Lincoln Fire & Rescue

Emergency Medical Services

Drug Guide

Last Edit: April 25, 2024

Changes Highlighted in Yellow

Acetaminophen

Generic Name:	Acetaminophen
Trade Name:	Tylenol
Therapeutic Class:	Analgesic and antipyretic
Actions:	May work peripherally to block pain impulse generation; may also inhibit prostaglandin synthesis in CNS
Pharmacokinetics:	Onset 15-30 minutes
Indications:	1. Mild to moderate pain 2. Pediatric fever
Contraindications:	1. Severe acute liver disease
Precautions:	Use cautiously if patient has self-administered in the last six hours.
Side Effects:	GI: Nausea, vomiting
Administration:	**Mild/Moderate Pain** • Adults: 1000 mg PO. Do not repeat. • Pediatric: 10 mg/kg PO (maximum dose 320 mg). Do not repeat. **Fever** • Pediatric: 10 mg/kg PO (maximum dose 320 mg). Do not repeat.
Notes:	

Adenosine

Generic Name:	Adenosine
Trade Name:	Adenocard, Adenoscan
Therapeutic Class:	Antiarrhythmic
Actions:	Adenosine is a naturally occurring substance that is present in all body cells. Adenosine decreases conduction of the electrical impulse through the AV node and interrupts AV reentry pathways in paroxysmal supraventricular tachycardia such as PSVT. Because of its rapid onset and very short half-life, the administration of adenosine is sometimes referred to as chemical cardioversion.
Pharmacokinetics:	Adenosine is cleared from plasma in less than 30 seconds.
Indications:	1. Stable narrow QRS tachycardia refractory to vagal maneuvers. **NOTE:** Unstable signs include altered mental status, ongoing chest pain, hypotension, and other signs of shock. 2. Ventricular tachycardia with a pulse, only if regular and monomorphic 3. PSVT with signs and symptoms of poor perfusion in pediatrics
Contraindications:	1. Second or third degree heart block 2. Sick sinus syndrome 3. Hypersensitivity to the drug
Precautions:	1. Adenosine typically causes dysrhythmias at the time of cardioversion. These generally last a few seconds or less and may include PVC's, PAC's, sinus bradycardia, sinus tachycardia and various degrees of AV block. In extreme cases, transient asystole may occur. If this occurs, appropriate therapy should be initiated. 2. Use with caution in patients with asthma as adenosine may induce bronchospasm.
Side Effects:	CNS: dizziness, headache CV: dysrhythmias, chest pain, hypotension, palpitations, GI: nausea Resp: chest pressure, dyspnea
Administration:	**Stable PSVT** • Adult: 6 mg RIVP and flush the line, if not effective after 2 minutes, give 12 mg RIVP and flush the line. **PSVT with signs and symptoms of poor perfusion** • Pediatric: 0.1 mg/kg RIVP (max first dose 5 mg). If not effective after 2 minutes, may double the dose and repeat once (maximum second dose 10 mg).
Notes:	1. Administer adenosine rapidly over 1 to 3 seconds, into the medication administration port closest to the patient, through a large vein followed by a 10mL saline flush and elevation of the arm. 2. Print continuous ECG tracing prior to, during, and post administration of medication for physician review.

Albuterol

Generic Name:	Albuterol
Trade Name:	AccuNeb, ProAir, Proventil, Ventolin
Therapeutic Class:	Bronchodilator
Actions:	Albuterol is a selective B2- adrenergic agonist causing bronchodilation.
Pharmacokinetics:	Onset: 5-15 minutes Peak: 1 to 1 ½ hours Duration: 4-6 hours Half-life: 2.5 to 4 hours
Indications:	1. Bronchial asthma 2. Reversible bronchospasm associated with chronic bronchitis, emphysema, and crush syndrome. 3. Anaphylactic respiratory distress
Contraindications:	1. Hypertension (SBP greater than 180). 2. Tachycardia (HR greater than 140 in an adult or 180 in a child. 3. Severe cardiac disease. 4. Hypersensitivity to the drug.
Precautions:	1. Hyperthyroidism 2. Diabetes mellitus 3. Convulsive disorder
Side Effects:	CNS: Dizziness, headache, stimulation, tremors CV: Dysrhythmias, hypertension, palpations, tachycardia GI: Nausea/vomiting
Administration:	Using a small volume nebulizer, adjust the oxygen flow meter to 6-10 L/min to produce a steady, visible mist. **Bronchospasm (Anaphylaxis, asthma, COPD)** • Adult: 5 mg (2, 2.5 mg/3mL), may repeat twice. • Pediatric: 2.5 mg/mL, may repeat twice. **Crush Syndrome:** • Adults: 2.5 mg/3mL, may repeat twice.
Notes:	1. The possibility of developing unpleasant side effects increases when albuterol is administered with other sympathetic agonists. 2. Beta blockers may blunt the pharmacological effects of albuterol. 3. Albuterol is also supplied in metered-dose inhalers (MDI) that deliver 90 mcg per inhalation. Be sure to obtain a complete medication history detailing administration times and frequency of use of home inhalation therapy. Overdose of inhalers can cause bronchoconstriction and possibly death.

Amiodarone

Generic Name:	Amiodarone
Trade Name:	Cordarone, Pacerone, Nexterone
Therapeutic Class:	Antiarrhythmic
Actions:	Amiodarone prolongs myocardial action potential and the effective refractory period. Causes noncompetitive alpha and beta adrenergic inhibition. Amiodarone suppresses atrial and ventricular ectopy (PSVT, AF, A-TACH, VT, VF, etc.) and slows conduction through the AV node (ventricular rate control; useful in WPW). Amiodarone also causes peripheral and coronary vasodilation, resulting in reduced cardiac work as well as increased myocardial oxygenation. Amiodarone may have a mild negative inotropic effect after acute IV dosing.
Pharmacokinetics:	Half-life: 20-47 days
Indications:	1. Defibrillation refractory ventricular fibrillation and pulseless ventricular tachycardia. 2. Ventricular tachycardia. 3. Wide complex tachycardia of unknown type. 4. ROSC from VF/VT
Contraindications:	1. Cardiogenic shock 2. Marked sinus bradycardia 3. Second- or third-degree heart block 4. Hypersensitivity to the drug 5. Enters breastmilk and causes harm to the neonate
Precautions:	1. Amiodarone prolongs the QT interval and is associated with a known risk of torsades de pointes, use caution in any patient with a long QT. 2. May worsen existing or precipitate new dysrhythmias, including VF. 3. Use with beta-blocking agents could increase risk of hypotension and bradycardia. Amiodarone inhibits atrioventricular conduction and decreases myocardial contractility, increasing the risk of AV block with Verapamil or Diltiazem or of hypotension with any calcium channel blocker.
Side Effects:	CNS: Dizziness, headache, confusion CV: Bradycardia, cardiac conduction abnormalities, CHF, dysrhythmias, hypotension, SA node dysfunction, sinus arrest Resp: dyspnea, pulmonary inflammation, adult respiratory distress syndrome.
Administration:	**V-fib or pulseless v-tach**: • Adult: 300 mg IV bolus, may repeat once in 3-5 min with 150 mg IV bolus. • Pediatric: 5mg/kg IV bolus (no subsequent doses). **Return of circulation from VF/pulseless VT**: • Adult: If pulseless patient was given Amiodarone bolus, do not administer Amiodarone infusion. If Amiodarone was not given and patient regains pulse start infusion of 150 mg Amiodarone in 100 mL of NS, infuse over ten minutes. Use a medication pump to administer the infusion. If a pump is not available,

