PAEDIATRIC HOSPITAL LEVEL ESSENTIAL MEDICINES LIST
CHAPTER 20: PAIN CONTROL
NEMLC 8 DECEMBER 2022 – REPORT

MEDICINE AMENDMENTS

SECTION	MEDICINE	ADDED/DELETED/NOT ADDED
Acute pain, simple analgesia	Paracetamol, oral/IV	Dose added for preterm neonates, < 32 weeks
	Paracetamol, oral/IV	Dose amended
	Paracetamol, oral/IV	Maintenance maximum dose amended
	Paracetamol	Caution added
	Ibuprofen	Frequency amended
Management of opioid-related side effects	Naloxone	Administration clarified
Acute pain, neuropathic pain	Amitriptyline	Recommendation to start low and titrate dose added
	Carbamazepine	Not re-added
Procedural pain	Ketamine	dosing units corrected
	Lidocaine/prilocaine, topical	onset of action amended
	Lidocaine infiltration	addition strength added

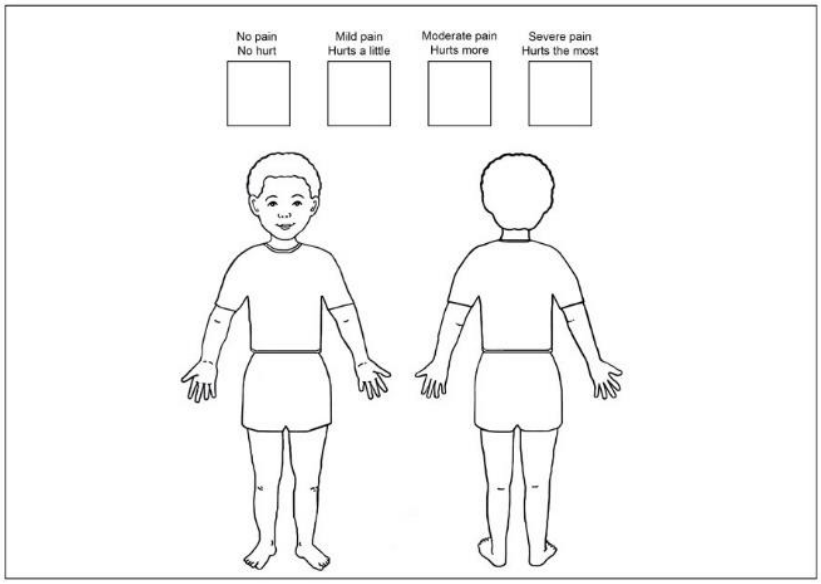
20.1 Pain Control

- **Neonatal Infant Pain Scale (NIPS):** The text was clarified to indicate the tool is for use in infants and children from 2 months of age to 18 years.

- **Numeric Rating Scale**: The text was clarified to indicated that can be used from 5 years of age, however if child is unable to self-report on a numeric scale, then the R-FLACC should be used.

- **Eland colour tool**: This tool was added as an additional resource for children to self-report pain.
  The following was added:

Figure 2: Eland colour tool



After discussing with the child several things that have hurt or caused the child pain in the past:

1. Present the child with four crayons or markers of different colours.
2. Using the term that the family and child use to describe hurt or pain (the word 'pain' is used in these instructions), ask the following questions and, after the child has answered, mark the appropriate square on the tool.
   - Of these colours, which colour is most like the worst pain you have ever had, or the worst pain anybody could ever have?
   - Which colour is almost as much pain as the worst pain, but not quite as bad?
   - Which colour is like a little pain?
   - Which colour is like no pain at all?
3. Show the four colours to the child in order, from the colour chosen for the worst pain to the colour chosen for no pain.
4. Ask the child to colour within the body outlines in the places where it hurts on their own body, using the colours chosen to show how much it hurts.
5. When finished, ask if this is a picture of how it hurts now or how it hurt earlier. Be specific about what earlier means by relating the time to an event, for example, at lunch or in the playroom.

NOTE: Ask the child what their favourite colour is before starting and remove that one from the group of colours, as you don't want them to associate pain with this colour.

20.1.2 Management of pain.

Paracetamol

Paracetamol, oral/IV: dose added for preterm neonates, 32 weeks

- A stakeholder comment was received outlining that no for preterm neonates were included in the paracetamol dosing table.
- The Committee agree that this would be a valuable addition.
- The dose was added in line with the National British Formulary for children (BNFc)[1]

Paracetamol, oral/IV: neonates dose amended

- The neonates dose was amended from the range of 5-10mg/kg 6 to 8 hourly, to 10mg/kg. This recommendation was made in line with the BNFc[1] and to prevent underdosing of this group.

[1] British National Formulary for Children. BMJ Group and Pharmceutical Press. 2020-2021.

