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Addendum. Recommended Moderate Sedation Drugs and Doses: Pediatric and Neonatal

Rationale for doses exceeding recommended ranges should be documented in the patient's chart. Pediatric doses calculated on a per-kilogram basis should not exceed a standard adult dose.

DRUG	RECOMMENDED SEDATIVE DOSE	ONSET OF ACTION (min)	PEAK EFFECT (min) & DURATION	DRUG EFFECTS	REVERSAL AGENT
Fentanyl	 0.5-2.0 mcg/Kg IV over 3-5 minutes Not to exceed usual adult maximum dose of 100 mcg in one hour in adolescents 	Almost immediate; less than 2 minutes	Peak within 1- 3 minutes; duration 30- 60 min	 Narcotic analgesic with less sedative effect than morphine 100 mcg equal to 10 mg morphine or 75 mg meperidine. Respiratory depressive effects similar to morphine. Maximal respiratory depression at 5-10 minutes with sensitivity of respiratory center normalizing within 1-2 hours. Exhibits minimal hypnotic action & histamine release rarely occurs. Rapid IV push may cause chest wall muscle rigidity 	Naloxone (Narcan) 0.01 mg /Kg IV q 2-3 minutes until respirations adequate for age or max of 0.1 mg/Kg
Morphine	0.05-0.1 mg/Kg IV over at least 5 minutes	Within 1-3 minutes	15-30 minutes, may last up to 2-4 hours	 Narcotic analgesic Sedative effect Maximal respiratory depression within 7 minutes; with return to normal within 2-3 hours; respiratory minute volume may be subnormal for 4-5 hours. Occasionally causes pruritus after administration due to release of histamine 	Naloxone (Narcan) 0.01 mg /Kg IV q 2-3 minutes until respirations adequate for age or max of 0.1 mg/Kg
Lorazepam (Ativan)	 0.05-0.1 mg/Kg IV slow push or PO Not to exceed usual adult max of 2 mg per dose in adolescents 	1-2 minutes	15-30 min; Duration 2-12 hours	 Sedative with no analgesic effect Hypotension when combined with opioids Respiratory depression when combined with opioids 	Flumazenil (Romazicon) 0.01 mg/kg (to max of 0.2 mg/ dose) IV q 2 min prn until respirations adequate. Max total dose: 1 mg.

DRUG	RECOMMENDED SEDATIVE DOSE	ONSET OF ACTION (min)	PEAK EFFECT (min) & DURATION	DRUG EFFECTS	REVERSAL AGENT
Midazolam (Versed)	 Older infants and children: 0.05-0.1 mg/Kg/dose IV over at least 5 minutes. Maximum single dose 5 mg; may repeat up to max total dose of 0.4 mg/kg or 10 mg. PO: 0.25-0.5 mg/kg , max of 20 ng total Not recommended for preterm infants 	1-5 minutes	5-7 minutes; duration 20- 60 min Full recovery may take more than 24 hours	 Sedative/hypnotic prior to short procedures Produces antegrade amnesia of perioperative events Seizure-like reactions reported in 8% of premature infants when given continuous infusion – may also occur with rapid bolus administration or with CNS problems. Respiratory depression or hypotension if given with narcotics or by rapid bolus 	Flumazenil (Romazicon) 0.01 mg/kg (to max of 0.2 mg/ dose) IV q 2 min prn until respirations adequate. Max total dose: 1 mg.
Diazepam (Valium)	 0.04-0.3 mg/Kg IV Lower dose when used with opiates Not recommended for neonates 	Less than 2 min	3-4 min; duration of sedation 15- 60; residual effects up to 4 hours or longer in infants	 Accumulation effect likely to occur in patients with congestive heart failure and liver disease. Respiratory depression when combined with opioids. Hypotension when combined with opioids. 	Flumazenil (Romazicon) 0.01 mg/kg (to max of 0.2 mg/ dose) IV q 2 min prn until respirations adequate. Max total dose: 1 mg.
Hydromorphone (Dilaudid)	 0.015 mg/Kg IV to max of 2 mg/hr Not recommended for neonates 	Within 1-3 min	Duration of analgesia: 4-5 hours.	 1.5 mg hydromorphone equal to 10 mg morphine. Respiratory depressant effect of 1.5 mg equivalent to 10 mg morphine. 	Naloxone (Narcan) 0.01 mg /Kg IV q 2-3 minutes until respirations adequate for age or max of 0.1 mg/Kg
Chloral Hydrate	 25-75mg/Kg/dose PO. 25 mg/Kg PO for neonates May repeat in 30 minutes up to 100 mg/Kg or max of 1 Gm (infant) 	10-15 min (variable)	Deep sleep usually occurs within 30-45 minutes. Variable	 Sedative/hypnotic for short term use only No analgesic effect Metabolites are active, long acting, and can be toxic Repetitive dosing may cause accumulation of metabolites, which may produce excessive CNS depression 	None.

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