DEXMEDETOMIDINE ADMINISTRATION IN CICU - SCH

PRACTICE GUIDELINE ©

DOCUMENT SUMMARY/KEY POINTS

- Dexmedetomidine is a sedative drug with analgesic as well as anxiolytic properties that does not cause significant respiratory depression[1]
- Dexmedetomidine is administered intravenously, has an onset of action of approximately 15 minutes, and reaches peak concentration after 1 hour of continuous infusion[2]
- Dexmedetomidine can be administered safely in conjunction with anaesthetics, sedatives, hypnotics, neuromuscular blockade agents, and opioids[3]
- Concurrent use of dexmedetomidine and other sedatives may enhance the effects of dexmedetomidine and may require dose reductions to reduce the risk of pharmacodynamic interactions[3,4]
- It is not necessary to discontinue dexmedetomidine prior to extubation: it has been continuously infused in mechanically ventilated patients prior to, during and post-extubation[4]
- **Concurrent use of clonidine is not to occur** except in the transition period when a dexmedetomidine infusion is being weaned.
- **Discontinuation of prolonged** *(greater than 24hrs)* **dexmedetomidine infusions may result in withdrawal symptoms**[5-9]
- It is potentially dangerous to bolus dexmedetomidine, to avoid cardiovascular instability **DO NOT BOLUS DEXMEDETOMIDINE.**

Approved by:	SCHN Policy, Procedure and Guideline Committee	
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CHANGE SUMMARY

- Mandatory review
- Change from Alaris infusion drug library to BBraun drug library
- References updated.

READ ACKNOWLEDGEMENT

- CICU staff are required to read and acknowledge they understand the contents of this document.

Role of Dexmedetomidine in ICU

Dexmedetomidine is a central-acting selective *alpha*$_2$-agonist producing both anaesthetic, sedative and anxiolytic properties[1] The off-label use of dexmedetomidine for sedation in paediatric population has increased due to potential opioid and benzodiazepine sparing effects of dexmedetomidine and lack of clinically significant respiratory depression. Its use in children has even expanded to include prevention of emergence delirium, postoperative pain management, invasive and non-invasive procedural sedation and the management of opioid withdrawal. Dexmedetomidine is not Therapeutic Goods of Australia (TGA) approved for use in children, however there are numerous reports of use in this age group, where it appears to be effective and well tolerated in a variety of settings. As further experience is gained regarding use of dexmedetomidine in paediatric intensive care, published data supporting durations of use longer than 24 hours remains limited[10-13]

INDICATIONS FOR USE IN CICU AT SCH

Dexmedetomidine is indicated for sedation of both intubated and non-intubated patients during treatment in the setting of Children's ICU.

Pharmacology [4,14-17]

- Dexmedetomidine and clonidine are structurally similar, however, dexmedetomidine has an a_2:a_1 specificity ratio of 1600:1 compared to 200:1 for clonidine. Dexmedetomidine is administered intravenously, has an onset of action of approximately 15 minutes, and reaches peak concentration after 1 hour of continuous infusion[2]
- In different studies the pharmacokinetic parameters are similar to that of adults. The changes in pharmacokinetics in children may be allometrically scaled and an increase in clearance during the first few years of life has previously been associated with covariates describing developmental growth *(body weight)* and organ maturation as assessed by age
- Currently it is unclear to what degree gestational age or post-natal age correlate with changes in drug clearance in neonates and infants. Dexmedetomidine has reduced clearance and a longer half-life in preterm compared to term infants and term infants compared to older infants.
- Consequently, infusion rates should be titrated with both patient age and clinical status in mind.

Contraindications

- Hypersensitivity to the drug[4]

Drug Interactions

- Dexmedetomidine will enhance the effects of anaesthetics, sedatives, hypnotics and opioids[3,4]

Precautions[4,18,19]

- Use with caution in patients with hypotension, severe bradycardia, ventricular dysfunction, hypovolaemia, diabetes, renal/hepatic impairment, concurrent use of vasodilator or negative chronotropic agents.
- Reports of hypotension and bradycardia have been associated with dexmedetomidine infusion. If medical intervention is required, treatment may include decreasing or stopping the infusion of dexmedetomidine.
- Bradycardia and hypotension may be potentiated when dexmedetomidine is used concurrently with propofol or midazolam therefore consider reduction in the dose of midazolam or propofol.