Paracetamol, oral/IV: Maintenance maximum dose amended

- A stakeholder comment was received indicating that the maximum doses do now add up. It was noted that if maintenance doses are added up it should be 60mg/kg/day. It was additionally noted that to prevent obese children receiving toxic doses, a maximum of 4g per day should be added. The committee amended the text to indicate that the maximum dose is looking at maintenance dose, and these were updated to 60mg/kg/day, 4g/day maximum.[2, Error! Bookmark not defined.]

Paracetamol: caution added

- A stakeholder comment recommended that that following cautions be added:
  - » Caution and dose reduction needs to be advised in giving paracetamol to chronically sick or malnourished children, with possibly depleted glutathione reserves, as this enzyme is required to detoxify paracetamol and cases of liver failure have been reported in these children when given otherwise standard doses of paracetamol.
  - » Similarly, prolonged use of paracetamol should be avoided.

  The Committee agreed that the cautions can be simplified and added below the table.

Dosing table updated as follows:

Route	Loading Dose		Maintenance dose			
		Preterm neonates < 32 weeks	Neonates	Infants 30 days to 3 months	3 months to 12 years	**Maximum daily dose**
Oral	20 mg/kg	10 mg/kg 12 hourly (maximum 30mg/kg/day)	~~5 –~~ 10 mg/kg 6 to 8 hourly	10 mg/kg 6 hourly	15 mg/kg 6 hourly	~~90 mg/kg/day Neonates:~~ 60 mg/kg/day 4g/day maximum
Intravenous	20 mg/kg	10 mg/kg 12 hourly (maximum 30mg/kg/day)	~~5 –~~ 10 mg/kg 6 to 8 hourly	10 mg/kg 6 hourly	15 mg/kg 6 hourly	~~90 mg/kg/day Neonates:~~ 60 mg/kg/day 4g/day maximum
Rectal	40 mg/kg		30 mg/kg/dose 6-hourly			5 g/day

» Avoid prolonged use of paracetamol.

» Caution and dose reduction needs to be considered when administering paracetamol to chronically sick or malnourished children.

Non-steroidal anti-inflammatory drugs (NSAIDS)

Ibuprofen: dosing frequency amended

A stakeholder comment was received indicating that if ibuprofen 10mg/kg is given 8 hourly, then the maximums dose should be 30mg/kg/day is possible. The Committee acknowledged this comment and amended the dosing frequency to 6-8 hourly in line with the British National Formulary for children.[1]

The text was amended as follows:

- Ibuprofen, oral, 5 - 10 mg/kg/dose 6 - 8 hourly with meals.
  - Maximum daily dose is 40 mg/kg /day

[2] South African Medicines Formulary.

Opioids

Morphine

An external comment was received outlining that there is a need to indicate what should be done in circumstances where patients may have delayed clearance.

Text amended as follows:

- ~~Dosing is 4 - 6 hourly except in patients with delayed clearance, i.e.,~~ Neonates, and patients with hepatic and renal dysfunction may require dose modification, specialist consultation.

Management of opioid-related side effects

Naloxone: clarity given to administration.

- An external comment was received that the slow IV administration must be defined, this was updated to indicate administration over 2 minutes.

Neuropathic pain

Amitriptyline: recommendation to start low and titrate dose added

- External comment was received indicating that there have only been a few studies examining amitriptyline for neuropathic pain in children. It was indicated that most sources indicate 10mg daily, and that 72mg daily may be excessive. It was proposed that the starting dose be lowered and up-titrated as needed.
- The dose was thus amended to start lower and be titrated slowly.[3]

Carbamazepine: not re-added

- An external comment was received questioning the removal of carbamazepine for neuropathic pain, with the rational that if may work in some children and was inexpensive and available in a syrup formulation. The Committee agreed to retain the recommendation of amitriptyline for neuropathic pain and not to add carbamazepine back.

20.1.2 Procedural sedation and analgesia

Ketamine: dosing units corrected

- An external comment indicated that the ketamine dosing table might have an error in terms of units used. The Committee acknowledged the error and the updated the units from mcg to mg.

Procedural sedation table

Lidocaine/prilocaine, topical: onset of action amended

Lidocaine infiltration: addition strength added

- An external comment was received indicating that lidocaine/prilocaine takes an hour to take effect and requires an occlusive dressing. The Committee amended the text accordingly.
- An external comment was received indicating that lidocaine 2% gel is largely ineffective for procedural sedation. The Committee agreed that the following comment be added below the table to provide clarity:

[3] Friedrichsdorf SJ, Nugent AP. Management of neuropathic pain in children with cancer. Current Opinion. 2013, 7 (2): 131-138

'Local anaesthetics are used in combination with systemic agents corresponding with the severity of pain associated with the procedure.'

