ADULT INTRAVENOUS MEDICATIONS

STANDARD AND MAXIMUM ALLOWABLE CONCENTRATIONS, GUIDELINES FOR CONTINUOUS OR TITRATED INFUSIONS

MEDICATION	STANDARD ADMIXTURE	MAXIMUM CONC./ INFUSION INSTRUCTIONS	DOSING	MONITORING/COMMENTS
Adenosine (Adenocard®) Slows conduction time through the AV node, interrupting the re-entry pathways through the AV node, restoring normal sinus rhythm. Onset of action: immediate Duration: seconds	6 mg/2 mL vial (3 mg/mL) given undiluted	Give undiluted directly into vein over 1-2 seconds. Administer as proximal as possible to trunk (i.e., not in lower arm, hand, lower leg, or foot). If administered through IV line, administer as close to pts heart as possible. NS flush must be given rapidly, immediately following injection of adenosine	6 mg initially. If SVT not resolved in 1-2 minutes, may follow with 12 mg dose. If not resolved in 1-2 minutes, may follow with an additional 12 mg dose.	ECG, heart rate, blood pressure Extremely short half life: < 10 seconds Not effective for converting A. flutter, A. fib, or ventricular tachycardia. Contraindicated if symptomatic bradycardia, sick sinus syndrome, 2nd or 3rd degree AV block (unless pt. has functioning pacemaker)
Amiodarone (Cordarone®) Antiarrhythmic agent that depresses conduction velocity, slows AV node conduction, raises the threshold for VF, and exhibits some α and β blockade activity. It possesses vasodilatory effects which decrease cardiac workload and decrease myocardial oxygen demand. Myocardial uptake is rapid and anti-arrhythmic effects are clinically relevant within hours, but full effect may take days. Exceptionally long half life of 40-55 days	Load: Dilute 150 mg (3mL) in 100 mL **D5W** (1.5 mg/mL) (PVC bag suitable for loading dose) Maintenance infusion: Dilute 900 mg (18 mL) in 500 mL D5W (1.8 mg/mL) **INFUSION MUST BE ADMIXED IN GLASS BOTTLE OR NON-PVC BAG. Amiodarone will leach plastic from PVC bag** Maximum daily dose: 2.1 g/day	Peripheral line: Up to 2 mg/mL (Concentrations over 2 mg/mL administered for longer than 1 hour must be infused via central line) Central line: Up to 6mg/mL	Load: 150 mg/100 mL over 10 minutes. (Not to exceed 30 mg/mL) **THEN** Infusion: 1 mg/min for 6 hours (33.3 mL/hr = 360 mg), followed by 0.5 mg/min for 18 hours (16.6 mL/hr = 540 mg) ACLS: 300 mg IV push, may repeat with 150 mg x 1.	Telemetry monitoring, BP (hypotension occurs frequently with initial rates), HR (arrhythmias: AV block, bradycardia, VT/VF, torsades de pointes), electrolytes Pulmonary function test within 1 week if possible Thyroid function Liver enzymes (AST/ALT) Significant interactions with digoxin and warfarin (enhances effect of each, ↓ dose, monitor digoxin levels, PT/INR)

Shaded medications require a double check

MEDICATION	STANDARD ADMIXTURE	MAXIMUM CONC./ INFUSION INSTRUCTIONS	DOSING	MONITORING/COMMENTS
Atropine Blocks the action of acetylcholine at parasympathetic sites in smooth muscle, secretory glands, and the CNS; increases cardiac output Onset of action: very rapid Duration: 2-3 hours	1 mg/10 mL Abboject syringe (0.1 mg/mL)	May be administered without further dilution	Asystole/PEA: No longer recommended per 2010 ACLS guidelines Bradycardia: 0.5 mg IV	Vital signs and/or EKG Doses < 0.5 mg may lead to paradoxical bradycardia
Bumetanide (Bumex®) Potent loop diuretic. Works in the ascending Loop of Henle and proximal renal tubule to excrete H_2O, Na^+, K^+, Cl^- Onset of action: 2-3 minutes Duration: 4-6 hours	0.25 mg/mL (2 mL, 4 mL, 10 mL) Infusion: 12 mg/48 mL (0.25 mg/mL) PROTECT FROM LIGHT **Non-formulary at HH**	May be given undiluted. Not usually added to IV solutions but compatible with D5W, NS, and LR	IV push: 0.5-1 mg/dose May repeat in 2-3 hours Infusion: 0.25-2 mg/hr **DO NOT EXCEED 10 MG/24 HOURS** **1 mg Bumex = 40 mg Lasix**	HR, BP, electrolytes, UOP, CO2, BUN, glucose Routine BMP and uric acid checks necessary during treatment
Calcium Chloride Electrolyte	1 g/10 mL Abboject syringe	May be administered without further dilution	8-16 mg/kg IV at 100 mg/min (Typical dose = 1g) May repeat as necessary at 10 minute intervals	Vital signs Central line recommended Calcium chloride not recommended for uses other than cardiac resuscitation or management of calcium channel blocker toxicity. Contains three times more elemental calcium than calcium gluconate.

