Policy

Clinical Guideline

South Australian Paediatric Practice Guidelines – Pain Management and Opioid Safety

Policy developed by: SA Child Health Clinical Network
Approved SA Health Safety & Quality Strategic Governance Committee on: 17 March 2015
Next review due: 31 March 2018

Summary Clinical Practice Guideline for the pain management and opioid safety.

Keywords Pain management, pain opioid, analgesia, analgesic, PCA, multimodal, Naloxone, Adjuvant medications, internasal Fentanyl, Neuroaxial opioids, transdermal opioids, Tramadol, simple analgesics, clinical guideline, South Australian Paediatric Practice Guidelines

Policy history Is this a new policy? **Y**
Does this policy amend or update an existing policy? **N**
Does this policy replace an existing policy? **N**

Applies to All Health Networks
CALHN, SALHN, NALHN, CHSALHN, WCHN, SAAS

Staff impact All Clinical, Medical, Nursing, Allied Health, Emergency, Dental, Mental Health, Pathology

PDS reference CG203

Version control and change history

Version	Date from	Date to	Amendment
1.0	02/03/2015	current	Original version

Government of South Australia
SA Health

South Australian Paediatric Practice Guidelines

Paediatric Pain Management and Opioid Safety

Note

This guideline provides advice of a general nature. This statewide guideline has been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach. The guideline is based on a review of published evidence and expert opinion.

Information in this statewide guideline is current at the time of publication.

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Health practitioners in the South Australian public health sector are expected to review specific details of each patient and professionally assess the applicability of the relevant guideline to that clinical situation.

If for good clinical reasons, a decision is made to depart from the guideline, the responsible clinician must document in the patient's medical record, the decision made, by whom, and detailed reasons for the departure from the guideline.

This statewide guideline does not address all the elements of clinical practice and assumes that the individual clinicians are responsible for discussing care with consumers in an environment that is culturally appropriate and which enables respectful confidential discussion. This includes:

- The use of interpreter services where necessary,
- Advising consumers of their choice and ensuring informed consent is obtained,
- Providing care within scope of practice, meeting all legislative requirements and maintaining standards of professional conduct, and
- Documenting all care in accordance with mandatory and local requirements

ISBN number: 978-1-74243-636-4
Endorsed by: South Australian Paediatric Clinical Guidelines Reference Committee. South Australian Child Health Clinical Network
Last Revised: 02/03/2015
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Paediatric Pain Management and Opioid Safety

Introduction

Scope

In addition to information on analgesic options for children, this guideline delineates the responsibilities of medical and nursing staff related to the selection of appropriate medication, its administration and the monitoring of children receiving analgesia

Doses and monitoring requirements in this guideline refer to analgesic doses. For procedural sedation refer to organisational guidelines

Key statements

- The assessment and management of paediatric pain requires consideration of the bio-psychosocial aspects of pain[1]
- Inadequate analgesia exacerbates the child's distress, may have negative physiological consequences and may result in fear of future health care interventions[2,3]
- Regular administration of simple analgesics (paracetamol, NSAIDs) reduces the amount of opioid that is required with a subsequent reduction in opioid related side effects
- Effective and safe pain management depends on the ordering, administration and monitoring of children following administration of analgesia especially opioid medications
- Opioids have been and are under-utilised in children arising from a fear of respiratory depression, potential for addiction and other side effects. Analgesics, including opioids, are safe for children if guidelines regarding patient assessment, dosing and monitoring are incorporated into practice
- Infants under the age of 1 year are most susceptible to the risk of over sedation following opioid use by any route and require lower doses of opioids than older children
- Consultation with paediatric services is recommended regarding dosing and monitoring in clinical settings which do not commonly administer opioid medications to infants

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Principles of paediatric pain management

- Every infant, child and adult has the right to appropriate pain assessment and safe pain management
- Health professionals have a responsibility to assess pain routinely, to accept the patients' and their family's pain reports, to document pain reports and to intervene to prevent and treat pain
- Baseline vital signs and an initial pain rating (when appropriate) should be obtained at the time of admission. With surgical patients this assessment may not occur until the patient is admitted to the post-acute care unit
- Pain management is a collaborative effort including all members of the health care team, the patient (where appropriate) and the patient's family. It includes both pharmacologic and non-drug therapies
- Pain should be assessed and documented every one to four hours when the patient is receiving interventions for pain, and then as needed. The patient should be reassessed at the time of peak effect of the drug related to route of administration
- The goal of pain management is to provide on-going relief from pain. This is best accomplished by giving continuous or regularly scheduled analgesics and using multimodal therapy where appropriate
- For management of moderate to severe acute pain, opioid analgesics should be the first choice of medications offered where continuous regional analgesia is not in use
- Opioid doses can be increased from the starting dose for additional pain control
- Opioids should generally be combined with simple analgesics (paracetamol +/- NSAIDs) to be opioid sparing multimodal analgesia
- Analgesics should be given by the simplest method possible and at the lowest dose to achieve the desired effect. Oral administration should be used as soon as the patient can tolerate oral intake
- Local anaesthetic blocks may be included within the analgesic options
- Procedural pain management often requires the use of opioids in addition to sedatives/anxiolytics &/or local anaesthesia. Refer to organisational guidelines for dosing, fasting & monitoring requirements

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PAIN ASSESSMENT REFERENCE PAGE

0= no pain 1-3= mild pain 4-7= moderate pain 8-10= severe pain

FLACC
(Behavioural)

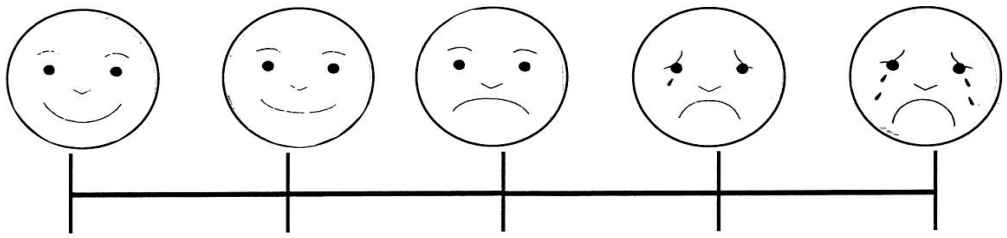
SUGGESTED AGE GROUP: 1month to 7years

	SCORING		
CATEGORIES	**0**	**1**	**2**
Face	No particular expression or smile	Occasional grimace or frown	Frequent to constant quivering chin, clenched jaw
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting back and forth, tense	Arched, rigid or jerking
Cry	No cry (awake or relaxed)	Moans or whimpers, occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching, hugging or being talked to, distractable	Difficult to console or comfort

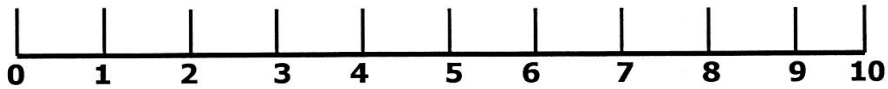
Each of the five categories (F) Face; (L) Legs; (C) Cry; (C) Consolability is scored from 0-2 which results in a total score between 0-10 *(Merkel et al, 1997)*

FACES SCALE
(Self Report)

SUGGESTED AGE GROUP: 4 years and older



NUMERICAL
(Self Report/ Parental Report)



Developed by WCH Children's Acute Pain Service

Pain assessment includes appropriate interventions including review of current analgesic status, ability to administer additional analgesia or to request review if regime is inadequate

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Definitions

Adjuvant describes the drug used to enhance the action of another medication

Analgesia means "absence of pain perception". Absence of pain sensation, or reduction in pain perception, is commonly induced by drugs which may act locally (by interfering with nerve conduction) or centrally (by suppressing pain perception)[4,5]

APS - Acute Pain Service

Breakthrough Pain describes a transitory exacerbation of pain in a patient who is on an established analgesic regime[6]

Breakthrough analgesia describes additional, usually short acting, analgaesia prescribed to treat breakthrough pain

Corrected age (also known as post conceptual age) - the age a premature baby would be if he/she had been born on their due date. This is calculated by subtracting the number of weeks born before 40 weeks' gestation from the chronological age[7]

