University Hospital

Pediatric Critical Care Guideline for the Use of Dexmedetomidine

Dexmedetomidine is a highly selective alpha$_2$-adrenergic agonist first introduced for human clinical practice in the United States in 1999 after FDA approval for use as a short-term sedative for mechanically ventilated adult ICU patients.

Dexmedetomidine is similar to clonidine; however, dexmedetomidine has greater selectivity for alpha$_2$ than alpha$_1$-receptors (1600:1) as compared to clonidine (200:1). Stimulation of alpha$_2$ -receptors in the periphery account for the vasoconstriction effects of the medication while stimulation of receptors found in the brain and spinal cord cause sedation and anti-nociception.

Since its introduction, there have been off-label uses of dexmedetomidine in pediatric patients for (1) sedation and analgesia during diagnostic studies/procedural sedation and (2) decreasing withdrawal symptoms during weaning/detoxification from other sedative medications.

UHS APPROVED INDICATIONS

- Procedural sedation in the PICU
- Sedation for rapid sequence intubation of difficult/at risk airway
- Sedation for intubated patient on mechanical ventilation
- Adjunct to weaning other sedative medications in setting of drug withdrawal

ADMINISTRATION/DOSING

- Concentration: 200 mcg/50 mL NS (4 mcg/mL)
- Intravenous administration through peripheral or central venous line
- For ICU sedation or procedural sedation
    - Loading dose (if necessary): 1 mcg/kg over ten minutes (monitor closely for hypotension)
    - **Maintenance dose**: 0.2-0.7 mcg/kg/hr (doses up to 1 mcg/kg/hr have been used)
- Titrate drip in increments of 0.1 mcg/kg/hr not more frequently than every 30 minutes
- Physician should specify desired level of sedation (see Richmond Agitation and Sedation Scale
- NOTE: *Loading dose*: Administration of a loading dose may increase the risk of hemodynamic compromise. For this reason, the loading dose may be omitted.
- Restricted to pediatric intensive care unit (PICU)
- Limited data are available regarding prolonged administration to children. Serlin reported use up to 144 hours.

MONITORING

- Requires continuous cardiopulmonary monitoring
- Requires continuous pulse oximetry
- Requires continuous end-tidal CO_2 monitoring
- Richmond Agitation and Sedation Scale (RASS) or level of sedation

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CAUTIONS/LIMITATIONS

- Avoid in cardiac patients with pre-existing bradyarrhythmias or atrioventricular block and those who are receiving negative chronotrophic drugs (e.g. digoxin).
- Transient hypertension, bradycardia and/or hypotension can occur with loading dose or rapid infusion rates. Slower infusion rates or eliminating the load dose can decrease or prevent these risks.
- Medication must be initiated by or on behalf of a pediatric critical care attending who has been involved primarily or in consultive manner in the care of the patient.
- Careful monitoring and possible dose reduction for patients with hepatic disease may be necessary due to hepatic metabolism via direct glucuronidation as well as cytochrome p450.
- Pregnancy category C
- Excretion in breast milk is unknown
- May cause malignant hypertension in patients taking monoamine oxidase inhibitors
- Infusions greater than 24 hours have risk of ARDS, respiratory failure and agitation as well as tolerance and tachyphylaxis.
- Administration up to seven days have shown that 5% of patients have at least one event related to withdrawal (e.g. nausea, vomiting, agitation) within the first 24 hours of discontinuation of drug.

Richmond agitation-sedation scale (RASS)

Score	Term	Description
+4	Combative	Overtly combative or violent, immediate danger to staff
+3	Very agitated	Pulls on or removes tubes or catheters, aggressive behavior toward staff
+2	Agitated	Frequent nonpurposeful movement or patient-ventilator dyssynchrony
+1	Restless	Anxious or apprehensive but movements not aggressive or vigorous
0	Alert and calm	
-1	Drowsy	Not fully alert, sustained (>10 seconds) awakening, eye contact to voice
-2	Light sedation	Briefly (<10 seconds) awakens with eye contact to voice
-3	Moderate sedation	Any movement (but no eye contact) to voice
-4	Deep sedation	No response to voice, any movement to physical stimulation
-5	Unarousable	No response to voice or physical stimulation

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