MEDICATION	STANDARD ADMIXTURE	MAXIMUM CONC./ INFUSION INSTRUCTIONS	DOSING	MONITORING/COMMENTS
Calcium Gluconate Electrolyte	1 g/10 mL (10%)	May be administered without further dilution or may be further diluted in up to 1,000 mL of **NS**	Emergency elevation of serum calcium: 15-30 mL (7-14 mEq). Repeat in 1-3 days per pt. response Hyperkalemia: 4.1-30 mL (2.25 - 14 mEq). May repeat in *1-2 minutes* if indicated as per EKG. **Do not exceed 2mL/min**	Vital signs, EKG Rapid administration may cause vasodilation, ↓BP, arrhythmias, syncope, or cardiac arrest.
Diltiazem (Cardizem®) Non-dihydropyridine calcium channel blocker that blocks Ca^{2+} ion influx during depolarization of cardiac and vascular smooth muscle. It decreases SVR and causes relaxation of the vascular smooth muscle resulting in ↓BP. Slows conduction through the AV node, prolongs the refractory period, and reduces ventricular rate. Decreases HR by 10% with a single dose.	Bolus: 5 mg/mL vial May be given undiluted through Y-tube or 3-way stopcock of tubing containing NS, D5W, or D5 ½ NS Infusion: Add 125 mg (25mL) to 100mL D5W or NS (1 mg/mL)	Bolus: No dilution required Infusion: 1 mg/mL	Bolus: 0.25 mg/kg IV (typical dose = 20 mg) May repeat with 0.35 mg/kg if no response after 15 min. (typical repeat dose (25 mg) Infusion: 5 – 15 mg/hr (5 -15 mL/hr). Initiate at 5 mg/hr. Max dose: 15 mg/hr **May only use for 24 hours**	↓HR, arrhythmias ↓BP, flushing, edema EKG monitoring during infusion preferred Stored in refrigerator
Dobutamine (Dobutrex®) Synthetic sympathomimetic catecholamine that stimulates the β receptors of the heart. Positive inotrope (↑ CO, ↑contractility, ↑CI). Produces minimal increases in rate and BP. Provides the extra "squeeze" in patients with cardiac decompensation. Onset of action: 1-10 minutes	Infusion: 500 mg/250 mL D5W premixed bag (2,000 mcg/mL) [concentrated 1000 mg/250 mL available if necessary (4,000 mcg/mL)] Vial: 250 mg/20 mL (12.5 mg/mL)	MAX: 5 mg/mL (1,250 mg/250 mL) in D5W or NS **Preferably given via central line**	Infusion: 2 – 20 mcg/kg/min Gradually adjust rate at 2 to 10 minute intervals. AHA guidelines recommend titrating so that HR does not increase by > 10% from baseline. If rates > 20 – 30 mcg/kg/min required, should consider alternate inotropic agent	↑HR, ↑BP or ↓*BP (typically associated with overdose)* Arrhythmia, myocardial ischemia, ↑CO Decreased effect seen in profoundly acidotic patients.

