MONOGRAPH

HYDROmorphone

Scope (Staff):	Medical, Pharmacy, Nursing, Anaesthetic Technicians
Scope (Area):	All Clinical Areas

Child Safe Organisation Statement of Commitment

CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations. This is a commitment to a strong culture supported by robust policies and procedures to reduce the likelihood of harm to children and young people.

This document should be read in conjunction with this DISCLAIMER

QUICKLINKS

Dosage/Dosage Adjustments	Administration	Compatibility	Monitoring

DRUG CLASS

- Hydromorphone is a potent opioid analgesic that activates opioid receptors in the central and peripheral nervous system to produce analgesia, sedation and opioid induced ventilatory impairment.[1, 2]
- Hydromorphone is structurally similar to morphine and in its pharmacokinetic and pharmacodynamic properties but is **5-7 times more potent than morphine**.[2]
- Hydromorphone is a High Risk Medicine and a Schedule 8 medication.

INDICATIONS AND RESTRICTIONS[3]

- Refer to Formulary 1
- Relief of moderate to severe acute and chronic pain.
- Opioid adjunct during general anaesthesia.
- For analgesia and/or sedation maintenance in mechanically ventilated intensive care patients.

CONTRAINDICATIONS[1, 4]

- Hypersensitivity to hydromorphone or any component of the formulation.
- Pre-existing significant respiratory depression in non-intubated patients on general wards.

PRECAUTIONS[1]

Careful titration and monitoring is required for:

- Hypothyroidism, adrenocortical insufficiency, myasthenia gravis, CNS depression.
- Epilepsy, or patients at risk of having seizures (e.g. head injury, metabolic disorders, CNS infections). All opioids have a dose dependent effect on risk of seizures.
- Raised intracranial pressure – respiratory depression may cause retention of carbon dioxide and may further increase intracranial pressure.
- Hypotension, shock – increased hypotensive risk, increased risk of respiratory depression.
- Severe obstructive airways disease and those at risk of upper airways obstruction.
- Patients on oxygen therapy – may mask signs of respiratory failure.

FORMULATIONS

Listed below are products available at PCH, other formulations may be available, check with pharmacy if required:

Parenteral:

- Hydromorphone 10 mg/mL ampoules
- Hydromorphone 2 mg/mL ampoules
- Hydromorphone pre-filled syringes (Baxter®) – 3 mg/30 mL, 10 mg/50 mL.

Enteral:

- Hydromorphone 2 mg tablet
- Hydromorphone 1 mg/mL oral liquid

Imprest location: Formulary One

DOSAGE & DOSAGE ADJUSTMENTS

Hydromorphone is 5-7 times more potent than morphine. Use extra caution when prescribing hydromorphone.[2]

Dosing in Overweight and Obese Children:

- Calculate dose using adjusted body weight.

Renal impairment:[5, 6]

- eGFR calculator
- Hydromorphone has an active/toxic metabolite and will accumulate in renal impairment, which may lead to respiratory depression and delirium. Consider a different opioid or reduce dose.

Hepatic impairment:[5, 6]

- Use with caution, titrate dose to response and monitor closely for toxicity. Avoid use in severe hepatic impairment.

Approximate equianalgesic potencies of various opioids[1, 7]		
Opioid	**Parenteral**	**Oral**
Morphine	10 mg IM/IV/subcut	30 mg
Fentanyl	150 to 200 microg IM/IV/subcut	-
Hydromorphone	**1.5 to 2 mg IM/IV/subcut**	**6 mg**
Oxycodone	10 mg IV/subcut (not available at PCH)	20 mg
Tramadol	100 mg IM/IV	150 mg

- Contact the Acute Pain Service or Ward Pharmacist for advice on opioid conversion.

The doses outlined below are within the standard reference range for opioid naïve patients; however, the dose of hydromorphone may vary according to the patient's clinical requirements.

Oral/Enteral (Immediate Release):[5]

- ≥ 12 months: 0.03–0.06 mg/kg/dose (maximum 2 mg/dose) every 4 hours; adjust according to response.[5]

Continuous Subcutaneous Infusion:

- Subcutaneous hydromorphone infusions must be prescribed by a Palliative Care Physician or Pain Specialist.

Intrathecal:

- Refer to the Acute Pain Service. Intrathecal hydromorphone must be prescribed by an approved prescriber (Anaesthetist, Pain Specialist or Nurse Practitioner).

- The time interval between intrathecal opioid and other opioids must be clearly documented. Usually, a single dose of preservative free hydromorphone is given as part of a spinal anaesthetic.
  Rarely, under pain specialist direction has it been used for ongoing intrathecal infusion therapy.

Intravenous Infusion and Patient Controlled Analgesia (PCA):

- On general ward areas, intravenous infusions and patient-controlled analgesia must be prescribed by an Anaesthetist or the Acute Pain Service.
- See Opioid Infusion Management in General Ward Areas and Opioid Patient Controlled Analgesia (PCA).
- Syringes should be ordered from Pharmacy Compounding Services (PCS) during business hours. Ward staff may make up syringes after hours or when needed urgently.

Titrate infusion rate according to response and adverse effects.
Higher doses may be required in some cases (e.g. in opioid-tolerant patients) as directed by APS.

Paediatric Critical Care (PCC): Intravenous Infusion (**mechanically ventilated patients**):

- Loading dose: 10 – 20 micrograms/kg (max 1 mg).[6]
- Continuous infusion: 0 – 16 micrograms/kg/hour.[3]
- Bolus dose for pain[##]: 4 – 8 micrograms/kg.

