



Drug	First concentration	Second concentration	Third conc	Dosing units	Commercially available	Comments
Alteplase	1 mg/mL			mg/hour	Yes, comes in a kit with diluent	This concentration is for treatment doses only and does not apply to interventional radiology needs and/or catheter treatments. Available in drug kits of 50 mg or 100 mg vials with diluent included
Amiodarone	1.5 mg/mL	3.6 mg/mL		mg/min	Yes	Two concentrations needed, 1.5 mg/mL for peripheral, 3.6 mg/mL for central. Some institutions were using 1.8 mg/mL but still seeing phlebitis.
Argatroban	1 mg/mL			mcg/kg/min	Yes	
Bumetanide	0.25 mg/mL			mg/hour	Administer undiluted	
Cisatracurium	2 mg/mL ^{1,2}			mcg/kg/min	Administer undiluted	The package insert (PI) has infusion information using 0.4 mg/mL
Dexmedetomidine	4 mcg/mL			mcg/kg/hour	Yes	Only concentration recommended in package insert also commercially available product
DilTIAZem	1 mg/mL			mg/hour	No	Hospira has advantage 100 mg/100 mL (may be similar products)- using the manufacturer vial of 125mg the admixture would be 125 mg in 125 mL unless not accounting for any overfill of the bag
DOBUTamine	4000 mcg/mL			mcg/kg/min	Yes	Premix bag -considerations may be needed for areas performing diagnostic tests - in addition to what is needed in home care setting. No evidence to dispute 4000 mcg/mL cannot be given via peripheral route
DOPamine	1600 mcg/mL	3200 mcg/mL		mcg/kg/min	Yes	Premix bags, consider limiting to one bag size of each (250 vs. 500 mL, could reduce inventory needs and errors)
EPINEPHrine	20 mcg/mL	40 mcg/mL		mcg/kg/min	No	vial size 1 mg/mL or 30 mg/30 mL. The group intentionally made these concentrations different from those for norepinephrine in order to avoid confusion between the two agents.
Esmolol	10 mg/mL	20 mg/mL		mcg/kg/min	Yes	10 mg/mL for peripheral, 20 mg/mL for central. Most institutions use the 10 mg/mL premix but dosing ranges indicate the 20 mg/mL is more appropriate based upon fluid volumes.
FentaNYL ⁴	10 mcg/mL	50 mcg/mL		mcg/hour	No	Ease of prep, can make 2500 mcg (50 mL) in 250mL to make 10 mcg/mL (need to remove volume of drug and overfill) or use straight drug of 50 mcg/mL
Furosemide	2 mg/mL	10 mg/mL		mg/hour	No, and the 10 mg/mL is administered undiluted	This is highly dependent upon using low dose continuous infusions (doses less than 10 mg/hour) or using high doses (20 mg/hour or more)