Administration Continued:	the infusion can be administered manually using a macro drip set @ 10 mL/min (100 gtt/min). • Pediatric: If pulseless patient was given Amiodarone bolus, do not administer Amiodarone infusion. If Amiodarone was not given and patient regains pulse start infusion of 5mg/kg of Amiodarone in 100 mL NS, infuse over 20 minutes. Maximum dose of 150 mg, do not repeat. Use a medication pump to administer the infusion. If a pump is not available, the infusion can be administered manually using a macro drip set @ 5 mL/min (50 gtt/min). **V-tach with pulses:** • Adult: 150 mg in NS 100 mL over10 min. If no conversion may repeat once. • Pediatric: 5mg/kg in 100 mL NS, infuse over 20 minutes. Maximum dose of 150 mg. Do not repeat. Use a medication pump to administer the infusion. If a pump is not available, the infusion can be administered manually using a macro drip set @ 5 mL/min (50 gtt/min). **Ventricular ectopy or runs of V-tach (3 or more PVC's in a row) and underlying heart rate of 60 or above:** • Adult: 150 mg in NS 100 mL over 10 min. If no response may repeat once. Use a medication pump to administer the infusion. If a pump is not available, the infusion can be administered manually using a macro drip set @ 10 mL/min (100 gtt/min).
Notes:	Never treat the combination of 3rd degree heart block and ventricular escape beats with Amiodarone, Lidocaine, or any agent that suppresses ventricular escape rhythms.

Aspirin

Generic Name:	Aspirin
Trade Name:	Bayer, St Joseph
Therapeutic Class:	Antipyretic, salicylate
Actions:	Aspirin blocks the formation of the substance Thromboxane A2 which causes platelets to aggregate and arteries to constrict. This will result in an overall reduction in mortality associated with myocardial infarction. It also appears to reduce the rate of nonfatal re-infarction and nonfatal stroke.
Pharmacokinetics:	Onset: 15 to 30 minutes Peak: 1-2 hours Duration: 4-6 hours Half-life: 3 hours at low doses
Indications:	New chest pain suggestive of an acute myocardial infarction
Contraindications:	1. Hypersensitivity to the drug, NSAIDS, and Tartrazine, (FDC yellow dye #5) 2. Bleeding disorders including GI hemorrhage and hemophilia 3. Hemorrhagic states
Precautions:	1. Children or teenagers with flu like symptoms (may be associated with the development of Reye's syndrome) 2. Asthma
Side Effects:	GI: GI bleeding, heart burn, nausea/vomiting HEMAT: Anemia, prolonged bleeding time
Administration:	Administer four (4) 81 mg chewable tablets (324 mg total dose) PO as soon as possible after the onset of chest pain.
Notes:	

Atropine

Generic Name:	Atropine
Trade Name:	Atropine Care, Atropen autoinjector, Atrosulf – 1
Therapeutic Class:	Antiarrhythmic, anticholinergic
Actions:	Atropine is a potent parasympatholytic that increases cardiac output and heart rate. Atropine acts by blocking acetylcholine receptors, thus inhibiting parasympathetic stimulation. Although it has positive chronotropic properties, it has little or no inotropic effect.
Pharmacokinetics:	Peak: 2-4 minutes Duration: 4-6 hours
Indications:	1. Bradycardia with signs and symptoms of poor perfusion. 2. Pediatric calcium channel blocker overdose with bradycardia 3. RSI premedication (pediatric patients)
Contraindications:	1. Hypersensitivity to the drug 2. Acute hemorrhage
Precautions:	1. Use atropine cautiously in the presence of acute coronary ischemia or myocardial infarction; increased heart rate may worsen ischemia or increase the zone of infarction. 2. Avoid relying on atropine in atrial fib/flutter with a slow ventricular response due to potential aggravation of the underlying rhythm. 3. Avoid relying on atropine in type II second-degree or third-degree AV block or in patients with third degree AV block with a new wide complex and poor perfusion. These patients require immediate pacing.
Side Effects:	CNS: Drowsiness, confusion CV: Tachycardia, palpitations, arrhythmias RESP: Tachypnea, pulmonary edema GI: Dry mouth, constipation
Administration:	**Bradycardia with signs and symptoms of poor perfusion:** • Adult: 1 mg IV, may repeat every 3-5 min, as needed up to a max dose of 3 mg or 0.04 mg/kg whichever is less. • Pediatric: 0.02 mg/kg IV (minimum. dose is 0.1 mg, max dose of 0.5 mg). May repeat once. **RSI premedication:** • Pediatric: 0.02 mg/kg IV (minimum dose of 0.1 mg, max dose of 0.5 mg) for the pediatric patient with potential bradycardia.
Notes:	1. Do not delay TCP while waiting for IV access or for waiting for atropine to take effect if patient is unstable. 2. Atropine is not effective for denervated transplanted hearts.

Calcium Chloride 10%

Generic Name:	Calcium Chloride
Trade Name:	N/A
Therapeutic Class:	Electrolyte
Actions:	Calcium chloride replaces calcium in cases of hypocalcemia. Calcium chloride acts as an antidote to counter the effects of Magnesium Sulfate in cases of hypermagnesemia(respiratory depression, hypotension, and potential circulatory collapse). Calcium chloride reduces the effects of potassium at the myocardial cell membrane (stabilizes the cell membrane) in hyperkalemia secondary to end stage renal failure.
Pharmacokinetics:	Rapid increase in serum levels, with return to pre-drug level within 30 minutes to two hours.
Indications:	1. Renal dialysis code 2. Known or suspected hyperkalemia (increased potassium)/Crush Syndrome 3. Calcium channel blocker overdose (nifedipine, verapamil, diltiazem). 4. Magnesium sulfate toxicity (hypermagnesemia) 5. Cardiac arrest secondary to agitated/combative patient emergency.
Contraindications:	1. Calcium chloride is contraindicated for cardiac resuscitation in the presence of ventricular fibrillation or in patients with the risk of existing digitalis toxicity. (Except for the cases of known dialysis patient, hyperkalemia, or calcium channel blocker overdose.) 2. Calcium chloride is not recommended in the treatment of asystole and electromechanical dissociation.
Precautions:	1. Ensure administration by slow IV push 2. Extravasation can cause tissue necrosis at the injection site
Side Effects:	CNS: dizziness, syncope CV: Bradycardia, cardiac arrest, dysrhythmias, heart block, hemorrhage, hypotension, shortened Q-T interval GI: Nausea, vomiting
Administration:	**V-fib or pulseless v-tach, asystole or PEA in known hyperkalemic or dialysis patient:** • Adult: 0.5 – 1 gm IV **Calcium channel blocker overdose:** • Adult: 1 gm mixed with 100 mL NS and infused over 10 minutes. Use a medication pump to administer the infusion. If a pump is not available, the infusion can be administered manually using a macro drip set @ 10 mL/min (100 gtt/min). • Pediatric: 20 mg/kg (max. dose of 1 g) mixed with 100 mL NS and infused over 10 minutes. Use a medication pump to administer the infusion. If a pump is not available, the infusion can be administered manually using a macro drip set @ 10 mL/min (100 gtt/min).

Agitated/Combative: patient who suffers cardiac arrest

- Adult: 1 gm IV

Crush syndrome: After release of compression and signs of hyperkalemia

- Adult: 1 gm mixed with 100 mL NS and infused IV over 10 minutes.

Notes: Do not mix with sodium bicarbonate in same IV.

