Prehospital Protocol for the Management of Acute Traumatic Pain

Introduction

- Project Co-Principal Investigators:
  - Matt Sholl, MD (Medical Director, Maine EMS Bureau)

  - Peter Taillac, MD (Medical Director, Utah EMS Bureau)

- Pediatric Emergency Medicine Specialist
  - Kathleen Adelgais, MD, MPH (Children's Colorado)

Terminal Objective

- Appropriately manage acute traumatic pain utilizing the prehospital guideline

Cognitive

- Identify trauma patients who are candidates for pharmacologic pain management
- Describe the age appropriate pain scale to assess the pain level of traumatic patient
- Explain the narcotic analgesics used to relieve moderate to severe pain in the trauma patient
- Identify the serious adverse effects of pain medication
- Identify the benefits of pain medication
- Identify the patients that are excluded from the pain management guideline
- Discuss the barriers to pain management, in the pediatric patient and describe solutions to the barriers
- Discuss the barriers to pain management in the adult patient and describe solutions to the barriers

Affective

- Recognize the need to manage pain in the prehospital setting when caring for a trauma patient
- Appreciate the beneficial effects of patient care and outcomes as a result of properly managing pain

Current State of Pain Control

- Pain is a common problem
- Severe pain is an emergency!
- Often not treated or under-treated
  - Worse in children

Current State of Pain Control

- EMS can provide medication faster than hospitals

Pain Control Barriers

- Inability to assess pain
- Low pain score
- Patient refusal of medication
- Difficult vascular access
- Vascular access not needed
- Delayed transport
- Fear of complications
- Record keeping
- Other care adequate
- Perception of possible drug seeking
- Not familiar with dosing
- Criticism from hospital
- Short transport time

Overcoming Barriers

- Offline protocols/guidelines (standing orders, including pediatric patients)
- Training (specific to pain assessment)
- Ability to administer pain medication without the need to first start an IV in children
- Medical support and oversight
- Coordination with, and education of, receiving facilities

Rationale for EMS Pain Management

- Timeliness of Care
  - Significantly decrease time to therapy
- EMS is the most reliable means to provide therapies to patients in a rapid fashion

The Value of Pain Control for Pediatric Patients

- Immediate benefits in the prehospital environment include the improvement of:
  - patient comfort
  - patient vital signs
  - patient assessment
  - physiology
    - Ex: In conditions such as chest wall injuries, control of pain improves respiratory effort

The Value of Pain Control for Pediatric Patients

- Long-term benefits in the prehospital environment
  - Military research reveals decreased incidence of post-traumatic stress
  - Decreased long-term sequela in children
  - Treatment prevents the development of hypersensitized pain pathways

Opioids in the Prehospital Environment

- Safe and effective
- Multiple routes of administration
  - Fentanyl
    - transmucosal, transdermal, intravenous and intranasal
  - Morphine
    - intravenous and intramuscular
- No statistical significant differences in ability to control pain

Pain Treatment

- Non-pharmacologic
  - RICE
  - Distraction (works well with some children)
  - Hypnosis (time consuming)
  - Acupressure (studied in Europe)
- Pharmacologic
  - Oral analgesics (acetaminophen, NSAIDS)
  - Narcotics (morphine, fentanyl)

Morphine

- Standard narcotic in prehospital setting
- Can be administered IV or IM
- Dosing:
  - 0.1 mg/kg (round to nearest mg)
  - Usually max 10mg/dose
- Benefit:
  - works well for pain
- Disadvantage
  - only parenteral administration

Fentanyl

- Used more commonly among aeromedical teams
- 1 mcg/kg (round to nearest 5 mcg)
- Usually max 50-100 mcg/dose
- Respiratory depression is less common
- Works quickly (onset of relief between 30 sec and 5 min)
- Administered IV, IN

Intranasal Fentanyl

- Advantages include:
  - More rapid and painless administration
  - Higher patient and provider satisfaction
  - Similar onset of action to morphine
  - Decreased time to administration
  - Serum levels after IN administration is approximately 70% of IV

Side Effects of Narcotics

- Respiratory depression, which could lead to:
  - Hypoxia
  - Apnea
  - Airway obstruction
- Hypotension
- Miosis (pinpoint pupils)

Prehospital Protocol for the Management of Acute Traumatic Pain

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

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)

↓

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

↓

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)

↓

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

Evidence of serious adverse effects should preclude further drug administration.