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Heparin	100 units/mL			units/hour or units/kg/hour ³	Yes	This comes in a commercially available bag, also recommend stocking one bag volume. This concentration is for treatment, systemic anticoagulation and is not for line patency, arterial-lines, etc. Hospitals should try to standardize the dosing units, however we recognize that weight based and flat dose is used in practice given indication. Please just try to be clear for nursing on the eMAR and in the smart pump programming to prevent errors
HYDRO morphone ⁴	0.2 mg/mL	1 mg/mL	5 mg/mL (based upon high dose requirements)	mg/hour	No	This is for hydromorphone infusions NOT via PCA pump infused on other continuous devices. Only consider the 5 mg/mL for patients with high dose needs. PCA concentrations will be in phase III of the project
Insulin (regular)	1 unit /mL			units/hour, DKA protocols may require units/kg/hour	No	compounded - 100 units in 100 mL NS or 250 units in 250 mL. We do not endorse using 0.1 units/mL in OB protocols as this is a significant error potential when pharmacies are compounding and the 1 unit/mL can be easily titrated
Isoproterenol	4 mcg/mL			mcg/min or mcg/kg/min ³	No	We recommend standardizing dosing units but understand current protocols may use flat dosing or weight based dosing units. A second concentration may be needed by heart transplant centers
Labetalol	5 mg/mL			mg/min	No	Typically the normal dosing ranges warrant the higher 5 mg/mL concentration
Lidocaine	8 mg/mL			mg/min	Yes	Based upon typical doses the 4 mg/mL concentration doesn't seem to be clinically needed. However this could have an operational impact on bags in ACLS crash carts
LOR azepam	1 mg/mL			mg/hour	No	100 mg in 100 mL or 50 mg in 50 mL -- very consistent concentration amongst everyone. If institutions use 2 mg/mL (straight drug), this is very viscous
Morphine ⁴	1 mg/mL	5mg/ml based upon high dose requirements		mg/hour	Yes	The 1 mg/mL is commercially available. These are NOT concentrations for PCA pump and for other continuous infusion pumps used in the ICU
Midazolam	1 mg/mL			mg/hour	No	consistent across the board, 10 mL of 5 mg/mL vials so no waste (50 mg in 50 mL or 100 mg in 100 mL)
Milrinone	200 mcg/mL			mcg/kg/min	Yes	commercial - most using 200 mcg/mL. Ambulatory heart failure patients -- hospitals may need to add another concentration for outpatient needs
NiCAR dipine	0.1 mg/ml	0.5 mg/mL		mg/hour	Yes - 0.1 mg/mL	does come as 0.1 mg/mL commercially available. Chose 2 concentrations the 0.1 mg/mL can be use peripherally, the 0.5 mg/mL only CENTRALLY and fluid restricted patients



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Nitroglycerin	200 mcg/mL			mcg/min	Yes	the 400 mcg/mL has been on and off the shortage list
Nitroprusside	200 mcg/mL	500 mcg/mL		mcg/kg/min	No	Vials are 50 mg, 1 vial 50 mg in 250 mL = 200 mcg/mL, 1 vial 50 mg in 100 mL = 500 mcg/mL
Norepinephrine	16 mcg/mL	32 mcg/mL	128 mcg/mL	mcg/kg/min	No	4 mg in 250 mL = 16 mcg/mL, 8 mg in 250 mL = 32 mcg/mL, 32 mg in 250 mL = 128 mcg/mL. The higher concentration is needed for hospitals with large trauma centers and/or severe fluid restriction in critically ill with high dosing needs
Phenylephrine	80 mcg/mL	400 mcg/mL		mcg/kg/min	No	10 mg, 50 mg, 100 mg vials , 20 mg in 250 mL (80 mcg/mL), 100 mg in 250 mL (400 mcg/mL). The higher concentration is for central line use only and is needed for hospitals with large trauma centers and/or severe fluid restriction in critically ill with high dosing needs
Propofol	10 mg/mL			mcg/kg/min	Yes	
Rocuronium	10 mg/mL ¹			mcg/kg/min	Administer undiluted	
Vasopressin	0.2 unit/mL	1 unit/mL		units/min or units/kg/min ³	No	Concentration recommended now by manufacturer with new product - these concentrations are for cardiac/vasopressor indications. We recommend standardizing dosing units but understand current protocols may use flat dosing or weight based dosing units. Phase 2 will be Diabetes Insipidus concentrations
Vecuronium	1 mg/mL ¹			mcg/kg/min	No	10 mg vials, typically dilute with NS

ISMP's List of Error-Prone Abbreviations, Symbols, and Dose Designations

Use mcg for Microgram <https://www.ismp.org/tools/errorproneabbreviations.pdf>

1. Paralytics are recommended to be administered as straight drug. The reason for this is consistency between the operating room and the intensive care unit. In addition further compounding in the pharmacy is a potential source of additional errors.
2. This is a concentration that differs from the package insert, therefore infusion related calculations will differ from the PI
3. We recommend trying to standardize dosing units but understand some protocols may use "flat" dosing while others may require weight based dosing.
4. These concentrations are for continuous infusions not delivered by a PCA device. PCA concentrations will be determined in stage III of the project