

Managing Pediatric Pain in Acute Care Settings



Updated October 2017



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 <u>emresearch@jax.ufl.edu</u>.

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





Citation for Presentation

- An electronic version of this module is available on the PAMI website <u>http://pami.emergency.med.jax.ufl.edu/</u>.
- All PAMI created materials are free access and can be utilized for educational programs or adapted to institutional needs.
- Suggested Citation: Managing Pediatric Pain in Acute Care Settings. 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 <u>http://pami.emergency.med.jax.ufl.edu/</u>.



Module Adaptation and Illinois EMSC Citation



- Portions of this pediatric module were adapted from Illinois Emergency Medical Services for Children materials. Per Illinois EMSC, all training materials are considered under public domain and can be utilized to conduct similar educational programs provided there is appropriate acknowledgement of the source of these materials.
- Suggested Citation: Pediatric Pain Management in the Emergency Setting, Illinois Emergency Medical Services for Children, 2013.

Disclaimer



The PAMI website, learning modules, and resources are for educational and informational purposes only. The PAMI website is not intended as a substitute for professional medical diagnosis or management by a qualified health care professional. PAMI is not responsible for any legal action taken by a person or organization as a result of information contained in or accessed through this website, whether such information is provided by PAMI or by a third party. As new research and clinical experience becomes available, patient safety standards will change. Therefore, it is strongly recommended that physicians, nurses and other healthcare professionals remain current on medical literature and national standards of care and structure their treatment accordingly. As a result of ongoing medical advances and developments, information on this site is provided on an "as is" and "as available" basis. Patient care must be individualized. The use of information obtained or downloaded from or through this website or module is at the user's sole discretion and risk.

If you use any links that appear in this website or module to other websites, you will leave the University of Florida's website. The University of Florida is not responsible for the contents of any linked site or any link contained in such a linked site. The University of Florida may provide such links to you only as a convenience and the inclusion of any link does not imply recommendation, approval or endorsement by the University of any third party site. All such links provided on this website are intended solely for the convenience of users of this site and do not represent any endorsement, advertisement or sponsorship of linked sites or any products or services offered through sites that are not owned by the University.

Module Outline



- Background Information
- Pain Pathophysiology
- Recognition and Assessment of Pediatric Pain
- Identifying the Type of Pain

Treatment options

- Pharmacological Treatment
- Non-pharmacologic Interventions
- Reassessment of pain
- Procedural Sedation and Analgesia (PSA)
- Summary
- Resources

Management Initiative



Learning Objectives

- 1. Discuss methods of recognizing and assessing pediatric pain
- 2. Review a developmental and behavioral approach to assessing and treating pain in children of all ages
- 3. Describe non-pharmacologic and pharmacologic options for pediatric pain management
- 4. Determine a stepwise approach to pediatric procedural sedation and analgesia (PSA)
- 5. Understand the importance of discharge planning and transition of care
- 6. Review patient safety aspects of pediatric pain management



Background Information



Background

- Pain is a common complaint in the ED, EMS and hospital settings and requires special considerations when dealing with children.
- One child suffering from a traumatic injury and two anxious family members can disrupt the flow of your entire ED.
- Recognizing and effectively managing your pediatric patient's pain improves outcomes and enhances compassionate familycentered care.

- Several studies have shown medical providers underestimate pain.
- This is especially true in the pediatric population as many of these patients have not developed the verbal and cognitive skills needed to fully understand and express their pain.



Background



There is a new emphasis on pain management due to:

- Joint Commission standards
- Patient satisfaction (HCHAPS) scores
- Focus on medication errors and patient safety
- Readmission penalties
- New evidence that inadequately treated acute pain may lead to chronic pain
- Concerns regarding opioid addiction
- New discoveries in clinical and basic science pain related research









Examples of Common Painful Pediatric Procedures Include:

Fracture reduction & orthopedic procedures	Burn & wound debridement	Cardioversion, endoscopy or bronchoscopy
IV or blood draw Lumbar puncture	Chest tube insertion	Radiographic studies in agitated or uncooperative patients
Abscess incision & drainage	Laceration repair	Foreign body removal



Other Pediatric Scenarios Requiring Sedation, Management Initiative Analgesia, and/or Anxiolysis

Chronic Pain Conditions

• Cancer

Rheumatologic disorders Migraine headaches

Adolescents posing a threat to themselves or staff

Chronic disorders with an exacerbation or new painful condition

- Autism plus foreign body or fracture
- Oncology patient on baseline pain medications with a fracture

Post-operative painTonsillectomyOrthopedic procedures



Pain Pathophysiology



Pain Pathophysiology

- Anatomic components related to pain transmission are complex and include:
 - Chemical mediators
 - Nociceptors
 - A delta fibers
 - C fibers
 - Dorsal horn of the spinal cord
 - Thalamus
 - Limbic system
 - Cerebral cortex
 - Endorphins

All of these components are usually present by 24 weeks gestation

- Metabolic effects of pain include:
 - Increased release of catecholamines, glucagon and corticosteroids

*Catabolic states induced by acute pain may be more damaging to infants and young children due to their higher metabolic rates and lower nutritional reserves compared to adults.







The Physiology of Pain Transmission

Step 1: An injury occurs, nerve endings or nociceptors respond to painful stimuli.

Step 2: Pain impulse is transmitted via peripheral nerve fibers to spinal cord.

Step 3: In the spinal cord and brain, neurotransmitters are released.

Step 4: Pain stimulus is transmitted through thalamus and out through limbic system and cerebral cortex.