Higher doses may be required in opioid-tolerant or patients with altered pharmacokinetics (e.g. Extra Corporeal circulation).[3]

[##]Recommended bolus dose based on morphine to hydromorphone equipotency (5:1) conversion.

Refer to Analgesia and Sedation in Paediatric Critical Care Guideline for further information.

REVERSAL OF OPIOID TOXICITY WITH NALOXONE:[1, 7]

Child ≥ 4 weeks of age:

See Opioid Infusion Management in General Ward Areas and Withdrawal Syndrome Management Guideline.

- Resuscitation (IV/IM): 10 microg/kg/dose (max 400 microg/dose). Doses may be repeated every 2–3 minutes, up to a total of 2mg.
- Reversal of sedation (IV/IM): 2 microg/kg/dose (max 100 microg/dose) every 2–3 minutes.

ADMINISTRATION

Oral/Enteral:[5]

- Give orally with food or milk to minimise gastric irritation.[5]

IV infusion and PCA on General Ward Areas:[5, 7-9]

- Syringes should be ordered from Pharmacy Compounding Services (PCS) during business hours. Ward staff may make up syringes after hours or when needed urgently.
- For < 50 kg dilute 0.1 mg/kg (max 5 mg) of hydromorphone made up to 50 mL with a compatible fluid.
- For ≥ 50kg it is a standard concentration of 10 mg in 50 mL with a compatible fluid.

PCC – IV infusion in mechanically ventilated patients:

Patient's Weight	Concentration (in sodium chloride 0.9%)	Notes
10 kg or less	3 mg in 30 mL (100 microg/mL)	In a 3kg patient, 4 microg/kg/hr = 0.1 mL/hr
Above 10 kg	10 mg in 50 mL (200 microg/mL)	In a 20kg patient, 4 microg/kg/hr = 0.4 mL/hr

Patients 10 kg or less may be prescribed the higher strength (10 mg in 50 mL) preparation to reduce fluid overload if clinically indicated, at the treating consultant's discretion.

COMPATIBILITY *(LIST IS NOT EXHAUSTIVE)*

Compatible fluids:[8]

Glucose 5%, glucose in sodium chloride solutions, Hartmann's, Ringer's, sodium chloride 0.45%, sodium chloride 0.9%.

Compatible at Y-site:[8]

Aciclovir, amikacin, atropine, aztreonam, caspofungin, cefotaxime, cefoxitin, ceftaroline fosamil, ceftazidime, clindamycin, dexamethasone, dexmedetomidine, erythromycin, filgrastim, foscarnet, gentamicin, granisetron, hyoscine hydrobromide, isavuconazole, ketamine, ketorolac, linezolid, metoclopramide, metronidazole, micafungin, midazolam, paracetamol, piperacillin-tazobactam (EDTA-free), posaconazole, remifentanil, tacrolimus, tobramycin, trimethoprim-sulfamethoxazole, vancomycin.

Only commonly used drugs are listed below. This is not a complete list of incompatible drugs. Compatibilities of IV drugs must be checked when two or more drugs are given concurrently.

INCOMPATIBLE drugs:[8] Sodium bicarbonate, thiopental sodium.

MONITORING

General Monitoring for Intravenous Administration:

See Opioid Infusion Management in General Ward Areas and Intravenous Patient Controlled Analgesia (PCA).

- Pre-administration and ongoing pain assessment.
- Baseline and post dose heart rate, level of sedation, respiration rate, oxygen saturation and blood pressure.
- Continuous pulse oximetry for patients at high risk of respiratory depression.
- Monitor for withdrawal symptoms on discontinuation, especially if abrupt or after prolonged regular use (>5 days). Refer to the WAT-1 form (MR859.80) and the Withdrawal Syndrome Management Guideline.

Palliative Care:

- Pain assessment, symptom control.
- Discuss with Palliative Care team for additional monitoring requirements.

PCC: Refer to Analgesia and Sedation in Paediatric Critical Care

ADVERSE EFFECTS[1]

Common: Nausea, vomiting, dyspepsia, drowsiness, dizziness, headache, orthostatic hypotension, itch, dry mouth, urinary retention, constipation**.**

Infrequent: Dose-related respiratory depression, bronchospasm, confusion, hallucinations, delirium, agitation, mood changes, tremor, flushing (due to histamine release), urticaria, hypothermia, muscle rigidity.

Rare: Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH), anaphylaxis, seizure.

STORAGE[4]

- Hydromorphone is a Schedule 8 medication and must be stored as outlined in the Schedule 8 and Restricted Schedule 4 Medication Policy.
- Store below 25°C. Do not refrigerate.
- Protect from light.

INTERACTIONS

This medication may interact with other medications; consult PCH approved references (e.g. Clinical Pharmacology), a clinical pharmacist or PCH Medicines Information Service on extension 63546 for more information.

Please note: The information contained in this guideline is to assist with the preparation and administration of **HYDROmorphone**. Any variations to the doses recommended should be clarified with the prescriber prior to administration

Related CAHS internal policies, procedures and guidelines

High Risk Medicines (CAHS policy)
Opioid Infusion Management in General Ward Areas (PCH guideline)
Intravenous Patient Controlled Analgesia (PCA)
Guidelines for Drug Dosing in Overweight and Obese Children 2 to 18 Years of Age (PCH guideline)
Schedule 8 and Restricted Schedule 4 Medication (PCH policy)
Operational Directive 0141/08: Code of practice for the handling of schedule 8 medicines (drugs of addiction) in hospitals and nursing posts
Withdrawal Syndrome Management Guideline
Opioid Analgesic Stewardship in Acute Pain Clinical Care Standard

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