Infant – many sources define infancy as the period from birth to 24 months. However in this document infant is used to describe full term infants (born after a minimum of 37 weeks' gestation) up to the age of 12 months

- **A premature infant** is one who is born 3 weeks or more before the due date
- **Chronological age** - The age of an individual expressed as time that has elapsed since birth, the age of the infant expressed as hours, days and weeks[7]
- **Neonatal -** Pertaining to the newborn period which, by convention, is the first four weeks after birth

Incident related pain - episodes of intermittent, often severe pain, related to specific activities such as coughing, physiotherapy, turning, and wound care[6]

Multimodal analgesia –the concurrent use of different classes of analgesic medications in order to maximise analgesia and minimise side effects[9]

Neonatal abstinence syndrome - a syndrome of drug withdrawal observed in infants of mothers physically dependent on opioids[10]. It is manifest by foetal and neonatal dependence resulting in withdrawal symptoms which develop shortly after birth. Symptoms exhibited include loud, high-pitched crying, sweating, yawning and gastrointestinal disturbances[10,11,12]

Neuroaxial analgesia - describes the administration of analgesics into the subarachnoid space (intrathecal or spinal analgesia) or the epidural space (epidural analgesia) by either single bolus or continuous infusion of analgesic agents[13,14]

Nurse Controlled Analgesia (NCA) – is where a nurse provides bolus doses of opioid medication as required without a background infusion for the management of acute pain in infants, children under 8 years of age and older patients who are unable to effectively manage patient controlled analgesia

NSAID - non steroidal anti-inflammatory drug e.g. ibuprofen, diclofenac

Opioid –any drug, either naturally occurring or synthetic, which has morphine like actions[13]

Opioid dependence - is characterised by the appearance of withdrawal symptoms when the drug is abruptly discontinued or the dose is reduced[8]

Opioid tolerance - a decrease in sensitivity to opioid activity over time so that a larger dose than originally used is needed to achieve the same analgesic effect[13]

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Opioid sparing agent – additional medication, analgesic or non-analgesic, prescribed with the intention of reducing the overall opioid dose required and subsequently the incidence of opioid induced side effects

Pain assessment - An ongoing systematic process of identifying pain and its characteristics including response to treatment[1,14,15]

PACU – Post acute care unit/recovery room

Numerical rating scale – patient's pain is assessed on a 0-10 scale using age appropriate assessment tools such as the FLACC Score, FACES Pain Assessment Scale or Visual Analogue Scale

Pain score	**Sedation score**
A = Asleep	0 = Awake
0 = No pain	1 = Sedated/Asleep – easy to rouse
10 = Worst pain imaginable	2 = Sedated /Asleep – hard to rouse
	3 = Unrousable

Pain Protocol the incremental administration of analgesia (usually opioid) using a prescribed pathway of dose, administration intervals and observation in order to achieve adequate analgesia. It is most commonly used in PACU and Emergency Department settings by nursing staff who have received appropriate education. Pain protocol regimes are institution/area specific

Patient Controlled Analgesia (PCA) provides a mechanism which enables self-administration of analgesics in response to pain or anticipated pain. It requires the use of a programmable device to administer opioid or occasionally other analgesic agents

PONV – post operative nausea and vomiting

SpO_2 - Oxygen saturation measured by pulse oximetry

Withdrawal (abstinence syndrome) - may occur if opioids are ceased rapidly, or have a significant dose reduction, after prolonged use – this may occur after as little as 7-10 days of high dose opioids[12,17]

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Multimodal analgesia and the use of adjuvant medications

Multimodal analgesia describes the concurrent use of different classes of analgesic medications in order to maximise analgesia and minimise side effects [16,18,19,20]

Medications most commonly used as components of multimodal analgesia have analgesic properties in their own right e.g:

- Paracetamol
- NSAIDs
- Tramadol
- Low dose ketamine infusion (requires anaesthetic supervision in a tertiary setting)

The most common scenario is the prescribing of regular paracetamol +/- NSAID for all patients receiving continuous or intermittent oral or parenteral opioids to reduce overall opioid use and even out the irregularities in PRN or PCA dosing.

Suggested combinations for multimodal analgesia

- Regular paracetamol + oral PRN opioid +/- NSAID
- Regular paracetamol + opioid infusion, Patient Controlled Analgesia (PCA) or Nurse Controlled Analgesia (NCA) +/- NSAID
- Tramadol may be used as a regular Slow Release dose or immediate release capsules given regularly or PRN with any of the above combinations

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Simple Analgesics

Paracetamol Dosing Guidelines for Analgesia

Take care when dosing for obese children always dose for lean body weight[21]

ORAL/RECTAL	DOSE & FREQUENCY
Term Infants < 3/12 (55 weeks post conceptual age)	**15 mg/kg/dose, max 4 doses/24hours** Total dose 60 mg/kg/24hours
Children >3 months (55 weeks post conceptual age) → ~12 years (50 kg) Available as mixture (note range of strengths available in the community) Tablets 500mg Suppositories 125, 250 & 500mg	**15 mg/kg/dose 6 hourly** Total dose 60 mg/kg/24hours is usually sufficient. Max total dose 90 mg/kg/day should only be prescribed for 48 hours
Adolescents > 50g	**1 gram QID,** max adult dose 4g/24hours
LOADING DOSE Rectal administration 20 – 40 mg/kg x 1 dose (consent recommended for rectal administration)	

INDICATIONS FOR IV USE
Nil by mouth or not tolerating oral intake
Rectal route not available – e.g. surgery, Oncology
Rectal route refused or inappropriate
As soon as the oral or rectal routes are available, therapy should be changed
Organisations may have restrictions on who can order IV paracetamol. Check local guidelines

INTRAVENOUS	DOSE & FREQUENCY
Neonates & infants < 44 weeks post conceptual age	Refer to Statewide Neonatal Medication Guidelines
Infants >4 weeks (44 weeks post conceptual age) and children up to ~12 years (50kg)	**15 mg/kg/dose, 6 hourly, max 4 doses/24hours** (60 mg/kg/24hours) This is the maximum dose and must not be exceeded
Adolescents > 50Kg	**1 gm/dose 6 hourly** (Max 4g/24hours)

PRECAUTIONS/CONTRAINDICATIONS (ALL ROUTES)

Hepatocellular insufficiency/hepatic failure
Known allergy to paracetamol
Severe renal insufficiency (creatinine clearance < 30 mL/min)
Chronic malnutrition (low reserves of hepatic glutathione)
Dehydration
Prolonged fever
If prolonged use or high risk patient, monitor Liver Function Tests (LFTs)

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Non-selective non-steroidal anti-inflammatory drugs (NSAID's)

Relative contraindications/considerations when ordering NSAIDs

- Hypovolaemia, dehydration
- Prolonged lack of oral intake
- Renal disease
- NSAID/Aspirin induced asthma. If previous NSAID with no problems – can be used
- Bleeding/clotting disorder, thrombocytopaenia
- Likelihood of surgical intervention/reintervention within 48 hours
- History of GI bleeding or ulceration
- Recent neurosurgical procedure
- Major orthopaedic procedures, fractures (consult with surgeon)
- ENT surgery – check (consult with surgeon)
- Rectal administration contraindicated in: inflammatory bowel disease, surgery or inflammatory conditions of the rectum, anus or sigmoid colon and most oncology patients

Drug	Indication	Dose	Available as	Additional information
Ibuprofen	Mild to moderate pain, especially in relation to an inflammatory process May be used as a component of multimodal analgesia	**5-10 mg/kg/dose** 6-8 hourly PRN or regularly	Oral – mixture (100 mg/5 mL) or tablets (200 mg & 400 mg) Oral - Always administer with food or milk	May be given in conjunction with paracetamol to maximise effect of both for moderate pain See above for relative contraindications Usual max adult dose 400 mg/dose Do not give to infants < 3 months of age
Diclofenac	Mild to moderate pain, especially in relation to an inflammatory process May be used as a component of multimodal analgesia See above for relative contraindications	**1 mg/kg/dose** 8 hourly PRN or regularly Rectal loading dose 2 mg/kg. No additional NSAID for 10-18 hours	Oral – tablets 25 mg, 50 mg NO liquid preparation available Oral - Always administer with food or milk Rectal (12.5, 25, 50, & 100 mg) (consent recommended for rectal administration)	Max dose 3 mg/kg/24hours Recommended adult dose 50 mg tds Do not give to infants < 6 months

