

Management of Pain and Distress in a Paediatric Population

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Table 1 : Barriers to the treatment of pain in children⁴

- 1) The myth that children, especially infants, do not feel pain the way adults do, or if they do, there is no untoward consequence.
- 2) Lack of formal assessment and reassessment for the presence of pain.
- 3) Misunderstanding of how to conceptualise and quantify a patient's subjective pain experience.
- 4) Lack of knowledge of pain treatments.
- 5) The notion that addressing pain in children takes too much time and effort.
- 6) Fears of adverse effects of analgesic medications including respiratory depression and addiction.
- 7) The notion that addressing pain in children masks clinical signs. There is NO evidence that provision of early analgesia negatively affects diagnostic accuracy.
- 8) The notion that NSAIDs usage negatively effect bone healing. There is no clinical evidence that using NSAIDs affects bone healing in children.

Introduction

Most healthcare visits are related to pain and distress. The extensive short and long-term consequences of inadequately treated acute pain have led to universal acceptance that pain management should begin at the earliest opportunity.¹ The effective management of pain in children is a priority for patients, parents, and health-care providers. Current standards recommend simple, timely, sequential processes of recognition, assessment, intervention, reassessment, and maintenance of pain relief.² 'Children' encompasses an extremely broad group from premature neonates to adolescents. There are age-related differences in children which affect all aspects of pain management including assessment, physiological and pharmacological responses, as well as clinical outcomes.³ It is important that these parameters are taken into consideration when managing paediatric pain. There are numerous perceived barriers to the treatment of pain in children outlined in Table 1. These barriers can mean that paediatric pain is frequently under-recognised and unfortunately, under-treated.

Recognising pain

It is important for healthcare providers to learn how to recognise that a child is in pain. In the acute setting, behaviour is the main way that infants and preverbal children communicate their pain.⁴ Always consider co-existing states that may mimic or exacerbate pain (Table 2). A child may present with acute uncontrolled pain (e.g., fracture, appendicitis) or may present with pain due a underlying chronic condition (e.g. sickle cell disease). The expression of pain in both of these circumstances can be quite different e.g. acute distress vs becoming quieter and more withdrawn. As healthcare providers, we must recognise the pain presentation and then manage it appropriately.

Table 2: Pain exacerbators or mimickers

- 1) Hunger or 'Het up'
- 2) Anxiety (e.g. stranger anxiety from 9 months onwards) or Anger
- 3) Lonely
- 4) Tired
- 5) Separation from a guardian/parent
- 6) Stressed

Assessment of pain

The assessment of pain should include history, examination and consideration of the presumed diagnosis.⁵ There are several validated pain scales available which cover a wide range of ages.⁶ These pain scales are used in clinical practice to assess a child's pain and then to classify pain as mild, moderate, or severe. International literature consistently demonstrates that a child self-reporting their pain leads to better assessment and management of pain.⁷ In general, children greater than 3 years of age can indicate their own pain score (in which case this is more accurate than the score made by the parent or carer). Severe pain is a score of 7 or greater on an age-

appropriate 11-point scale (0-10). Moderate pain is a score of 3 to 6 and mild pain is a score of 2 or less. Behavioural scales (FLACC) are used for younger infants or children. The pain assessment tools commonly used in clinical practice are outlined in Table 3. These tools are also used for the reassessment of pain to ensure that analgesia is effective.

Management of pain

Interventions in pain management should include both non-pharmacological and pharmacological methods. It must be emphasized that it may not be possible to achieve a completely "pain-free" condition. A realistic target is that the child should be comfortable (or have self-control) with the pain they are experiencing.

Non-pharmacological methods

These can be used independently or in combination with pharmacological methods. Parents should remain with their child when in pain or having a painful procedure, as presence of the care giver is shown to reduce pain/distress.⁸ A Cochrane review examining non pharmacological

Table 3: Examples of pain assessment tools

Assessment tool	Age range	Assessment
Faces, Legs, Activity, Cry and Consolability (FLACC) scale	Non-verbal children other than neonates; can be adapted for use in cognitive impairment. Typically, under 3 years old.	Facial expression, leg position, activity pattern, presence of crying and nature of cry, ability to be consoled
Wong Baker Faces	3 years onwards	Six-line drawn faces generated from children’s drawings
Manchester Pain Ladder	3 years till adulthood	Six pictured faces in varying levels of pain on an ascending ladder with associated pain statements/ability to do activities and a numeric scale.

methods of pain relief found sufficient evidence to support the efficacy of distraction, hypnosis, and cognitive behavioural techniques in reducing needle-related pain and distress in children and adolescents.⁹

For infants, strong evidence exists for the use of comfort measures such as swaddling, non-nutritive sucking and breast-feeding for reduction of pain scores in the infant population.¹⁰ For older children, distraction techniques are particularly effective. These may include distracting visual aids (e.g. books, smart devices, virtual reality headsets) and play, either with a play therapist or guardian (blowing bubbles, music, conversation/interaction with caregiver).¹¹ Additional non-pharmacological methods are listed in Table 4. Suggested language for parents and health care providers should be positive, distracting, truthful with a coaching focus which rewards with praise. Language that is vague, negative, critical or apologetic should be avoided.

