1 **Drug** **Amiodarone**

Indications Life-threatening ventricular arrhythmias refractory to other agents.

Loading Dose 5 mg/kg IV over 1 h

Infusion Dose 1200 mg / 500 mL or 2400 mcg/mL

Med Order 5 mg/kg IV over 1 h then 1200 mg IV continuous infusion over 24 h. Order daily for 5 days, then reassess. *Infuse centrally, if possible.

Comment Class III antiarrthythmic. Extended load (7 days) is required. Beware of hypotension, bradycardia and AV heart block. Monitor QT interval. Switch to oral (400 mg q6h po), for the balance of the load, as soon as possible. Should have baseline thyroid function studies. If amiodarone is stopped, effects will last for an extended period of time.

2 **Drug** **Bretylium**

Indications Life-threatening ventricular arrhythmias.

Loading Dose 5 mg/kg IV over 1 minute

Infusion Dose 2000 mg / 500 mL or 4000 mcg/mL

Med Order For refractory ventricular fibrillation give 5 mg/kg over 1 minute. May repeat 10 mg/kg bolus at 5-30 minute intervals. Up to total dose of 30 mg/kg. Start infusion at 1 mg/min.

Comment *Should not be used in place of more rapidly acting agents since there is a delay in antiarrhythmic effect; should only be used if lidocaine/defibrillation have failed to convert ventricularfibrillation. Effects prolonged in renal failure.

3 **Drug** **Cisatricurium**

Indications As an adjunct to general anesthesia to facilitate endotracheal intubation and to relax skeletal muscles during surgery; to facilitate mechanical ventilation in the ICU patient.

Loading Dose 0.15-0.2 mg/kg IV

Infusion Dose 100 mg / 50 mL or 2000 mcg/mL

Med Order 0.1 mg/kg bolus; at initial signs of recovery begin at infusion rate of 0.03-0.6 mg/kg/min and adjust accordingly (rates of 0.5-10 mcg/kg/min).

Comment Non-depolarizing neuromuscular blocking agent. Elimination independent of renal or hepatic function. Does not relieve pain or produce sedation. **Ventilation must be supported during neuromuscular blockade and adequate sedation/analgesia must be ordered.** **Only to be initiated after discussion with ICU Senior or Consultant.

4 **Drug** **Diltiazem**

Indications PSVT; Atrial fibrillation or flutter. Temporary control of atrial fibrillation ventricular rate but rarely converts to normal sinus rhythm.

Loading Dose 0.15 mg/kg IV over 2 min (usually 20 mg)

Infusion Dose 125 mg / 100 mL or 1250 mcg/mL

Med Order Give 0.15 mg/kg IV over 2 min (may repeat with 0.35 mg/kg in 15 minutes). Start infusion at 5-10 mg/h. Increase in 5 mg/h increments up to 15 mg/h as needed.

Comment Antianginal agent. Antihypertensive. Calcium channel blocker. Infusions >24 h or infusion rates > 15 mg/h are not recommended due to the potential accumulation of metabolites and increased toxicity. Prolongs refractory period of AV node and intranodal conduction. Contraindicated in hypotension, sick sinus syndrome, 2nd degree and complete AV block. Increases serum digoxin concentration.

5

Drug **Dobutamine**

Indications Short term IV therapy of congestive heart failure and low cardiac output states.

Loading Dose None

Infusion Dose 250 mg / 250 mL or 1000 mcg/mL

Med Order Start infusion at 2 mcg/kg/min to keep CI > ____, as long as mean BP > ____. Maximum infusion rate of 20 mcg/kg/min.

Comment Inotropic agent and synthetic cathecholamine. Stimulates β1−adrenergic receptors. 3+ inotropic effect; 2+ chronotropic effect; 1+ vasodilation. Beware of tachyarrhythmias and ischemia. When stopping taper slowly, by 1 mcg/kg/min q1h.

6

Drug **Dopamine**

Indications Increase cardiac output, blood pressure, and urine flow as an adjunct in the treatment of shock persisting after adequate fluid volume replacement.

Loading Dose None

Infusion Dose 800 mg / 500 mL or 1600 mcg/mL

Med Order Start infusion at 2 mcg/kg/min to keep mean BP > ___. Notify resident if heart rate > ___ /min.