Review of Physiologic Consequences of Unrelieved Pain in Children



Responses to Pain	Potential Physiologic Consequences			
Respiratory Changes				
Rapid shallow breathing Inadequate lung expansion Inadequate cough	Alkalosis Decreased oxygen saturation, atelectasis Retention of secretions			
Neurological Changes				
Increased sympathetic nervous system activity and release of catecholamines	Tachycardia, elevated BP, change in sleep patterns, irritability			
Metabolic Changes				
Increased metabolic rate with increased perspiration; Increased cortisol production	Increased fluid and electrolyte losses Increased cortisol and blood glucose levels			
Immune System Changes				
Depressed immune and inflammatory responses	Increased risk of infection, delayed wound healing			
Gastrointestinal Changes				
Increased intestinal secretions and smooth muscle sphincter tone, nausea, anorexia	Impaired gastrointestinal functioning, poor nutritional intake, ileus			
Altered Pain Response				
Increased pain sensitivity	Hyperalgesia, decreased pain threshold, exaggerated memory of painful experiences			



Factors Affecting Pediatric Response to Painful Stimuli

- Age, gender, ethnicity
- Socioeconomic and psychiatric factors
- Culture and religion
- Genetics
- Previous experiences
- Patient/family perceptions
- Catastrophizing





Creation of Pain Memory in Children

What we do in the ED during a child's first painful experience has lasting effects!





Recognition and Assessment of Pediatric Pain Transient





The First Step is to *Recognize* or *Anticipate* a Painful Condition

- Recognition of pain is the first step to effectively managing pain.
- Children often cannot differentiate between pain and anxiety.
- The child's demonstration of pain and response to pain is multifactorial and related to age or developmental stage.
- Assessing pediatric pain can be difficult especially in those who are preverbal.



- Additionally, procedures and treatments used to manage the disease or injury may induce pain.
- The next section will review the elements of pain assessment
 - Assess physiologic parameters
 - Perform behavioral observation
 - Question the child
 - Use a standardized assessment tool



Elements of Pain Assessment





- Perform a pain focused physical exam.
- Children with acute pain may have:
 - Tachycardia
 - Tachypnea
 - Hypertension
 - Oxygen desaturation
 - Dilated pupils
 - Flushing or pallor

• Heart rate, blood pressure, and respirations may provide clues, especially in acute pain settings.



Elements of Pain Assessment: Perform Behavioral Observation



Behavioral Observation and Recognition of Pain



Ongoing Transient Brow Lower Brow Lower Lid Tighten Lid Tighten Eye closure Eye Closure **Cheek Raise Cheek Raise** Nose Wrinkle Nose Wrinkle Lip Raise Mouth Open Jaw Drop

Non-verbal cues such as facial expressions and body language help assist in recognizing pain. Caregivers can also be used to help provide insight as they often are better at assessing their child's behavior.

Learn How to Observe Pain by Development Management Initiative



Infant



Toddler



Preschooler



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



Pain Assessment and Management Initiative

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
- Poor eating and sleep quality
- 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



Used with permission from Illinois EMSC

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





Explore:

- Location of pain
- Duration of pain
- Quality of pain
- Precipitating factors
- Effect on daily activities
- Pain relief measures
- Previous pain experiences



Consider:

- The child's primary language
- Words or phrases suggested by the parent/caregiver
- The child's developmental level



Why Children Might Not Disclose Pain

- Avoidance of painful treatments
- Fear of being sick
- Fear of healthcare professionals
- Protection of parents or caregiver
- Avoidance of hospitalization
- Desire to return to activities
 - Sports
 - Social events
 - School





Questioning the Special Needs Child

- Adapt questioning and communication to the child's ability to understand and respond
- Ask the parent/caregiver to describe:
 - The child's cognitive level and communication abilities
 - Pain-related behaviors
 - Effective calming and soothing measures







the child's:

- Age
- Cognitive ability and language
- Condition
- Institutional preference

- Use the *same* pain scale throughout the hospital experience
 - Document the use of a differing scale, if changed
- Educate the child/parent/caregiver about the use of the scale

Pediatric Pain Assessment Scale Descriptions



Measurement Scale	Age Range	Description	
Birth - 6 months			
Neonatal Infant Pain Scale (NIPS)	Preterm and full term neonates	Behavioral scale.	
Neonatal Pain Assessment and Sedation Scale (N-PASS)	Preterm and full term neonates	Behavioral and physiologic scale.	
Neonatal Facial Coding System (NFCS)	32 weeks gestation to 6months	Facial muscle group movement, brow budge, eye squeeze, nasolabial furrow, open lips, stretch mouth lip purse, taut tongue, and chin quiver	
CRIES	32 weeks gestation to 6 months	Behavioral and physiologic scale.	
Infant and older (non-verbal children)			
Revised Faces, Legs, Activity, Cry, and Consolability (r-FLACC)	2 months to 3 years, critically ill, cognitively impaired, and older than three years of age unable to utilize a self-report scale.	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)	3-19 years (with cognitive impairment)	30 items that assess seven dimensions: vocal, eating/sleeping, social, facial, activity, body/limb, and physiologic signs	
3 years and older			
Wong Baker Faces	3 years and older	Self-report scale. Please refer to specific references for those alternative face scales.	
Oucher	3 -12 years	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)	8 years and older	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)	8 years and older	Self-report scale. Eleven point scale that requires understanding of numbers, addition and subtraction.	