MEDICATION	STANDARD ADMIXTURE	MAXIMUM CONC./ INFUSION INSTRUCTIONS	DOSING	MONITORING/COMMENTS
Dopamine (Inotropin®) Catecholamine precursor to norepinephrine that activates α, β, and DA receptors. 5-10 mcg/kg/min: renal, mesenteric, coronary dilation 10-20 mcg/kg/min: increased contractility, HR >20 mcg/kg/min : vasoconstriction, increased HR and BP Onset of action: 5 minutes	Infusion: 400 mg/250 mL D5W premixed bag (1,600 mcg/mL) Vial: 200 mg/5 mL	MAX: 6.4 mg/mL (1,600 mg/250 mL) **Preferably given via central line**	Infusion: 2.5 – 20 mcg/kg/min If more than 20 mcg/kg/min is required to maintain BP, consider use of norepinephrine in addition	↑BP, palpitations, arrhythmias, ↑HR, peripheral necrosis with ↑doses Infuse via central line to avoid extravasation Fluid resuscitate pts. prior to vasopressor therapy. Effect diminished in acidosis. Do not administer through same line as sodium bicarbonate!
Epinephrine (Adrenalin®) Natural symmpathomimetic catecholamine, both an α and β agonist. Can ↑SVR, ↑BP (via vasoconstriction). It is a potent cardiac stimulant (↑HR, ↑contraction) and dilates bronchi	1 mg/10 mL (1:10,000) Abboject syringe 1 mg/1 mL (1:1000) vial Infusion: 1 mg/250 mL NS (4 mcg/mL) [*concentrated 2 mg/250 mL or 4 mg/250 mL available if necessary)* ***10 mg/250 mL NS (cardiac arrest infusion)***	4 mg/ 250 mL NS or D5W (16 mcg/mL) Some institutions report higher concentrations, if needed (**Duke = 10mg/250 mL)** **(Lit = 30 mg/250 mL)**	ACLS Bolus: 1 mg/10 mL (1:10,000 syringe) q3-5 min [1mg/ mL (1:1,000) **must be diluted in 10 mL NS before IV administration**] ACLS infusion: **30mg/250 mL at 100 mL/hour then titrate* **10mg/250 mL at .01-1.2 mcg/kg/min* Vasopressor or maintenance infusion: 1 – 10 mcg/min **Rates > 10 mcg/min, should consider alternate or additional vasopressor**	↑HR, ↑BP (monitor BP and HR q5min) Arrhythmias, tremor, anxiety, pulmonary edema, myocardial ischemia Monitor for signs of peripheral necrosis

Shaded medications require a double check

MEDICATION	STANDARD ADMIXTURE	MAXIMUM CONC./ INFUSION INSTRUCTIONS	DOSING	MONITORING/COMMENTS
Eptifibatide (Integrilin®) Blocks platelet glycoprotein IIb/IIIa receptor, the binding site for fibrinogen, von Willebrand factor, and other ligands. Reversibly blocks platelet aggregation and prevents thrombosis	200 mg/100 mL vial (2,000 mcg/mL) Bolus: Dose administered from 100mL vial, given undiluted over 1-2 minutes ***Give with heparin or lovenox***	Bolus: Over 1-2 minutes Infusion: Administered directly from vial Max bolus dose = 22.6 mg Max infusion rate = 15 mg/hr	ACS Bolus: 180 mcg/kg administered over 1-2 minutes Infusion: 2 mcg/kg/min (max of 15 mg/hr) **Renal Dysfunction: If CrCl < 50 mL/min, ↓ infusion to 1 mcg/kg/min.**	Platelets, Hgb, SCr, PT/aPTT Signs of bleeding – avoid BP cuffs, watch IV sites, monitor for black tarry stools etc. **Modified Cockroft-Gault equation to determine CrCl: (140 – age/SCr) [x 0.85 if female]** (this equation provides a rough estimation of CrCl in order to determine an approximation of the patients renal function)
Esmolol (Brevibloc®) Short acting β_1 selective adrenergic blocker (may have some β_2 activity at high doses). Has antiarrhythmic properties and acts to ↓HR, ↓BP, and ↓ contractility in a dose-related manner. Used for Tx of SVT with RVR or HTN Onset of action: 2-10 minutes. Duration is 10-30 minutes.	Bolus: May be given undiluted *****Only use 10 mg/mL amp***** Infusion: 2,500 mg/250 mL NS premixed bag (10 mg/mL)	20 mg/mL (5,000 mg/250 mL) **D5W or NS**	SVT Bolus: 500 mcg/kg over 1 minute Infusion: Start infusion at 50 mcg/kg/minute. Titrate to response q4min up to a maximum dose of 200 mcg/kg/min **HTN control** = up to 300 mcg/kg/min	↓HR, ↓BP, arrhythmias, CHF, bronchospasm, thrombophlebitis Should taper off slowly Infuse via central line to prevent extravasation
Etomidate (Amidate®) Short-acting, non-barbiturate hypnotic without analgesic activity. Able to produce the full spectrum of CNS depression, from light sleep to coma. Onset of action: 60 seconds Duration: ~ 5 minutes.	2 mg/mL vial May be given undiluted	Dose may be given undiluted, administered over 30 – 60 seconds	0.3 mg/kg	Pain with infusion common Myoclonus commonly seen May increase EEG activity in focal seizures Will cause transient adrenal suppression, use caution in septic patients.