Comment Inotropic agent and endogenous cathecholamine. Stimulates both adrenergic and dopaminergic receptors. 2+ inotropic effect; 2+ chronotropic effect. Dopaminergic 2-5 mcg/kg/min; β1 5-10 mcg/kg/min; α >10 mcg/kg/min. Beware of tachyarrhythmias and ischemia.

7

Drug **Enalaprilat**

Indications Management of mild to severe hypertension and congestive heart failure.

Loading Dose 1.25 mg in 50 mL D5W IV over 30 min

Infusion Dose mg / mL or mcg/mL

Med Order Give 1.25 mg in 50 mL D5W over 30 min every 6 hours (for impaired renal function or patient with ↓ intravascular volume/diuretics use 0.625 mg q6h to start). Maximum 20 mg/day.

Comment IV ACE inhibitor; active metabolite of enalapril. Restricted to ICU use . Need approval of ICU Consultant. Switch to po ASAP.

8

Drug **Ephedrine**

Indications Hypotension during anesthesia.

Loading Dose 5 mg IV q5min (slowly)

Infusion Dose mg / mL or mcg/mL

Med Order Give 5 mg IV by slow injection.

Comment Adrenergic agonist agent. Sympathomimetic. Releases tissue stores of epinephrine. Longer acting and less potent than epinephrine. May use up to 10 mg/dose q2min. Not to exceed 150 mg/day. Tachyphylaxis develops.

9

Drug **Epinephrine**

Indications Anaphylactic reactions; cardiogenic shock, cardiac arrest.

Loading Dose None

Infusion Dose 4 mg / 250 mL or 16 mcg/mL

Med Order Start infusion at 1 mcg/min. Increase by 0.5 mcg/min q5min to keep mean BP> ___ . Notify resident if HR>___ min.

Comment Inotropic agent and endogenous cathecholamine. Stimulates both α and β adrenergic receptors. 4+ inotropic effect; 4+ chronotropic effect; 4+ vasoconstriction. Use when less potent inotropes are inadequate. Beware of tachyarrhythmias, ischemia (myocardial, mesenteric, renal, extremity), and hyperglycemia.

10

Drug **Esmolol**

Indications Perioperative hypertension; treatment of supraventricular tachycardia; atrial fibrillation (ventricular rate control); acute myocardial ischemia.

Loading Dose 1.5 mg/kg IV bolus (over 30 sec)

Infusion Dose 2500 mg / 250 mL or 10000 mcg/mL

Med Order Give 1.5 mg/kg bolus (over 30 sec) then start infusion at 0.15 mg/kg/min. Titrate to 0.3 mg/kg/min for desired heart rate.

Comment Ultra short acting β-adrenergic blocker and class II antiarrhythmic agent. Use restricted to OR, ICU and ER. Not for long term use (extremely expensive - minimum $1000/day by continuous infusion).

11

Drug **Hydralazine**

Indications Management of moderate to severe hypertension and congestive heart failure.

Loading Dose None required

Infusion Dose 100 mg / 100 mL or 1000 mcg/mL

Med Order Afterload Reduction: Start infusion at 1 mg/hr. Increase by 0.5 mg/hr q20 min if mean BP >___ . Maximum infusion rate of 5 mg/hr. Notify resident if HR>___ .
Antihypertensive: Start infusion at 5 mg/hr. Increase by 2.5 mg/hr q20 min to keep mean BP <___ . Maximum infusion rate of 25 mg/hr. Notify resident if HR>___ .

Comment Direct vasodilation of arterioles producing decreased SVR. It is associated with reflex tachycardia, increased cardiac output and plasma volume. * Less cerebral vasodilation.

12

Drug **Isoproterenol**

Indications Temporizing treatment of life-threatening bradycardia.

Loading Dose None

Infusion Dose 1 mg / 250 mL or 4 mcg/mL

Med Order Start at 1 mcg/min. Titrate to patient response. Call resident if HR>___ min or mean BP < ___ mmHg. (Titration varies with indication,. i.e., bronchospasm, AV dissociation with bradycardia, cardiac standstill). Maximum infusion of 30 mcg/min.