Identifying the Type of Pain



Classification of Pain

There are multiple ways in which pain may be classified. Pain is broadly classified by underlying etiology, anatomic location, the temporal nature, and intensity.

- **Underlying etiology** refers to the <u>source</u> of the experienced pain.
- Anatomic location refers to the <u>site</u> of pain within the body and can divided into somatic and visceral.
- **Temporal nature** refers to the <u>duration</u> of the pain.
- Intensity refers to how the <u>pain experience</u> hurts.

Refer to the **Basics Principle's of Pain Module** for further information.








Treatment Options

Pharmacological

Nonpharmacologic



Pain Interventions That Alter <u>Peripheral</u> Transmission of Pain

Transmission Point

- Reduce tissue injury
- Alter blood flow to area
- Reduce swelling
- Inhibit prostaglandin production

Nonpharmacologic Interventions

- Splinting
- Immobilization
- Skin stimulation
- Application of heat and cold

Pharmacologic Interventions

- Administer non-steroidal anti-inflammatory drugs (NSAIDs)
- Administer local anesthetic agent

Pain Interventions That Alter <u>Spinal Cord</u>

Transmission Point

- Block by activating large fibers and preventing nociceptive transmission
- Block by binding opioid receptors in spinal cord
- Decrease release of neurotransmitters
- Interrupt descending input from brain.

Nonpharmacologic

Interventions

- Skin stimulation
- Massage
- Acupuncture
- Application of heat and cold
- Touch

Pharmacologic Interventions

- Epidural analgesia
- Intrathecal analgesia
- Opioids

Pain Interventions That Alter <u>Receptor Site</u> Transmission of Pain

Transmission Point

- Increase stimuli to the brain
 - Increase blood flow to targeted areas, decreases pain chemicals
 - Increase endorphins

Nonpharmacologic Interventions

- Distraction
- Imagery
- Relaxation
- Biofeedback

Pharmacologic Interventions

• Systemic opioids



Pharmacologic Interventions



Pharmacologic Pain Management Strategies



Promote use of least invasive, most 80 effective agent Oral or nasal By the

•IV route

reserved for

moderate to severe pain

Avoid intramuscular and rectal routes if possible

🖌 Promote pain relief **0**0 with timely and routine dosing

Start with dose that

matches the pain

assessment findings

s and pain score

 $\mathbf{\Omega}$ Titrate dose upward if relief is inadequate

> Modify intervals between doses in the presence of moderate and severe pain

Incorporates the 70 **child's**

С С • Developmental

status 0

- Cultural influences
- Religious beliefs

 $\mathbf{\Omega}$ Personal preferences

> • Previous pain experiences

Originally created for guiding cancer pain Ο treatment 0

Uses a three-step ladder

Ð

Uses least invasive

administration route

S to provide needed **analgesic**

> Recommends use of adjuvants to manage side effects, minimize fear, and enhance pain relief











Pharmacologic Categories

Topical agents

Infiltrative local agents or nerve blocks

Mild oral agents

Moderate agents



For more information refer to module on Pharmacologic Treatment of Pain

PAMI Pain Management and Dosing Guide

- The PAMI Pain Management and Dosing Guide is a free tool for use by health care providers in hospital, EMS or acute care settings and should be used as general guide when managing pain in pediatric and adult populations.
- 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, <u>click here</u>!
- A free downloadable pdf of the dosing guide can be accessed on the PAMI website.

http://pami.emergency.med.jax.ufl.e du/resources/dosing-guide/





Topical Anesthetic Overview

Туре	Onset	
EMLA®	60 min	lidocaine 2.5% and prilocaine 2%
LMX4®	40 min	liposomal lidocaine 4%
LET	20 min	lidocaine , epinephrine ,and tetracaine (A gel form of TAC can be made by adding 150 mg of methyl- cellulose 4000 cps to 3 mL of LET solution)
Synera®	20 min	lidocaine and tetracaine patch
Topical Anesthetic Skin Refrigerant (Pain Ease®):	< 5 min	

Tips

Safety Tip: agents are cardiac depressants; maximum allowable safe dosage should be calculated *before* administration to avoid overdose in pediatric cases.

Topical Anesthetics



AGENT	INDICATION	DOSE/ROUTE	TIME ONSET/ DURATION	MAXIMUM DOSE	COMMENTS
L.M.X.4® (Lidocaine 4%)	For external use for pain relief of minor cuts, scrapes, burns, sunburn, insect bites, and minor skin irritations	Apply externally	Onset 20-30 minutes Duration 60 minutes	Externally 3-4 times per day Apply in area less than 100cm ² for children less than 10 kg Apply in area less than 600cm ² for children between 10 and 20 kg	Advantages For use in children 2 years and older Over-the-counter (OTC) availability Risks Use discretion in children < 2 years old.
LET Lidocaine Epinephrine Tetracaine (gel or liquid)	Wound repair (non-mucosal)	4% Lidocaine 1:2,000 Epinephrine 0.5% Tetracaine	Onset 10 minute Duration 30-60 minute	3 ml (not to exceed maximal Lidocaine dosage of 3-5 mg/kg)	Advantages No physical wound distortion, painless application, decreased repair time, non-cocaine containing anesthetic Risks Not for use over end arteriole locations