Shaded medications require a double check

MEDICATION	STANDARD ADMIXTURE	MAXIMUM CONC./ INFUSION INSTRUCTIONS	DOSING	MONITORING/COMMENTS
Fentanyl (Sublimaze®) Opium derived narcotic analgesic which is a descending CNS depressant. Approximately 100 times more potent than morphine mg for mg. Has definite respiratory depressant actions that outlast its analgesic effects. Onset of action: almost immediate Duration: 0.5-1 hour.	Bolus: Small volumes may be given undiluted (50 mcg/mL) Infusion: 1,250 mcg/250 mL (5 mcg/mL) PCA: 1,250 mcg/25 mL (50 mcg/mL) See Standard PCA Order Form Epidural: 2 or 5 mcg/mL with bupivicaine 0.125% in 250 mL NS	50 mcg/mL undiluted drug Other bupivicaine concentrations available per request (e.g., 0.0625%)	Titrate to effect using pain scale or RASS score Infusion: 25 – 100 mcg/hr	↓RR, ↓HR, ↓BP Pain scale assessment for analgesia RASS score for sedation Naloxone (Narcan) is antidote *Use caution in obese patients. Fentanyl distributes to adipose tissue, requiring a larger initial dose to see effect. Duration of effect will be greatly extended as drug is slowly released from adipose tissue. Monitor respiratory status closely.*
Furosemide (Lasix®) Potent loop diuretic. Works in the loop of Henle to excrete H_20, Na^+, K^+, Cl^- Onset of action: ~ 5 minutes Duration: 2 hours	Bolus: 10 mg/mL undiluted drug Infusion: 100 mg/100 mL NS (1 mg/mL) **Protect from light**	Bolus: 10 mg/mL May be further diluted upon request Infusion: 100 mg/mL (1 mg/mL) **D5W or NS** (infusion bag stable for 24 hours)	Titrate to desired effect Infusion rate should not exceed 4 mg/min A 1 gram dose should infuse over at least 3 hours to prevent ototoxicity	HR, BP, electrolytes, UOP Over-diuresis may precipitate a contraction alkalosis
Heparin Potentiates the action of antithrombin III, thereby inactivating thrombin (as well as factors IX, X, XI, XII, and plasmin). Prevents conversion of fibrinogen to fibrin Onset of action: almost immediate	Infusion: 25,000 units/500 mL D5W (50 units/mL)	Preprinted weight-based forms available	See preprinted weight based protocols	Platelets, Hgb, aPTT Signs of bleeding – watch IV sites, monitor for black tarry stools, etc Antidote: Protamine – each 1mg will reverse 100 units of heparin.

Shaded medications require a double check

MEDICATION	STANDARD ADMIXTURE	MAXIMUM CONC./ INFUSION INSTRUCTIONS	DOSING	MONITORING/COMMENTS
Insulin, Regular (Novolin R®) Pancreatic hormone responsible for storage, metabolism, and uptake of carbohydrates, fats, and protein. Facilitates entry of glucose into muscle, adipose and other tissues. Onset of action: 30 minutes	Vial: 100 units/mL Infusion: 100 units/100 mL **NS** (1 unit/mL)	1 unit/mL Usually diluted in NS or ½NS. Also compatible with D5W May adhere to IV tubing	Infusion: Titrate to desired blood glucose goals – follow protocol If pt in DKA, please titrate IVF's, not insulin drip	Hypoglycemia (FSBS) ONLY Regular insulin may be given IV Do not lower BG by >100 mg/dL per hour. Rapid lowering may lead to cerebral edema
Isoproterenol (Isuprel®) Synthetic sympathomimetic that stimulates β1 and β2 receptors resulting in relaxation of bronchial, GI, and uterine smooth muscle, increased heart rate and contractility, and vasodilation of peripheral vasculature Onset of action: immediate Duration: 10-15 minutes	1 mg/250 mL D5W (4 mcg/mL)	20 mcg/mL D5W or NS	Infusion: 2-20 mcg/min (Up to 30 mcg/min in severe shock)	↑HR, arrhythmias, ↑or↓BP, flushing, HA, pulmonary edema
Labetalol (Trandate®) Blocks α, β1, and β2 adrenergic receptor sites. Decreases heart rate and peripheral vascular resistance. Ratio of alpha- to beta-blockade depends upon the route of administration (1:3 oral versus 1:7 IV) Onset of action: 2-5 minutes Duration: 2-4 hours	Bolus: 5 mg/mL undiluted Infusion: 200 mg/200 mL (**Add 200mg [40 mL] labetalol to 160 mL D5W, NS, LR, or D5/NS**) Final concentration: 1 mg/mL	IV Bolus: 20 mg over at least 2 minutes Max concentration: 5 mg/mL	Bolus: 20 mg as initial dose, may repeat with doses of 40-80 mg q10min **Do not exceed total dose of 300 mg** Infusion: starting 2 mg/min (2 mL/min) – 8 mg/min titrated to response. **Do not exceed total dose of 300 mg.**	BP – before & 5-10 minutes after injection or during infusion. Keep patient supine and assist with ambulation (postural hypotension) As cumulative dose nears 300mg IV, duration of action extends to nearly 18 hours.