Comment Synthetic sympathomimetic primarily β adrenergic. Large chronotropic effect. 4+ inotropic effect; 4+ chronotropic effect; 3+ vasodilation. Beware of tachyarrhythmias, myocardial ischemia, and hypotension.

13 **Drug** **Labetalol**

Indications Management of mild to severe hypertension. For hypertensive emergencies.

Loading Dose 5-10 mg IV over 2-3 minutes

Infusion Dose 500 mg / 100 mL or 5000 mcg/mL

Med Order Give 5 mg IV push (up to 20 mg) and start infusion at 0.5 mg/min to maintain mean BP <___ and >___ and HR >___ /min (usual maximum 4 mg/min).

Comment Antihypertensive. Combined α/β blocker. Contraindication with bronchospasm, CHF, and heart block. Consider switching to oral β blocker, when possible.

14 **Drug** **Lidocaine**

Indications Acute treatment of ventricular arrhythmias from myocardial infarction, cardiac manipulation, digitalis intoxication.

Loading Dose 1-1.5 mg/kg IV bolus over 2-3 min

Infusion Dose 2000 mg / 500 mL or 4000 mcg/mL

Med Order Give 1 mg/kg followed by infusion to start at 2 mg/min (additional bolus of 0.5 mg/kg IV may be repeated).

Comment Class I-B antiarrthythmic. Toxicity: drowsiness; disorientation; paresthesia; twitching; seizures; Decrease dose by 50% (i.e. same boluses then 1 mg/min) with shock, CHF, liver disease.

15 **Drug** **Milrinone**

Indications Short term IV therapy of congestive heart failure and low cardiac output states; used for calcium antagonist intoxication.

Loading Dose 50 mcg/kg IV over 10 minutes

Infusion Dose 20 mg / 100 mL or 200 mcg/mL

Med Order 50 mcg/kg IV over 10 minutes then start infusion at 0.375 mcg/kg/min, titrated according to the hemodynamic and clinical response (give bolus from infusion bag rather than from vial).

Comment Inotropic agent and phosphodiesterase inhibitor. 2+ inotropic effect; 1+ chronotropic effect; 3+ vasodilation. Beware of tachyarrhythmias, hypotension, ischemia. Can be combined with dobutamine. Loading dose is desirable when increasing infusion rate. Prolonged duration of action. Drug will clear slowly from system once stopped, hence prolonged weaning is not necessary.

16 **Drug** **Morphine**

Indications Relief of moderate to severe acute and chronic pain; pain of myocardial infarction; relieves dyspnea of acute left ventricular failure and pulmonary edema.

Loading Dose 0.1-0.2 mg/kg/dose IV

Infusion Dose 100 mg / 50 mL or 2000 mcg/mL

Med Order Infusion rates at 1-10 mg/h. May increase depending upon pain relief/adverse effects. No actual maximum.

Comment Analgesic; narcotic. Metabolites can accumulate in renal failure, producing respiratory depression.

17

Drug **Nitroglycerin**

Indications Treatment of angina pectoris; CHF (especially when associated with acute myocardial infarction); pulmonary hypertension; hypertensive emergencies (especially those associated with coronary complications); control of blood pressure

Loading Dose None

Infusion Dose 50 mg / 250 mL or 200 mcg/mL

Med Order Start at 2.5-10 mcg/min. Increase by 5-10 mcg/min q5 min as long as mean BP > ___ mmHg.

Comment Antianginal agent. Antihypertensive. Vasodilator. No set maximum, (usual maximum 250 mcg/min). Tolerance develops with prolonged continuous (>48 hrs) usage.

18

Drug **Nitroprusside**

Indications Treatment of hypertensive crisis; congestive heart failure; used for controlled hypotension to reduce bleeding during surgery.

Loading Dose None

Infusion Dose 50 mg / 250 mL or 200 mcg/mL

Med Order Start infusion at 0.2-0.5 mcg/kg/min and increase by increments of 0.5 mcg/kg/min. Titrate to the desired response (usual maximum 3 mcg/kg/min).

Comment Antihypertensive. Vasodilator (arterial and venous). Afterload reduction. Watch for tachyphylaxis and metabolic acidosis (cyanide toxicity). Also risk of thiocyanate toxicity, especially in renal failure.

19

Drug **Norepinephrine**

Indications The treatment of shock persisting after adequate fluid volume replacement.

