MONOGRAPH

DEXMEDETOMIDINE

Scope (Staff):	Medical, Pharmacy, Nursing, Anaesthetic Technicians
Scope (Area):	Intravenous – PCC, NICU, Theatre, ED Intranasal – ED, PCC, General Wards

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

⚠ HIGH RISK MEDICINE ⚠

QUICKLINKS

Dosage/Dosage Adjustments	Administration	Compatibility	Monitoring

DRUG CLASS

Dexmedetomidine is a selective alpha$_2$-adrenoceptor and imidazoline receptor agonist.[1]

Dexmedetomidine is a High Risk Medicine

INDICATIONS AND RESTRICTIONS

Intravenous dexmedetomidine must only be administered in a critical care setting e.g. in Paediatric Critical Care (PCC), Neonatal Intensive Care Unit (NICU),Theatre and ED.

Intranasal dexmedetomidine may be administered for premedication / procedural sedation in ED, PCC and on general wards under the direction of an ED consultant or fellow, anaesthetist, intensivist or the Acute Pain Service. Patient must be monitored as per the requirements listed in the monitoring section.

- Sedation of intubated and mechanically ventilated patients during treatment in an intensive care setting[1]
- Short-term use in patients with acute withdrawal from opiates[5]
- To reduce opiate requirements in patients with a high opiate tolerance[5]
- Post-operative surgical patients on a morphine infusion[5]

- Premedication to facilitate induction of general anaesthesia[1]
- Procedural sedation[1]

The use of intranasal dexmedetomidine as a premedication may be appropriate in children:

- With anxiety
- With autism spectrum disorder
- At risk of emergence delirium
- In whom other premedications may not be appropriate.

Use of intranasal dexmedetomidine is at the discretion of the treating anaesthetist, emergency consultant or the Acute Pain Service.

See Formulary One

CONTRAINDICATIONS

Hypersensitivity to dexmedetomidine or any component of the formulation.

PRECAUTIONS[5,13]

- Hypotension
- Severe bradycardia, ventricular dysfunction including congestive heart failure (CHF)
- Chronic hypertension
- Hypovolaemia
- Diabetes mellitus
- Renal, hepatic impairment
- Post-operative complex congenital heart disease
- Patients currently taking vasodilators or negative-chronotropic agents such as digoxin, β-adrenergic blockers, calcium channel blockers, amiodarone, monoamine oxidase inhibitors
- Acute cerebrovascular disease
- Known long QT prolongation
- Hypokalaemia or hypomagnesaemia

FORMULATIONS

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

- Dexmedetomidine 200 microgram/2 mL ampoules

Imprest location: Formulary One

DOSAGE & DOSAGE ADJUSTMENTS

Neonates : Refer to Neonatal Medication Protocols

Intravenous Infusion: (PCC, NICU, Theatre, ED only)

Sedation / Pre-anaesthetic / Opioid sparing

≥ 4 weeks:

Loading dose (at the discretion of the treating consultant):

1 microgram/kg infused over 15 minutes[5]

Note: Loading doses are associated with bradycardia and hypotension.

Maintenance: 0.2-1 microgram/kg/hour.[1,3-5]

Increase infusion rate by 0.1 - 0.2 microgram/kg/hour every 20 - 30 minutes until adequate sedation achieved.[4]

Maximum age dependent doses:[6]

4 weeks to 1 year: 1 microg/kg/hour

1 to 5 years: 1.4 microg/kg/hour

6 to 10 years: 1.3 microg/kg/hour

>10 years: 1 microg/kg/hour

Intranasal: (PCC, ED, General Wards)

Procedural Sedation / Premedication

≥ 10 kg and ≥ 1 year old: 1 - 2 microgram/kg (maximum 200 microgram) as a single dose, 30-60 minutes prior to induction of anaesthesia or procedure.[5,7] Consider 3 – 4 microgram/kg (maximum 200 microgram) as a single dose if the patient is extremely anxious or where the sedative effect is deemed very important.[5]

Satisfactory sedative effect is usually achieved between 30-45 minutes. [8-11] The sedative effect and time to onset is subject to interindividual variability.[8]

Note: Painful procedures will require the addition of an analgesic agent.

