# Acute pain management in children

Early and appropriate pain management, and the reduction of pain during diagnostic and therapeutic procedures, are essential in all trauma patients, but paediatric patients present particular challenges. Appropriate analgesia, as well as appropriate routes of administration, depends on the age of the child, the nature of their injury and the severity of their pain. We describe a general approach to the management of acute pain in children.

## Non-drug measures

Ideally, children should be treated in a designated area with toys, books and other familiar distractions. Their parents should be allowed to stay with them as much as possible. Dressings, splints and slings can provide effective pain relief and might help to reduce anxiety by covering the injury. Ice packs or warm water can be used to treat insect stings, and cold water can be used to limit the extent of injury in burn wounds.

## Assessment of pain

The choice of analgesia largely depends on the severity of the child's pain, but pain severity can be difficult to assess. Older children might be able to describe their pain, or indicate their pain severity by means of a visual analogue scale or 'faces' pain scale. But in infants and pre-verbal children, behavioural signs such as irritability or apathy are often the only way to assess pain severity.

## Choice of analgesic medicine

Mild pain can usually be controlled with paracetamol or ibuprofen, but severe pain requires treatment with an opiate such as morphine. Frequent reassessment is important: if pain is not adequately controlled by paracetamol or ibuprofen, a weak opioid such as codeine may be added; and if pain is still not controlled, a strong opioid such as morphine should be considered.

There are significant pharmacokinetic differences in children compared with adults (such as higher body water content, smaller fat and muscle stores, reduced protein binding, immature hepatic enzymes and decreased renal function in neonates). These differences have important implications for the dosage regimens of the various analgesics. Table I lists the current paediatric dosing recommendations for commonly prescribed analgesics, with particular emphasis on those included in the South African Essential Medicines List.

The common adverse effects of analgesic medicines should be considered and appropriately managed. For example, opiate-induced nausea should be treated with an appropriate antiemetic.

The route of administration of the analgesic will depend on the child's clinical situation. Oral medicines are usually the easiest to administer, but in a child who is vomiting or unable to take oral medicines, suppositories or intravenous formulations are more suitable. Local anaesthetic medicines are especially valuable for pain relief during invasive procedures.

### *Oral medicines*

Oral medicines can be given painlessly, and are usually the most acceptable option for children and parents. Paracetamol, ibuprofen, diclofenac and codeine may all be given orally to children, and are available in syrups, suspensions or drops, to make accurate dosing easier.

Paracetamol may be used on its own to treat mild pain, or as an adjuvant treatment for moderate and severe pain. Adverse effects are rare, but care needs to be taken when calculating the dose as overdose can cause hepatic necrosis.

Non-steroidal anti-inflammatory agents such as ibuprofen and diclofenac are

**Table I. Doses of commonly prescribed analgesic medicines by route of administration**

| Medicine | Oral | Rectal | Intravenous | Intramuscular |
|---|---|---|---|---|
| Paracetamol | Pre-term neonates:<br>15 mg/kg/dose 8-hourly<br>Neonates:<br>20 mg/kg/dose 8-hourly<br>(maximum 60 mg/kg/24 h)<br>>1 month:<br>20 mg/kg/dose 6-hourly<br>(maximum 90 mg/kg/24 h) | As per oral doses | Over 33 kg:<br>15 mg/kg/dose 4-hourly<br>(maximum 60 mg/kg/24 h) | |
| Ibuprofen | >6 months or 7 kg:<br>5 mg/kg/dose 4 - 6-hourly<br>(maximum 20 mg/kg/24 h) | | | |
| Diclofenac | >2 years:<br>1 - 3 mg/kg/24 h in<br>2 - 3 divided doses<br>(maximum 150 mg/day) | As per oral doses | | |
| Tilidine | >1 year:<br>1 mg/kg/dose 6-hourly | | | |
| Codeine | 0.5 mg/kg/dose 4 - 6-hourly | | | |
| Morphine | | | <6 months:<br>0.025 - 0.05 mg/kg/dose<br>4 - 6-hourly<br>>6 months:<br>0.05 - 0.1 mg/kg/dose<br>4 - 6-hourly | <6 months:<br>0.05 - 0.1 mg/kg/dose<br>4 - 6-hourly<br>>6 months:<br>0.1 - 0.2 mg/kg/dose<br>4 - 6-hourly |

used to treat mild to moderate pain, particularly in pain associated with tissue inflammation. They are associated with adverse gastrointestinal and renal effects and should be used with caution in children with a history of asthma or atopy.

Codeine may be added to any of the above medicines to treat moderate pain. Adverse effects include nausea and drowsiness and it should not be used in patients with head injuries or acute asthma.

Tilidine can be used to treat severe pain, but must be avoided in patients with head injuries or asthma.

### *Intravenous medicines*

Intravenous opiates such as morphine provide fast-onset analgesic effects. They are useful in children with severe pain and in those who are unable to take medicines orally, although their disadvantage is that they require intravenous access. Other forms of analgesia should be used while intravenous access is established.

Intravenous paracetomol is useful in older children who are unable to take oral medicines or suppositories and who are at significant risk of opiate adverse effects such as sedation or respiratory depression.

### *Topical medicines*

Lidocaine/prilocaine or tetracaine creams can be used to reduce the pain of needle insertion for blood tests or intravenous cannula insertion. They should be applied to intact skin in a thick layer and covered with an occlusive dressing. They take between 45 minutes and 1 hour to achieve full effect.

### *Medicines given by other routes*

Inhaled nitrous oxide can be used to reduce pain during procedures such as applying dressings or splints. Intramuscular injections are often painful and are associated with variable absorption. Analgesia can be given intramuscularly in children, but there are usually other options available that are more acceptable to patients.

Paracetamol and diclofenac are available as suppositories for use in children who are unable to take oral medicines.

Intranasal fentanyl has proved to be an effective alternative to intravenous opioids, but the formulation is not yet available in South Africa.

### *Sedation*

Children often require sedation for painful procedures such as fracture reduction, wound cleaning and dressing changes. Ketamine or midazolam can be used by doctors trained and experienced in their use where adequate monitoring and resuscitation facilities are available. General anaesthesia should be considered for potentially difficult procedures and for those involving large wounds.

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**Further reading**

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## *In a nutshell*

- Use appropriate medicines at adequate doses to achieve early pain control.
- Frequently reassess patients and uptitrate the dose or agent if pain is not adequately controlled.
- Consider additional analgesia during painful procedures.
- Beware of adverse effects of analgesic medicines and manage them appropriately.

## *Single Suture*

# *HIV resistance surging*

Studies of gay men in San Francisco suggest that drug-resistant strains of HIV will surge in the next 5 years, according to Sally Blower and colleagues of the University of California, Los Angeles.

Currently, about 15% of new infections with HIV in San Francisco are from resistant strains, in spite of the cocktail of drugs used to treat the disease. Blower and colleagues modelled viral transmission among gay men in the city. The model correctly predicted how drug-resistant HIV has already evolved and spread among gay men in the past 20 years. When used to predict the future, the same model predicted a surge in resistant strains, with 60% of those currently circulating capable of self-sustaining epidemics in which each infected person spreads the resistant strain to more than one new recipient.

Blower expects similar surges in Europe and the rest of the USA, which also have resistant strains circulating. In the developing world, where use of antiretrovirals is expected to increase massively, resistance could also be boosted.

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