D10W

Generic Name:	Dextrose
Trade Name:	Glucose, Glutose, Insta-glucose
Therapeutic Class:	Nutrient, caloric
Actions:	Dextrose supplies supplemental glucose in cases of hypoglycemia and restores blood sugar.
Pharmacokinetics:	N/A
Indications:	1. Hypoglycemia (less than 60 mg/dl) based on glucose determination 2. Oral hypoglycemic agent overdose
Contraindications:	No contraindications for a patient with suspected hypoglycemia.
Precautions:	1. Use with caution in patients with increased intracranial pressure because dextrose may worsen cerebral edema. 2. Localized venous irritation may occur when smaller veins are used. 3. Infiltration may result in tissue necrosis
Side Effects:	Tissue necrosis and phlebitis at the injection site.
Administration:	**Hypoglycemia:** • Adult: Administer D10W with a macro drip IV set. Initially administer 100 mL (10 gm) and recheck level of consciousness. If patient can eat, and food is available, discontinue administering D10W. If patient is obtunded, administer D10W in 50 mL (5 gm) boluses until patient's level of consciousness improves. • **Pediatric:** Administer D10W 0.5 g/kg of body weight up to a maximum of 10 g or 100 mL using a macro drip IV set. May repeat one time if patient remains hypoglycemic.
Notes:	1. Establish a free flowing IV of normal saline in a large vein. Aspirate blood before and during administration of dextrose to ensure IV patency. 2. Hypoglycemic states require immediate intervention. Prolonged hypoglycemia can result in permanent brain damage.

Dexamethasone

Generic Name:	Dexamethasone
Trade Name:	Decadron, Dexasone
Therapeutic Class:	Corticosteroid, anti-inflammatory
Actions:	Potent glucocorticoid with minimal to no mineralocorticoid activity. Decreases inflammation by suppressing migration of polymorphonuclear leukocytes (PMNs) and reducing capillary permeability; stabilizes cell and lysosomal membranes, increases surfactant synthesis, increases serum vitamin A concentration, and inhibits prostaglandin and proinflammatory cytokines; suppresses lymphocyte proliferation through direct cytolysis, inhibits mitosis, breaks down granulocyte aggregates, and improves pulmonary microcirculation.
Pharmacokinetics:	Onset: 30 minutes
Indications:	1. Adult bronchospasm: asthma or COPD 2. Pediatric asthma or croup
Contraindications:	1. Systemic fungal infection 2. Cerebral malaria
Precautions:	1. Immunocompromised
Side Effects:	CNS: Headache CV: Bradycardia, cardiac arrhythmias, hypertension GI: Nausea Resp:
Administration:	**Adult Bronchospasm: Asthma/COPD** • 10 mg nebulized, IV, or IM **Pediatric Asthma or Croup** • 0.6 mg/kg nebulized, IV, or IM (max dose 10 mg)
Notes:	

Diphenhydramine

Generic Name:	Diphenhydramine hydrochloride
Trade Name:	Benadryl
Therapeutic Class:	Antihistamine
Actions:	Diphenhydramine is an antihistamine with anticholinergic (drying) effects. Diphenhydramine decreases the allergic response by blocking histamine at H1 receptor sites.
Pharmacokinetics:	Onset: IM 20-30 minutes IV-rapid Duration: 4-8 hours
Indications:	1. Allergic reactions 2. Medication induced dystonic reactions 3. Anaphylaxis in conjunction with Epinephrine
Contraindications:	1. Bronchial Asthma 2. Nursing mothers 3. Children less than 7 kg (6 months old) 4. Hypersensitivity to the drug or other antihistamines
Precautions:	1. Use with caution in patients with a history of severe liver disease, seizure disorders and peptic ulcers.
Side Effects:	CNS: Dizziness, drowsiness, headache CV: Hypotension, palpitations GI: Dryness of mouth, nose and throat RESP: Thickening of bronchial secretions, wheezing, chest tightness
Administration:	**Allergic Reaction:** • Adult: Administer 50 mg SIVP or deep IM. • Pediatric: Administer 1 mg/kg deep IM or SIVP, maximum dose of 50 mg.
Notes:	1. The IV route is preferred for the patient in severe shock. If an IV cannot be readily established, give diphenhydramine via the IM route. Administer deep IM into large muscle mass. Dystonic reactions can occur after administration of neuroleptic drugs, including (trade name listed in parenthesis~~,~~ haloperidol (Haldol), metaclopramide (Reglan), prochlorperzine (Compazine), and promethazine (Phenergan)

Dopamine

Generic Name:	Dopamine hydrochloride
Trade Name:	Intropin
Therapeutic Class:	Vasopressor, alpha and beta adrenergic sympathomimetic
Actions:	Dopamine stimulates both adrenergic and dopaminergic receptors in a dose dependent manner. Intermediate doses (5-10 mcg/kg/min) stimulate both dopaminergic and beta 1 adrenergic receptors producing cardiac stimulation and renal dilation. Large doses (10-20 mcg/kg/min) stimulate alpha-adrenergic receptors producing vasoconstriction and increases in peripheral vascular resistance and blood pressure.
Pharmacokinetics:	Onset: 5 minutes Duration: < 10 minutes Half-life: 2 minutes
Indications:	1. Hemodynamically significant bradycardia that does not respond to atropine. 2. Hemodynamically significant hypotension associated with cardiogenic shock.
Contraindications:	1. Hypovolemic shock; volume replacement must be accomplished prior to using dopamine. 2. Pheochromocytoma (tumor of the adrenal gland) 3. Dopamine should not be administered in the presence of tachydysrhythmias or ventricular fibrillation.
Precautions:	1. Dopamine increases heart rate and can induce or worsen supraventricular and ventricular dysrhythmias.
Side Effects:	CNS: Headache CV: Angina, arrhythmias, hypertension, palpitations, vasoconstriction GI: Nausea, vomiting RESP: Dyspnea
Administration:	**Unstable Bradycardia with MAP less than 65, Cardiogenic Shock, or Post Cardiac Arrest with MAP less than 65:** • Adult: Dopamine drip @ 5 mcg/kg/min. Titrate to a Mean Arterial Pressure (MAP) of greater than 65 mmHg. Dose should not exceed 20 mcg/kg/min. Use a medication pump to administer the infusion. If a pump is not available, the infusion can be administered manually. Refer to the Notes section below for preparing the infusion for manual administration.
Notes:	1. To prepare a dopamine infusion, mix 400 mg dopamine in a 250 mL bag of normal saline and mix well. Resultant concentration is 1600 mcg/mL. Infuse using a 60 drop administration set. Use the formula below to calculate the drip rate. 2. Tissue sloughing may occur with extravasation. AC veins are preferable sites. 3. Dopamine Infusion Formula: ➢ Infusion Rate (gtts/min) = $\frac{\text{Dose x Weight in kg x 60 gtts/mL}}{\text{Concentration of drug in 1 mL}}$

Epinephrine Auto Injector

Generic Name:	Epinephrine
Trade Name:	Epipen
Therapeutic Class:	Antiasthmatic, bronchodilator, vasopressor
Actions:	Epinephrine is a naturally occurring catecholamine. It acts directly on alpha and beta adrenergic receptors. Its effects on beta receptors is much more profound than its effects on alpha receptors. The effects of epinephrine on beta 1 adrenergic receptors include a positive chronotropic effect (increased heart rate) and a positive inotropic effect (cardiac contractile force). The effects of epinephrine on alpha-adrenergic receptor sites include increased systemic vascular resistance. The effects on these receptors sites together cause an increased blood pressure. Epinephrine also causes bronchodilation due to its effects on beta-2 adrenergic receptors.
Pharmacokinetics:	Onset: Rapid
Indications:	Severe allergic reactions caused by insect stings or bites, foods, drugs, and other allergens. It can also be used in the treatment of anaphylaxis of unknown causes or exercise-induced asthma.
Contraindications:	No contraindications when used for indicated conditions.
Precautions:	1. No precautions when used for indicated conditions.
Side Effects:	CV: Increased pulse rate CSN: Tremors, nervousness
Administration:	**Severe Allergic Reaction or Asthma**: • Adult: 0.3mg IM, if patient condition worsens may repeat using a second epinephrine auto injector.
Notes:	EMT basics who have completed a Nebraska state certifying epinephrine auto injector course are authorized to administer agency stocked epinephrine auto injector.