Serious Adverse Effects

GCS < 15
Hypotension
SpO_2< 90% on 15L O_2
Hypoventilation
Allergy
Condition preventing administration (blocked nose, no IV)

(Weak recommendation, very low quality evidence)

↓

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)

GRADE Process

- GRADE stands for "Grading of Recommendations Assessment, Development and Evaluation"
  - Is an increasingly important mechanism to review and rate the medical literature
  - Is gaining popularity due to its many benefits, including transparency with its process and definitions
- PICO Questions (Population, Intervention, Comparison, Outcome)
  - Ex: In patients in the prehospital environment, is the provision of pain medications safe and effective?

Interpreting GRADE Recommendations

- Strong recommendation means the desirable effects clearly outweigh the undesirable effects
  - May occur, even in the face of lower quality of evidence
  - However, further research may alter future recommendations
- Weak recommendations occur when the desirable effects are closely balanced by the undesirable effects

Assessment

Assess pain as part of the general patient care in children and adults.

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

(strong recommendation, low quality evidence)

- Assess pain as part of general patient care in children and adults.
- Consider all patients as candidates for pain management, regardless of transport interval.

How Do We Assess Pain?

- The Kid-Friendly Basics:
  - Speak calmly and gently
  - Get down on their level
  - Use the child's name
  - Help the parents remain calm

OPQRST: Pain History

- **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)

Pain Scoring Methods

Use age appropriate pain scale to assess pain

(Weak recommendation, very low quality evidence for patients;
<12 years moderate quality of evidence for patients >12 years)

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

- Self-report
- Behavioral observation
- Physiologic measures

Age-Appropriate Pain Scales

- Age <4 yrs:
  FLACC or CHEOPS
- Age 4-12 yrs:
  Self-report scale such as FPS-revised, or Wong-Baker FACES®
- Age >12 yrs:
  Self-report scale such as NRS

FLACC Scale

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

Note: Each of the five categories Face (F), Legs (L), Activity (A), Cry (C), and Consolability (C) is scored from 0-2, which results in a total score between 0 and 10.

From Merkel, Voepel-Lewis, Shayevitz, & Malviya (1997). The FLACC: A behavioral scale for scoring postoperative pain in young children. *Pediatric Nursing, 23*(3) 293-297.

FLACC Scale Total

- Assessment of Behavioral Score:
  - 0 = Relaxed and comfortable
  - 1-3 = Mild discomfort
  - 4-6 = Moderate pain
  - 7-10 = Severe discomfort/pain

CHEOPS

Item	Behavioral		Definition
Cry	No cry	1	Child is not crying.
	Moaning	2	Child is moaning or quietly vocalizing silent cry.
	Crying	2	Child is crying, but the cry is gentle or whimpering.
	Scream	3	Child is in a full-lunged cry; sobbing; may be scored with complaint or without complaint.
Facial	Composed	1	Neutral facial expression.
	Grimace	2	Score only if definite negative facial expression.
	Smiling	0	Score only if definite positive facial expression.
Child Verbal	None	1	Child not talking.
	Other complaints	1	Child complains, but not about pain, e.g., "I want to see mommy" of "I am thirsty".
	Pain complaints	2	Child complains about pain.
	Both complaints	2	Child complains about pain and about other things, e.g., "It hurts; I want my mommy".
	Positive	0	Child makes any positive statement or talks about others things without complaint.
Torso	Neutral	1	Body (not limbs) is at rest; torso is inactive.
	Shifting	2	Body is in motion in a shifting or serpentine fashion.
	Tense	2	Body is arched or rigid.
	Shivering	2	Body is shuddering or shaking involuntarily.
	Upright	2	Child is in a vertical or upright position.
	Restrained	2	Body is restrained.
Touch	Not touching	1	Child is not touching or grabbing at wound.
	Reach	2	Child is reaching for but not touching wound.
	Touch	2	Child is gently touching wound or wound area.
	Grab	2	Child is grabbing vigorously at wound.
	Restrained	2	Child's arms are restrained.
Legs	Neutral	1	Legs may be in any position but are relaxed; includes gentle swimming or separate-like movements.
	Squirm/kicking	2	Definitive uneasy or restless movements in the legs and/or striking out with foot or feet.
	Drawn up/tensed	2	Legs tensed and/or pulled up tightly to body and kept there.
	Standing	2	Standing, crouching or kneeling.
	Restrained	2	Child's legs are being held down.