Shaded medications require a double check

MEDICATION	STANDARD ADMIXTURE	MAXIMUM CONC./ INFUSION INSTRUCTIONS	DOSING	MONITORING/COMMENTS
Lidocaine Local anesthetic and class Ib antiarrhythmic. Suppresses automaticity of conduction tissue by increasing the electrical stimulation threshold of the ventricle. With usual therapeutic doses does *not* change myocardial contractility, systemic arterial pressure, or absolute refractory period. Onset of action: 2 minutes Duration: 10-20 minutes (half life increases with repeat dosing)	Bolus: 100 mg/5 mL Abbojject syringe (2%) Infusion: 2,000 mg/500 mL D5W (4 mg/mL) premade bag *(Concentrated 4,000 mg/500 mL available if necessary)*	8 mg/mL in D5W	Bolus: 1-1.5 mg/kg (avg. 50-100 mg) Infuse over 2-3 minutes. May repeat bolus dose in 3-5 minutes to a max of 3 doses Infusion: With return of perfusion, initiate at 1-4 mg/min. **Do not exceed 4 mg/min**. Decrease dose by 50% for CHF, impaired liver function, elderly, use of drugs that may decrease hepatic clearance of lidocaine (e.g., beta blockers), shock	Monitor EKG continuously Monitor HR, BP, CNS effects (confusion, nervousness, seizure), cardiovascular collapse, arrhythmias Lidocaine levels (if maintained on lidocaine drip, would draw level 12 hours after initiating drip then q24h thereafter) ACLS note: If pt. has received amiodarone, there is no evidence supporting the use of concurrent lidocaine. Once an antiarrhythmic agent has been chosen per the ACLS algorithm, need to stay with that agent.
Magnesium Electrolyte	1 gm/50 mL D5W 2 gm / 100 mL D5W 4 gm/100 mL D5W	1 gm / hr	Case based (suggested doses): 1.5 - 2.0: give 2 g TRO 2 hrs 1.0 - 1.5: give 4 g TRO 4 hrs < 1.0: give 8 g TRO 8 hrs	↓BP Mg levels
Midazolam (Versed®) Short acting benzodiazepine with sedative, anxiolytic, and amnestic properties. Three to four times as potent as diazepam. Onset of action: 1-5 minutes Duration: average 2 hours	100 mg/mL NS pre-made bag (1 mg/mL)	1 mg/mL	Titrate to effect using RASS RSI induction: 0.2-0.3 mg/kg Infusion: Initially 1-7 mg/hr, then titrate according to RASS Use lower initial dose if receiving concurrent sedatives/analgesics	↓RR, ↓BP, ↓HR Drowsiness, impaired memory or coordination, agitation (paradoxical) Flumazenil (Romazicon) is antidote but its use is **strongly** discouraged, especially if pt. has a h/o benzo use or Sz history. May precipitate seizures via irreversible binding of BZD receptors (GABA) – Duration~1hr