Epinephrine (0.1 mg/mL or 1.0 mg/mL)

Generic Name:	Epinephrine
Trade Name:	Adrenalin
Therapeutic Class:	Bronchodilator, vasopressor
Actions:	Epinephrine is a naturally occurring catecholamine. It acts directly on alpha and beta-adrenergic receptors. Its effect on beta-receptors is much more profound than its effect on alpha-receptors. The effects of epinephrine on beta1 adrenergic receptors include a positive chronotropic effect (increased heart rate) and a positive inotropic effect (cardiac contractile force). The effects of epinephrine on alpha-adrenergic receptor sites together cause an increased blood pressure. Epinephrine also causes bronchodilation due to its effects on beta-2 adrenergic receptors.
Pharmacokinetics:	Onset: IV-rapid IM: 6-12 minutes
Indications:	1. Cardiac arrest 2. Symptomatic bradycardia 3. Anaphylaxis 4. Bronchial asthma 5. Hypotension in the ROSC or cardiogenic shock patient
Contraindications:	1. Known hypersensitivity
Precautions:	1. Cardiac disease 2. Hypertension 3. Tachydysrhythmias
Side Effects:	CNS: Anxiety, dizziness, restlessness, tremulousness, headache CV: Angina, arrhythmias, hypertension, palpitations GI: Nausea, Vomiting
Administration:	**Cardiac arrest dose**: • Adult: ○ 1 mg (0.1 mg/mL) IV, repeat every 3-5 minutes as needed ▪ Max total dose of 5 mg in asystole/PEA and 3 mg ventricular fibrillation or pulseless ventricular tachycardia. ▪ If patient's cardiac rhythm changes, the max dose of epinephrine is based on current presenting rhythm. Regardless of cardiac arrest rhythm, the maximum total dose is 5 mg. ○ 2 mg (1 mg/mL) ET, repeat every 3-5 minutes if needed • Pediatric: ○ Preemie or newborn: ▪ 0.02 mg/kg (0.1 mg/mL) IVP every 3 to 5 minutes **OR** Epinephrine, 0.2 mg/kg (1 mg/mL) ET every 3 to 5 minutes ▪ Max of three total doses in ventricular fibrillation or pulseless ventricular tachycardia.

- 28 days and older:
  - 0.01 mg/kg (0.1 mg/mL) IVP every 3 to 5 minutes **OR** Epinephrine, 0.1 mg/kg (1 mg/mL) ET every 3 to 5 minutes.
  - Max of three total doses in ventricular fibrillation or pulseless ventricular tachycardia.

Hypotension associated with Cardiogenic shock or ROSC:

- Adult:
  - 0.1 mg/mL by push dose (dilute boluses). Administer 10-20 mcg boluses (1-2 mL every 2 minutes) Titrate to a MAP of greater than 65mmHg

Bradycardia- HR < 60 in infant/child:

- Preemie or newborn:
  - 0.02 mg/kg (0.1 mg/mL) IVP every 3 to 5 minutes **OR** Epinephrine 0.2 mg/kg (1 mg/mL) ET every 3 to 5 minutes if needed.
- 28 days and older:
  - 0.01 mg/kg (0.1 mg/mL) IV, repeat every 3-5 minutes if needed.
  - 0.1 mg/kg (1 mg/mL) ET, repeat every 3-5 minutes if needed.

Difficulty Breathing – Asthma:

- Adult: 0.3 mg (1mg/mL) IM or 0.3 mg (0.1 mg/mL) IV
- Pediatric: 0.01 mg/kg (1 mg/mL) IM or 0.01 mg/kg (0.1 mg/mL) IV max initial dose of 0.3mg. May repeat in 5-10 minutes if needed.

Difficulty Breathing – Allergic Reaction:

- Adult:
  - 0.3 mg (1 mg/mL) IM or 0.3 mg (0.1 mg/mL) IV, may repeat every 5 -10 minutes depending on VS and respiratory status.
  - Drip: 2-10 mcg/min titrated to a MAP of greater than 65 mmHg. Use a medication pump to administer the infusion. If a pump is not available, the infusion can be administered manually. Refer to the Notes section below on how to mix an epinephrine infusion for manual administration.
- Pediatric:
  - 0.01 mg/kg (1 mg/mL) IM or 0.01 mg/kg (0.1 mg/mL) IV, max initial dose of 0.3mg. May repeat in 5-10 minutes if needed.
  - Drip: 0.1-0.3 mcg/kg/min, titrate to a MAP greater than 65 or age-appropriate blood pressure.

Notes: Epinephrine may be administered by the endotracheal route. However, the preferred route of administration is IV or IO because it will provide more predictable drug delivery and pharmacologic effect.

Use extreme caution if the patient has cardiac chest pain or is being treated for angina or has a history of AMI within the last year.

To prepare an epinephrine infusion, mix 1mg epinephrine in a 250 mL bag of normal saline and mix well. Resultant concentration is 4 mcg/mL. Infuse using a 60-drop administration set. Use the formula below to calculate the drip rate.

- Infusion Rate (gtts/min) = $\frac{\text{Dose x 60 gtts/mL}}{\text{Concentration of Drug in 1mL}}$

Prepare push dose Epinephrine 10 mcg/mL by adding 1 mL of Epinephrine 1 mg/mL to 100 mL normal saline. **RSI Credentialed paramedic procedure ONLY.**

Epinephrine Racemic

Generic Name:	Racemic Epinephrine
Trade Name:	MicroNefrin
Therapeutic Class:	Bronchodilator, vasopressor
Actions:	Racemic epinephrine stimulates both alpha and beta adrenergic receptors. However, racemic epinephrine has a slight preference for beta-2 adrenergic receptors and causes bronchodilation. It also has some effect in relieving the subglottic edema associated with croup.
Pharmacokinetics:	Onset: <5 minutes Peak effects: 5-15 minutes Duration: 1-3 hours
Indications:	Moderate to severe croup
Contraindications:	Racemic Epinephrine should not be used in the management of epiglottitis.
Precautions:	1. Tachycardia
Side Effects:	Tachycardia
Administration:	**Difficulty breathing – Croup** • **Pediatric:** o 6 months old and greater: 0.5 mL diluted in 3 mL saline by nebulizer. o Less than 6 months old: 0.25 mL diluted in 3 mL saline by nebulizer.
Notes:	Due to rebounding, all children who receive racemic epinephrine should be transported to the hospital.

Etomidate

Generic Name:	Etomidate
Trade Name:	Amidate
Therapeutic Class:	Anesthetic without analgesic activity
Actions:	Etomidate is a hypnotic without analgesic activity. It depresses CNS function via GABA and depresses activity of the brain stem reticular system.
Pharmacokinetics:	Onset: 1 minute, Duration: 3-5 minutes
Indications:	1. Induction agent for RSI
Contraindications:	1. Patients less than 3 months of age 2. Hypersensitivity to the drug
Precautions:	1. Marked hypotension 2. Severe asthma 3. Severe cardiovascular disease
Side Effects:	CNS: myoclonic skeletal muscle movement, pain on injection CV: hypotension or hypertension, tachycardia or bradycardia GI: nausea, vomiting RESP: Apnea, hyperventilation or hypoventilation, laryngospasm
Administration:	Adult: 0.3 mg/kg IV/IO over 30 seconds, max dose 40 mg. Do not repeat. Pediatric: 0.3 mg/kg IV/IO over 30 seconds, max dose 15 kg. Do not repeat.
Notes:	1. Etomidate preserves cardiovascular stability better than other induction agents (such as Versed) which makes it appropriate for use in pts who are hemodynamically unstable when ketamine is not available or appropriate. 2. Etomidate has been known to cause adrenal-cortical suppression in critically ill pts. This occurs most frequently when IV drips of etomidate are used. Therefore, it's use is limited to a single dose.