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Selective Cox-2 Inhibitor (Parecoxib)

Relative contradictions/considerations when ordering Parecoxib

- Active GI bleeding,
- Severe hepatic impairment
- Inflammatory bowel disease
- Asthma, urticaria or bronchospasm after previous NSAID, aspirin or parecoxib
- Smoking
- History of hypertension or other cardiovascular disease

Drug	Indication	Dose	Available as	Additional information
Parecoxib	Approved at WCHN for use as a single dose for children aged 12 years and over and who weight >40kg	**40 mg dose**	Vial 40mg in 2mL	Minimum withholding time from NSAIDs is 12 hours after parecoxib

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Tramadol

Tramadol is commonly referred to as an atypical centrally-acting analgesic because of its combined effects as an opioid agonist and a serotonin and noradrenaline reuptake inhibitor[22]

It is a useful analgesic for moderate pain and is associated with less sedation, respiratory depression or slowing of gastrointestinal mobility than opioid medications[9]

It is not licensed for children <12 years. Use of drops should be limited to health care settings where there are organisational guidelines in place for the use of tramadol drops/solution.

In SA this is WCH only

However because of the relative contraindications (see below) "The decision to prescribe tramadol should not be a trivial one"[22]

NB: See next page for dosing guidelines

Relative contraindications/considerations when ordering Tramadol

Do Not Use in the following patients:

- Those with a history of seizures (may lower seizure threshold)
- Concurrently on SSRIs (citalopram, escitalopram, fluoxetine, fluvoxamine, paroxetine, sertraline, venlafaxine and desvenlafaxine)
- Received pethidine in the last 2 days
- Received moclobemide in the last 2 days
- Received MAO inhibitors (phenelzine, tranylcypromine) in the last 14 days

Use with caution in patients who:

- Are also taking warfarin (may increase anticoagulant effects)
- have hepatic or renal impairment as dose adjustment may be required – check with pharmacist
- Are taking tricylic antidepressants (amitriptyline, clomipramine, dothiepin, doxepin, imipramine, nortriptyline, trimipramine
- Are taking carbamazepine as it may reduce tramadol's activity
- Are taking stimulants (both methylphenidate and dexamphetamine) as these might contribute to developing serotonin syndrome
- Are ultra-rapid metabolisers (commonly from Middle Eastern countries)

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Tramadol (Immediate release)	Moderate pain May be used as analgesic in its own right or as an opioid sparing agent See box above for contraindicat-ions.	**1-2 mg/kg /dose** 4-6 hourly PRN or regularly (max 4 doses/day) Adult dose 50-100 mg/dose 4-6 hourly PRN or regularly (usual maximum dose 400mg/day)	Capsules (50 mg) Oral drops (100 mg/ml) *see note below* Use 1mL syringe to administer Very small volume oral medication. HIGH RISK OF OVERDOSE MAX ADULT ORAL DOSE 1mL (100mg) **Use of drops should be limited to health care settings where there are organisational guidelines in place for the use tramadol drops/solution. In SA this is WCH only**	Works most effectively with regular paracetamol Reputation for causing nausea but well tolerated by many, especially pre-pubertal children Max daily dose 8 mg/kg/day Max adult dose 400 mg/day oral, Report tachycardia, tremor, agitation Do not give to infants under 1 year

Drug	Indications	Dose	Available as	Time to peak concentration	Duration of effect	Routine observations
Tramadol SR	Moderate pain May be used as analgesic in its own right or as an opioid , sparing agent See box above for contraindicat-ions	**2-4 mg/kg/ dose BD** Min weight 25 kg Max adult dose 400mg/24hours If prescribing SR + immediate release tramadol for breakthrough, do not exceed recommended total daily dose	100 mg tablet Tablets must not be crushed, cut or chewed	Initial dose does not reach effect for 8 hours	12 hours	Report nausea, agitation

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Opioids

Opioid Safety for Health Professionals

- Opioid medications are the primary medications administered to patients with moderate – severe pain
- Safe use of opioid medications requires knowledge of available opioids, their relative indications, formulations and routes of administration, potential adverse effects and how to manage them
- Ensure that care is safe. This will vary depending on location of patient, route and dose of prescribed opioid
- Monitoring processes are highly recommended. These should be continued during transfer between departments and other health care agencies and the child will require an appropriately trained escort
- Individual response to opioid medication is idiosyncratic, with patients requiring variable doses to achieve adequate analgesia without side effects
- Recommended doses provide a starting point but may require adjustment for individual need. Balance analgesic effect with prevention of side effects.
- If in any doubt about the appropriate dose, it is safer to administer a lower dose and titrate up to achieve the desired analgesic effect
- In Infants under 6/12 and ex premature infants up to 6/12 corrected age (15 months post conceptual age) opioid medications have a prolonged half-life with increased risk of opioid accumulation[19,20,27]
- As such they require special consideration of monitoring and dosing if opioids are administered by any route to infants < I year. If the prescriber is unfamiliar with opioid dosing for children <1 year it is recommended to seek advice from a tertiary paediatric anaesthetic, acute pain or retrieval service
- As a result of the individual variability of response, close OBSERVATION is a requirement for all patients over the period of peak concentration of the medication – this will depend on the specific medication used and the route of administration Time to peak concentration of opioid medications by route of administration
- The opioid antagonist naloxone should always be available in health care settings where opioid medications are administered
- The action of naloxone is short lived and patients require frequent reassessment with sedation scoring and pulse oximetry to monitor for over sedation/respiratory depression for a minimum of 4 hours after naloxone administration
- Comply with organisational and legislative guidelines for documentation of opioid delivery

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- All opioids have the potential to cause over sedation, nausea and vomiting, itch, urinary retention, constipation and occasionally dysphoria/bad dreams. Management of opioid related side effects These are side effects rather than allergy and are usually dose related for each individual. Management of side effects includes the use of adjuvant analgesia to reduce overall opioid requirement and additional medications to ameliorate unpleasant symptoms
- Intermittent doses should not be administered unless the pain score - ≥ 3 and the sedation score ≤ 1
- If slow release opioid medications are prescribed the pain score may be < 3 but the sedation score should be ≤ 1 at time of administration (Exceptions may apply in long term and palliative care situations)
- There are a range of patients who have a higher than usual risk of over sedation and consequent respiratory depression. These patients require special consideration when prescribing opioids and SpO_2 monitoring before, during and after administration Patients requiring special consideration and closer monitoring
- Recommended doses are for routine analgesic use.
- Doses and clinical guidelines for opioid medications used in conjunction with sedative medications for procedural pain relief can be found in organisational specific guidelines.
- Recommended doses are for opioid naïve patients
- If patients have received regular opioids or high doses of PRN opioids for more than 1 week, a weaning process will be required before cessation[15] Opioid weaning
- NHMRC Guidelines[16] recommends the use of simple analgesics and if appropriate adjuvant medications to reduce overall opioid use Multimodal analgesia and the use of adjuvant medications
- Prolonged use of opioids will result in tolerance, requiring increasing doses if the cause of pain does not diminish over time

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Medical responsibility in prescribing opioid medications

- Ensure that care is safe.This will vary depending on location of patient, route and dose of prescribed opioid
- Dosing guidelines designed for Intensive Care settings are often not appropriate for use in a ward or community setting
- Recommended doses in this guideline have been developed by the WCHN Acute Pain Service in consultation with anaesthetic, medical, pharmacy and nursing personel
- If in any doubt about the appropriate dose, it is safer to administer a lower dose and titrate up to achieve the desired analgesic effect
- Consider pre-existing conditions and concurrent sedative medications when prescribing Patients requiring special consideration and closer monitoring
- Infants under 6/12 and ex premature infants up to 6/12 corrected age (15 months post conceptual age) require reduced doses
- A useful rule of thumb is to halve the standard dose of any opioid, by any route for all children under 1 year[23-27]
- Ensure that PRN orders allow for repeat doses appropriate to the duration of action and route of administration of the medication Time to peak concentration of opioid medications by route of administration
- Ensure that there are adequate orders to enable the nurse to maintain patient comfort using PRN doses safely
- Order simple analgesics to maximise the benefits of multimodal analgesia Multimodal analgesia and the use of adjuvant medications
- Order PRN antiemetics for all patients receiving parenteral opioids
- Consider ordering regular aperients/laxatives when patients receive regular opioids