Dosing in Overweight and Obese Children:

In overweight and obese children, dexmedetomidine should be dosed on Ideal Body Weight (IBW) and titrated to effect.

Renal impairment:[5]

No dosage adjustments are required in renal impairment

Hepatic impairment:[5]

Clearance may be reduced in patients with hepatic impairment, consider reducing dose and use with caution

RECONSTITUTION & ADMINISTRATION

Intravenous Infusion: (PCC, NICU, Theatre, ED only)

Dilute 200 micrograms (2 mL) of dexmedetomidine with 48 mL of a compatible fluid to make a 50 mL infusion with a final concentration of 4 micrograms/mL.[12]

Give via a rate-controlled infusion device.[12]

Intranasal: (PCC, ED, General Wards)

Draw up the required dose in an IV syringe from the 200 microgram/2 mL ampoule and administer intranasally using an Intranasal Mucosal Atomisation Device (MAD). See Appendix 1 for detailed instructions.

Divide the dose (if the volume is greater than 1 mL) and give half into each nostril.[13]

COMPATIBILITY *(LIST IS NOT EXHAUSTIVE)*

Compatible fluids:

Glucose 5%, Hartmann's, mannitol 20%, sodium chloride 0.9%[12]

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: Diazepam, pantoprazole, phenytoin[13]

MONITORING

For Intravenous dexmedetomidine:[5]

Monitor electrocardiogram (ECG), blood pressure (BP), sedation scores and pulse oximetry.

For intranasal dexmedetomidine prior to anaesthesia or procedural sedation:

- Monitoring is to be performed by a dedicated nurse or doctor.
- Obtain baseline observations and record on the age-appropriate Observation and Response Chart prior to administering intranasal dexmedetomidine:
  - All 9 vital signs and Early Warning Score (EWS)
  - UMSS – University of Michigan Sedation Scale (if ≥ 1, may not be suitable for conscious sedation, consult with treating medical team)
  - Pain intensity score (where appropriate)
- Observation during sedation period:

- Continuous pulse oximetry and heart rate monitoring until return of pre-sedation conscious level.
- At a minimum, 15 minutely observations will be recorded on the age-appropriate Observation and Response chart (or more frequently as directed by the prescriber):
  - Heart Rate (HR)
  - Respiratory Rate (RR)
  - Oxygen Saturation measured by pulse oximetry (SpO_2)
  - Blood Pressure (BP)
  - UMSS during the sedation period
  - Pain intensity score (if indicated)

- Consider ECG monitoring in patients with a history of heart disease or concurrent use of medications affecting cardiac conduction.
- Escalation /excess sedation: manage as per the Procedural Sedation guideline

ADVERSE EFFECTS

Common: *During loading dose*: transient hypertension, hypotension, bradycardia.

Following intranasal administration: hypotension and bradycardia may occur but are usually self-limiting and generally do not require treatment.[11]

Infrequent: Nausea, fever, vomiting, atrial fibrillation, hypoxia, tachycardia, haemorrhage, anaemia, dry mouth, hypokalaemia, constipation, confusion, dizziness

Rare: Rigors, agitation, hyperpyrexia, pain, hyperglycaemia, acidosis, pleural effusion, oliguria, thirst, visual disturbance, arrhythmia[1]

Withdrawal effects: Agitation, nervousness, sleeplessness, headache, tremor, nausea, vomiting, diarrhoea, tachycardia, hypertension, and elevated plasma and urine catecholamine concentrations.

Patients should be carefully monitored 12-48 hours after drug discontinuation for signs and symptoms of withdrawal. After prolonged use of high dose dexmedetomidine, therapy should involve a gradual IV infusion taper or a change made to a weaning regimen of oral clonidine.[13]

STORAGE

Store below 25°C in the original container.[12]

INTERACTIONS

Dexmedetomidine may interact with other medications; please consult PCH approved references (e.g. Clinical Pharmacology Online), your ward pharmacist or Pharmacy on extension 63546 for more information.