Loading Dose None

Infusion Dose 4 mg / 250 mL or 16 mcg/mL

Med Order Start infusion at 1-4 mcg/min. Increase by increments of 1 mcg/min q5min to maintain a mean BP > ___ .

Comment Adrenergic agent and endogenous cathecholamine. Stimulates both α and β-adrenergic receptors (primarily α). 2+ inotropic effect; minimal chronotropic effect; 4+ vasoconstriction. Use when less potent inotropes are inadequate. Beware of tachyarrhythmias and ischemia (myocardial, mesenteric, renal, extremity). Extravasation can cause tissue necrosis.

20

Drug **Phentolamine**

Indications Treatment of hypertension associated with pheochromocytoma; treatment of dermal necrosis after extravasation of drugs with α-adrenergic effects.

Loading Dose None

Infusion Dose 5 mg / 250 mL or 20 mcg/mL

Med Order Start infusion at 0.1 mg/min and increase in increments of 0.1 mg/min q10min to maximum of 2 mg/min to keep mean BP < ___ mmHg.

Comment α-adrenergic blocking agent. Primarily causes afterload reduction. For treatment of dermal necrosis after extravasation of drugs with α-adrenergic effects, use contents of a 5 mg vial in 10 mL 0.9% NaCl within 12 hours and infiltrate area.

21 **Drug** **Phenylephrine**

Indications Treatment of hypotension, vascular failure in shock.

Loading Dose None

Infusion Dose 100 mg / 250 mL or 400 mcg/mL

Med Order Start at 33 mcg/min (5 mL/hr) and titrate. Increase by increments of 33 mcg/min (5 mL/hr) q5min to maintain mean BP > ___ . Usual maximum ≤ 300 mcg/min (45 mL/hr).

Comment Pure vasoconstrictor (pure alpha-adrenergic agonist) without direct cardiac effect; may cause reflex bradycardia; useful when other pressors cause tachyarrhythmias.

22 **Drug** **Propafenone**

Indications Life-threatening ventricular arrhythmias.

Loading Dose None

Infusion Dose 70 mg / 100 mL or 700 mcg/mL

Med Order Give 0.5-1 mg/kg (usually 70 mg) in 100 mL D5W over 1 hr. Repeat q8h.

Comment Class I-C antiarrhythmic structurally similar to propranolol: local anesthetic/ β blocking properties. Daily maximum: 560 mg IV. Change to oral ASAP (70 mg IV = 150 mg po).

23 **Drug** **Propofol**

Indications Induction or maintenance of anesthesia. Used in intubated patients on mechanical ventilation in the ICU as an alternative to benzodiazepines for the treatment of agitation.

Loading Dose 2-2.5 mg/kg IV induction dose by slow infusion.

Infusion Dose 1000 mg / 100 mL or 10000 mcg/mL

Med Order Starting infusion rate 1-3 mg/kg/h. Adjustments in dose can be made every 3-5 minutes.**Reassess use daily, given cost.

Comment General anesthetic. Sedative. Onset of anesthesia within 30-60 seconds after bolus infusion. Duration of action 3-10 minutes, depending upon the dose. Rapid bolus injection should be avoided and can result in hypotension, apnea, airway obstruction, and oxygen desaturation. Can effect triglyceride /cholesterol levels as diluent 10% lipid. Refer to the ICU 'Sedation Protocol' for further details.

24 **Drug** **Vecuronium**

Indications As an adjunct to general anesthesia to facilitate endotracheal intubation and to relax skeletal muscles during surgery; to facilitate mechanical ventilation in ICU patient.

Loading Dose 0.05-0.1 mg/kg IV bolus

Infusion Dose 50 mg / 50 mL or 1000 mcg/mL

Med Order 0.05-0.1 mg/kg bolus; at initial signs of recovery begin at infusion rate of 1 mcg/kg/min and adjust accordingly (rates of 0.5-10 mcg/kg/min) or 0.1-0.2 mg/kg dose q1h.

Comment Non-depolarizing neuromuscular blocking agent. Active metabolites accumulate in renal failure. Dose reduction is necessary in cirrhosis. Does not relieve pain or produce sedation. **Ventilation must be supported during neuromuscular blockade and adequate sedation/analgesia must be ordered.**