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Nurses - pre and post administration care

In addition to the special requirements for children <1 year, continuous SpO_2 monitoring is recommended for all paediatric patients receiving opioid infusions, NCA, PCA and high dose oral opioids plus standard dose oral opioids if they have any risk factors that increase the risk of over sedation and subsequent respiratory depression.[25,28] Patients requiring special consideration and closer monitoring

- Ensure the patient is cared for in a safe environment. This will vary depending on location of patient, route and dose of prescribed opioid.
- Assess the patient prior to administration of opioids. Do not administer a dose unless the Pain Score ≥ 3 and the sedation score ≤ 1
- If administering slow release oral opioids do not administer unless the sedation score is ≤ 1
- Following the administration of opioids monitor and record analgesic effect, sedation score, respiratory rate and SpO_2 saturation levels as per organisational protocols related to medication used and route of administration Minimum Observation Following Opioid Administration
- Maximise the use of simple analgesics to maximise the benefits of multimodal analgesia Multimodal analgesia and the use of adjuvant medications
- Observation protocols may be superseded if a clinical situation requires more frequent observations
- Follow organisational Nursing Clinical Guidelines relevant to the route of administration
- Monitoring may be suspended in palliative care patients, but this should be documented in the patient record by the treating medical officer
- Follow organisational Nursing Clinical Guidelines relevant to the route of opioid administration
- In the event that continuous SpO_2 monitoring is not used, clinical indicators for 'spot' pulse oximetry are:
    - Tachypnoea or bradypnoea (decreased respiratory rate)
    - Sedation score 2 or more (hard to rouse)
    - Respiratory distress
    - Pallor or cyanosis
    - Confusion or agitation
    - Hypotension
    - Other health professional concern[28]

ISBN number: 978-1-74243-636-4
Endorsed by: South Australian Paediatric Clinical Guidelines Reference Committee. South Australian Child Health Clinical Network
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- Continuous SpO_2 monitoring should be considered for high-risk patients with acute pain especially if they : Patients requiring special consideration and closer monitoring
  - Are receiving intravenous opioids
  - Are less than 1year and receiving opioids via any route
  - Have a sedation score 2 or more (hard to rouse)
  - Have significant cardio-respiratory impairment
  - Has a history of sleep apnoea, snoring or airway obstruction
  - Have spot oximetry less than 94%
  - Are receiving concurrent sedative medications
- Notify MO if inadequate analgesia or side effects do not respond to available strategies
- Remain aware that over sedation is the precursor to respiratory depression and can occur following administration by any route and at the recommended doses
- In the event of over-sedation
  - Check respiratory rate and O_2 saturation levels
  - Administer oxygen and other resuscitation measures as needed
  - If patient is on infusion or PCA put the pump on hold
  - Call organisational emergency team if required
  - If vital signs satisfactory and saturating well:
    - Continue SpO_2 monitoring until over sedation resolves
    - Once Sedation Score returns to 1 and Pain Score ≥ 3 restart PCA or infusion at a lower rate, continue close monitoring
    - If patient having oral or bolus administration ask for review of analgesia before the next dose is required

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Patients requiring special consideration and closer monitoring

Infants – Mandatory monitoring

- Infants receiving opioids by any route, including oral, require minimum cardio-respiratory monitoring as below:
    - Ex premature infants up to 6/12 corrected age (older if persisting respiratory issues) Monitor for 12 hours post opioid or since last apnoea/bradycardic episode
    - Full term infants: Birth - 2 months → Monitor for 8 hours
    - Full term infants: 2 - 6 months → Monitor for 4 hours

      (SpO_2 monitoring may be sufficient for full term infants over 3/12)
    - 6 months -1year SpO_2 monitoring for a minimum of 2 hours

In Infants under 6/12 and ex premature infants up to 6/12 corrected age (15 months post conceptual age) opioid medications have a prolonged half-life with increased risk of opioid accumulation[19,20,27]. If the prescriber is unfamiliar with dosing for children ≤1 year it is recommended to seek advice from a tertiary paediatric anaesthetic, acute pain or retrieval service.

Others requiring special consideration

In addition to the special requirements for children <1 year, continuous SpO_2 monitoring is recommended for all paediatric patients receiving opioid infusions, NCA, PCA and high dose oral opioids plus standard dose oral opioids if they have any risk factors that increase the risk of over sedation and subsequent respiratory depression

- Patients with a history of sleep apnoea or airway obstruction
- Patients following surgery related to the airway e.g. tonsillectomy and/or adenoidectomy
- Pre-existing respiratory co-morbidity e.g.
    - ex-premature infants
    - asthma, other chronic respiratory conditions e.g. cystic fibrosis
    - limited neck mobility
    - obesity- initial dosing should be based on lean body mass and titrated up if needed[29]
    - sleep apnoea (or increased potential for sleep apnoea e.g. cerebral palsy, craniofacial disorders, muscular dystrophy)
- Pre-existing conditions e.g. renal or hepatic impairment or concurrent medication which reduce/increase drug metabolism or excretion
- Previous adverse reactions to opioid medications
- Concurrent use of sedative medications including sedating antihistamines[28,29]

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Paediatric Pain Management and Opioid Safety

Minimum Observation Following Opioid Administration

In the treatment of acute pain opioid medications should only be given if: Pain Score is ≥ 3 and Sedation Score <1	These guidelines do not apply to opioid weaning programs such as for Neonatal Abstinence Syndrome

PATIENTS are at their most vulnerable when:

- The medication is at peak concentration for the route of administration
- If the child is on concurrent sedating medications
- The pain stimulus is removed eg dressing completed, hernia reduced

ROUTE	OBSERVATIONS
All Children aged > 6 months actual or corrected age	
Oral opioids*	Observe at 1 hour for analgesic effect and side effects
IM/SC opioids Should not routinely be used in children	Record RR + Sedation and Pain Scores pre and 1 hour post administration
IV bolus	Baseline Pain Score RR, HR, Sedation Score + SpO_2 saturations for paediatric patients All patients repeat observations at 5,15 & 30 minutes
Intranasal Fentanyl **Minimum age 1 year**	Baseline RR, HR, Sedation Score, Pain Score & SpO_2 saturations. Repeat at 10 & 30 minutes. Observe for 45 minutes from last dose.
Pain protocols May be developed in specific PACU and emergency areas	As per protocol documents in relevant clinical areas Minimum weight 10 kg
Opioid infusions, NCA, PCA, epidural bolus and infusion	Observations as per organisational PCA, NCA, Analgesic Infusion and Epidural Infusions charts and standards. Continuous SpO_2 is highly recommended with all these modalities

Infants under 6 months and ex premature infants under 6 months corrected age require smaller doses and longer observation after opioid administration via oral or parenteral routes.

