CHILDREN'S ACUTE PAIN

Pediatric Pain PRN Curriculum

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The MAYDAY Fund

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Objectives

- Explore the diversity of acute pain experienced by children by providing at least 5 examples from your clinical and personal experiences.
- Compare the efficacy and risk of different methods of managing children's acute pain in hospitals, including: patient-controlled analgesia, nurse-controlled analgesia, authorized agent controlled analgesia, epidural analgesia, patient controlled epidural analgesia, continuous nerve blocks and other forms of regional analgesia.
- Synthesize knowledge of pediatric acute pain assessment and management to formulate care plans for all developmental levels and at least three different cases of acute pain experienced by children.

Why Do Children Experience Acute Pain?

Take a minute to reflect about a time you experienced acute pain.

What was it like?

Type your answer here.

Diversity of acute pain experienced by children

The experience of pain is as diverse as the patients and families we care for, even when pain is from the same cause, event, or stimulus.

Pain in children occurs across a spectrum of conditions including everyday pains, acute injuries, disease processes, and medical procedures

Acute pain should resolve with time and the healing process; however, the time for healing is also diverse among patients and conditions. Poorly controlled acute pain is a risk factor for the development of chronic pain.

It is also possible for children to experience acute and chronic pain. Consider, for example, teenagers with chronic back pain who have 3rd molar extractions or children with sickle cell disease or even children with functional abdominal pain who develop appendicitis.

Acute pain alerts us to injury and illness. Once a family has heeded this alarm system, it is our obligation as healthcare providers to assess and manage both the cause of pain and the pain experience.

Acute pain treatment expectations

"What do they expect?...."

"There is no way to completely relieve that pain!"

Or is there?

Are there organizational or individual healthcare professional barriers to complete pain relief?

If acute pain can not be completely relieved, discuss other achievable outcomes, such as functional recovery.

Given the diversity of our acute pain experiences, differences in patient, parent, family, and healthcare provider's preferences for managing children's pain and expectation for acute pain treatment outcomes should be expected.

To develop a shared understanding of the treatment plan and realistic outcomes, it is important to discuss past experience and expectations for acute pain treatment, as well as the risks and benefits of treatments.

What acute pain experiences can not be relieved? Why?

What would be appropriate treatment expectations for these acute pain experience you could share with patients and families?

Type your answer here.

Guidelines

American Pain Society (APS) Postoperative Guidelines

APS Clinical Practice Guidelines for Post-surgical Pain Management

These guidelines are based on a systematic evidence review of over 10,000 publications related to postoperative pain. Many of these guidelines, however, are also applicable to acute pain requiring hospitalization for management and monitoring.

The panel recommends that facilities in which surgery is performed:

- have an organizational structure in place to develop and refine policies and processes for safe and effective delivery of postoperative pain control (strong recommendation, low-quality evidence).
- provide clinicians with access to consultation with a pain specialist for patients with inadequately controlled postoperative pain or at high risk of inadequately controlled postoperative pain (e.g., opioid tolerant, history of substance abuse) (strong recommendation, low-quality evidence).

Reference:

http://americanpainsociety.org/about-us/press-room/american-pain-society-publishes-clinical-practice-guideline-for-post-surgical-pain-management

APS Postoperative Guidelines

The panel recommends that clinicians:

- offer multimodal analgesia, or the utilization of a variety of analgesic medications and techniques combined with non-pharmacological interventions, for the treatment of perioperative pain in children and adults (strong recommendation, high-quality evidence)
- adjust the postoperative pain management plan based on adequacy of pain relief and presence of adverse events (strong recommendation, low-quality evidence)
- provide adults and children with acetaminophen and/or NSAIDs as part of multimodal analgesia for management of postoperative pain in patients without contraindications (strong recommendation, high-quality evidence)
- consider use of gabapentin or pregabalin as a component of multimodal analgesia (strong recommendation, moderate quality evidence).
- consider intravenous ketamine as a component of multimodal analgesia in adults (weak recommendation, moderate-quality evidence)

APS Postoperative Guidelines

The panel can neither recommend nor discourage *acupuncture, massage, or cold therapy* as adjuncts to other postoperative pain treatments (insufficient evidence).