Shaded medications require a double check

MEDICATION	STANDARD ADMIXTURE	MAXIMUM CONC./ INFUSION INSTRUCTIONS	DOSING	MONITORING/COMMENTS
Morphine Opium-derived narcotic analgesic, CNS depressant, respiratory depressant. Relieves pulmonary congestion, reduces myocardial oxygen demand, and reduces anxiety. Onset of action: Almost immediate Duration: Average of 2 hours	Bolus: may be given undiluted Infusion: 100 mg/mL in D5W (1 mg/mL) PCA: 30 mg/30 mL (1 mg/mL) See standard PCA order form	Usually 1 mg/mL	Bolus: average 2.5 – 15 mg. Repeat q2-4h as needed Recommend lower initial dose for renal or hepatic dysfunction and in elderly. Infusion: Titrate to effect using pain scale or RASS	↓BP, ↓RR, HR, GI effects (constipation) Pain scale assessment for analgesia. Active metabolite Morphine-6-Glucuronide accumulates in renal dysfunction. Naloxone (Narcan) is antidote
Naloxone (Narcan®**)** Pure opioid antagonist that competes and displaces narcotics at opioid receptors. Onset of action: ~ 2 minutes Duration: 30-45 minutes (up to 2 hours if given IM)	May be given undiluted, diluted with SW for injection, or further diluted in NS or D5W and given as an infusion. Infusion: 2 mg/500 mL NS or D5W (0.004 mcg/mL [4 mcg/mL])	1 mg/mL	Narcotic overdose: 0.4 – 2 mg. May repeat in 2-3 minutes if indicated. Typically start with lower dose then increase as needed. (May initiate with 0.1 mg in patients with known opioid dependence to prevent withdrawal reaction) Opioid induced pruritis: 0.25 mcg/kg/min. Monitor pain control to ensure naloxone is not reversing analgesia	RR, HR, BP, temp, level of consciousness, O2 sat Monitor for withdrawal symptoms Ineffective against respiratory depression caused by barbiturates, anesthetics, other non-narcotic agents, or pathological conditions
Nesiritide (Natrecor®) Recombinant human BNP, dilates veins & arteries. Produces dose dependent decrease in PCWP & systemic arterial pressure. Used for treatment of acutely decompensated CHF in pts with dyspnea at rest or with minimal activity Onset of action: 15 minutes Duration: >60 minutes (up to several hours)	1.5 mg in 250 mL D5W or NS (6 mcg/mL) [reconstitute vial with 5 mL gently rolling vial in hand to dilute. DO NOT SHAKE]	6 mcg/mL	Bolus: 2 mcg/kg over 1 minute (withdraw bolus from the prepared infusion bag) Infusion: 0.01 mcg/kg/min	BP (may last for hours) UOP, renal function Continuous tele monitoring PCWP

MEDICATION	STANDARD ADMIXTURE	MAXIMUM CONC./ INFUSION INSTRUCTIONS	DOSING	MONITORING/COMMENTS
Nicardipine (Cardene®) Dihydropyridine calcium channel blocker. Causes coronary and peripheral blood vessel dilation leading to ↓SVR, ↑ CO, ↑ coronary blood flow, and myocardial oxygen supply without increasing cardiac oxygen demand. Onset of action: 10 minutes Duration: <8 hours	25 mg/250 mL D5W or NS (0.1 mg/mL) (withdraw 10 mL from 250 mL bag prior to addition of nicardipine for 0.1mg/mL final concentration)	0.1 mg/mL If infused peripherally, change IV site Q12h	Infusion: 5 mg/hr (50 mL/hr) Increase rate by 2.5 mg/hr every 5-15 minutes up to max of 15 mg/hr Consider reducing to 3 mg/hr for maintenance	BP, HR HA, nausea/vomiting
Nitroglycerin Causes relaxation of smooth muscle, producing a vasodilator effect on the peripheral veins and arteries with more prominent effects on the veins. Primarily reduces cardiac oxygen demand by decreasing preload. May modestly reduce afterload. Dilates coronary arteries and improves collateral flow to ischemic regions Onset of action: Immediate Duration: 3-5 minutes	50 mg/250 mL D5W (200 mcg/mL) Pre-mixed in glass bottle	Start with 5 mcg/min then increase by 5 mcg/min Q3-5min until desired response obtained. If not response at 20 mcg/min, may increase by 10 mcg/min. No fixed maximum dose Tolerance may develop after 12-24 hours, requiring nitrate free period	**Unstable angina or CHF associated with MI:** 10-20 mcg/min and increase by 10-20 mcg/min until desired effect. May need bolus of 12.5 to 25 mcg. Need nitro free period for effect to last	USE EXTREME CAUTION IN PTS WITH RIGHT VENTRICULAR INFARCT (these pts are extremely sensitive to effects of nitroglycerine. Use may cause a precipitous drop in BP) Monitor: BP, HR, HA Flushing, postural hypotension, reflex tachycardia, dizziness Methemoglobinemia Antidote: Decrease rate, elevate foot of bed, IV fluids, oxygen, epinephrine
Nitroprusside (Nitropress®) Potent, rapid acting antihypertensive. Causes peripheral vasodilation by direct action on venous and arteriolar smooth muscle, thus reducing peripheral resistance. Decreases BP and SVR, but will ↑CO and may ↑HR. Metabolized in RBCs to cyanide, then in the liver to thiocyanate. Liver or kidney dysfunction can affect metabolism and elimination. Onset of action: < 2 min Duration: 1-10 minutes	50 mg/250 mL D5W (200 mcg/mL) **PROTECT FROM LIGHT** *Solution will have a faint brownish tint.* *Discard solution if highly colored, blue, green, or dark red*	100 mg/250 mL D5W (400 mcg/mL)	Infusion: 0.1 – 5 mcg/kg/min AHA recommends starting with 0.1 mcg/kg/min, then gradually titrating every 2-3 minutes. Small adjustments can lead to major fluctuations in BP. Doses > 3 mcg/kg/min rarely needed. **Do not exceed 10 mcg/kg/min**	HR, ↓BP, flushing, HA Renal function Hepatic Function Cyanide, thiocyanate, or methemoglobin levels for prolonged use or suspected toxicity. Do not use in renal failure – Risk of cyanide toxicity **DO NOT USE IN NEUROLOGIC INJURY (trauma, stroke, etc.).** Will lead to ↑CBF, causing ↑ICP which may lead to secondary infarct