- 6 categories, each with 3-4 levels of care
- Total score= 4-13

Faces Pain Scale (FPS)

- Used in children 4-12 years
- Children point to face that represents their pain
- Compute using score 0-6

Faces Pain Scale-Revised (FPS)-R

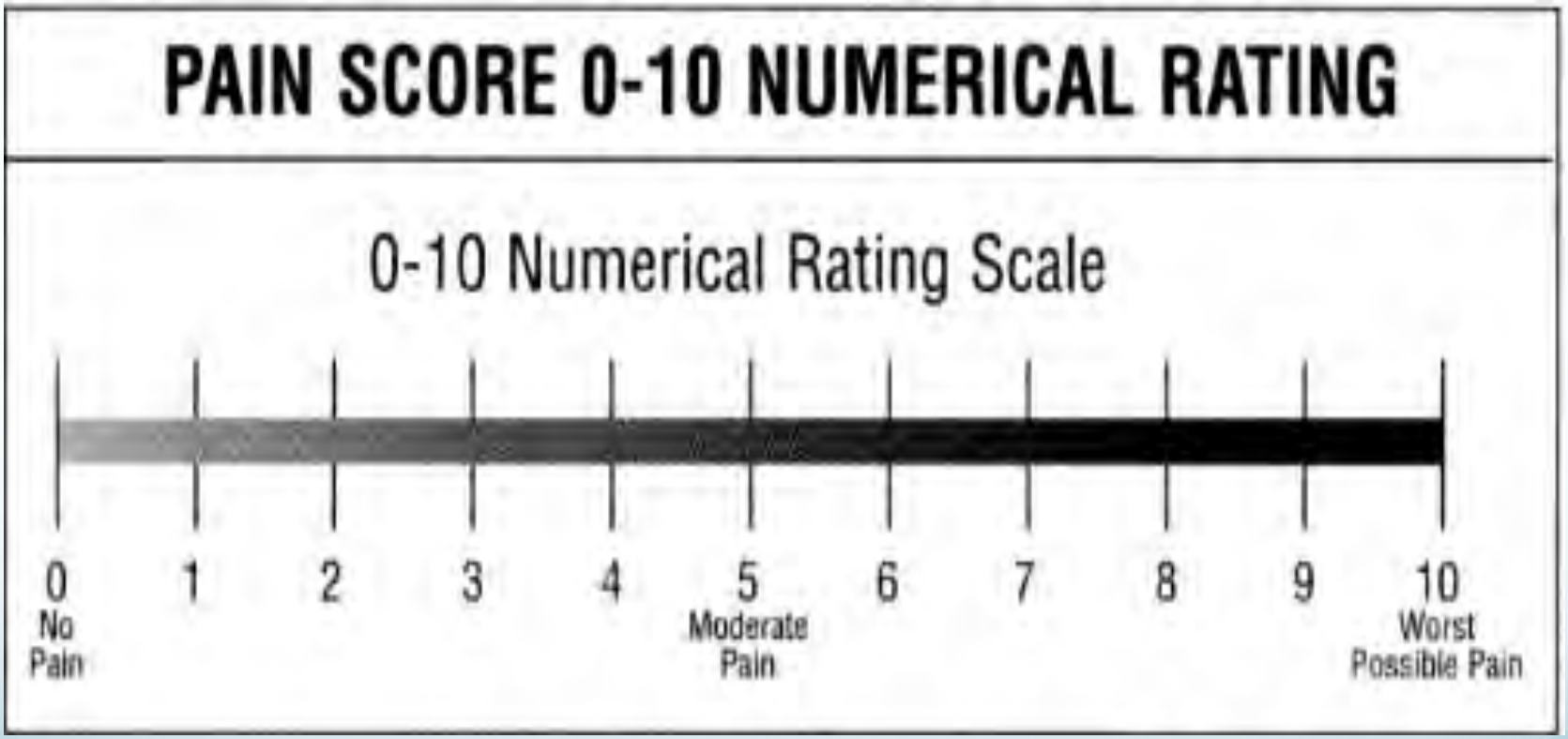
- Used in children 4-12 years
- Children point to face that represents their pain
- Compute using score 0-10

Wong-Baker FACES® Scale

Wong-Baker FACES Pain Rating Scale

From Wong D.L., Hockenberry-Eaton M., Wilson D., Winkelstein M.L., Schwartz P.: Wong's Essentials of Pediatric Nursing, ed. 6, St. Louis, 2001, p. 1301. Copyrighted by Mosby, Inc. Reprinted by permission.

Numerical Rating Scale (NRS)



BLS Interventions

- Perform general assessment
- Obtain VS:
  - BP, HR, RR, temp., GCS, pain score
- Maintain airway
- Immobilize any obvious injuries
- Place in position of comfort
- If multi-system trauma, follow appropriate spinal immobilization procedures
- Regularly reevaluate the patient
- Transport for medical evaluation (in position of comfort)

ALS Interventions

- Follow BLS interventions
- Place on cardiac monitor and pulse oximetry
- Determine need for IV access
  - If mucosal atomizer available, consider intranasal route for medication administration if no other access needed
- Initiate treatment for underlying cause of pain

ALS Interventions

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)

- Reassess mental status and breathing
  - Naloxone for respiratory depression

Reassess

Reassess every 5 minutes

(Strong recommendation, moderate quality evidence)