Topical Anesthetics



AGENT	INDICATION	AGE/DOSE/ROUTE	TIME ONSET/ DURATION	MAXIMUM DOSE	COMMENTS
EMLA (2.5% Lidocaine 2.5% Prilocaine)	Dermal analgesic (intact skin)	3-12 months (and >5 kg) maximum area covered 20 cm ²	Onset 45-60 minutes Duration 3-4	2 gm	Advantages Painless application, patient compliance, decreased repair
(for children > 3 months age)		1-6 years (and >10 kg) maximum area covered 100 cm ²	hour	10 gm	time Risks Methemoglobinemia
		7-12 years (and >20 kg) maximum area covered 200 cm ²		20 gm	Contact dermatitis
		topical/transdermal (cover area with occlusive dressing)		Maximum application time not to exceed 4 hours	

Topical Anesthetics



AGENT	INDICATION	DOSE/ROUTE	TIME ONSET/ DURATION	MAXIMUM DOSE	COMMENTS
Pain-Ease [®]	Cooling intact skin and mucus membranes and minor open wounds	Spray for 4-10 seconds from a distance of 8-18 cm	Onset- immediate Duration- a few seconds, up to a minute	When skin turns white	Advantages Quick acting Risks Skin freezing may create hypo- pigmentation especially in dark skin
Lidocaine NOTE: Not reco children or you expectorate- D	Foley catheter and NG tube insertion; Intubation; Gingivostomatitis painful lesions ommended for teethin ng children who canno o not give Rx for home	2% topical gel/jelly 5% topical ointment 2% oropharyngeal viscous topical solution	Onset 2-5 min Duration 30-60 min	3-5 mg/kg	Advantages Comfort of insertion Risks Hematoma, painful, bleeding at site, absorption can cause systemic toxicity.

Infiltrative Anesthetics



AGENT	INDICATION	DOSE/ROUTE	TIME ONSET/ DURATION	MAXIMUM DOSE	COMMENTS
Infiltrative Lidocaine	Vascular access; needle insertion procedures	Subcutaneous 1% Lidocaine without epinephrine 0.5%= 5mg/ml 1% = 10mg/ml 2% = 20 mg/ml 1% Lidocaine with epinephrine	Onset 4-10 min Duration 90-120 min	 4.5 mg/kg maximum dose or 300 mg 7 mg/kg maximum dose Additional dosing after maximum reached, may occur after 2 hours. 	Advantages Rapid onset, longer duration Risks Hematoma, bleeding at site; absorption can cause systemic toxicity
J-Tip [®] Jet injector of 1% buffered Lidocaine	Vascular access, needle insertion procedures	0.2 ml subcutaneous	Immediate	One application per site	Advantages Needleless Risks Not for preterm infants; neonates; patients with blood disorders; or in children receiving chemotherapy or blood thinners.

Mild Pain Agents



NON-OPIOID	INDICATION	DOSE/ROUTE*	MAX DOSE	COMMENTS
Acetaminophen (APAP) Mild pain NOTE: ‡ All doses of combination products limited by APAP content to 75 mg/kg/day		10 - 15 mg/kg Every 4-6 hr PO, PR	75 mg/kg/day or 4 g/day 60mg/kg/day for neonates	Advantages Minimal adverse effects on GI tract or renal function Risks Liver toxicity
Ibuprofen (Motrin [®] , Advil [®])	Mild pain	5 - 10mg/kg Every 6-8 hr PO	40 mg/kg/day Adults 3200 mg/day	Advantages Inhibits prostaglandin-induced nociception Risks Nausea, vomiting, ulcers, platelet dysfunction, liver toxicity



Moderate Pain Agents

NON-OPIOID INDICATION DOSE/ROUTE [*] MAX DOSE	COMMENTS
Ketorolac (Toradol*) Moderate - severe pain 0.5 mg - 1 mg/kg every 6 hr 30 mg/IM every 6 hr Advantag NOTE: Do not use with other NSAIDs. PO for patients > 50 kg Adult dose: 60 mg Effective at treatment pain Moderate - severe pain PO for patients > 50 kg Adult dose: 60 mg Bleeding at the patient of the patient o	tive alternative to opioids for ment of moderate to severe ding diathesis; hyperkalemia; ession of renal function; and totoxicity

*IM routes not recommended as first line treatment.



Moderate Pain Agents

OPIOIDS §	INDICATION	DOSE/ROUTE*	ONSET	DURATION	MAX DOSE	COMMENTS
Codeine/APAP	Mild - moderate	0.5 - 1 mg/kg of	1-2 hr	4-6 hr	60 mg/dose	Advantages
with Codeine	pain	Codeine or 12 mg				Rapid onset action
		for 3-6 yo and 15-				
NOTE: Codeine is of	ten ineffective.	30 mg for 7-12 yo				Risks
Use for cough a contraindicated in	and cold is children. Not	Every 4-6 hr				Nausea, vomiting, constipation,
recommended for < 1	2 yo or 12-18 yo	РО				respiratory depression,
with respiratory cond	dition or nursing					hypotension, bradycardia, CNS
mothe	rs.	Oral solution: 12				depression
		mg codeine/5 ml				See current FDA warnings



Moderate Pain Agents

OPIOIDS	INDICATION	DOSE/ROUTE*	ONSET	DURATION	MAX DOSE	COMMENTS
Hydrocodone (+ APAP: Norco, Hycet, Lortab [®] Vicodin [®])	Mild - moderate pain	 0.1 - 0.2 mg/kg of Hydrocodone Every 4-6 hr PO 2.5 mg hydrocodone/5 ml 	30 min	3 - 4 hr	Limited by APAP component	Advantages Oral medication, moderately rapid onset Risks Dizziness, sedation, nausea, vomiting, constipation
Oxycodone (+APAP: Percocet [®])	Moderate - severe pain	0.05 - 0.15 mg/kg of Oxycodone Every 4-6 hr PO (immediate release formula)	15 min	3 - 4 hr NOTE: Generall ommended in ch than 6 years of	10 mg every 4-6 hr y not ildren less age.	Advantages Oral medication, moderately rapid onset Risks CNS depression, respiratory depression, hypotension, bradycardia, nausea