Shaded medications require a double check

MEDICATION	STANDARD ADMIXTURE	MAXIMUM CONC./ INFUSION INSTRUCTIONS	DOSING	MONITORING/COMMENTS
Norepinephrine (Levophed®) Natural sympathomimetic catecholamine, α1, and β1 agonist. Causes peripheral vasoconstriction, stimulates cardiac contractility and dilates coronary arteries. ↑HR and↑SVR. Onset of action: very rapid Duration: 1-2 minutes	4 mg/250 mL D5W (16 mcg/mL) NS alone not recommended due to loss of potency from oxidation	8 – 16 mg/250 mL D5W (32 – 64 mcg/mL) Infuse via central line to avoid extravasation	0.5 – 30 mcg/min Initiate at lower doses, then titrate to effect Rates > 30 mcg/min, should consider additional or alternative vasopressor	↑HR, **arrhythmias**, ↑BP, HA, ↑SVR, ↑PCWP, ↓renal blood flow Acidosis will greatly diminish effect.
Octreotide (Sandostatin®) Somatostatin analog, suppresses serotonin secretion, growth hormone, and other gastro-pancreatic peptides (insulin, gastrin, glucagon, etc.). Stimulates fluid and electrolyte absorption from the GI tract and prolongs transit time. Onset of action: 6-12 hours	Bolus: 50 mcg/mL May be given undiluted Infusion: 500 mcg/100 mL NS (5 mcg/mL)	10 mcg/mL in NS or D5W bag or glass	Bolus: 50-100 mcg over 3 minutes (undiluted) Antidiarrheal (AIDS): initial 100 mcg, followed by infusion of 10-100 mcg/hr GI Bleed: Loading dose of 50-100 mcg followed with a continuous infusion of 25-50 mcg/hr for 72 to 96 hours	Glucose, GI effects, HA, LFTs
Pancuronium (Pavulon®) Nondepolarizing neuromuscular blocking agent. Blocks neural transmission at the myoneural junction by binding with cholinergic receptor sites. Onset of action: 2-3 minutes Duration: Dose dependent, 60-100 minutes	Bolus 1 mg/mL May be given undiluted Infusion: 100 mg/100 mL undiluted (1 mg/mL)	1 mg/mL In manufacturer's diluents	Bolus: 0.04 – 0.1 mg/kg over 1 minute Infusion: 0.06 – 0.1 mg/kg/hr (1 - 1.7 mcg/kg/min) Titrate to effect	Train-of-four & RASS scale monitoring by nursing. Vagolytic – will increase heart rate. Not recommended in pts w/ cardiovascular disease Renal function: If Creatinine clearance < 50 mL/min, use 50% of dose

