MUSC Continuous Infusion Guidelines for Pediatric Intensive Care Unit (PICU) Patients

Please note the following when using these guidelines:

1. **Orders for continuous infusions should be written in accordance with the *MUSC Guidelines for Writing Medication Orders*.**
2. **All initial continuous infusion orders must include dose and patient weight (eg, dopamine IV at a rate of 10 micrograms/kg/min, patient weight = 20 kg).**
3. **Dextrose 5% is the default diluent for patients in the PICU, PCICU, and 7CHC, unless the drug is incompatible in dextrose or unless the order is written for a diluent other than dextrose 5%.**
4. **Dextrose 10% is the default diluent for patients in the NICU, unless the drug is incompatible in dextrose or unless the order is written for a diluent other than dextrose 10%.**
5. **Any concentration ordered that exceeds the maximum concentration requires appropriate clinical justification in the medication order. The pharmacist processing the order will document the justification in the pharmacy order entry system.**
6. **Dosage adjustment may be necessary in patients with renal dysfunction. Please consult your pharmacist regarding any dose adjustments.**
7. **Higher doses may be required, especially in infants that develop opioid tolerance.**

[1000 micrograms = 1 mg] Caution: All units must agree when calculating infusion rate.

For drips dosed **in micrograms/kg/minute** use the following formula to calculate the rate to run the drip:

$$\text{Rate (mL/hour)} = \frac{\text{Desired dose (micrograms/kg/min) x Weight (kg) x 60 (min/hour)}}{\text{Concentration of Drip (micrograms/mL) **}}$$

If concentration is in **mg/mL, divide the result of this formula by 1000 to get infusion rate.

For drips dosed in **mg/kg/hour** use the following formula to calculate the rate to run the drip:

$$\text{Rate (mL/hour)} = \frac{\text{Desired dose (mg/kg/hour) x Weight (kg)}}{\text{Concentration of Drip (mg/mL)}}$$

For drips dosed in **micrograms/kg/hour** use the following formula to calculate the rate to run the drip:

$$\text{Rate (mL/hour)} = \frac{\text{Desired dose (micrograms/kg/hour) x Weight (kg)}}{\text{Concentration of Drip (micrograms/mL)}}$$

For drips dosed **in units/kg/minute** use the following formula to calculate the rate to run the drip:

$$\text{Rate (mL/hour)} = \frac{\text{Desired dose (units/kg/min) x Weight (kg) x 60 (min/hour)}}{\text{Concentration of Drip (units/mL)}}$$

For drips dosed **in units/kg/hour** use the following formula to calculate the rate to run the drip:

$$\text{Rate (mL/hour)} = \frac{\text{Desired dose (units/kg/hour) x Weight (kg)}}{\text{Concentration of Drip (units/mL)}}$$

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Prepared by the MUSC Drug Information Center

Medication	Standard Concentration	Average Starting Dose	Dosage Range	Maximum Concentration	Comments
Amiodarone **(DEXTROSE ONLY)**	**Loading dose:** 5 to 10 mg/kg over 1 hr, followed by the continuous infusion listed below				
	2 mg/mL	5 micrograms/kg/min	5 to 15 micrograms/kg/min	2 mg/mL **(PERIPHERAL LINE)** 6 mg/mL **(CENTRAL LINE)**	Any concentration greater than 2 mg/mL must be given centrally.
Cisatracurium	**Loading dose:** 0.1 mg/kg, followed by the continuous infusion listed below				
	0.4 mg/mL **(weight ≤ 10 kg)** 1 mg/mL **(weight > 10 kg)**	3 micrograms/kg/min	0.5 to 10 micrograms/kg/min	5 mg/mL	
DOBUTamine	1 mg/mL **(weight ≤ 20 kg)** 2 mg/mL **(weight > 20 kg)**	5 micrograms/kg/min	2 to 20 micrograms/kg/min	5 mg/mL	
DOPamine	0.8 mg/mL **(weight ≤ 20 kg)** 1.6 mg/mL **(weight > 20 kg)**	5 micrograms/kg/min	2 to 20 micrograms/kg/min	3.2 mg/mL **(PERIPHERAL LINE)** 6 mg/mL **(CENTRAL LINE)**	Any concentration greater than 3.2 mg/mL must be given centrally.
Epinephrine	20 micrograms/mL	0.05 micrograms/kg/min	0.025 to 1 micrograms/kg/min	64 micrograms/mL	
Esmolol **(DEXTROSE ONLY)**	**Loading dose:** 500 micrograms/kg/min over 1 min, followed by the continuous infusion listed below. (Loading dose not required unless otherwise specified)				
	10 mg/mL	50 to 100 micrograms/kg/min	50 to 1,000 micrograms/kg/min	10 mg/mL	
Fentanyl	10 micrograms/mL **(weight ≤ 2 kg)** 50 micrograms/mL **(weight > 2 kg)**	2 micrograms/kg/hr	2 to 12 micrograms/kg/hr	50 micrograms/mL	**See legend note 6**
Furosemide	1 mg/mL	0.1 mg/kg/hr	0.1 to 0.4 mg/kg/hr	10 mg/mL	

To make a 100-mL drip, multiply desired concentration [dose unit/mL] X 100 mL = amount of drug to add to 100-mL bag of fluid. For example, Epinephrine 20 micrograms/mL X 100 mL = 2000 micrograms (2 mg). Add 2 mg epinephrine to 100 mL of D5W. 1 mg = 1000 micrograms.