Fentanyl

Generic Name:	Fentanyl
Trade Name:	Sublimaze, Actiq, Durogesic, Duragesic, Fentora, Matrifen, Haldid, Onsolis, Instanyl, Abstral, Lazanda
Therapeutic Class:	Opioid analgesic, opioid agonist
Actions:	Binds to opiate receptors in the CNS, altering the response to and the perception of pain.
Pharmacokinetics:	Onset: 1-2 minutes Duration: 30-60 minutes
Indications:	1. Pain relief 2. Maintenance of analgesia in tracheal intubation 3. Premedication (transcutaneous pacing or synchronized cardioversion)
Contraindications:	1. Severe hemorrhage or shock 2. Known hypersensitivity
Precautions:	1. Bradyarrhythmia's as fentanyl can produce bradycardia. 2. Use with caution to patients with liver and kidney dysfunction because of the importance of these organs in the metabolism and excretion of drugs. 3. Respiratory support therapy equipment should be available for treatment of possible respiratory depression.
Side Effects:	RESP: Apnea, laryngospasm, bronchospasm, respiratory depression. CV: Arrhythmias, bradycardia, circulatory depression, hypotension. CNS: Confusion, drowsiness. GI: Nausea, vomiting.

Administration:	**Pain management:**
	• Adult:
	  ○ 25-50 mcg SIVP. May repeat every 5 minutes to a max dose of 150 mcg if needed.
	  ○ If unable to establish vascular access, consider administering IN with mucosal atomization device. 50 mcg maximum dose IN (divide between nostrils). May repeat in 5 minutes to a max total dose of 100 mcg
	• Pediatric:
	  ○ 1 mcg/kg SIVP, max initial dose of 25 mcg. Do not repeat.
	  ○ If unable to establish vascular access, consider administering IN with a mucosal atomization device. 1 mcg/kg, maximum dose of 25 mcg. Divide between the nostrils.
	
	Premedication for TCP or cardioversion
	• Adult: 25-50 mcg SIVP. May repeat after five minutes (max total dose of 150 mcg).
	• Pediatric: 1 mcg/kg SIVP to a max dose of 25 mcg. Do not repeat.

RSI maintenance sedation:

- Adult: 25-50 mcg IV. May repeat to max dose of 100 mcg.
- Pediatric: 1 mcg/kg IV to a max of 25 mcg. Do not repeat.

Notes:
1. Fentanyl may be given intranasal route for pain management purposes only.
2. Alterations in respiratory rate may last longer than the analgesic effect. Large doses may produce apnea.
3. Fentanyl appears to have less emetic activity than other narcotic analgesics.
4. Use of SpO2 and waveform capnography in all patients given controlled medications to monitor respiratory changes.

Glucagon

Generic Name:	Glucagon
Trade Name:	GlucaGen
Therapeutic Class:	Antihypoglycemic
Actions:	Glucagon is a protein secreted by the alpha cells of the pancreas. When released, it causes the breakdown of glycogen, stored in the liver, to glucose. It also inhibits the synthesis of glycogen from glucose. Both actions tend to cause an increase in circulating blood glucose. A return to consciousness following the administration of glucagon usually takes 5-20 minutes. Glucagon is only effective if there are sufficient stores of glycogen in the liver.
Pharmacokinetics:	Onset: within 15 minutes Half-life: 3-6 minutes
Indications:	1. Hypoglycemia (less than 60 mg/dl) based on a rapid glucose determination or clinical judgement. (If IV unavailable or pt uncooperative) 2. Oral hypoglycemic agent overdose.
Contraindications:	Hypersensitivity to the drug
Precautions:	1. Glucagon is only effective if there are sufficient stores of glycogen with the liver. In emergency situations, intravenous dextrose is the agent of choice.
Side Effects:	CNS: dizziness, headache CV: hypotension GI: Nausea, vomiting
Administration:	**Hypoglycemia:** • Adult: 1 mg IM • Pediatric: 0.5 mg IM for patient less than 20 kg and 1.0 mg IM for patient greater than 20 kg.
Notes:	Glucagon has a delayed response and providers shall encourage/initiate transport. Nausea and vomiting are more common in the pediatric pt who received glucagon by any route.

Hydroxocobalamin

Generic Name:	Hydroxocobalamin (injection)
Trade Name:	Cyanokit, Hydroxy-Cobal, Hydro-Cobex, Cobalin-H, Neo-Cytamen
Therapeutic Class:	Antidote, Vitamin
Actions:	Hydroxocobalamin is a form of vitamin B-12. It is used as an antidote to cyanide poisoning. Hydroxocobalamin works by helping cells in the body convert cyanide to form nontoxic cyanocobalamin, which is excreted in urine.
Pharmacokinetics:	The action of CYANOKIT in the treatment of cyanide poisoning is based on its ability to bind cyanide ions. Each hydroxocobalamin molecule can bind one cyanide ion by substituting it for the hydroxo ligand linked to the trivalent cobalt ion, to form cyanocobalamin, which is then excreted in the urine.
Indications:	1. Treatment of known or suspected cyanide poisoning
Contraindications:	None
Precautions:	Risk of Increased Blood Pressure: Substantial increases in blood pressure may occur following CYANOKIT therapy. Monitor blood pressure during treatment.
Side Effects:	CNS: Feeling light-headed CV: Tachycardia, chest pain RESP: Shortness of breath GU: Urinary discoloration
Administration:	• Adult: 5 g administered as an intravenous infusion over 15 minutes. Each 5 g vial of hydroxocobalamin for injection is to be reconstituted with 200 mL of NS. Administration of the entire vial constitutes a complete dose. Infusion must be administered through an infusion pump. • Pediatric: 70 mg/kg (reconstitute concentration is 25 mg/mL). Maximum single dose is 5 g. Each 5 g vial of hydroxocobalamin for injection is to be reconstituted with 200 mL of NS (25 mg/mL) and administered at 14 mL for every 5 kg of bodyweight. Infusion must be administered through an infusion pump.
Notes:	Preparation of Solution for Infusion 1. Reconstitute the 5 g vial of hydroxocobalamin with 200 mL of diluent (not provided with CYANOKIT) using the supplied sterile transfer spike. The recommended diluent is 0.9% Sodium Chloride injection (0.9% NaCl). The line on the vial label represents 200 mL volume of diluent. Following the addition of diluent to the lyophilized powder, the vial should be repeatedly inverted or rocked, not shaken, for at least 60 seconds prior to infusion.