- An external comment indicated that the lidocaine infiltration concentration should be 0.5% as this is as efficacious as 1% or 2%, and may burn less. The Committee updated the text to include the 0,5% option and added a comment indicating that lower concentrations burn less.

The table was amended as follows:

Local analgesia *	• Topical lignocaine (lidocaine)/prilocaine ~~(30 mins –~~ 1hr before procedure covered with occlusive dressing. • Lignocaine (lidocaine) 2% gel • Lignocaine infiltration 0.5, 1 or 2% (lower concentrations burn less) • Consider regional anaesthesia (e.g., digit blocks, wrist block)

*Local anaesthetics are used in combination with systemic agents corresponding with the severity of pain associated with the procedure.

Previously accepted amendments: NEMLC October 2022

MEDICINE AMENDMENTS

SECTION	MEDICINE	ADDED/DELETED/NOT ADDED
Acute pain, simple analgesia	Paracetamol, IV	Added
	Paracetamol, rectal	Retained
Acute pain, opioid therapy	Tilidine	Removed
Acute pain, adjuvant analgesia	Corticosteroid therapy	Removed
	Ketamine (oral and IV)	Added
Severe neurological impairment	Clonidine	Added
	Amitriptyline	Added
Acute pain, neuropathic pain	Amitriptyline	Added
	Carbamazepine	Removed
Procedural pain	Tilidine	Removed
	Fentanyl, intranasal	Added
	Fentanyl, IV	Added
	Midazolam, sublingual	Added
	Midazolam, intranasal	Added

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	Midazolam, sublingual	Added
	Midazolam, intranasal	Added

20.1 Pain Control

Description

- Pain description updated in line with the International Associations for Study of Pain, 2020.[4]
- General description reworded to outline acute and chronic pain.
- The 6 steps for good pain management were added as follows:

Good pain management involves 6 steps:

- A high index of suspicion that pain is present
- Accurate pain assessment that is developmentally appropriate, using scoring tools
- Making an assessment of pain severity – Mild, moderate or severe
- Initiating non-pharmacological pain management strategies
- Timely administration of analgesia, appropriate for the severity of pain
- Reassessment within an appropriate time period, and ongoing care

Pain assessment

- Narrative provided for pain assessment.
- Neonatal Infant Pain Scale (NIPS) added
- FLACC scale updated to revised FLACC tool.
- Faces pain scale removed: facial expressions may be interpreted as emotions (happy or sad), rather than the level of pain experienced.
- Numeric rating scale added.

Pain management

[4] International Association for the Study of Pain, 2020. https://www.iasp-pain.org/resources/terminology/#pain

- Pain management principles aligned with those of the World Health Organization.
- Non-medicine pain management strategies added as follows:

Type of intervention	Examples of evidence-based interventions
Contextual	Cluster procedures to reduce handling and allow rest.
Physical	Breast feed, non-nutritive sucking (dummy/pacifier), Kangaroo Mother Care/ parental holding (not restraint), facilitated tucking, 24% sucrose, massage, containment, aromatherapy, keep warm. Ice for acute injuries with significant swelling. Immobilise/splint fractures. Cover burns or bleeding wounds.
Cognitive	Explain procedures, allow music, provide appropriate reassurance, educate on pain mechanisms, encourage mindfulness, distraction, imagery, favourite toy, music therapy.
Emotional	Caregiver presence, structured caregiver involvement (provide guidance), caregivers voice, clinician voice calm, soothing, positive affirmations, active reassurance. Parental involvement and interaction should be actively encouraged and should be an integral part of care.
Environmental	Reduce noise, dim lights, set monitor alarms. Use incubator covers/sheets to decrease light levels as appropriate for each baby. Create a child-friendly environment.

- Detail provided around use of sucrose for short-duration procedures for neonates and infants up to 18 months of age.

20.1.2 Management of pain.

Acute pain

- Concept of multimodal analgesia added
- Term simple analgesia added in place of non-opioid medicines.

Simple analgesia

Paracetamol IV: Added

Added as an alternative in patient who cannot receive oral paracetamol. In line with recommendations made in the Paediatric Anaesthetics Chapter and paracetamol IV review[5]; and only for short term use where oral cannot be used.

Paracetamol rectal: retained

Rectal paracetamol was retained for consideration in patients where IV access is not available. Limitation is that is must be avoided in children with neutropaenia.

Paracetamol mg/kg dosing table, with maximum doses: Added

Table added for clarity and dosing recommendations for loading and maintenance.

Non-steroidal anti-inflammatory drugs

Ibuprofen: dose amended, maximum dose added in line with the South African Medicines Formulary.[6]

Opioid therapies

Tilidine: removed

[5] Paediatric Hospital Level STGs and EML. Paracetamol IV review. June 2022

[6] Division of Pharmacology, UCT. South African Medicines Formulary. 2016, 12th Edition.

