Dexmedetomidine HCl

Brand names	Precedex
Medication error potential	ISMP high-alert medication (moderate sedation agent) that has an increased risk of causing significant patient harm if it is used in error.[1] Look-alike, sound-alike drug names USP reports that dexmedetomidine has been confused with dexamethasone and patient harm occurred. Precedex has the potential to be confused with Cerebyx.[2]
Contraindications and warnings	**Warnings:** Because of known cardiovascular effects, including bradycardia, sinus arrest, and hypotension, patients should be continuously monitored.[3,4] Slowing the rate of the infusion may modify the cardiovascular effects.[3] Transient hypertension has been noted during loading dose infusion.[3] During infusion, some patients may be arousable and alert when stimulated and this alone should not be considered lack of efficacy.[3] Abrupt withdrawal symptoms include nervousness, agitation, and headaches with increased blood pressure and can occur up to 48 hours following discontinuation of a continuous infusion.[3] (See Significant Adverse Effects in the Comments section.)
Infusion-related cautions	See the Contraindications and Warnings section.
Dosage	**Dosing adjustment in obesity:** In obese *adults* (defined as BMI >30 kg/m²), dosing based on lean body mass (LBM) has been shown to correlate with successful postoperative sedation (titrated to attain target Richmond Agitation and Sedation Scale (RASS).[66] Another study in *adults* (BMI >35 kg/m²) recommended dosing based on fat-free mass.[67] **Neonates (premature and term):** A phase II/III multicenter study found the following regimens to be safe and effective in 42 mechanically ventilated neonates 28–44 weeks gestational age (WGA). Bolus over 10–20 minutes followed by an infusion for 6–24 hours, respectively: 0.05 mcg/kg then 0.05 mcg/kg/hr, 0.1 mcg/kg then 0.1 mcg/kg/hr, and 0.2 mcg/kg then 0.2 mcg/kg/hr.[68] A case report describes successful addition of dexmedetomidine in a baby born at 24 WGA, birth weight 730 g, requiring high-frequency ventilation who developed agitation refractory to standard sedatives. On day of life 9, a bolus of 0.5 mcg/kg over 10 minutes and an infusion of 0.25 mcg/kg/hr were initiated. The infusion reached a max of 0.7 mcg/kg/hr; duration of infusion was 19 days. The infusion was eventually tapered off by 0.1 mcg/kg/hr q 12–24 hr.[5] **Procedural sedation:** Higher doses may be required if used as the sole sedative.[6,7] **Bolus:** 0.5–3 mcg/kg over 5–10 minutes[4,6-18] About one third of patients may need more than 1 bolus dose and/or additional sedatives during longer procedures such as MRI scans.[18] One study examined rapid boluses (0.25 mcg/kg or 0.5 mcg/kg over 1 minute) in 12 patients with heart transplants and found transient increases in systemic and pulmonary pressures along with bradycardia.[19] **Infusion:** 0.3–2 mcg/kg/hr[4,6,7,9-12,14-18] **Intraoperative or preoperative adjunct to general anesthesia** **Bolus:** 0.3–4 mcg/kg over 3–10 minutes[20-27] **Infusion:** 0.7–2 mcg/kg/hr.[20,21,24] Dexmedetomidine was found to reduce postoperative pain/agitation[20,22-24,27] in surgeries including hypospadias repair, strabismus repair, and tonsillectomy/adenoidectomy. **Sedation in critically ill children requiring mechanical ventilation (noncardiac population)** **Bolus:** 0.25–0.5 mcg/kg[28] **Infusion:** 0.2–1.4 mcg/kg/hr[28-30,69,70]

Dosage *(cont.)*

Three groups of 10 children per group received either continuous infusion midazolam, a bolus of 0.25 mcg dexmedetomidine/kg over 5 minutes followed by 0.25 mcg/kg/hr, or 0.5 mcg dexmedetomidine/kg over 5 minutes followed by 0.5 mcg/kg/hr. The dexmedetomidine or midazolam infusions were increased if 3–4 doses of morphine were required within 8 hours.[28] Less morphine and fewer infusion rate changes were required by either of the dexmedetomidine groups than the midazolam comparator.[28] To minimize midazolam use and to facilitate weaning from mechanical ventilation, an initial continuous infusion of 0.2 ± 0.2 increased to 0.5 ± 0.2 mcg/kg/hr (used with fentanyl or morphine) based on adequacy of sedation was used for 3–75 hours in 17 infants and children.[29] None experienced significant changes in blood pressure or heart rate.[29]

Sedation in cardiothoracic surgery population

Bolus: 0.35–1 mcg/kg[31-33,71]

Infusion: Typical dosing range is 0.2–1 mcg/kg/hr.[31-36,70,71]

Facilitation of opioid weaning: A 6-month-old infant and a 7-year-old child sedated for 8 weeks and 15 days prior to cardiac transplant and for 4 weeks and 3 days after, respectively, were given 1 mcg/kg over 10 minutes followed by 0.8–1 mcg/kg/hr and 0.5–1 mcg/kg/hr for 10 and 8 days, respectively. Doses were then weaned as tolerated over 6 days and 24 hours.[37] Seven patients, 3–24 months old, received a bolus of 0.5 mcg/kg and an infusion of 0.5 mcg/kg/hr to treat opioid withdrawal. The infusion was weaned off by 0.1 mcg/kg/hr q 12–24 hr.[38]

Termination of reentrant supraventricular tachycardia (SVT): 0.5–1 mcg/kg over 20 seconds followed by 5–10 mL saline flush was 96% successful and without adverse events in 15 patients (newborn to 2 years old).[72]

Treatment of opioid-induced hyperalgesia: 0.2–0.7 mcg/kg/hr, often as part of a multicomponent regimen to allow reduction of opioids (*n* = 3 and *n* = 1 pediatric patients in two reports).[39,40]

Dosage adjustment in organ dysfunction

Manufacturer recommends consideration of dose reduction in patients with hepatic impairment.[3] In premature neonates, due to the increase in unbound drug, decreased clearance, and increased AUC, consider dose reductions in either renal or hepatic impairment.[68]

Maximum dosage

Procedural sedation: Bolus of 3 mcg/kg[7]; infusion of 2 mcg/kg/hr.[16,41] 15 mcg/kg/hr for 30 minutes then 5 mcg/kg/hr was used for a diagnostic and interventional cardiac catheterization procedure in a 16-month-old child. The infusion was titrated to achieve bispectral index (BIS) scores of 40–70. The child did not require supplemental oxygen or mechanical ventilation.[73]

Sedation during mechanical ventilation

Noncardiac: Bolus dose of 0.5 mcg/kg[5,28]; infusion of 1.5 mcg/kg/hr[70] to 2 mcg/kg/hr.[42]

Cardiac population: Bolus of 1 mcg/kg[31,32]; infusion of 1 mcg/kg/hr[31] to 2.1 mcg/kg/hr.[74]

Additives

Contains 9 mg sodium chloride/mL and is preservative free.[3]

Suitable diluents

NS is recommended. Also compatible with D5W, LR, and mannitol 20%.[3,43]

Maximum concentration

4 mcg/mL[3]

Preparation and delivery

Parenteral products should be visually inspected for particulate matter and discoloration before use. Refer to appropriate references for more information on compatibility with other drugs and solutions, compatibility following Y-site delivery, and suggested storage and extended stability.[43]

The 100-mcg/mL vial must be diluted in NS for infusion.[3]