NSAIDS versus Opioids- Update

- Numerous studies have shown the benefit of NSAIDS as equal to oral morphine and usually with less side effects and risks in mild pain management of children.
 - Found no significant difference in analgesic efficacy between orally administered morphine and ibuprofen. Morphine was associated with a significantly greater number of adverse effects. (Poonai N. Oral administration of morphine versus ibuprofen to manage postfracture pain in children: a randomized trial. CMAJ. 2014 Dec 9;186(18):1358-63).
 - Randomized controlled trial of 91 healthy children aged 1 to 10 years with diagnosis of sleep disordered breathing and scheduled for tonsillectomy. Given acetaminophen and either morphine or ibuprofen. Concluded that ibuprofen is as effective as and safer than morphine for post-tonsillectomy analgesia in children, without a higher risk of postoperative hemorrhage. (Kelly LE, Sommer DD, Ramakrishna J, et al. Morphine or ibuprofen for post-tonsillectomy analgesia: a randomized trial. Pediatrics. 2015;135(2):307-313).

Severe pain

- Use high potency analgesics
 - Morphine
 - Fentanyl
 - Hydromorphone
- Intractable pain may require:
 - Nerve block, epidural or patient controlled analgesia (PCA)





Severe Pain

	OPIOIDS	INDICATION	DOSE/ROUTE*	ONSET	DURATION	MAX DOSE	COMMENTS
	Fentanyl (Sublimaze [®])	Moderate - severe pain	1-2 mcg/kg/dose IV (over 3-5 min)	1-2 min IV	30-60 min IV	1-3 mcg/kg/dose	Advantages Rapid onset, short duration, potent analgesic; preferred
NOTI use	NOTE: IN route should not be used in patients with facial trauma.		IN 1.5-2 mcg/kg 10 min IN (divide dose equally between each nostril)	10 min in	60 min in		for renal patients Risks Respiratory depression,
			IM*	7-15 min IM	1-2 hr IM		apnea may precede alteration of consciousness chest wall rigidity if given too rapidly

*IM routes not recommended as first line treatment. IM=Intramuscular IN=Intranasal

Severe Pain



OPIOIDS	INDICATION	DOSE/ROUTE*	ONSET	DURATION	MAX DOSE	COMMENTS
Morphine (Roxanol®)	Moderate - severe pain	<pre>IV, SC, IM* <6mo: 0.05-0.1 mg/kg q4h prn; 6 mo-12yo: 0.1-0.2 mg/kg q2-4h prn >12yo: 3-10mg q2-6h prn >12yo: 0.2-0.5 mg/kg PO q4-6h prn >12yo: 10-30 mg q3-4h prn Chronic Pain PCA route <50kg: 0.01-0.03 mg/kg IV q6-20 min prn; >50kg: 0.5-2.5mg IV q6- 20min prn</pre>	5-15 min	3-4 hr TE: Avoid in ch vith renal failu	15 mg ildren re.	Advantages Moderately rapid predictable onset. Significant role for patients who need prolonged pain control (e.g., fracture reduction, multiple trauma, sickle cell disease) Risks Respiratory depression, hypotension, bradycardia, CNS depression

*IM routes not recommended as first line treatment.



Severe Pain

OPIOIDS	INDICATION	DOSE/ROUTE*	ONSET	DURATION	MAX DOSE	COMMENTS
Hydro-morphone (Dilaudid®)	Severe pain	0.01-0.015 mg/kg IV Every 4 hr 0.03 - 0.06 mg/kg PO Every 4 hr	Almost immediately Up to 30 min	2-4 hr 4-5 hr	0.015 mg/kg/dose Adult dose=1-4 mg/dose	Advantages Rapid onset; less pruritis than morphine Risks Respiratory depression, CNS depression, sedation

Pharmacologic Safety in Pediatric Patients

- Many medications are metabolized in the liver via cytochrome P450 subtypes which are not fully developed in newborns
 - Hepatic 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.



Incorporate Current Evidence-based Pharmacologic Pain Interventions



- Provide analgesia for children with acute abdominal pain prior to the surgical consult
- Provide pain medication for children in triage with a pain rating greater than 6 out of 10
- Provide anesthetic ear drops for ear pain

- Apply topical anesthetics prior to IV insertions, blood draws and laceration repairs
- Provide pressure to IM site before giving injections
- Consider lidocaine as a diluent if giving IM ceftriaxone
- Consider buffered lidocaine for local anesthesia





Nonpharmacologic Interventions

- Child Life Specialist
- Comforting Positioning
- Distraction Techniques
- Guided Imagery
- Infant interventions

- Toddler interventions
- Preschooler interventions
- School-aged child interventions
- Adolescence interventions

For more information see Nonpharmacologic Treatment and Management module

Nonpharmacologic Interventions



Nonpharmacologic and pharmacologic methods can work together effectively



- Educate and encourage the parent/caregiver to participate in nonpharmacologic techniques
- There are multiple non-pharmacologic interventions for pediatric patients and their developmental stages.

Child Life Services

<u>Child Life Specialists</u> are professionals who provide developmental, educational, and therapeutic interventions for children and their families.