Dosage and Administration[4]

- Dexmedetomidine is generally initiated with a dose of 0.5 microg/kg/hr titrated to achieve desired effect by increasing or decreasing by 0.1 microg/kg/hr depending on level of pain and agitation
- If the sedation or analgesia is considered inadequate after 30 minutes, then the rate of infusion may be increased by 0.1-0.2 microg/kg/hr increments and reassessed in 30 minutes.
- If sedation or analgesia is still inadequate at that time further increments of the Dexmedetomidine infusion rate may be made at 30 minute intervals to a **MAXIMUM DOSE OF 1.5 MICROG/KG/HR** and/or a rescue dose of other sedative or analgesic agent may be administered.

  NB: Patients receiving dexmedetomidine have been observed to be rousable and alert when stimulated. This is an expected component of dexmedetomidine sedation and should not be considered a lack of efficacy in the absence of other clinical signs and symptoms.[16]
- Product is preservative-free and contains no additives or chemical stabilisers therefore aseptic non-touch technique must always be maintained during preparation and handling of dexmedetomidine.
- **For pts < 8 kg: Calculate 25 microg x weight (kg). Draw up the calculated dose and dilute with 0.9% sodium chloride or 5% glucose to make a total of 50 mL. Shake gently to mix the solution well.**
- **For pts ≥ 8 kg: Withdraw 2 mL of the drug (i.e. 200 microg) and add to 48mL of 0.9% sodium chloride or 5% glucose for total of 50 mL. Shake gently to mix solution well.**
- Dexmedetomidine infusions must be administered using a BBraun syringe infusion pump. The drug must be programmed into the pump using the BBraun drug library.
- The rate of infusion must always be calculated and checked prior to starting infusion.
- Labels defining the name of the medication must be clearly attached both on the syringe and the administration line.

- Dexmedetomidine should not be placed on any infusion line where boluses of any medication or fluid are possible
- Continuous electrocardiogram (ECG) blood pressure and oxygen saturation monitoring are required during the infusion of dexmedetomidine.
- Any concerns or marked changes to the patient's condition should be reported immediately to the Clinical NUM / Team leader and appropriate medical officer.
- Infusions should usually be weaned rather than discontinued abruptly, especially if used for greater than 48 hours.

Weaning[5-9]

There is evidence that the discontinuation of prolonged administration of dexmedetomidine is associated with withdrawal symptoms. Subsequently:

- The weaning regime is to be documented by the medical officer and during this weaning phase the patient closely observed.
- If a dexmedetomidine infusion has been in progress < 24hrs, weaning will be undertaken as directed by CICU Consultant / Fellow
- The patient's level of comfort and sedation will guide the weaning regimen therefore a faster rate and / or increase in increments may be appropriate
- If dexmedetomidine infusion has been in progress > 24hrs, a reasonable approach is to decrease the infusion by 0.2 microg/kg/hr every 8hrs or as directed by Consultant/Fellow.
- Consider changing to Clonidine if sedation and /or analgesia has been in progress for greater than 3 -5 days.
    - *Patients should be monitored for withdrawal symptoms for the first 12-24hrs following discontinuation of therapy as it is possible that abrupt cessation of dexmedetomidine may produce withdrawal symptoms including agitation, irritability, headache and rebound hypertension.*
- Once the infusion is ceased, precautions must be taken to ensure that any future infusions administered through the infusion line do not result in an inadvertent bolus of residual medication.
    - *0.9% sodium chloride or 5% glucose should be infused **at the same rate** as the discontinued dexmedetomidine infusion until the volume of the IV line has been cleared.*
- Reconstituted dexmedetomidine infusions must be changed every 24 hours. The administration lines must be changed after a maximum of 72 hours and all changes must be documented appropriately on the CICU care plan.

Drug compatibility [4,18,19]

- Compatibility of dexmedetomidine with co-administration of blood or plasma has not been established.
- Dexmedetomidine is compatible with 5% glucose in water and 0.9% sodium chloride
- Dexmedetomidine has been shown to be compatible when administered at “Y-sites” and not as an additive with a number of intravenous fluids and drugs, for comprehensive compatibility please refer to clinical resources.
- For any medication not listed please assume it is incompatible.

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