safety Considerations

- All patients should have drug allergies identified prior to administration of pain medication.
- Contraindications to the administration of opioids include hypotension, head injury, respiratory depression.
- Non-steroidal anti-inflammatory medications should not be administered to pregnant patients and patients with GI bleed.



Key Documentation Elements

- ✓ Patient vital signs with pulse oximetry
- ✓ Patient's allergies prior to administration of medication
 - ✓ Initial patient pain scale assessment
- ✓ Administered medications, their timing, and dose
- ✓ Reassessments with repeat vital signs and pain scale assessments

**All of the above information
should be relayed to the receiving treating team**

Summary



In summary

- ✓ Perform a pain assessment as part of the patient evaluation
- ✓ Document pain score and medications given
- ✓ Identify contraindications if present
- ✓ Consider nonpharmacologic and comfort measures in all patients
- ✓ Administer pain medication to patients in moderate to severe pain
- ✓ Reassess pain scores every 5 minutes
- ✓ Re-dose medication if still in significant pain
- ✓ Relay clinical course to receiving facility

Case Discussions

Review and Resolution

Case Scenario 1

During a rainy Saturday evening, a 28 year old male was speeding around a curve when he lost control and hit a tree at 45 mph. He was restrained with airbag deployment and denies loss of consciousness. When EMS arrives they find the patient alert and complaining of severe pain in the left thigh. Physical exam reveals a swollen and tender thigh. Any movement causes an increase in pain. The paramedic wonders if he should place an IV for pain medication or transport rapidly to the closest hospital which is 15 minutes away.



- **How would you approach this patient?**
 - Should you 'scoop and run'?
- **How would you assess or quantify the pain?**
- **Would you give this patient pain medications?**
- **What treatment options should you consider?**
- **How should you proceed if medications are administered?**

Case 1 Resolution

The paramedic quickly assesses the patient's vital signs, pain scale, and allergies. She has no known drug allergies. Using the Numerical Rating Scale she reports her pain as a 9/10. An IV was established and 6 mg morphine was given. The patient was then moved to the stretcher and a splint was applied to the extremity. On reassessment the patient rated her pain 5/10. An additional 3 mg IV morphine was given and the patient reported her pain was significantly improved on arrival in the ED.

Because the paramedic took an extra few minutes to place an IV and provide pain relief **prior** to placing the patient on the stretcher, in a splint, and taking her for a bumpy ride in the ambulance, she did not need to suffer in pain while awaiting treatment in the ED.

Case Scenario 2

You are called to the residence of a healthy 3 year old female who pulled a hot pot of coffee off the counter. She has first and second degree burns on the front and back lower legs but has no other injuries. She is screaming and running away from you.

Questions to Consider

- How would you assess her pain?
- Which pain assessment scale would you use?
- What are your options for treating her pain?



Case 2 Resolution

You decide to use the FLACC pain scale and determine she has a pain rating of 8. The patient likely would benefit from opioid medications- nasally or via IV.

FLACC Scale ²		0	1	2
1	Face	No particular expression or smile.	Occasional grimace or frown, withdrawn, disinterested.	Frequent to constant frown, clenched jaw, quivering chin.
2	Legs	Normal position or relaxed.	Uneasy, restless, tense.	Kicking, or legs drawn up.
3	Activity	Lying quietly, normal position, moves easily.	Squirming, shifting back and forth, tense.	Arched, rigid or jerking.
4	Cry	No crying (awake or asleep).	Moans or whimpers; occasional complaint.	Crying steadily, screams or sobs, frequent complaints.
5	Consolability	Content, relaxed.	Reassured by occasional touching, hugging or being talked to, distractible.	Difficult to console or comfort.



Closing

- References and resources can be found on the main [PAMI website](#)
- Email us your challenging EMS pain management cases, recommendations, comments, and questions.



Additional Resources

- Position paper National Association of EMS Physicians: Prehospital Pain Management by Hector M. Alonso-Serra et al.
 - <http://www.naemsp.org/Documents/Position%20Papers/POSITION%20PrehospitalPainMgmt.pdf>
- National Association of EMS Physicians Dialog: Prehospital Pain Management
 - <http://www.naemsp.org/Pages/dialogPrehospitalPainManagement.aspx>
- National Association of State EMS Officials: National Module of EMS Clinical Guidelines (pgs61-66)
 - <https://www.nasemso.org/Projects/ModelEMSClinicalGuidelines/documents/National-Model-EMS-Clinical-Guidelines-23Oct2014.pdf>
- NAEMSO Presentation on Preshospital Protocol for the Management of Acute Traumatic Pain
 - https://www.nasemso.org/Projects/ImplementationOfEBG/documents/ManagementofAcuteTraumaticPain_PPT.pdf

Additional Resources

- Emergency Medical Services for Children: Pediatric Pain Management
 - [http://emscnrc.org/EMSC Resources/Pediatric Pain Management Toolbox.aspx](http://emscnrc.org/EMSC_Resources/Pediatric_Pain_Management_Toolbox.aspx)
- EMS Reference: 10 Things to Know About Acute Pain Management
 - <https://emsreference.com/articles/article/top-10-things-know-about-acute-pain-management>
- EMS World: An EMS Guide to Chronic Pain
 - <http://www.emsworld.com/article/10959254/managing-chronic-pain>



PAMI learning module content will sometimes overlap due to similar topics. The PAMI website offers access to learning module handouts, pain tools, resources, websites, and recent pain news.

We welcome your feedback on all PAMI materials and are interested in how you use them to improve patient safety and clinical care.

Please email emresearch@jax.ufl.edu.

For more information please visit
<http://pami.emergency.med.jax.ufl.edu/>



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