- Only hospitals with significant pediatric volumes usually employ child life specialists.
- Consider having other staff members learn certain child life techniques.

Related services include:

- Provide psychosocial preparation for tests, surgeries, and other procedures
- Facilitate medical play using special dolls, stuffed animals and medical equipment to inform and prepare child for what he/she is going to hear, see, or feel
- Reduce overall anxiety to help prevent a negative medical experience
- Evaluate influence of previous negative experiences to help determine appropriate level of sedation

With appropriate support, preparation, and pain management (i.e., topical analgesic), a young child may be capable of remaining still for minor procedures with minimal sedation and/or restraint.





Comfort Positioning



<u>Comfort positions</u> are used by parents and caregivers to reduce stress and anxiety to infants and children undergoing invasive medical procedures.

- Why use positioning for comfort?
 - Fewer people are needed to complete a procedure (in turn, less overwhelming for child)
 - 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



Permission to use by Wolfson Children's Hospital



Consider using comfort positioning during presedation procedures (e.g., IV placement)

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 boxes
 - 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/





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 his/her imagination to create a descriptive story
 - Ask questions about a favorite place, upcoming events, vacations 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)





Developmentally Specific Nonpharmacologic Therapies

- In the next few slides non-pharmacologic therapies will be reviewed by developmental stages.
 - Infants
 - Toddles
 - Preschoolers
 - School Age Child
 - Adolescence





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

- Offer play with blocks
- Drawing with crayons and paper
- Encourage picture reading
- Encourage singing
- Blowing bubbles





Nonpharmacologic Measures: Preschoolers

- Provide a calm environment
- Apply cold or hot pack
- Provide a position of comfort
- Provide light touch or massage
- Suggest music or TV to entertain
- Coach child through the ED process and/or procedures

- Draw in coloring books
- Play with puzzles
- Look at or read storybooks
- Encourage singing or storytelling
- Hold cold or hot pack
- Engage in distracting conversation




Nonpharmacologic Measures: School Age Child

- Provide a calm environment
- Suggest new positions for comfort
- Suggest music, TV
- Read books
- Coach child through the ED 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 tablet/wireless Internet device



Nonpharmacologic Measures: Adolescent Assessment and Management Initiative

- 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
- Read
- Visit with friend
- Use telephone access





- Coach about ED processes and procedures
- Discuss preferred relaxation techniques
- Demonstrate relaxation techniques, if unfamiliar
- Use squeeze balls
- Encourage making choices
- Play with electronic games or tablets





Reassessment of Pain





Reassessment of Pain, Evaluation of Treatment Effectiveness, and Adjustment of Treatment Plan

- One of the most common mistakes made in pain management is failure to reassess
 - Reassess the patient to determine if your pharmacologic and non-pharmacologic interventions are making a difference
 - Repeat the same pain score or assessment tool
 - Ask the patient, the caregiver and other members of the healthcare team if they believe the pain intensity and/or anxiety has diminished
 - Determine next steps in treatment



Permission to use by Connie Baker. Wong Baker Faces Pain Rating Scale 2015. <u>http://wongbakerfaces.org/</u>

Faces Pain Scale - Revised



From: <u>http://www.iasp-pain.org/Education/</u> Content.aspx?ItemNumber=1823&navItemNumber=1119



Procedural Sedation and Analgesia (PSA)

Definition

Stepwise Approach





Procedural Sedation and Analgesia (PSA)

PSA is a form of pain management that is often used in the ED setting for pediatric patients.

PSA is **defined** as the use of pharmacologic agents to provide anxiolysis, analgesia, sedation, **or** motor control during procedures or diagnostic tests.

• PSA reduces the discomfort, apprehension, and potential unpleasant memories associated with procedures and facilitates improved performance.

The next portion of this module will give a brief overview of PSA. To learn more about Procedural Sedation and Analgesia click <u>here</u>



Definition of Procedural Sedation and Analgesia (PSA)

PSA has overlap with many terms and was previously synonymous with the term "*conscious sedation*"; however, effective sedation often alters consciousness so the preferred term in the ED and acute care setting is "**procedural sedation** and analgesia (PSA)."





- Sedation levels exist along a **continuum** but it is clinically challenging to use discrete sedation stages or terminology, especially in children.
- The Joint Commission and American Society of Anesthesiologists (ASA) adopted definitions to define the continuum of levels that range from minimal sedation to general anesthesia:
 - Analgesia
 - Minimal sedation
 - Moderate sedation and analgesia
 - Deep sedation and analgesia
 - General anesthesia
 - Dissociative sedation

Procedural Sedation Definitions



Organization Definition or Statement Technique of administering sedatives or dissociative agents with or without analgesics to induce an altered state of consciousness that allows the patient to tolerate painful or unpleasant procedures while American College of Emergency Physicians* ACEP preserving cardiorespiratory function. The intent of the sedation, not ADVANCING EMERGENCY CARE. the agent itself, determines whether medication is being delivered to relieve anxiety or to facilitate a specific procedure as with procedural sedation Administration of sedatives or dissociative agents with or without American Society of ASA Anesthesiologists[®] unpleasant procedures while maintaining cardiorespiratory function.

American Academy of Pediatrics



DEDICATED TO THE HEALTH OF ALL CHILDREN*

analgesics to induce a state that allows the patient to tolerate

The sedation of children is different from the sedation of adults. Sedation in children is often administered to control behavior to allow the safe completion of a procedure. A child's ability to control his or her own behavior to cooperate for a procedure depends both on chronologic and developmental age. AAP uses the terms minimal, moderate and deep sedation.