The panel recommends that clinicians:

- consider *TENS* as an adjunct to other postoperative pain treatments (weak recommendation, moderate-quality evidence).
- consider the use of *cognitive modalities* as part of a multimodal approach (weak recommendation, moderate-quality evidence)

APS Postoperative Guidelines

The panel recommends that clinicians:

- Provide patient and family-centered, individually tailored *education* to the patient (and/or responsible caregiver), including information on treatment options for management of postoperative pain, and document the plan and goals for postoperative pain management (strong recommendation, low-quality evidence).
- Provide education to all patients (adult and children) and primary caregivers on the pain treatment plan including tapering off analgesics following *hospital discharge* (strong recommendation, low-quality evidence).
- The panel recommends that the parents (or other adult caregivers) of children undergoing surgery receive instruction in *developmentally-appropriate methods* for assessing pain as well as counseling on appropriate administration of analgesics and modalities (strong recommendation, low-quality evidence).

Neuraxial or Interventional Techniques

APS Postoperative Guidelines

The panel recommends that clinicians:

- offer *neuraxial analgesia* with opioids, local anesthetics, or both for major thoracic and abdominal procedures, particularly in patients at risk for cardiac complications, pulmonary complications, or prolonged ileus (strong recommendation, high-quality evidence).
- consider *surgical-site specific peripheral regional anesthetic techniques* in adults and children for those procedures with evidence indicating efficacy (strong recommendation, high-quality evidence).
- use *continuous, local-anesthetic based peripheral regional analgesic techniques* when the need for analgesia is likely to exceed the duration of effect of a single injection (strong recommendation, low-quality evidence).
- consider *surgical-site specific local anesthetic infiltration* for those surgical procedures with evidence indicating efficacy (weak recommendation, moderate-quality evidence).
- consider the *addition of clonidine* as an adjuvant for prolongation of analgesia with a single injection peripheral neural blockade (weak recommendation, moderate-quality evidence).

Interventional techniques

Local infiltration

Infiltration of local anesthetic into tissue surrounding the area of surgery (e.g., incisional, intra-articular, intrapleural, or transversus abdominus plane [TAP]) block may be performed.

Peripheral regional blocks

Peripheral nerve blocks are typically used for lower or upper extremity surgeries and include paravertebral, intercostal, femoral and lumbar plexus, obturator, popliteal fossa, sciatic, axillary, supraclavicular and intraclavicular, interscalene and suprascapular, and pudendal blocks among others. A single "shot" technique or continuous infusion through a catheter to prolong analgesia may be used.

Epidural analgesia

Spinal analgesia

Epidural or intraspinal (intrathecal) analgesia with opioids (with or without local anesthetics) lessens postoperative pain or decreases need for rescue analgesics in a variety of surgeries.

Interventional Techniques

Epidural analgesia

Epidural analgesia is recommended for essentially every major surgery a child may require below the neck and epidural catheters can be placed in all ages, including neonates.

Advantages

Good to excellent analgesia with less side effects than with the use of systemic opioids, including retention of cough reflex, decreased pulmonary dysfunction, decreased neuroendocrine and metabolic response to surgical stress.

Disadvantages

Infrequent use has led to fear with use. While complications are rare they are significant:

- Traumatic epidural placement or coagulopathies can lead to the development of an epidural hematoma which can cause permanent paralysis.
- Profound analgesia may mask complications.
- Infection may seed the catheter and lead to meningitis.

Contraindications

- Vertebral anomalies that would make catheter placement difficult
- Coagulopathies
- Systemic infections

Epidural Analgesia

Local Anesthetics

The lipophilic (fat-loving) local anesthetics diffuse through the dura into the CSF to the dorsal root ganglion of the spinal nerve fibers and act directly on the nerve roots by blocking the generation and conduction of nerve impulses. They decrease the influx of sodium and efflux of potassium at the neuron level, thus, slowing or stopping pain transmission. Because local anesthetics are lipophilic, they have a quick onset of action but provide a long duration of analgesia.