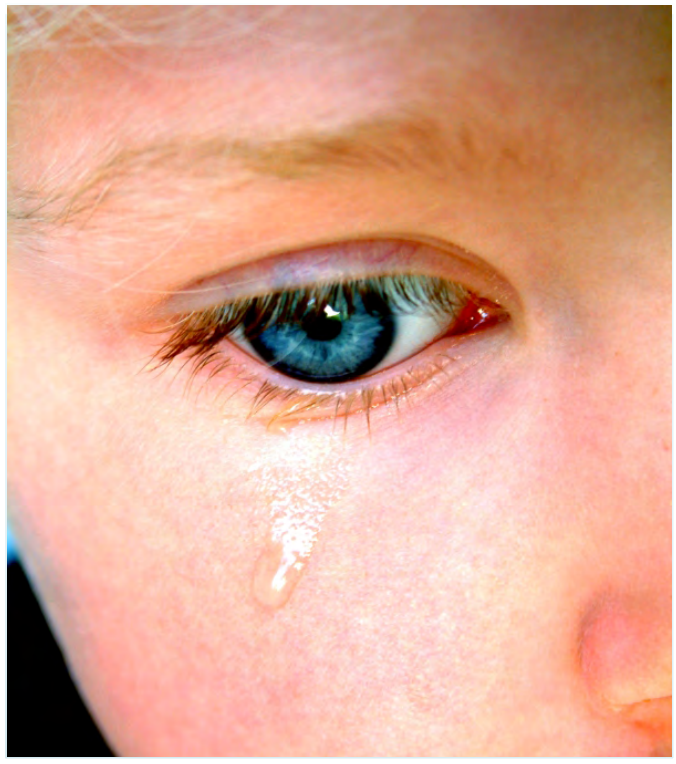
Evidence of serious adverse effects should preclude further drug administration.

Redose

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)

Adverse Effects/ Contraindications



Serious Adverse Effects

GCS < 15
Hypotension
SpO_2 < 90% on 15L O_2
Hypoventilation
Allergy
Condition preventing administration
(blocked nose, no IV)

(Weak recommendation, very low quality evidence)

Exclusion Criteria

- Allergies to narcotic medications
- Altered mentation
  - (GCS < 15 or mentation not appropriate for age)

Glasgow Coma Scale

EYE OPENING

- None (1) = Even to supra-orbital pressure
- To pain (2) = Pain from sternum/limb/supra-orbital pressure
- To speech (3) = Non-specific response, not necessarily to command
- Spontaneous (4) = Eyes open, not necessarily aware

MOTOR RESPONSE

- None (1) = To any pain; limbs remain flaccid
- Extension (2) = Shoulder adducted and shoulder and forearm internally rotated
- Flexor response (3) = Withdrawal response or assumption of hemiplegic posture
- Withdrawal (4) = Arm withdraws to pain, shoulder abducts
- Localizes pain (5) = Arm attempts to remove supra-orbital/ chest pressure
- Obeys commands (6) = Follows simple commands

VERBAL RESPONSE

- None (1) = No verbalization of any type
- Incomprehensible (2) = Moans/groans, no speech
- Inappropriate (3) = Intelligible, no sustained sentences
- Confused (4) = Converses but confused, disoriented
- Oriented (5) = Converses and oriented

NASEMSO

Exclusion Example

- 12 yo with fall from tree
- Abrasions to forehead and R arm and bruising to forearm around wrist
- Not opening eyes except to verbal stimuli (GCS 14)
- Moaning in pain

Case Studies

Case 1

- Called to scene at the local playground/ picnic area
- 10 yo otherwise healthy male
- Fell off a picnic table
- Obvious left forearm deformity
  - Intact CSM

How will you care for this patient at the scene and during transport?

Case 2

- Called to local water park
- 14 yo female with history of asthma
- Slipped while running
- Swelling of left elbow, abrasion on scalp

Name important parts of her history and physical that may affect treatment decisions

Case 3

- Called to a residence
- 3½ yo male, otherwise healthy
- Pulled a hot pot of coffee off the counter
- First and second degree burns on the front and back of lower legs
- No other injuries
- FLACC pain scale rating of 8

What are your options to treat his pain?

Conclusion

- Pain is a common condition in adults and pediatrics that should be managed by EMS providers
- There are various medical and non-medical means to treat pain, but serious pain should be treated with parenteral opioid analgesics
- Many of the barriers for the provision of these medications in pediatrics may be overcome by adherence to the evidence-based “Prehospital Protocol for the Management of Acute Traumatic Pain”

Resources

- Articles and resources are located here:
  - https://www.nasemso.org/Projects/ImplementationOfEBG/documents/Resources