Tilidine has been removed from the market, and only a few hospitals still have stock. It was recommended that this item be removed due to lack of access. The removal of this item removed the step of an intermediate opioid. Oral morphine is recommended in its place, in line with circular sent in December 2021.

Morphine, oral: onset of action, time to peak and duration of action added
Morphine, IV: dosing recommendations updated (included bolus and infusion dosing).
Morphine, IV: time to peak and duration of action added

Fentanyl IV: Added
Fentanyl has been added as an alternative opioid therapy in line with the WHO guidelines on persistent pain in children. [7]

Management of opioid related side effects: Section expanded

- Lactulose dose: amended
- Ondansetron, oral: added
- Naloxone: Added
  Agents and dosing in line with other areas within the STGs.

Distinction between withdrawal and weaning: Added

Monitoring of opioids: Added
As follows:

All patients receiving opioids should have the following monitored and documented:
» Heart rate
» Oxygen saturation via continuous saturation monitoring for the first 15 minutes.
» Respiratory rate
» Level of consciousness
» Pain scores

Frequency of monitoring:
» Observe closely for 15 minutes after administering first opioid dose.
» Then do observations every 30 minutes for the first hour.
» Thereafter, observations must be documented 4-hourly.

The word should was included to ensure that patients are not denied opioid therapy where resources may not allow the full monitoring schedule.

Adjuvant medicines
The term adjuvant medicines was updated from co-analgesics.

- Steroids: removed
- Ketamine, oral: added
- Ketamine, IV: added

Multimodal pain management: Table with recommendations added.

[7] World Health Organization. WHO guidelines on the pharmacological treatment of persisting pain in children with medical illnesses. 2012. https://www.apsoc.org.au/PDF/SIG-Pain_in_Childhood/WHO_Guidelines.pdf

Multimodal analgesia is an approach to effectively manage pain with reduced adverse effects. [8]

Pain in children with severe neurological impairment (SNI)
Section added.

Clonidine: Added
Amitriptyline: Added
Clonidine is proposed for addition as management for SNI as it has a role in spasticity, and autonomic dysfunction, as well as helping to reduce pain. There is limited evidence in the SNI setting, however amitriptyline is often recommended as second line management (gabapentin usually first line). [9]

Pain in children with burn injury
Section added

Neuropathic pain
Carbamazepine: removed
Amitriptyline: added
Amitriptyline is recommended as one of the first line agents recommended in the SASA acute pain management guidelines. [10] This is in line with Adult STG recommendations. Carbamazepine was removed as evidence for its use in this indication is limited.[11]

20.1.1.3 Cancer pain

Section added.

Recommendation of medications already listed in the chapter (or other chapters). All patients for referral.

20.1.2 Procedural sedation and analgesia

- Guiding text on procedural sedation and analgesia added.
- Procedural sedation and analgesia table amended
- Detail on dose/onset/peak and duration added for fentanyl/midazolam/ketamine

Fentanyl, intranasal: added
Fentanyl, IV: added
Midazolam, SC: added
Midazolam, intranasal: added

[8] Helander EM, Menard BL, Harmon CM, Homra BK, Allain AV, Bordelon GJ, et.al. Multimodal analgesia, current concepts and acute pain considerations. Curr Pain Headache Rep. 2017, 21 (3).
[9] Hauser J, Houtrow AJ. Pain assessment and treatment in children with significan impairment of the central nervous system. American Academy of Pediatrics. 2017, 139(6).
[10] South African Society of Anaesthesiologists (SASA). South African Acute Pain Guidelines 2015. https://painsa.org.za/wp-content/uploads/2016/07/SASA-Acute-Pain-Guidelines_2015.pdf
[11] Wiffen P, Derry S, Moore RA, Kalso EA. Carbamazepine for chronic neuropathic pain and fibromyalgisa in adults. Cochrane Database of Systematic Reviews. 2014, Issue 4, no: CD005451.

Fentanyl

Intranasal fentanyl has been demonstrated to be safe and effective in children, shown to be equivalent or superior to morphine (oral/IV/IM) and equivalent to fentanyl IV. [12]

IV and intranasal dosing in line with the SASA Paediatric Sedation Guidelines for Procedural Sedation and Analgesia. [13]

Midazolam

Dosing in line with SASA procedural sedation and analgesia.[13]

[12] Mudd S. Intranasal fentanyl for pain management in children: A systematic review of the literature. J Pediatr Health Care. (2011) 25, 316-322.

[13] South African Society of Anaesthesiologists (SASA). Paediatric Sedation Guidelines for Procedural Sedation and Analgesia. SAJAA. 2016. https://www.sajaa.co.za/index.php/sajaa/article/view/2392/2666