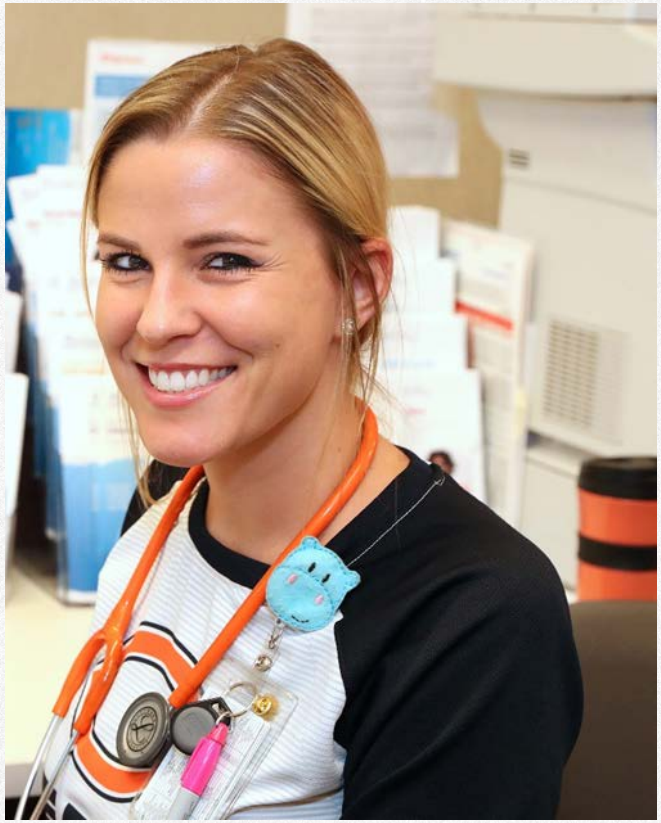
Local anesthetics block pain, then sensation, then motor function.

- Nerve conduction in small nerve fibers is blocked at a lower concentration than in large nerve fibers.
- Small nerve fibers carry pain impulses
- Larger nerve fibers transmit sensory and motor function.

Monitor for pain and rising sensory and motor function blocks. Always assist children in walking if they have a local anesthetic in their epidural, to assess motor function and prevent falls.

Local anesthetics also cause a sympathetic block which results in vasodilation, so we monitor patients for hypotension.

Epidural Analgesia



Opioids

Lipophilic opioids (like fentanyl) are readily absorbed in the epidural space, transverse the dura into the CSF, then exit the aqueous CSF and easily penetrate the lipid-rich spinal tissue.

- Therefore, with fentanyl there is a quick onset of analgesia, short duration of analgesia, and smaller area of spread.
- When fentanyl is used the epidural catheter needs to be inserted at the dermatome level of the surgical area or site of pain.

Hydrophilic opioids (like morphine and hydromorphone) slowly transverse the dura to reach the aqueous CSF. Eventually, high enough concentrations are reached in the CSF and the drug then moves into the spinal cord to the opioid receptors

- Therefore, hydrophilic opioids spread a greater distance in the CSF, providing analgesia over a greater area but also requiring close monitoring to detect rising dermatome levels that may lead to late respiratory compromise.
- Morphine's onset of action is 30-90 minutes; hydromorphone's is 15-30 minutes.
- The duration of analgesia for both is 18-24 hours.

Questions to ask

- What kind of nerve block or other technique was used?
- What is the extent of the motor and sensory block?
- Will this block affect blood pressure, heart rate, bowel function, ability to ambulate?
- How long will the effect last?
- Is it likely that other nerves were blocked too, (e.g., diaphragm, bladder)?
- Do I need to restrict use of systemic analgesics or anti-coagulants?
- Whom do I contact for more information or help?

APS Postoperative Guidelines

The panel recommends that clinicians:

- provide *appropriate monitoring* of patients who have received neuro-axial interventions for perioperative analgesia (strong recommendation, low-quality evidence).
- **AVOID** the neuro-axial administration of magnesium, benzodiazepines, neostigmine, tramadol and ketamine in the treatment of postoperative pain (strong recommendation, moderate-quality evidence).
- The panel does **NOT** recommend intrapleural analgesia with local anesthetics for pain control after thoracic surgery (strong recommendation, moderate-quality evidence).

Patient-Controlled Analgesia

APS Postoperative Guidelines

The panel recommends that clinicians:

- *AVOID using the intramuscular route* for the administration of analgesics for management of postoperative pain (strong recommendation, moderate quality evidence).
- *use oral over intravenous administration of opioids* for postoperative analgesia in patients who can utilize the oral route (strong recommendation, moderate quality evidence)
- use *intravenous patient controlled analgesia (IV PCA)* for postoperative systemic analgesia when the parenteral route is needed (strong recommendation, moderate quality evidence)
- *provide appropriate monitoring* of patients receiving systemic opioids for postoperative analgesia (strong recommendation, low-quality evidence)
- The panel does *NOT recommend routine basal infusion of opioids with IV PCA in* opioid naïve adults (strong recommendation, moderate quality evidence).