- **Ex premature infants up to 6/12 corrected age** Monitor for 12 hrs post opioid or since last apnoea/bradycardia (older if persisting respiratory issues) [27]
- **Full term infants: Birth - 2 months** Monitor for 8 hours using cardio-respiratory monitoring
- **Full term infants: 2 - 6 months** SpO_2 monitoring may be sufficient for this group

Medical practitioners who are unfamiliar with prescribing opioid medications for infants may like to consult with Paediatric Anaesthetic, Intensive Care or Retrieval Services for dosing guidance

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Time to peak concentration of opioid medications by route of administration

Drug	Route	Onset of action	Time to Peak effect	Duration	Other info
Morphine	IV bolus	5-10 mins[13]	10 -60 mins[13]	2 hours[13]	
	IM	10-20 mins[13]	10-60 mins[13]	3-4 hours[13]	
	SC	15-30 mins[31] 10-20 mins[13]	30-60 mins[13]	3-4 hours[13]	
	Oral	30-60 mins[13]	1-1.5 hours[13]	2-4 hours[13]	
	Oral SR, BD duration eg MSContin® 24 hour duration eg Kapanol®	30-60mins[13]	4-5 hours[13] 8-15 hours	12 hours[13] 24 hours	Available as tablets, capsules and sachets for non-tablet takers
Fentanyl	IV bolus	0-5 mins	3-5 mins[13]	30-60 mins[13]	
	Intranasal	5-10 minutes [32]	10 mins[32]	40 minutes[32]	
	Transdermal	12-24 hours[33] 12-16 hours Therapeutic at 6 hours	24 hours 48-72hours[33]	72 hours[33]	Decreasing effect after patch removed but can last up to 48 hour
Oxycodone	Oral	30-60 mins[13]	60-90 mins[13]	3-4 hours[13]	
Tramadol	Oral	Capsule: 30-60 mins[36] No data for drops most likely absorbed more quickly, some by buccal absorption	2-4 hours[36]	3-6 hours[36]	
	Oral SR BD preparation Once daily extended release	Initial dose 8 hours to effect[36]	Initial dose 8 hours to effect[36]	12 hours once therapeutic level established[36] 24 hours once therapeutic level established	

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Naloxone for the reversal of opioid action

The duration of action of many opioids is longer than that of naloxone.

Half life of naloxone is approximately 1 hour therefore patients should be carefully monitored for a minimum of 4 hours because of the potential for relapse of opioid toxicity

- In the event of respiratory depression initiate immediate resuscitation with O_2 and assisted ventilation as required and initiate organisational emergency codes if clinically indicated
- Naloxone is a specific opioid antagonist and may be used to rapidly reverse opioid induced respiratory depression or other side effects.
- Naloxone may be administered in a resuscitation scenario whereby the goal is reversal of the opioid, but at other times, low doses may be titrated to effect for reversal of other side effects such as opioid-induced itch.
- Naloxone SHOULD NOT BE used for tramadol overdose as the risk of seizures is increased[36]

NB: See next page for dosing guidelines

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Naloxone dosing variables Refs: [29,35,36,37]

Purpose	**Treatment of opioid overdose**	**Reversal of excessive sedation or respiratory depression following therapeutic doses**	**Relief of opioid itch following therapeutic doses**
End point	Full reversal of opioid effect	Desired degree of reversal – adequate ventilation & alertness without significant pain/discomfort	Reduction of itch without loss of analgesic effect
Children **SEE BELOW FOR NEONATES**	Administer **10 micrograms/kg as a single dose IV** or IM if no IV access **If no response give 100micrograms/kg IV** ED departments may choose to administer 100 micrograms/kg as the initial dose If further reversal is required commence an IV infusion starting at 10micrograms/kg/hour and review diagnosis	Administer **increments of 5 - 10 micrograms/kg IV** at 2 to 3 minutely intervals to the desired degree of reversal	Administer **1 microgram/kg IV** Repeat after 30 minutes if required
Adolescents	**400 micrograms up to a total of 2mg** IV, **IM or SC every 2-3 minutes** max 10mg	**100 micrograms IV every 2-3 minutes** to the desired degree of reversal	**40 - 100 micrograms IV** Repeat after 30 minutes if required
Neonates	The administration of naloxone is not routinely used in neonatal resuscitation, but may be ordered by neonatal staff. Naloxone is contraindicated in the management of newborn infants born to opioid tolerant mothers. Acute opioid withdrawal in these infants can result in rapid onset of withdrawal symptoms including convulsions		

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Dose range orders for oral immediate release opioids

Dose range orders for oral immediate release opioids, most commonly oxycodone, allow nurses to provide pain management for patients based on individual responses to treatment. They enable the administration of an initial dose, and a second dose if required, **within the first hour** of the initial administration time.

General principles of oral opioid therapy

Most paediatric patients are 'opioid naïve' and their response is unknown

- Higher doses increase the risk of side effects including sedation
- **Oxycodone should only be given if the pain score is > 3 and the sedation score < 1**
- Continuous pulse and SpO_2 monitoring is mandated for all children <1year receiving oral opioids
- Always continue the use of simple analgesia (eg paracetamol and NSAIDs) to maximise opioid sparing effect
- Always evaluate analgesic response between 30 and 60 minutes after administration

Selecting a dose when a range is ordered

- Many children will gain adequate analgesia from the lower end of the dose range
- If previous doses have been given, consider the prior dose and patient's response when giving further doses
- Consider any concurrent use of medications which may also cause sedation

What to do if a dose given from the lower end of the range is ineffective

- Review analgesia at least 30 minutes after administration
- Administer a 'top up' dose using the following guidelines
    - The total dose will be equal to or less than the upper end of the dose range.
    - **The top-up dose should be no larger than the original dose** eg. If the range is 5-15mg and the initial dose given was 5 mg, only 5mg should be given as the top-up dose in that administration period
    - If more than 60 minutes has elapsed using a 'top up' dose is not an option -Consider other analgesic options/review

See example next page

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Example

Date	Medication			Date		
10. 10. 14	**Oxycodone**				**10/10**	**10/10**
Route	Dose	Hourly frequency	Max dose 24 hours	Time		
Oral	**2.5-5mg**	**3 hourly PRN**	**30mg**		**09.00** **Initial dose**	**09.40** **Top up dose**
Pharmacy additional info				Dose	**2.5 mg**	**2.5 mg**
Indication	Dose calculation			Route		
Pain	**0.1- 0.2mg/kg/dose**				**Oral**	**Oral**
Prescriber Signature	Print Name	Contact/Pager		Sign		

In the above example the total dose for the time period 09.00 – 12.00 is given in divided doses between 09.00 and 10.00 as the initial dose did not provide adequate analgesia.

Next dose of oxycodone may be given at 12.00 if required, with the nurse using their assessment and clinical judgement skills to decide whether to give the 2.5mg or 5mg dose or a dose in between

Ref. A Consensus Statement of the American Society of Pain Management Nurses and the American Pain Society in

Drew,D, Gordon,D et al. Pain Management Nursing.15(2):551-554. 2014

http://www.medscape.com/viewarticle/826290_print Accessed 30. 09. 2014

WCH Acute Pain Service January 2015

ISBN number: 978-1-74243-636-4
Endorsed by: South Australian Paediatric Clinical Guidelines Reference Committee. South Australian Child Health Clinical Network
Last Revised: 02/03/2015
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Immediate release oral opioids

CONSIDER DOSE REDUCTION IN RENAL OR HEPATIC IMPAIRMENT

CODEINE WARNING[38-41]

1. Codeine-containing medications should not be prescribed for children. The wide variability in metabolism due to cytochrome P450 2D6 polymorphisms make its effect unpredictable with resultant deaths in ultra-rapid metabolisers and lack of effect for children who are poor metabolisers
2. Codeine has been associated with deaths in children following tonsillectomy &/or adenoidectomy

Drug	Indications	Dose	Available as	Time to peak concentration	Duration of effect	Routine observations
Oral Oxycodone	Moderate - severe pain, if the oral route is available If ordering for infants less than 1 year consult with paediatric anaesthetic, or neonatal consultants regarding dosing & monitoring requirements	**0.1 - 0.15 mg/kg**/dose 4hourly PRN. Usual adult dose 10-15 mg/dose 4hrly PRN **if <1 year** or concern re respiratory depression: **0.05 - 0.1 mg/kg/dose**	Mixture (1 mg/mL) Tablets 5mg and Capsules 5, 10, 20mg	60-90 minutes	3-4 hours	Observe for 1 hour following administration for analgesic effect & sedation. Under 1 year Patients requiring special consideration and closer monitoring