Ipratropium

Generic Name:	Ipratropium
Trade Name:	Atrovent
Therapeutic Class:	Anticholinergic, bronchodilator
Actions:	Ipratropium blocks interaction of acetylcholine at receptor sites on bronchial smooth muscle resulting in bronchodilation, reduced mucus production, and decreased levels of cyclic guanosine monophosphate.
Pharmacokinetics:	Onset: Less than 15 min Duration: 2-4 hours
Indications:	1. Persistent bronchospasms associated with asthma or COPD.
Contraindications:	1. Known hypersensitivity ipratropium or atropine
Precautions:	1. Caution should be used when administering it to elderly patients and those with cardiovascular disease or hypertension
Side Effects:	RESP: CV: Tachycardia, palpitations, CNS: Blurred vision, dizziness, headache, anxiety GI: Nausea, vomiting
Administration:	• Adult: 0.5 mg diluted in 2.5 mL NS via nebulizer, may repeat two times • Pediatric: 0.5 mg diluted in 2.5 mL NS via nebulizer, may repeat two times
Notes:	

Ketamine

Generic Name:	Ketamine
Trade Name:	Ketalar
Therapeutic Class:	Dissociative analgesic/anesthetic
Actions:	Ketamine blocks NMDA receptors, stimulates opioid receptors and muscarinic receptors, blocks catecholamine reuptake channels leading to a bronchodilator effect and sympathetic stimulation. At high doses produces anesthesia. Maintains pharyngeal and laryngeal reflexes and permits spontaneous respiration.
Pharmacokinetics:	Onset: IV onset 10-30 seconds. IM onset within 4 min, duration 15-30 min. Half-life: 45 minutes
Indications:	1. Low dose for analgesia especially in traumatic hypotension/shock patients 2. CPR induced conscious sedation 3. Pharmacological restraint in agitated/combative patient 4. RSI 5. Pharmacological consideration for intubated patients
Contraindications:	Pt with history of schizophrenia, tendency to exacerbate condition Acute alcohol intoxication, may precipitate death Use with c*aution in patients with severe hypertension where worsening HTN is detrimental*
Precautions:	May precipitate dysphoria and confusion (emergence phenomenon); mitigate with verbal direction, if unsuccessful use low dose midazolam to control agitation
Side Effects:	RESP: Bronchodilation CV: Increased CO, increased BP CNS: dream-like state, drowsiness, dizziness, diplopia, confusion, hallucinations GI: Nausea, vomiting, increased pharyngeal secretions
Administration:	**Pain Management:** • Adult: 0.25 mg/kg SIVP to max dose of 20 mg, may repeat one time after 10 minutes. Max total dose 40 mg • Pediatric: 0.25 mg/kg SIVP to max dose of 10 mg, do not repeat. **CPR induced Conscious Sedation:** • Adult: 1mg/kg IV, Maximum initial dose of 100 mg, may repeat every 3-5 minutes as needed, total maximum dose of 300 mg. • Pediatric: 1 mg/kg IV, maximum initial dose of 50 mg, may repeat every 3-5 minutes as needed, total maximum dose of 150 mg. **Agitated/Combative Patients**: • Adult: 250 mg IM • If RASS +4, consider Ketamine 250 mg IM • If after 5 minutes, RASS remains +3 or +4, consider repeating Ketamine 250 mg IM, maximum total dose 500 mg. **RSI Initial Sedation**: • Adult: 2 mg/kg IV, max initial dose of 200 mg or 250 mg IM if combative. consider 1 mg/kg IV/IM for patients with hypotension.

- Pediatric: 2 mg/kg IV, max initial dose of 100 mg. Consider 1 mg/kg IV for patients with hypotension.

RSI Maintenance Sedation:

- Adults: 1 mg/kg IV to a max initial dose of 100 mg. May repeat every 3-5 minutes to a max maintenance dose of 300 mg. (Max total dose for initial and maintenance sedation is 500 mg.)
- Pediatrics: 1 mg/kg IV to a max initial dose of 50 mg. May repeat every 3-5 minutes to a max maintenance dose of 150 mg. (Max total dose for initial and maintenance sedation is 250 mg.

Pharmacological Consideration for Intubated Patients

- If mentation or level of consciousness improves after intubation (including i-Gel) and RASS score is -2 or -3, consider:
- Adults: 1 mg/kg IV to a max initial dose of 100 mg. May repeat every 3-5 minutes PRN to a max total maintenance dose of 300 mg.
- Pediatrics: 1 mg/kg IV to a max initial dose of 50 mg. May repeat every 3-5 minutes PRN to a max total maintenance dose of 150 mg.

Notes:

1. ***Must be diluted prior to administration.*** Ketamine is highly irritating to vessels.
2. Use of SpO2 and waveform capnography in all patients given controlled medications to monitor respiratory changes.
3. If administered too rapidly or too high a dose, transient respiratory depression may occur.
4. Once ketamine is used for analgesia, another analgesic choice cannot be used unless authorized by receiving hospital physician.
5. Children metabolize ketamine faster than adults.
6. The elderly metabolize ketamine slower than adults.
7. Do not use during pregnancy, ketamine crosses placental barrier, unknown effect on developing fetus.

Ketorolac

Generic Name:	Ketorolac
Trade Name:	Toradol
Therapeutic Class:	Non-steroidal anti-inflammatory
Actions:	Inhibits synthesis of prostaglandins in body tissues by inhibiting at least 2 cyclo-oxygenase (COX) isoenzymes, COX-1 and COX-2. May inhibit chemotaxis, alter lymphocyte activity, decrease proinflammatory cytokine activity, and inhibit neutrophil aggregation; these effects may contribute to anti-inflammatory activity.
Pharmacokinetics:	Onset: 30-60 minutes
Indications:	1. Minor/moderate pain
Contraindications:	1. NSAID allergy 2. Aspirin sensitive asthma 3. Renal insufficiency/dialysis patient 4. Pregnancy 5. Peptic ulcer disease 6. Hypotension (due to potential renal toxicity)
Precautions:	
Side Effects:	CNS: Headache, drowsiness GI: GI bleeding, nausea/vomiting, abdominal pain, diarrhea
Administration:	**Pain Management** • Adult: 30 mg IM or 15 mg IV. Do not repeat. • Pediatric 0.5 mg/kg IM or IV for patients greater than 2 years old. Max dose is 20 mg IM or 10 mg IV. Do not repeat.
Notes:	Consider reducing dose by 50% in patients >65 years old due to concern for age related reduction in renal function.

Lidocaine

Generic Name:	Lidocaine
Trade Name:	Xylocaine
Therapeutic Class:	Anesthetic, antiarrhythmic
Actions:	May blunt the intracranial pressure rise associated with RSI. Lidocaine stabilizes the neuronal membrane by inhibiting the ionic fluxes required for the initiation and conduction of impulses thereby effecting local anesthetic action. Lidocaine also suppresses automaticity and spontaneous depolarization of the ventricles.
Pharmacokinetics:	Onset: Immediate Duration: 10 to 20 minutes Half-life: 1.5 -2 hours
Indications:	1. IO pain relief in conscious patient
Contraindications:	1. Third degree heart block 2. Hypersensitivity to the drug
Precautions:	1. Use with caution in patients with liver disease, CHF, or those with respiratory depression or shock.
Side Effects:	CNS: confusion, drowsiness, unconsciousness, tremens, convulsions CV: Hypotension, bradycardia, CV collapse, cardiac arrest EENT: Tinnitus, diplopia
Administration:	Adult: 20-40 mg SIOP Pediatric: 0.5 mg/kg SIOP
Notes:	