PSA Continuum Tips





- Sedation is *unpredictable* and levels may rapidly change to unanticipated and deeper levels of sedation than intended.
- Providers of PSA must be able to rescue the patient from deeper levels of sedation and require PALS training or knowledge equivalency.
- Providers must also take into account the patient's unique makeup including age, body habitus, comorbidities, medications, and allergies to determine if PSA is a safe and effective option and to determine medication selection.
- Dissociative sedation is unique and commonly used in the pediatric and ED settings, but does not fall neatly within the continuum.



Overview of Stepwise Approach to Pediatric Pain Ranagement Initiative Management or Procedural Sedation Analgesia (PSA)

Children bring unique challenges to the use of PSA. The choice of whether or not to use PSA and what agents to use are determined by using a stepwise approach that is outlined next.

These same steps can be used in assessing and treating any type of pain scenario in the pediatric setting.

Step 7. Monitoring & Discharge Checkpoint

Step 6. Management Checkpoint

Step 5. Patient Assessment Checkpoint

Step 4. Facility Checkpoint

Step 3. Family Dynamic Checkpoint

Step 2. Developmental or Cognitive Checkpoint

Step 1. Situation Checkpoint

Step 1: Determine the Situation: What are and you trying to accomplish or treat?

Step 1. Situation Checkpoint

- Pain only
- Pain and anxiety or agitation
- Anxiety only
- Agitation only
- Sedation only plus topical, local, or other intervention
- Procedure that will induce pain or anxiety
- Chronic pain condition exacerbation

Determination accomplished after a brief history and PE or triage

Step 2: Perform a Developmental Checkpoint

Step 2. Perform a Developmental or Cognitive Checkpoint

- What is the developmental stage
- Is development normal for age
 - Developmental delay
 - Autism
 - Special health care needs
 - Mental health
 - Recent traumatic events



- What are characteristics of this developmental stage in response to pain?
- How do you adapt your approach based on developmental level?
- Kids and teens don't always follow the charts!



Step 2: Child's Understanding of Pain, Behavioral Responses, and Verbal Descriptions by Developmental Stage

|--|

Age Group	Understanding of Pain	Behavioral Response	Verbal Description
		Infants	
6 months	No understanding of pain; is responsive to parental anxiety	Generalized body movements, chin quivering, facial grimacing, poor feeding	Cries
6–12 months	Has a pain memory; is responsive to parental anxiety	Reflex withdrawal to stimulus, facial grimacing, disturbed sleep, irritability, restlessness	Cries
		Toddlers	
1–3 years	Does not understand what causes pain and why they might be experiencing it	Localized withdrawal, resistance of entire body, aggressive behavior, disturbed sleep	Cries and screams, can't describe intensity /type of pain; Use words for pain such as owie and boo-boo
		Preschoolers	
3–6 years (preoperational)	Pain is a hurt; Does not relate pain to illness; may relate pain to an injury; <i>Often believes pain is punishment;</i> Unable to understand why a painful procedure will help them feel better or why an injection takes the pain away	Active physical resistance, directed aggressive behavior, strikes out physically and verbally when hurt, low frustration level	Has language skills to express pain on a sensory level; Can identify location and intensity of pain, denies pain, may believe his or her pain is obvious to others
		School-Age Children	
7–9 years (concrete operations)	Doesn't understand cause of pain; Understands simple relationships between pain and disease and need for painful procedures to treat disease ; May associate pain with feeling bad or angry; recognize psychologic pain related to grief and hurt feelings	Passive resistance, clenches fists, holds body rigidly still, suffers emotional withdrawal, engages in <i>plea bargaining</i>	Can specify location and intensity of pain and describes pain physical characteristics in relation to body parts
10–12 years (transitional)	Better understanding of relationship between an event and pain; More complex awareness of physical and psychologic pain,(moral dilemmas , mental pain)	May pretend comfort to project bravery, may regress with stress and anxiety	Able to describe intensity and location with more characteristics, able to describe psychologic pain
		Adolescents	
13–18 years (formal operations)	Has a capacity for sophisticated and complex under-standing of causes of physical and mental pain; Recognizes pain has qualitative and quantitative characteristics; <i>Can relate to pain experienced by others</i>	Want to behave in socially acceptable manner -like adults; controlled response; May not complain if given <i>cues</i> from other healthcare providers	More sophisticated descriptions with experience; may think nurses are in tune with their thoughts, so don't need to tell nurse about their pain 86



Step 3: Family Dynamic Checkpoint

Step 3. Family Dynamic Checkpoint

- Who is there with the child?- parents, siblings.....
- Who is the legal guardian?
- Who actually cares for the child?
- Who do you want at the bedside?
- Culture, past experience
- What can they tolerate
- Time commitments
- Family personality
- Family stress level











A quick visual or peek in the door is invaluable. What is child's personality? What is caregiver's personality? Is caregiver going to be a help or hindrance?





Step 4: Facility Checkpoint



Step 4. Facility Checkpoint

- Staffing and setting
 - Community, rural, children's hospital
- Experience
 - Pediatric
 - Sedation
 - Team capabilities and expertise
- Hospital policies on Pain and PSA
- Acuity and overcrowding of the ED
- Other priorities
- Equipment
- Monitoring
- Backup







Step 5: Patient Assessment Checkpoint

Step 5. Patient Assessment Checkpoint

- Review risk factors from history and PE
- CSHCN, genetic syndromes,...
- Chronic illness
- History of failed sedation
- Psychiatric and mental considerations
- Injury severity
- Body habitus
 - Weight- ideal or real?