ISBN number: 978-1-74243-636-4
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Drug	Indications	Dose	Available as	Time to peak concentration	Duration of effect	Routine observations
Oral Morphine	Moderate - severe pain, if the oral route is available. If ordering for infants less than 1 year consult with paediatric anaesthetic or neonatal consultants regarding dosing & monitoring requirements	**0.2 mg/kg/dose 4 hourly PRN** Usual adult dose 15 – 30 mg/dose 4hrly PRN if <1 year or concern re respiratory depression: 0.1mg/kg/dose	Mixture note: multiple strengths available Not very palatable Tablets (range of strengths available)	60-90 minutes	3-6 hours	Observe for 1 hour following administration for analgesic effect & sedation. Under 1 year Minimum Observation Following Opioid Administration

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Slow Release (SR) Oral Opioid Analgesics

- Slow/controlled/modified release oral opioid formulations are indicated for the relief of moderate to severe pain
- They are intended for use in patients who require repeated dosing with potent opioid analgesics over periods of more than a few days
- It takes 2-3 days to reach steady state following commencement of SR therapy
- Breakthrough analgesia should be ordered when these drugs are used
- Children with significant incident related pain may require IV bolus via PCA or NCA
- Slow release opioids can also be used for opioid weaning
- In most instances SR doses should be administered even when patients are fasting prior to an anaesthetic
- Consider dose reduction in hepatic or renal impairment
- Always mark the SR box on the National Inpatient Medication Chart when ordering these medications and use the trade name to avoid confusion with the generic immediate-release formulation

Drug	Indications	Dose	Available as	Time to peak concentration	Duration of effect	Routine observation
Slow release morphine (eg. MSContin®)	see above 1st choice SR opioid	**0.6 mg/kg/ dose bd** or if using once daily product 1.2 mg/kg/daily dose Conversion to oral from IV using a 1:3 IV/oral ratio may result in overdose. It is preferable to order a starting dose and adjust according to breakthrough requirement.	Sachets 20 mg made up in 10mL of H_2O = 2 mg/mL. (other strengths available) Tablets: (5, 10, 30, 60, & 100 mg. Tablets must not be crushed, cut or chewed	4-5 hours Administer only if patient awake	12 hours 24 hours for once daily products	Observe for and report excessive sedation especially at commencement of therapy or dose increase If ordering for infants less than 1 year consult with paediatric anaesthetic, or neonatal consultants regarding dosing & monitoring requirements Minimum Observation Following Opioid Administration

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Intermittent Subcutaneous or Intramuscular Opioid Administration

Opioids are not routinely administered to paediatric patients by intermittent subcutaneous or intramuscular injection. Although they may be used, there are less painful routes of administration.

Other opioid administration options include

- Oral oxycodone if the oral route is available
- Intranasal fentanyl for rapid onset analgesia:
- Intravenous bolus, but if regular bolus doses are required, the use of PCA, NCA or an opioid infusion should be considered

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IV Opioid

Bolus IV Opioid Administration and Pain Protocols

Minimum Observation Following Opioid Administration

- Single dose IV bolus opioids have a role in the management of short term moderate - severe pain or incident related pain
- If regular bolus doses are required, the use of PCA, NCA or opioid infusion should be considered
- Morphine - Consider dose reduction in hepatic or renal impairment
- Fentanyl – Consider dose reduction in renal impairment
- Pethidine should not be used
- If ordering for infants less than 1 year, consult with paediatric, anaesthetic or neonatal consultants regarding dosing & monitoring requirements
- Paediatric Emergency Department and Recovery and Anaesthesia areas may have IV Pain Protocols developed for use only in those areas by accredited staff. They should not be used in other clinical areas

NB: See next page for dosing guidelines

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Drug	Dose	Indications	Peak concentration at	Duration of effect	Routine observations
IV bolus Morphine **Order 2/24 PRN**	**0.05 – 0.1 mg/kg/dose** Titrate in small increments If ordering for infants less than 1 year consult with paediatric anaesthetic or neonatal consultants regarding dosing & monitoring requirements Minimum Observation Following Opioid Administration	Moderate to severe pain Incident pain	10-30 min	2 hours	Pre-administration pain score, sedation score (≤ 1), respiratory rate, Pulse Rate. Repeat at 5, 15 and 30 min. Minimum Observation Following Opioid Administration Continuous SpO_2 monitoring recommended for children <1 year and those requiring special consideration. Others if possible Patients requiring special consideration and closer monitoring

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V bolus Fentanyl **Incident/procedural pain only**	**1.0 microgram/kg /dose** Titrate in small increments eg 25% of total If ordering for infants less than 1 year consult with paediatric anaesthetic, or neonatal consultants regarding dosing & monitoring requirements Minimum Observation Following Opioid Administration	Incident pain Procedural pain	3-5 mins	30-60 mins	Pre-administration pain score, sedation score respiratory rate, pulse rate Repeat at 5, 15 and 30 min. Link to minimum observations Continuous SpO_2 monitoring for children <1year and those requiring special consideration. Others if possible Patients requiring special consideration and closer monitoring

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Patient Controlled Analgesia (PCA)

- Morphine or fentanyl may be administered by patient controlled analgesia provided the patient has the cognitive skills and physical dexterity to use this technology. Consider for children from 6 – 8 years +
- Medical Prescribing - can only be prescribed by anaesthetic staff on PCA specific charts. Notation must be made on the National Inpatient Medication Chart that opioid medication is in progress
- Continuous SpO_2 monitoring maximises safe practice for children receiving parenteral opioids
- Inclusion of a background infusion increases the possibility of over sedation and expert advice should be sought if a background is being considered.
- Antiemetics should be ordered PRN for all patients receiving ongoing parenteral opioids
- The initial pump program and all changes in settings must be checked by two people, one of whom must be an anaesthetist or an accredited RN
- Children receiving PCA analgesia, require supervision by an anaesthetist or Acute Pain Service. Refer to organisational guidelines for nursing management of patients receiving opioids via PCA

Morphine: Use a pump programmed for PCA administration

Select appropriate weight quadrant for the patient's weight

Below are recommendations for bolus doses for a range of weight quadrants

Consider dose reduction in hepatic or renal impairment

Weight	Bolus
15-20 kg	300 micrograms
21-26 kg	400 micrograms
27-32 kg	500 micrograms
33-38 kg	600 micrograms
39-44 kg	700micrograms
45-50 kg	800 micrograms
51-56 kg	900 micrograms
57 kg+	1.0 mg

** Please order all increments of less than 1(one) milligram in micrograms**

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Fentanyl: Use a pump programmed for PCA administration

Select appropriate weight quadrant for the patient's weight

Below are recommendations for bolus doses for a range of weight quadrants

Consider dose reduction in renal impairment

Weight	Bolus
15-20 kg	6 micrograms
21-26 kg	8 micrograms
27-32 kg	10micrograms
33-38 kg	12 micrograms
39-44 kg	14micrograms mcg
45-50 kg	16 micrograms
51-56 kg	18 micrograms
57 kg+	20 micrograms

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Intravenous opioid analgesic infusions

- Infusions of morphine or fentanyl can provide continuous analgesia without the peaks and troughs of intermittent bolus administration
- Morphine - Consider dose reduction in hepatic or renal impairment
- Fentanyl – Consider dose reduction in renal impairment
- Infusions are most commonly used when children are too young or do not have the cognitive skills or physical dexterity to self-administer Patient Controlled Analgesia (PCA)
- Patients receiving opioid infusions require close observation because of the possibility of accumulation and adverse effects
- Continuous SpO_2 monitoring is mandatory for all children receiving opioid infusions[24]
- Antiemetics should be ordered PRN for all patients receiving ongoing parenteral opioids
- Ensure appropriate monitoring resources available. Minimum Observation Following Opioid Administration
- Opioids may be administered as a continuous infusion with or without a nurse administered bolus regime
- NCA uses the same equipment as a continuous infusion but with no background infusion ordered, just the ability for nursing staff to administer bolus doses

Infants < 1 year or 21 months post conceptual age require reduced doses and continuous monitoring. If the prescriber is unfamiliar with dosing for children <1 year it is recommended to seek advice from a tertiary paediatric anaesthetic, acute pain or retrieval service

Opioid Infusion - Prescribing & Set up information (standard infusions)

- Comply with organisational documentation guidelines for opioid administration
- Morphine: Add **0.5 mg/kg of morphine** to the syringe. Dilute to a total volume of 50mL with sodium chloride 0.9%. (1 mL = 10 micrograms/kg)
- Fentanyl: Add **10 micrograms/kg of** fentanyl to the syringe. Dilute to a total volume of 50mL with sodium chloride 0.9%. (1 mL = 0.2 microgram/kg)
- < 1 year Run infusion at zero-2 mL/hour, with bolus doses 1-2 mL 30 minutely PRN
- >1 year Run infusion at zero -4 mL/hour with bolus doses 1-3 mL 30 minutely PRN
- If for any reason non-standard solutions are used this must be clearly identified on the prescription
- Opioid infusion should be initiated and monitored by an Acute Pain Service, Anaesthetic, Intensive Care medical staff or Palliative Care medical staff.