Patient-Controlled Analgesia (PCA)

Appropriate patients for PCAs are those who can not tolerate oral opioids and are able to:

- Activate the device
- Self-report and quantify pain
- Understand the relationship between pushing the button and medication delivery
- Understand the safety mechanisms of the machine
- Report unsatisfactory pain relief

Patient-Controlled Analgesia (PCA)

Advantages

- Adjusts for individual variations in pharmacokinetics and pharmacodynamics.
- For some patients - particularly adolescents, PCA provides a sense of control. They do not have to bargain and beg for analgesics.
- In >30 years of use, PCA is considered safe and effective.
- Anyone can push the button to quickly treat the patients pain

Disadvantages

- Anyone can push the button - the nurse, the parent, the friend, the little sister.
- It makes the patient responsible for their pain control. When they do complain of pain, we tell them to push the button.
- The machine gives small doses frequently to titrate to effect, but this means the patient must titrate their dosage and severe pain of sudden onset may subsequently be more difficult to control.
- Opioid side-effects still persist

Authorized Agent - Controlled Analgesia (usually parent or nurse)

Placing the button in the parents hand makes them responsible for under or over medicating their child. They should be:

- Consistently with the patient
- Willing and able to learn to use the device as the authorized agent (AACA)
- Willing to agree not to attempt any reprogramming of the analgesic infusion pump or otherwise violate the infusion system's integrity
- Willing not to activate the analgesic dosing button for purposes other than pain relief, (e.g., not for promoting patient sleep or decreasing anxiety)
- Willing not to activate the device while the patient is sleeping; this overrides the primary safety mechanism of the pump
- Willing not to activate the device If the patient is experiencing abnormal breathing

ASPMN Authorized and Unauthorized ("PCA by Proxy") Dosing of Analgesic Infusion Pumps (pdf) *This statement is endorsed by* The Oncology Nursing Society *and* The Hospice and Palliative Nurses Association
http://www.aspmn.org/Organization/documents/PCAbyProxy-final-EW_004.pdf

Assess PCA Use: Attempts > Doses

PCA injects	PCA attempts
0.00	0.00
1.00	11.00
0.00	0.00
0.00	1.00
0.00	0.00
2.00	10.00
1.00	3.00
1.00	1.00
8.00	34.00
0.00	0.00
2.00	2.00
2.00	9.00
2.00	3.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
3.00	26.00
0.00	0.00
1.00	7.00
2.00	11.00
12.00	58.00
20.00	92.00
2.00	6.00
2.00	5.00
2.00	5.00
0.00	2.00
1.00	6.00
1.00	32.00
0.00	0.00
1.00	3.00
2.00	36.00
0.00	0.00

If the child has a large number of attempts as compared to injections: In other words, does the child push the button repeatedly to get prescribed doses? If so,

- Consider exploring whether the child understands the machine.
- Do they understand that they can only get one dose every lockout period?
- Are they communicating inadequate pain relief? Does the dose need to be changed?
- Consider further educating the child about the machine or switching to another mode of medication delivery.

Assess PCA Use: Large number of Doses

PCA injects	PCA attempts
5.00	7.00
1.00	7.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
1.00	1.00
0.00	0.00
0.00	0.00
1.00	1.00
0.00	0.00
9.00	18.00
37.00	55.00
0.00	0.00
2.00	2.00
0.00	0.00
1.00	1.00
1.00	1.00
3.00	4.00
5.00	6.00
5.00	7.00
3.00	4.00
5.00	7.00
3.00	4.00
3.00	5.00
31.00	41.00
5.00	7.00
2.00	2.00
3.00	5.00
2.00	5.00
1.00	1.00
2.00	3.00
0.00	0.00

If the child has a large number of doses. For example, they are reaching their one-hour limit, consider exploring whether the child understands the machine. Ask:

- Is the child communicating inadequate pain relief? Does the dose or lock-out interval, and on-hour limit need to be changed?
- Is the child the only one pushing the button?
- Does the child understand the button should only be pushed when experiencing pain; It is not a video game or TV remote!

Consider further educating the child about the machine or switching to another mode of medication delivery.