Pharmacological methods

The pharmacological agent of choice will be dictated by the child’s age-appropriate pain score. Pain should be reassessed at regular intervals once analgesia has been administered.

For mild pain, paracetamol and ibuprofen should be used. These may be given orally or rectally. Despite a slow onset of action, oral medications are generally preferred as they can be given painlessly, have a synergistic effect when used with other analgesics, and are usually more acceptable to parents and children. Administration of analgesia rectally can be particularly useful if the child is vomiting although this route may prove unacceptable for parents and may add to the older child’s distress. Intramuscular administration of pain relief has a limited role in the management of acute pain in children because the injection is often painful, absorption unpredictable, and the onset of effect slow.

For severe pain, immediate administration of opiates in combination with oral medications and non-pharmacological methods is recommended. Morphine and fentanyl are the opioids of choice used for severe pain in children. The intranasal route is commonly used as it avoids the distress associated with obtaining intra-

Physical Comfort Measures	
Oral Stimulation	Breastfeeding, Pacifier and sucking in infants and neonates
Physical Contact	Skin-to-skin contact, rocking, cuddling, swaddling and kangaroo care
Touch	Stroking, rubbing, patting
Dressings	The covering of an injury may provide psychological benefit. Burns dressings that may cool, or cellophane wrap, can alleviate the pain in a paediatric burn.
Splintage	Simple splintage of fractures may provide analgesia and minimise ongoing trauma and bleeding.
Temperature regulation	Use of cold packs is a standard approach for ligamentous injuries and pain from insect and marine stings can be treated by applying cold or heat to the affected part. Cold spray and ice packs provide immediate short-term relief.
Distracting Activities and Language	
Visual aids	Bubbles, Books (cartoons or an activity e.g. colouring), puppets, smart devices (interactive games or more passive videos) and virtual reality headsets.
Communications/auditory aids	Conversation (e.g. Storytelling, reassurance, positive language and avoidance of negative language), music, sound, games. Guided imagery and hypnosis

venous access. Well designed studies found that intranasal fentanyl is absorbed rapidly across the nasal mucosa and provides initial pain relief comparable to intravenous opiates.^{12, 13, 14} The doses and indications for commonly used analgesics in children are outlined in Table 5.

Procedural pain

Pharmacological agents used for procedural pain (i.e., pain associated with procedures such as fracture manipulation, wound exploration) can include topical, local, or regional anaesthesia.

Topical anaesthetic preparations such as EMLA (euteric mixture of local anaesthetics—lidocaine

and prilocaine) and Ametop (tetracaine) can be used on intact skin in patients older than one month before minor skin procedures. Ametop takes 45 minutes to anaesthetise the skin, whereas EMLA takes 60 minutes. Ethyl chloride (coolant) spray is an alternative for minor cutaneous procedures such as venepuncture, especially when urgent, but its efficacy is unclear. LAT gel (lidocaine, adrenaline, and tetracaine) is useful in providing anaesthesia for the cleaning and repair of open wounds such as skin lacerations. All simple lacerations less than 5cm in length can be considered for exploration and repair using LAT gel rather than local anaesthetic infiltration.

Table 4: Commonly used non-pharmacological methods of pain relief

Several randomised controlled trials have shown that it has a similar efficacy but is less painful to apply.^{16, 17}

Local anaesthetics for infiltration include lidocaine (with or without adrenaline) and bupivacaine. Local nerve blocks (without adrenaline) completely or partially anaesthetise the area supplied by that nerve. Common examples include digital nerve blocks for injuries to the fingers, and the femoral nerve block for femoral shaft fractures. Specific nerve

blocks can be performed for minor surgical procedures around the hand, face, and ears.

Nitrous oxide is an anaesthetic gas which is delivered in variable concentrations with oxygen. It is frequently used for procedural sedation in children e.g., suturing a laceration. It has modest analgesic and sedative properties, with minimal respiratory and cardiovascular depression.¹⁸ It can be delivered painlessly through inhalation and its rapid onset and recovery make it ideal for use in the emergency department.