Equipment

- Syringe pump. Ideally the syringe pump should be lockable to prevent accidental or intentional tampering
- Limiting the rate that can be delivered by the pump also provides additional safety
- Pulse oximeter[28]

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Nurse Controlled Analgesia / PCA by Proxy

- Nurse Controlled Intravenous Analgesia (NCA) provides the advantages of Patient Controlled Analgesia (PCA) administration, giving intermittent bolus doses as required without background infusion. It is used for children and adolescents who are too young for, or are unable, to effectively self-administer a standard PCA
- NCA is a technique that can be used when moderate analgesic needs are anticipated. Background analgesia may be provided using simple analgesics e.g. paracetamol +/- NSAIDs. NCA can also be effective in the management of incident pain
- There are advantages in the ability to administer timely analgesia, and reduce the risk of multiple medication calculations, whilst minimising the overall use of opioids and therefore opioid related side effects. However it removes the inherent safety of PCA (patient being sufficiently awake to administer the bolus) and therefore organisational criteria for nurse bolus administration are required if this modality is used
- Opioid administration by NCA should be initiated and monitored by an Acute Pain Service, Anaesthetist or Intensive Care medical staff or Palliative Care medical staff

Prescribing Information

- The syringe is prepared as for opioid infusions
- Morphine: Add 0.5 mg/kg of morphine to the syringe. Dilute to a total volume of 50 mL with sodium chloride 0.9%. (1 mL = 10 micrograms/kg) Consider dose reduction in hepatic or renal impairment
- Fentanyl: Add 10 micrograms/kg of fentanyl to the syringe. Dilute to a total volume of 50mL with sodium chloride 0.9%. (1 mL = 0.2 micrograms/kg). Consider dose reduction in renal impairment
- NCA should be initiated and monitored by an Acute Pain Service, Anaesthetist, Intensive Care medical staff or Palliative Care medical staff

Bolus Dose and Dosing Interval

- For children over 1 year, the routine bolus dose is up to 3 mL, at intervals of 20 minutes with a maximum of four bolus doses within any 2 hour period
- Infants under 1 year and ex premature infants up to 1 year corrected age (21 months post conceptual age) require reduced bolus dose sizes of 1 or 2 mL/dose. Please consult with Anaesthetic or Neonatal Consultants for dosing assistance
- Request review from prescribing Medical Officer if this is not providing adequate analgesia, or if requiring 2-3 boluses in each hour
- Continuous SpO_2 monitoring is recommended for all children receiving nurse controlled opioid analgesia[24,28]

Equipment

- Syringe pump. Ideally the syringe pump should be lockable to prevent accidental or intentional tampering
- Limiting the bolus size within the original pump programming provides additional safety
- Pulse oximeter

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Other routes of administration for opioids

Transdermal Opioids

- Transdermal opioids are a specialised modality and expert advice should be sought prior to commencing this treatment
- This route is NOT suitable for the management of acute pain chronic non-cancer pain or for children who require less than 12 micrograms of fentanyl/hour
- Fentanyl can be delivered transdermally via a fentanyl patch. (e.g. Durogesic®) They are predominantly used in oncology and palliative care
- Fentanyl patches are available in a range of sizes to deliver 12, 25, 50 or 100 micrograms/hour
- Starting doses can be estimated using the total opioid requirement in the previous 24 hours adjusting downwards if opioid rotation has occurred
- It is preferable to choose a slightly lower size patch when commencing therapy and provide breakthrough analgesia
- Patch size should be titrated up or down depending on breakthrough analgesia use and adverse effects
- The initial patch will take a minimum of 12-24 hours to reach peak effect and breakthrough analgesia may be required during this time
- Patients require observation for over sedation during the first 24 hours of therapy using a patch or if the patch size is increased
- The patch should be applied to a dry, non-hairy area of skin on the upper body, and in an area that will not be affected by activity[33]. For a young child, it should be applied out of their reach
- When the patch is applied, record the site of application, date and time on the National Inpatient Medication Chart for inpatients or in a parent's diary or calendar in community settings. Some patches may be hard to see on some skin tones
- Regular checking to ensure the patch remains in place should be initiated 2-3 times/day and documented for patients in health care settings
- If a patch is found to be missing it is imperative that the missing patch be located and disposed of correctly
- Never apply heat e.g. hot packs, hot water bottles, electric blankets over the patch
- The patch is usually replaced every 72 hours
- Remove the old patch prior to applying the new one
- The patch should not usually be cut
- Used patches must be folded over and disposed of in a yellow sharps container
- Transdermal opioid therapy is not suitable for patients living in areas of high humidity
- If there are problems with the patch sticking properly, it may be covered with an adhesive dressing e.g. Hypafix

ISBN number: 978-1-74243-636-4
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Intranasal Fentanyl

Intranasal fentanyl can be used as initial analgesia for children aged 1year to young adults. The uses for this route of drug administration are in the treatment of severe, incident related pain, including fractures and plaster applications. It can also be used for wound exploration, during the treatment of burns and their subsequent dressing changes[42,43]

- Intranasal fentanyl is an effective and well tolerated route of administration for children
- Do not use if the patient has an altered conscious state, head injury or if they have upper respiratory or nasal tract infection, as absorption may be affected
- Intranasal fentanyl dose **1.5 micrograms/kg**
- It is best delivered through a Mucosal Atomizer Device® attached to a 2mL syringe
- The patient is positioned at a 45 degree angle sitting up and the fentanyl is sprayed into the nostril. (the volume may be equally divided into both nostrils)
- Therapeutic level is reached in 10 minutes and the duration of action is 30-60 minutes
- The dose may be repeated after 10 minutes if no effect and another dose administered after 30 minutes if required
- Monitoring: Pain score, respiratory rate, heart rate, SpO_2 and a sedation score prior to the administration and 10 minutes after each dose. Minimum Observation Following Opioid Administration
- The patient must be observed for 45 minutes after the last dose and until they have returned to their pre-analgesic level of functioning
- Patients must be discharged in the care of a responsible adult[42,43]

Neuroaxial Opioids

This modality should only be used in a tertiary setting and under the supervision of an Acute Pain Service or Anaesthetist

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Opioid Considerations

Opioid weaning

- Patients who have received continuous/high dose opioids for more than 7 days (5-9 days), may require a weaning program to avoid opioid withdrawal symptoms[17]

Weaning occurs mainly in 3 scenarios

- Infants of opioid tolerant mothers born with Neonatal Abstinence Syndrome

  Newborn infants of opioid tolerant mothers born with Neonatal Abstinence Syndrome require monitoring and if appropriate a weaning protocol calculated on the birth weight and the neonates withdrawal score as per SA Perinatal Guidelines[10]

- Following prolonged opioid administration for ventilation

  Usually initiated in an intensive care unit

- Following prolonged opioid administration for analgesia[17]
  - Opioid weaning for this group of patients often occurs at a time when they also have ongoing, though decreasing, analgesic need
  - This will influence the rate and duration of weaning
  - An Acute Pain Service or anaesthetist can assist with planning a weaning program
  - If weaning is to continue at home, it is imperative that the patient/family fully comprehend the process
  - When patients are discharged on a weaning program, ensure their GP or other health professionals involved in their care are notified of the weaning process