Magnesium Sulfate

Generic Name:	Magnesium Sulfate
Trade Name:	Magnesium Sulfate
Therapeutic Class:	Electrolyte, anticonvulsant
Actions:	Magnesium Sulfate is a salt that dissociates into the magnesium cation and the sulfate anion when administered. Magnesium is an essential element in many of the biochemical processes that occur in the body. It acts as a physiological calcium channel blocker and blocks neuromuscular transmission by decreasing acetylcholine release at the neuromuscular junction. Magnesium slows the rate of SA node impulse formation and prolongs conduction time.
Pharmacokinetics:	Onset: Immediately Duration: 30 minutes
Indications:	1. Refractory ventricular fibrillation 2. Torsades de pointes 3. Polymorphic ventricular tachycardia with a pulse 4. Severe asthma with severe bronchoconstriction or concern of impending respiratory failure 5. Anticonvulsant associated with pregnancy induced seizures/imminent seizures (eclampsia)
Contraindications:	1. Heart block 2. Hypermagnesia or hypocalcemia 3. Known hypersensitivity
Precautions:	1. If patellar reflexes disappear in the eclampsia patient, do not repeat the doses. 2. Magnesium sulfate should be administered slowly to minimize side effects. 3. Magnesium sulfate should be given very cautiously in the presence of serious impairment of renal function since it is excreted almost entirely by the kidneys.
Side Effects:	CV: Heart block, hypotension, bradycardia RESP: Respiratory depression CNS: Drowsiness Skin: Flushing, sweating
Administration:	**Pulseless Torsades or refractory V-fib:** • Adult: 1 gm diluted in 10 mL of NS SIVP. May repeat once. • Pediatric: 50 mg/kg (maximum dose of 1g) diluted in 10 mL NS SIVP. May repeat once. **Torsades with pulses:** • Adult: 1 gm in 100 mL of NS over 10 min. Use a medication pump to administer the infusion. If a pump is not available, the infusion can be administered manually using a macro drip set @ 10 mL/min (100 gtt/min). • Pediatric: 50 mg/kg (maximum dose of 1 g) diluted in 100 mL of NS over 10 minutes. Use a medication pump to administer the infusion. If a pump is not available, the infusion can be administered manually using a macro drip set @ 10 mL/min (100 gtt/min).

Asthma

- Adult: 2 gm in 100 mL of NS over 10 min. Use a medication pump to administer the infusion. If a pump is not available, the infusion can be administered manually using a macro drip set @ 10 mL/min (100 gtt/min).
- Pediatric: 40 mg/kg (max dose of 2 gm) in 100 mL over 10 minutes. Use a medication pump to administer the infusion. If a pump is not available, the infusion can be administered manually using a macro drip set @ 10 mL/min (100 gtt/min).

Eclampsia:

- Adult: 4 gm in 100 mL NS over 10 minutes. Use a medication pump to administer the infusion. If a pump is not available, the infusion can be administered manually using a macro drip set @ 10 mL/min (100 gtt/min). If patient is still seizing after 10 minutes, consider repeating once.

Notes: Any Patient receiving intravenous magnesium sulfate should have continuous cardiac monitoring and frequent monitoring of vital signs.

Infusion may cause some hypotension that will usually respond to a fluid bolus.

Midazolam

Generic Name:	Midazolam
Trade Name:	Versed
Therapeutic Class:	Sedative/hypnotic
Actions:	Midazolam causes central nervous systems depression via facilitation of inhibitory GABA 1 at benzodiazepine receptor sites (BZ1 – associated with sleep; BZ2 – associated with memory, motor sensory and cognitive function). Midazolam is a short acting benzodiazepine that is three to four times more potent than Diazepam. Midazolam has important amnesic properties.
Pharmacokinetics:	Onset: 2 minutes (IV), 15 minutes (IM) Half-life 1-12 hours Duration: 2-6 hours IV/IM
Indications:	1. Seizures not caused by hypoglycemia 2. Sedation for RSI 3. Agitated/Combative patients 4. Pharmacological consideration for intubated patients
Contraindications:	1. Hypersensitivity to the drug 2. Depressed vital signs 3. Hypotension (systolic BP less than 90 mmHg) 4. CNS depression or alcoholic coma
Precautions:	1. Use with caution in patients with pulmonary disease, CHF, renal or liver impairment
Side Effects:	CNS: Drowsiness, amnesia, altered mental status CV: Hypotension, tachycardia, PVC's RESP: Bronchospasm, coughing, laryngospasm, respiratory depression and arrest

Administration:	**Seizures:**
	• Adult:
	  ○ If patient is seizing on EMS arrival: 10 mg IM. Do not wait for IV access.
	  ▪ If patient continues to seizure after 3-5 minutes, 2.5 mg IV, IM, or IN. May repeat every 3-5 minutes for continued seizures. Total maximum dose shall not exceed 20 mg.
	  ○ If the patient starts actively seizing AFTER EMS arrival: 2.5 mg IV, IM, or IN. May repeat every 3-5 minutes for continued seizures. Total maximum dose shall not exceed 10 mg.
	• Pediatric:
	  ○ 0.2 mg/kg IM if patient is seizing upon EMS arrival. Do not wait to obtain an IV/IO. Maximum initial dose is 5 mg.
	  ▪ 0.2 mg/kg IV, IM, or IN if the patient continues to seize after 3-5 minutes. Maximum single dose is 2.5 mg. May repeat once after five minutes for persistent seizures. Maximum total dose of 10mg.
	  ○ If the patient starts actively seizing AFTER EMS arrival: 0.2 mg/kg IV, IM, or IN. Max single dose 2.5 mg. May repeat once after 5 minutes for persistent seizures. Maximum total dose of 5 mg.

Administration Continued:

Agitated/Combative Patients:

- Adult: If RASS +2 or +3
  - 2.5 mg IV, may repeat every 3-5 minutes as needed to a maximum total dose of 15 mg.
    OR
  - 5.0 mg IM, may repeat every 3-5 minutes to a maximum dose of 15 mg

RSI sedation: Use caution in the hypotensive patient

- Adult:
  - Initial sedation: 5 mg IV or 10 mg IM if combative
  - Maintenance sedation: 2.5 mg slow IV, may repeat every 3-5 minutes to a max total dose of 15 mg.
- Pediatric:
  - Initial sedation: 0.3 mg/kg IV, maximum dose 5 mg
  - Maintenance sedation: 0.1 mg/kg slow IV, maximum initial dose of 2 mg. May repeat every 3-5 minutes to a maximum total dose of 10 mg.

Pharmacological Considerations for Intubated Patients:

- If mentation or level of consciousness improves after intubation (including i-Gel) and RASS score is -2 or -3, consider:
- **Adults:** 2.5 mg slow IV. May repeat every 3-5 minutes to a max total dose of 15 mg.
- **Pediatrics:** 0.1 mg/kg slow IV to a max initial dose of 2 mg, may repeat every 3-5 minutes to a maximum total dose of 10 mg.

Notes:

1. The effects of midazolam can be accentuated by CNS depressants such as narcotics and alcohol.
2. Use of SpO2 and waveform capnography in all patients given controlled medications to monitor respiratory changes.

Morphine Sulfate

Generic Name:	Morphine Sulfate
Trade Name:	Astramorph, Duramorph, MS Contin, Roxanol
Therapeutic Class:	Opioid analgesic
Actions:	Morphine is a CNS depressant that acts on opioid receptors in the brain, providing both analgesia and sedation. It increases peripheral venous capacitance and decrease venous return. Morphine also reduces myocardial oxygen demand due to both the decreased systemic vascular resistance and the sedative effects of the drug.
Pharmacokinetics:	Onset: Immediately IV Duration: 4-5 hours IV
Indications:	1. Severe pain
Contraindications:	1. Respiratory depression 2. Hypotension (systolic BP less than 90 mmHg) 3. Known hypersensitivity
Precautions:	1. Use with caution in patients with head trauma, increased intracranial pressure, renal or liver dysfunction, or pulmonary disease.
Side Effects:	CV: Hypotension, bradycardia RESP: Respiratory depression CNS: Confusion, sedation, dizziness, euphoria, hallucinations Skin: Flushing, sweating
Administration:	**Pain Management: (Use caution in the hypotensive patient, should only be considered if systolic BP is greater than 90 mmHg in adults or appropriate BP for age in pediatrics.)** • Adult: 2-4 mg SIVP. May repeat every 5 minutes if pain is not relieved. (Max total dose 10 mg) • Pediatric: 0.1 mg/kg to a maximum of 2 mg increments SIVP. May repeat every 5 minutes if pain is not relieved. (Max total dose 6 mg)
Notes:	1. Have naloxone available for administration to reverse respiratory depression and overdose. 2. Use of SpO2 and waveform capnography in all patients given controlled medications to monitor respiratory changes.