Beta-blockers – Dexmedetomidine may enhance the AV-blocking effect of beta-blockers and enhance sinus node dysfunction caused by beta-blockers. Beta-blockers may enhance the rebound hypertensive effect of dexmedetomidine. Monitor heart rate (HR) carefully.[5]

Drugs that cause bradycardia – Dexmedetomidine may further reduce HR.[1,5]

CNS depressants – Dexmedetomidine may enhance sedation, bradycardia and hypotension. Monitor and titrate dose carefully.[1]

CYP2A6 inhibitors (e.g. letrozole, amiodarone, isoniazid, ketoconazole) – may decrease metabolism of dexmedetomidine leading to increased effect, though clinically significant cytochrome P450-mediated drug interactions are not expected[5]

Hypotensive agents – Dexmedetomidine may further reduce blood pressure. Monitor BP closely and titrate dose carefully.[1,5]

Potassium and drugs that cause potassium retention – may cause hyperkalaemia. Consider monitoring potassium levels.[1]

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

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Appendix 1: Preparation and Administration guide for Intranasal Dexmedetomidine

Administration:

Dexmedetomidine is administered using an intranasal Mucosal Atomization Device (MAD Nasal™).

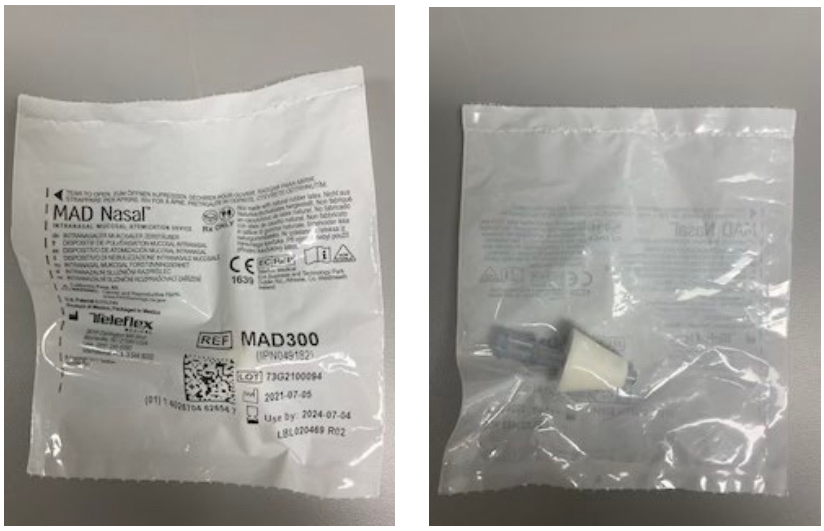

Image 1: MAD Nasal™ device.

Instructions:

1. Draw up the desired dose of dexmedetomidine solution in a syringe, plus an additional 0.1 mL to account for the dead space in the MAD nasal™.
2. Attach the MAD nasal™ and push the plunger to the desired dose to prime the MAD nasal™. **Note: not priming the MAD may result in underdosing**.
3. Ensure the patient is positioned safely on the bed or on the parent or caregiver's lap.
4. Using the free hand to hold the occiput of the child's head stable, place the MAD nasal™ against the nostril of the child aiming slightly up and outward (toward the top of the ear).
5. Administer the dose as a rapid push and avoid spillage from the nose by ensuring an adequate seal.
6. The dose can be divided over both nostrils to increase the absorptive area. Doses greater than 100 micrograms (1mL) should be divided between both nostrils.[2,6]

Tips for administering IN dexmedetomidine to children:

- Consider allowing the child to touch the soft tip of the MAD nasal™ to reassure them, 'It is soft like a marshmallow'.
- Ask children to inhale as you administer the IN dexmedetomidine.