Shaded medications require a double check

MEDICATION	STANDARD ADMIXTURE	MAXIMUM CONC./ INFUSION INSTRUCTIONS	DOSING	MONITORING/COMMENTS
Pantoprazole (Protonix®) Proton pump inhibitor that suppresses gastric acid production. Inhibits both basal and stimulated gastric acid secretion.	Bolus: 80 mg/100 mL NS Withdraw 20 mL from 100 mL NS bag, reconstituting each 40 mg vial with 10 mL. (0.8 mg/mL) Infusion: 40 mg/100 mL NS to run over 5 hrs (8 mg/hr)	Stable for 12 hours	GI bleed: 80 mg bolus over 15 minutes, followed by continuous infusion of 8 mg/hr x 72 hours Stress ulcer prophylaxis/GERD: Infuse 40 mg over 15 minutes	Rash, infusion site reactions Anaphylaxis has been reported 72 hour infusion only indicated for active GI bleeds. **Not indicated for variceal bleed!** Convert to oral therapy when/if appropriate
Phenylephrine (Neosynephrine®) Synthetic sympathomimetic acting primarily on α adrenergic receptors. Causes potent vasoconstriction, lacks chronotropic or inotropic properties, ↓HR.]	10 mg/250 ml in **NS** or **D_5W** (40 mcg/ml)	40 mg/250 ml in **NS** or **D_5W** (160 mcg/ml) Some institutions report up to 400 mcg/ml (100 mg/250 ml) **Infuse via central line to avoid extravasation.**	Bolus: 0.1 to 0.5mg/dose every 10 to 15 minutes Infusion: 100 to 180 mcg/min initially, then 40 to 60 mcg/min maintenance rate.	↓HR, ↑BP, HA, arrhythmias
Potassium Chloride electrolyte	10 mEq/ 100 ml USE PRE-MIXED IVPBs PER PROTOCOL	MAXIMUM INFUSION RATE: 10 mEq/ hr MAX CONC: 40mEq/1000 ml	Case based Rate of Infusion: Not faster than 10 mEq / hr	Serum Potassium Level Tachycardia, arrhythmia, muscle aches, GI upset. Renal function
Propofol (Diprivan®) Potent, emulsified, sedative-hypnotic agent. Can provide conscious or unconscious sedation, depending on dose. Onset of action is rapid, as is recovery after discontinuation. Minimal impact on cardiac parameters.	1000 mg/100 ml glass bottle (10 mg/ml) 10% Lipid emulsion = 1.1 Kcal/ml	10 mg/ml undiluted drug	Infusion: 5-100 mcg/kg/min Titrate slowly q5-10 min by 5-10 mcg/kg/min increments to desired sedation **Initial Rate: 5 mcg/kg/min**	↓BP, ↓HR, **Triglycerides:** Q3 days Lipid profile Ventilation status, RASS score May turn urine green Do not exceed 75 mcg/kg/hr – increases risk of propofol infusion syndrome

Shaded medications require a double check

MEDICATION	STANDARD ADMIXTURE	MAXIMUM CONC./ INFUSION INSTRUCTIONS	DOSING	MONITORING/COMMENTS
Vasopressin (Pitressin®) Increases cyclic adenosine monophosphate (cAMP) which increases water permeability at the renal tubule resulting in decreased urine volume and increased osmolality; At greater than physiologic doses, vasopressin has a pressor effect due to vasoconstriction and causes contraction of the smooth muscle of the gastrointestinal tract	Vial: 20 units/ml Infusion: 50 units/50 ml **NS** (1 unit/ml)	If given per IV Infusion, **use central line**	Vasopressor/Sepsis : 0.04 units/min **(2.4 units/hr – DO NOT TITRATE)** Diabetes Insipidus : 5-10 units 2-3 times daily SC or IM ACLS: 40 units IV single dose	BP Serum and Urine Osmolarity Serum and Urine Sodium Concentration Serum Electrolytes Maintains good effect in acidosis
Vecuronium (Norcuron®) Nondepolarizing neuromuscular blocking agent with rapid onset and intermediate duration of action.	Bolus: Dilute to 2mg/ml with Sterile Water Infusion: 100mg/100ml NS (1mg/ml)	0.1-1 mg/ml in NS or D_5W	Bolus : 0.08-0.1 mg/kg Infusion : 0.05-0.1 mg/kg/hr Titrate to effect	Train-of-Four and **RASS scale monitoring by nursing.** Pt must be intubated & sedated Renal function Liver function

Medications that must be checked by 2 RN's:

Amiodarone IVP, Drip
Diltiazem (Cardizem) IVP, Drip
Dobutamine Drip
Dopamine Drip
Epinephrine SQ, IM
Heparin Drip
Insulin SQ, Drip
Integrilin Drip
Levophed Drip
Lidocaine Drip
Lovenox SQ
Magnesium IVP, Drip
Nitroprusside (Nitropress) Drip
Nitroglycerine Drip
Potassium Drip
Propofol Drip
Reteplase (Retavase) Drip
RSI
Midazolam (Versed) Drip