Discharge of paediatric patients on opioid analgesia

- Calculate the amount of medication required and include the number of tablets/volume of mixture in the order
- A clinically appropriate quantity of opioid medication may be less than the PBS pack, and this smaller amount may be ordered.
- If more than the PBS pack, an authority for increased quantity will need to be obtained from the PBS
- Reinforce the education of the patient/family and provide written information
- Some families find a timetable and administration chart helpful, especially if more than 1 parent/carer is administering medication
- Discuss safe storage of the medications at home to ensure they will be kept out of reach of children
- Remind parents not to leave medications in a stationary car in hot weather
- Advise the patients/parents to return any unused opioid medication to their local pharmacy for safe disposal
- Provide adequate information regarding the pain management plan in the discharge letter to the GP to enable ongoing care and management following discharge from the acute setting. Where appropriate, speak with the GP about the patient and his/her needs

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Management of opioid related side effects

Over sedation indicating potential respiratory depression

"As respiratory depression is almost always preceded by sedation, the best clinical indicator is increasing sedation"[29]

- Check respiratory rate and O_2 saturation levels
- Administer oxygen and other resuscitation measures as needed
- If patient is on infusion or PCA put the pump on hold
- Call organisational emergency team if required
- If vital signs satisfactory and saturating well
- Continue SpO_2 monitoring until over sedation resolves
- Restart PCA or infusion at a lower rate, continue close monitoring once Sedation Score returns to 1 and Pain Score ≥ 3
- If patient having oral or bolus administration ask for review of analgesia before the next dose is required
- If naloxone has been used to reverse the action of the opioid continue frequent observations for the next 4 hours, as the effect of naloxone dissipates after 2 hours or less and over sedation can recur Naloxone for the reversal of opioid action

Nausea and vomiting

Administer antiemetics as ordered Postoperative/opioid induced nausea and vomiting

  - 1st line ondansetron
  - 2nd line droperidol if > 3yrs of age (Max dose 0.5mg)
  - Other options include single dose dexamethasone IV (slow injection) if none received within the last 24 hours

- Maximise opioid sparing using simple analgesia
- Metoclopropramide (eg Maxalon®) not recommended because of limited effect and high side effect profile
- Report nausea and vomiting that persists despite available measures being used
- Consider change of opioid if nausea and vomiting does not respond to anti-emetic regime
- Review fluid status, consider limiting oral intake
- Consider other causes for persisting nausea and vomiting

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Paediatric Pain Management and Opioid Safety

Itch (opioid induced itch is primarily on the face and chest)

- Maximise opioid sparing using simple analgesics
- There is some evidence that ondansetron may reduce itch
- Use non-sedating antihistamine medications e.g. cetirizine
- Consider change of opioid if itch is causing patient distress or changing IV to oral administration is an option
- Low dose naloxone may be titrated to effect Naloxone for the reversal of opioid action

Myoclonic Jerks (Startles)

- Occur most often in infants and young children
- Maximise opioid sparing using simple analgesics
- Consider change of opioid if myoclonic jerks are causing patient distress

Urinary retention

- Maximise opioid sparing using simple analgesics
- Use appropriate strategies to encourage urination
    - privacy
    - sit/stand out of bed (if appropriate)
- Consider other reasons for urinary retention/lack of urinary output
- Contact treating medical clinic if not resolved within 8 hours of return from surgery

Constipation

- Monitor bowel function
- Initiate high fibre diet and increase fluids as appropriate
- Prescribe regular stool softeners and stimulant laxatives, unless contraindicated, for patients receiving regular opioids for more than 2 days

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Paediatric Pain Management and Opioid Safety

Postoperative/opioid induced nausea and vomiting

GUIDELINES FOR THE MANAGEMENT OF ESTABLISHED POST OPERATIVE NAUSEA AND VOMITING (PONV) IN PAEDIATRIC PATIENTS

SELECT 1 (5HT3 antagonist)		SELECT 2 (dopamine agonist)		SELECT 3	
	Reassess in 30 minutes		Reassess in 2 hours		Reassess in 2 hours
← **Maximise opioid sparing** →					
Ondansetron **0.15 mg/kg/dose** 8/24 IV or oral (wafer) Max dose 8mg or Granisetron 20-40 micrograms/dose once daily	Document If nausea and/or vomiting persists	**Droperidol** **0.01mg/kg/ dose,** 8 hourly IV Start at 0.01 mg/kg Max dose 0.5 mg per dose	Document If nausea and/or vomiting persists	**Dexamethasone** **0.15 mg/kg/ dose IV** Not within 24 hrs of intra-operative dose if given Max dose 8 mg stat	Document Review other causes of vomiting Monitor hydration Seek additional input from treating medical team
	→	**Do not prescribe for children less than 3 years**	→	Single dose only.	

If PONV fails to respond to the above measures Acute Pain Service or anaesthetist may prescribe Cyclizine

- **By mouth or by intravenous injection over 3–5 minutes**

  Child 1 month–6 years **0.5–1.0 mg/kg** up to 3 times daily; max single dose 25 mg

  Child 6–12 years **25mg** up to 3 times daily

  Child 12–18 years **50mg** up to 3 times daily

Monitor for increased sedation, especially if the child is receiving concurrent opioid analgesia

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Adjuvant medications (discuss with Acute Pain Service)

Antispasmodics

- Spasm pain may occur following some orthopaedic surgery/trauma
- Oral diazepam is the medication of choice **Dose 0.05- 0.1 mg/kg/dose 8 hourly**
- If patient is on concurrent opioids monitor SpO_2 following **i**nitial dose

Low dose Ketamine infusion for use in tertiary settings with the supervision of APS, anaesthetic or intensive care physicians

- Ketamine, an NMDA (N-methyl-D-aspartate) antagonist has been shown to be effective in reducing postoperative pain and has an opioid sparing effect[14,44]
- It also influences neuropathic pain and may be used in the prevention/treatment of phantom limb pain and as a component of multimodal analgesic therapy following severe burn injuries[14]
- There is no evidence that low-dose ketamine causes respiratory depression, although it may cause mild sedation
- Consider dose reduction if hepatic impairment
- Psychotomimetic effects, such as hallucinations and bad dreams, can occur with low-dose infusion
- Dosage Guidelines for low dose ketamine infusion
    - **5mg/kg diluted to 50 mL with sodium chloride 0.9%**
    - Maximum/adult dose 200 mg in 50 mL
    - Infuse at 0-2 mL/hour
        - Start at 1 mL/hour
        - Do not give boluses

Clonidine

- α_2 adrenoreceptor agonist
- Recognised to be opioid sparing when given in conjunction with systemic or spinal opioids[45]
- Has analgesic, sedative and some antispasmodic properties
- Has a role in facilitating opioid weaning
- Antihypertensive – do not give if hypotensive, monitor BP pre and post 1st and any increased dose
- Reduce dose if sedation excessive
- Wean off regular doses to avoid rebound hypertension
- Dose **1-2 micrograms/kg/dose 8 hourly** regularly or PRN
- Same dose for oral or IV administration
- No proprietary mixture available

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Medications for the treatment of neuropathic pain

- **Amitriptyline** is a tricyclic antidepressant but can be used in the management of neuropathic pain in low doses (lower than used to treat depression)
  - Prescribed once per day 2 hours prior to bed time
  - May cause morning drowsiness for the first few days
  - Starting dose ~ **0.25 mg/kg (max 50 mg),** may be increased to 1 mg/kg after 2-4 weeks
  - No proprietary mixture available
- **Gabapentin,** an anticonvulsant medication
  - Analgesic in neuropathic pain
  - Used in post-operative and burn injury for neuropathic pain
  - Dose **10 mg/kg/dose**, Day 1 single dose, Day 2 BD, Day 3 and thereafter TDS
  - Not available on PBS for neuropathic pain so not first choice for outpatient care
  - No proprietary mixture available
- **Pregabalin (Lyrica®)**
  - Available on PBS for neuropathic pain
  - No paediatric dosing or proprietary mixture available
- **Other anticonvulsant medications**
  - Carbamazepine and sodium valproate may be used

Version control and change history

Version	Date from	Date to	Amendment
1.0	02/03/2015		Original version

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