Assess PCA Use: All hours

PCA injects	PCA attempts
8.00	9.00
0.00	0.00
1.00	1.00
2.00	2.00
0.00	0.00
1.00	1.00
1.00	1.00
1.00	2.00
1.00	2.00
0.00	0.00
2.00	2.00
1.00	1.00
0.00	0.00
10.00	12.00
18.00	21.00
0.00	0.00
1.00	1.00
1.00	1.00
1.00	1.00
1.00	1.00
1.00	2.00
2.00	2.00
1.00	1.00
2.00	2.00
1.00	1.00
1.00	1.00
1.00	1.00
13.00	14.00
1.00	1.00
1.00	1.00
1.00	1.00
2.00	2.00
1.00	1.00
1.00	1.00

If the child has a long runs of PCA attempts and injections, for example 48 hours of straight use, ask:

- Is the child is the only one pushing the button?
- Is the child getting adequate rest? Does the dose need to be changed?

Consider further educating the child about the machine or switching to another mode of medication delivery to promote night-time rest in comfort.

Assess PCA Use: Severe Pain

PCA injects	PCA attempts
2.00	2.00
0.00	0.00
17.00	20.00
40.00	51.00
1.00	1.00
4.00	108.00
4.00	75.00
1.00	1.00
3.00	4.00
1.00	1.00
0.00	0.00
3.00	3.00
0.00	0.00
1.00	1.00
1.00	1.00
1.00	1.00
20.00	196.00
1.00	1.00
0.00	0.00
1.00	2.00
0.00	0.00
1.00	3.00
1.00	1.00
2.00	2.00
3.00	6.00
1.00	1.00
0.00	0.00
0.00	0.00
2.00	2.00

If the child has high pain scores, ask:

- Does the child understand to push the button when in pain, and not to wait until pain is out of control. Does the child know to push the button at a low pain score in order to keep the pain under control?

- Is the child communicating inadequate pain relief or satisfaction? Some patients are concerned that if they report pain as well-controlled or relieved, their medication will be stopped and the pain will return.

Consider further education on the machine, switching to another mode of medication delivery, or rephrasing your questions. For example, is this machine helping to control your pain or do you need more medicine to better control your pain?

APS Postoperative Guidelines

The panel does *NOT recommend routine basal infusion of opioids with IV PCA in* opioid naïve adults (strong recommendation, moderate quality evidence).

Safety & Efficacy of Parent-/Nurse-Controlled Analgesia in Patients Less than Six Years of Age (Monitto et al., 2000)

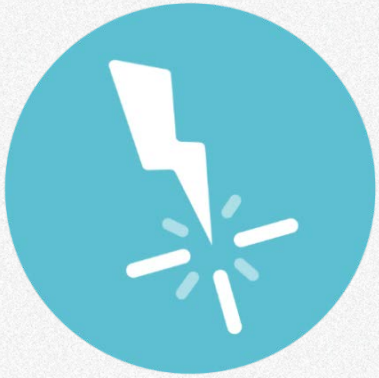
212 children (mean age 2.3 years) who were treated on 240 occasions with PNCA for episodes of pain and received a median of 4 (range 2–54) days of PNCA therapy.

Maximum daily pain scores were 3/10 (objective pain scale) or 2/5 (objective or self-report pain scale) in more than 80% of all occasions of PNCA use.

- 8% incidence of pruritus
- 15% incidence of vomiting on the first day of treatment.
- Supplemental oxygen was given in 25% (54/217) of instances when PNCA was used for unintubated patients,
- 9 children studied received naloxone, 4 (1.7%) for treatment of PNCA-related apnea or desaturation. All had improvement in their symptoms after naloxone administration.

In Summary…

Key Points



To develop a shared understanding of the treatment plan and realistic outcomes, it is important to discuss past experience and expectations for acute pain treatment, as well as risks and benefits of treatments.

Acute pain

Everyone experiences pain differently.

Acute pain should resolve with time and the healing process; However, the time for healing is also diverse among patients and conditions. Poorly controlled acute pain is a risk factor for the development of chronic pain.

APS

American Pain Society (APS) provides Postoperative Guidelines for facilities and clinicians. To learn more, see http://americanpainsociety.org.

ASPMN

American Society for Pain Management Nurses (APS) provides position statements to guide the ethical practice of nurses caring for children with pain. To learn more, see http://ASPMN.org.

Appendix

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Pediatric experts indicated in **Bold**

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