Step 6: Management Checkpoint: Choose Your "Recipe"

Step 6. Management Checkpoint

- No magic recipe, must individualize and adjust "Ingredients"
- Pharmacologic "ingredients"
 - Topical
 - Local anesthetics or blocks
 - Oral, nasal, IV
- Nonpharmacologic "ingredients"
 - Everyone in ED needs a little child life 101 course- music, swaddling, etc.
 - Engage caregivers, parents, volunteers, etc.
 - Lobby for child life specialist in your ED if \uparrow pediatric volume

Usually need both pharmacological and nonpharmacological options







Step 7: Monitoring And Discharge Checkpoint

Step 7. Monitoring & Discharge Checkpoint

- Joint Commission standards
- Document reassessments
- Child should be back to baseline and tolerating fluids at discharge but difficult situation when after bedtime







Step 7: Monitoring During PSA

- Monitor vital signs frequently and at regular intervals (document every 5 minutes during procedure):
 - blood pressure
 - heart rate
 - respiratory rate
- Monitor **continuously**:
 - oxygen saturation (SpO2)
 - end-tidal carbon dioxide level (EtCO2) if available
 - cardiac rhythm



Patient safety tip: Complications from sedation such as respiratory depression are most likely to occur within 5 to 10 minutes after administration of IV medication and immediately after the procedure when stimuli associated with the procedure are removed. Thus, monitoring should be especially close during these periods.





Step 7: Monitoring of Pediatric Patients that are Transported to Another Facility or Area After PSA or Receiving Analgesics

- Have credentialed and skilled personnel accompany the child
- Monitor all vital signs and level of consciousness
- Transport on cardiac monitor and pulse oximeter
- Bring necessary supplies or emergency equipment bag with age appropriate sizes and oxygen tank
- Bring necessary emergency drugs (including reversal agents)
- Give report to receiving facility of last analgesic or PSA medication







Summary



Pain Assessment, Intervention, Reassessment, and Disposition Process(continued)

- Upon arrival, the child and parent or caregiver have their first opportunity to share pain information.
- The healthcare team completes an initial pain assessment.
- A plan of care is developed, including discussion with the child and family regarding the pain assessment process and proposed interventions.
- Before providing pain interventions, minimize anxiety by anticipating and preparing for painful experiences, for example, venipuncture, IV starts, and laceration suturing.



Pain Assessment, Intervention, Reassessment, and Management Initiative Disposition Process (continued)

• Timing is determined by the intervention chosen

- Document intervention(s)
- Document instruction provided
- Continue to reassess after each intervention until discharge

Reassessment

Disposition

- Home
- Admission
- Surgery
- Transfer

- Reassessment interval varies based upon hospital and current regulatory policy and the type of intervention offered.
- A good rule of thumb to follow is to conduct a reassessment 15 to 30 minutes following IV pain medication administration, and 30-60 minutes after oral pain medication administration.

Pain Assessment, Intervention, Reassessment, and Management Initiative Disposition Process



Summary of the Approach to Effectively Managing Pain Assessment and Pediatric Pain

- Recognize and anticipate
- Identify type of pain
- Select appropriate treatment(s)- pharmacologic and non-pharmacologic
- Re-evaluate effectiveness of the selected treatment(s)
- Adjust accordingly based on clinical course

Step 7. Monitoring & Discharge Checkpoint

Step 6. Management Checkpoint

Step 5. Patient Assessment Checkpoint

Step 4. Facility Checkpoint

Step 3. Family Dynamic Checkpoint

Step 2. Developmental or Cognitive Checkpoint

Step 1. Situation Checkpoint



Resources

Resources



Websites	Links
PAMI Home Page	http://pami.emergency.med.jax.ufl.edu/
Pain Assessment scales	http://pami.emergency.med.jax.ufl.edu/resources/educational- materials/pain-assessment-scales/
PAMI Module: Basic Principles of Pain Management	http://pami.emergency.med.jax.ufl.edu/resources/educational- materials/basics-of-pain/
PAMI Module: Pharmacologic Management and Treatment of Pain	http://pami.emergency.med.jax.ufl.edu/resources/educational- materials/pharmacological-treatment-of-pain/
PAMI Module: Procedural Sedation and Analgesia	http://pami.emergency.med.jax.ufl.edu/resources/educational- materials/procedural-sedation/
PAMI Module: Non-pharmacologic Management and Treating of Pain	http://pami.emergency.med.jax.ufl.edu/resources/educational- materials/non-pharmacological-treatment-of-pain/
YouTube Video: It Doesn't Have to Hurt	https://www.youtube.com/watch?v=KgBwVSYqfps&feature=youtu.be
Podcast: Emergency Medicine Cases: Pediatric Pain Management	http://emergencymedicinecases.com/pediatric-pain-management/



Pain Assessment Tools

- Birth 6 months
 - Neonatal Infant Pain Scale (NIPS)
 - Neonatal Pain Assessment and Sedation Scale (N-PASS)
 - Neonatal Facial Coding System (NFCS)
 - CRIES
- Infant and older (non-verbal children)
 - Revised Faces, Legs, Activity, Cry, and Consolability (r-FLACC)
 - Non Communicating Children's Pain Checklist (NCCPC-R)

- 3 years and older
 - Wong Baker Faces
 - Oucher
- 8 years and older
 - Visual Analogue Scale (VAS)
 - Verbal Numeric Scale (VNS)



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 <u>emresearch@jax.ufl.edu</u>.

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