Medication	Standard Concentration	Average Starting Dose	Dosage Range	Maximum Concentration	Comments
Heparin	40 units/mL	10 to 15 units/kg/hr	10 to 28 units/kg/hr	100 units/mL	Maximum rate = 1,000 units/hr
Lidocaine	**Loading dose:** 1 mg/kg IV push over 2 to 4 mins, followed by the continuous infusion listed below. May repeat every 5 to 10 mins x 2 doses. Maximum total dose = 5 mg/kg				
	8 mg/mL	20 micrograms/kg/min	20 to 50 micrograms/kg/min	8 mg/mL	
Labetalol	2 mg/mL	1 mg/kg/hr	0.25 to 3 mg/kg/hr	1 mg/mL **(PERIPHERAL LINE)** 5 mg/mL **(CENTRAL LINE)**	Any concentration greater than 1 mg/mL must be given centrally.
Midazolam	1 mg/mL	0.1 mg/kg/hr	0.1 to 0.5 mg/kg/hr	5 mg/mL	**See legend note 6**
Milrinone	200 micrograms/mL	0.5 micrograms/kg/min	0.25 to 0.75 micrograms/kg/min	200 micrograms/mL	**See legend note 6**
Morphine	0.2 mg/mL **(weight ≤ 3 kg)** 1 mg/mL **(weight > 3 kg)**	0.05 mg/kg/hr	0.05 to 0.2 mg/kg/hr	1 mg/mL	**See legend note 6**
Nicardipine	0.1 mg/mL	0.5 micrograms/kg/min	0.5 to 3 micrograms/kg/min	0.5 mg/mL	
Nitroglycerin	0.4 mg/mL	0.5 micrograms/kg/min	0.5 to 5 micrograms/kg/min	0.4 mg/mL	
Nitroprusside (DEXTROSE ONLY)	400 micrograms/mL **(weight ≤ 10 kg)** 1 mg/mL **(weight > 10 kg)**	0.5 micrograms/kg/min	0.3 to 10 micrograms/kg/min	200 micrograms/mL **(PERIPHERAL LINE)** 1 mg/mL **(CENTRAL LINE)**	Any concentration greater than 200 micrograms/mL must be given centrally.
Norepinephrine	8 micrograms/mL	0.05 micrograms/kg/min	0.05 to 1 micrograms/kg/min	16 micrograms/mL **(PERIPHERAL LINE)** 64 micrograms/mL **(CENTRAL LINE)**	

To make a 100-mL drip, multiply desired concentration [dose unit/mL] X 100 mL = amount of drug to add to 100-mL bag of fluid. For example, Epinephrine 20 micrograms/mL X 100 mL = 2000 micrograms (2 mg). Add 2 mg epinephrine to 100 mL of D5W. 1 mg = 1000 micrograms.

Medication	Standard Concentration	Average Starting Dose	Dosage Range	Maximum Concentration	Comments
Octreotide **(CHYLOTHORAX)**	10 micrograms/mL	3.5 micrograms/kg/hr **(CHYLOTHORAX)**	3.5 to 7 micrograms/kg/hr	100 micrograms/mL	Maximum rate = 100 micrograms/hr **See legend note 6**
Octreotide **(GI BLEED)**	**Bolus dose:** 1 to 2 micrograms/kg, followed by the continuous infusion listed below Maximum bolus dose = 50 micrograms				Maximum rate = 50 micrograms/hr **See legend note 6**
	10 micrograms/mL	1 microgram/kg/hr **(GI BLEED)**	1 to 2 micrograms/kg/hr	100 micrograms/mL	
Phenylephrine	40 micrograms/mL	0.1 micrograms/kg/min	0.1 to 0.5 micrograms/kg/min	60 micrograms/mL **(PERIPHERAL LINE)**	
				160 micrograms/mL **(CENTRAL LINE)**	
Procainamide	**Loading dose:** 3 to 15 mg/kg at rate of 0.2 to 0.5 mg/kg/min, followed by the continuous infusion listed below				Maximum total dose = 2 g in 24 hr **See legend note 6**
	4 mg/mL	20 micrograms/kg/min	20 to 80 micrograms/kg/min	4 mg/mL	
Prostaglandin E_1	10 micrograms/mL	0.1 micrograms/kg/min	0.01 to 0.1 micrograms/kg/min	20 micrograms/mL	
Terbutaline	**Loading dose:** 2 to 10 micrograms/kg over 5 to 30 mins, followed by the continuous infusion listed below				**See legend note 6**
	1 mg/mL	0.4 micrograms/kg/min	0.4 to 6 micrograms/kg/min	1 mg/mL	
Vasopressin **(DIABETES INSIPIDUS)**	0.03 units/mL	0.0005 units/kg/hr **(DIABETES INSIPIDUS)**	0.0005 to 0.01 units/kg/hr	1 unit/mL	
Vasopressin **(GI BLEED)**	1 unit/mL	0.002 units/kg/min **(GI BLEED)**	0.002 to 0.01 units/kg/min	1 unit/mL	
Vasopressin **(HYPOTENSION)**	0.2 units/mL **(weight ≤ 20 kg)**	0.0003 units/kg/min **(HYPOTENSION)**	0.0003 to 0.002 units/kg/min	1 unit/mL	Maximum rate = 0.1 units/min
	0.4 units/mL **(weight > 20 kg)**				
Vecuronium	**Loading dose:** 0.1 mg/kg, followed by continuous infusion listed below				
	1 mg/mL	2 micrograms/kg/min	2 to 4 micrograms/kg/min	1 mg/mL	

To make a 100-mL drip, multiply desired concentration [dose unit/mL] X 100 mL = amount of drug to add to 100-mL bag of fluid. For example, Epinephrine 20 micrograms/mL X 100 mL = 2000 micrograms (2 mg). Add 2 mg epinephrine to 100 mL of D5W. 1 mg = 1000 micrograms.