Ketamine is a dissociative anaesthetic agent which is used to facilitate short painful procedures in children. Ketamine acts by binding to N-methyl-D-aspartate (NMDA) receptors and creates a dissociation (disconnection) between the cortex and the limbic system and prevents the higher centres from perceiving visual, auditory, or painful stimuli. Protective airway reflexes, spontaneous respiration as well as cardiovascular stability are maintained which makes ketamine a particularly useful agent for the sedation of children. Numerous large studies have consistently demonstrated its safety for use in children.^{19,20}

Conclusion

The safe and effective management of pain in children is a clinical priority. Pain should be assessed using a validated and age-appropriate pain scale and with consideration of pain exacerbators or mimickers. Non-pharmacological and pharmacological methods should be used to treat pain and distress accordingly. Topical, local, and regional anaesthetic agents may be used for procedural pain. Pain should be reassessed frequently to ensure efficacy of interventions.

Useful online references

Children's Health Ireland formulary app <https://apps.apple.com/ie/developer/our-ladys-childrens-hospital-crumlin/id423768291>

Irish Association of Emergency Medicine Clinical Guideline: Pain Management for Paediatric Emergency Care IAEM-Pain-Management-in-Paediatric-Emergency-Care.pdf

Translating Emergency Knowledge For Kids Pain Treatment 2021-03-16_Pain_Treatment_v2.0.pdf (trekk.ca)

References available on request

Table 5: Doses and indications for commonly used analgesics in children¹⁵

Drug	Primary use	Dose	Comment
Paracetamol	Analgesic	<u>Oral</u> >32 weeks: 10-15mg/kg 6-8 hourly as required. Max dose in 24 hours: 60mg/kg Over one month: 15mg/kg (max 1g) 4-6 hourly as required. Max dose in 24 hours: 75mg/kg or 4g, whichever is lower.	Used alone in mild pain e.g. a sprained ankle or as an adjunct in moderate or severe pain There is no therapeutic advantage with IV paracetamol versus other routes of administration. IV paracetamol has utility where other routes of administration are unavailable for clinical reasons.
		<u>Rectal</u> >1 month-<3 months: 15mg/kg PR 4-6 hourly as required. Max dose in 24 hours: 75mg/kg in divided doses. >3 months: 15mg/kg (max 1g) PR 4-6 hourly as required. Max dose in 24 hours: 75mg/kg, not to exceed 4g. <u>Intravenous</u> <10 kg: 7.5 mg/kg IVI 4-6 hourly. Max dose in 24 hours: 30mg/kg in divided doses. >10kg: 15mg/kg (max 1g) IVI 4-6 hourly. Max dose in 24 hours: 60mg/kg or 3g, whichever is lower, in divided doses.	
Ibuprofen	Analgesic	<u>Oral</u> > 1 month: 7.5-10mg/kg 8 hourly. Max single dose 400mg. Do not exceed 30mg/kg/24 hours or 1.6g /24 hours, whichever is lower. <u>Rectal</u> : >6kg -<8kg: 60mg PR 6-8 hourly. Do not exceed 180mg/24 hours. >8kg -<12kg: 60mg PR 6 hourly. Do not exceed 240mg/24 hours.	Used alone in mild pain (for example, minor head injury) or as an adjunct in moderate or severe pain
Diclofenac sodium	Analgesic	<u>Oral</u> > 6 months; 0.3-1mg/kg (do not exceed 50mg) PO 8 hourly. Max dose 3mg/kg/day or 150mg daily whichever is lower. <u>Rectal</u> > 6months: 8-12 kg: 12.5mg PR 12 hourly >12 kg: 1mg/kg (do not exceed 50mg) PR 8 hourly. Round dose to nearest available suppository strength. Max dose 3mg/kg/day or 150mg daily whichever is lower.	Used alone in mild pain (for example, small superficial burn or scald) or as an adjunct in moderate or severe pain
Fentanyl	Analgesic	<u>Intranasal</u> >1 year old and >10kg: First dose 1.5 micrograms/kg dose (max 100micrograms) Second dose: 0.75-1.5 micrograms/kg (max 100 micrograms). N.B. to be given 10 minutes after the first dose and only if adequate analgesia has not been attained.	Acute moderate to severe pain in the emergency setting. Can be used in conjunction with other analgesics
Morphine	Analgesic	<u>Oral</u> (Oramorph® liquid) 1 month-1yr: 80-200 micrograms/kg up to 6 times in 24 hrs PO 1-2 yrs: 200-400microgram/kg up to 6 times in 24 hrs PO 2-12 yrs: 200-500 microgram/kg (max 15mg) up to 6 times in 24hrs 12-18 yrs: 5-15mg up to 6 times in 24 hours PO <u>Intravenous</u> : >1month -<12 yrs: 0.05-0.2mg/kg (max initial dose 5mg) IV bolus over at least 5 minutes. These doses may be repeated up to 4 times / day if < 6 months and up to 6 times / day if > 6 months. >12 yrs: 5mg IV bolus over at least 5 minutes, up to 6 times daily.	Lower end of dose range should be used in opioid – naïve patients. Chronic pain or palliative patients may require higher doses. Most reliable method to relieve severe pain is by titrated intravenous opiates. Can be used in conjunction with other analgesics