Naloxone

Generic Name:	Naloxone
Trade Name:	Narcan
Therapeutic Class:	Narcotic antagonist
Actions:	Naloxone is chemically similar to narcotics. However, it has only antagonistic properties. Naloxone competes for opiate receptors in the brain and displaces narcotic molecules from opiate receptors. It can reverse respiratory depression associated with narcotic overdose.
Pharmacokinetics:	IV onset: 2 minutes. Duration: 45 minutes IV
Indications:	Reversal of respiratory depression caused by suspected opioid overdose
Contraindications:	Hypersensitivity to the drug
Precautions:	1. Naloxone should be administered cautiously to patients who are known or suspected to be physically dependent on narcotics. Abrupt and complete reversal by naloxone can cause withdrawal type effects (this includes newborns of mothers with known or suspected narcotic dependence).
Side Effects:	CNS: Seizures, tremulousness CV: Hypertension, hypotension, ventricular dysrhythmias GI: Nausea, vomiting

Administration:	**Suspected narcotic overdose:**
	• Adult:
	  ○ 0.4 mg IVP. Repeat every 2-3 minutes to desired effect, total max dose not to exceed 4.0 mg.
	  ○ 2.0 mg IN via MAD. Divide between the nostrils. System certified paramedics may repeat once after 5 minutes if needed, maximum dose of 4 mg. BLS providers will not repeat.
	  ○ 4.0 mg IN via Narcan Nasal Spray device. Gently insert the tip of the nozzle into one nostril until your fingers on either side of the nozzle are against the bottom of the person's nose. Press the red plunger firmly to give the dose of NARCAN Nasal Spray.
	  ○ If respiratory effort does not improve after IN administration, consider one dose of 0.4 mg IV.
	• Pediatric:
	  ○ 0.1 mg/kg IV to a max initial dose 0.4 mg. May repeat every 2-3 minutes to desired effect, total max dose is 4.0 mg.
	  ○ 0.1 mg/kg IN to a max initial dose of 2.0 mg. Divide between nostrils. May repeat one time after 5 minutes.
	  ○ If patient respiratory effort does not improve after IN administration, consider one additional dose of 0.1 mg/kg IV, max dose 0.4mg.

Notes:	The duration of action of naloxone is shorter than that of narcotics. Therefore, repeat doses may be necessary. Titrate administration of naloxone to respiratory effort rather than LOC.

Nitroglycerin

Generic Name:	Nitroglycerin
Trade Name:	Nitrolingual, Nitroquick, Nitro-bid, Nitrol
Therapeutic Class:	Anginal, vasodilator
Actions:	Nitroglycerin is a rapid smooth muscle relaxant that causes vasodilation and, to a lesser degree, dilates the coronary arteries. This results in increased coronary blood flow and improved perfusion of the ischemic myocardium. Relief of ischemia causes reduction and alleviation of chest pain. Vasodilation decreases preload and leads to decreased cardiac work that can help reverse the effects of angina pectoris. Additionally, decreases preload and afterload in cardiogenic pulmonary edema. Peripheral vasodilation will result in a decrease in blood pressure which may be useful in the treatment of hypertensive crisis.
Pharmacokinetics:	Onset: 1-3 minutes Peak: 5 minutes Duration: 30-60 minutes Half-life: 2-3 minutes
Indications:	1. Chest pain suspected cardiac in origin 2. Cardiogenic pulmonary edema
Contraindications:	1. Hypotension (systolic BP less than 90 mmHg) 2. Increased intracranial pressure 3. Hypersensitivity to the drug 4. Patient has taken erectile dysfunction (ED) medication within 48 hours 5. Inferior wall MI (leads II, III, AVF)
Precautions:	1. Patients taking the drug routinely may develop a tolerance and require an increased dose. 2. Postural syncope sometimes occurs following administration of nitroglycerin; it should be anticipated, and the patient kept supine when possible. 3. Careful clinical or hemodynamic monitoring must be used because of the possibility of hypotension and tachycardia.
Side Effects:	CNS: dizziness, headache, weakness CV: Dysrhythmias, palpitations, hypotension, tachycardia GI: Nausea: vomiting Skin: Diaphoresis, flushing, pallor, rash

Administration:	**Cardiac Chest Pain:**
	• Adult: 0.4 mg SL, every 5 minutes if systolic BP remains greater than 90 mmHg
	Pulmonary Edema:
	• Systolic BP < 160 mmHg
	  ○ Adult: 0.4 mg SL/Buccal, every 5 minutes if systolic BP remains greater than 120 mmHg
	• Systolic BP > 160 mmHg or MAP > 120
	  ○ Adult: 0.8 SL/Buccal, can repeat every 5 minutes for systolic BP > 120 mmHg

Notes:	Additive hypotension is possible when used in conjunction with antihypertensives, beta blockers, or calcium channel blockers.

Norepinephrine

Generic Name:	Norepinephrine
Trade Name:	Levophed
Therapeutic Class:	Sympathomimetic
Actions:	Causes peripheral vasoconstriction
Indications:	1. Non-hemorrhagic hypotension in adult patients (MAP < 65, refractory to fluid boluses or other sympathomimetics) 2. Cardiogenic shock 3. Septic shock 4. Neurogenic shock
Contraindications:	1. Know allergy to norepinephrine. 2. Hypotension secondary to blood volume deficits
Precautions:	1. Can be deactivated by alkaline solutions. 2. Constant monitoring of blood pressure is essential. 3. Extravasation can cause tissue necrosis
Side Effects:	1. Anxiety 2. Palpitations 3. Headache 4. Hypertension
Administration:	**Must be administered with an IV infusion pump.** • Adults 0.1-1.0 mcg/kg/min
Blood pressure goal:	Titrate to a Mean Arterial Pressure (MAP) of greater than 65mmHg
NOTES:	

Ondansetron

Generic Name:	Ondansetron
Trade Name:	Zofran
Therapeutic Class:	Anti-nausea, anti-emetic
Actions:	Ondansetron's effects are thought to be on both peripheral and central nerves. One part is to reduce the activity to the vagus nerve, which is a nerve that activates the vomiting center in the medulla oblongata, the other is a blockage of serotonin receptors or muscarinic receptors.
Pharmacokinetics:	Onset: 15-30 minutes Duration: 4-8 hours
Indications:	Nausea/vomiting
Contraindications:	1. Concomitant use of apomorphine will cause profound hypotension and loss of consciousness. 2. Known hypersensitivity to the drug.
Precautions:	
Side Effects:	CNS: Headache, dizziness, fatigue, weakness GI: Constipation, diarrhea, abdominal pain
Administration:	**Nausea/vomiting:** • Adult: 4 mg IV/IM, do not repeat. • Pediatric: 0.1 mg/kg IV, max initial dose is 4 mg, do not repeat.
Notes:	

Oral Glucose

Generic Name:	Dextrose
Trade Name:	Glutose, Insta-Glucose
Overview:	Oral glucose is used to treat patients with a history of diabetes exhibiting an altered mental status and the ability to swallow. Oral glucose is a form of glucose that can reverse a diabetic's hypoglycemic condition. Time of administration can make a critical difference.
Indications:	Patient with altered mental status and a known history of diabetes controlled by medication.
Contraindications:	1. Unresponsive 2. Unable to swallow 3. Unable to self-administer 4. Known hypersensitivity to the drug
Precautions:	
Side Effects:	None when given properly. May be aspirated by the patient without a gag reflex.
Administration:	**Hypoglycemia:** • Adult: 15 g, repeat once in 15 minutes if necessary • Pediatric (2 years of age and older): 7.5 g, may repeat once if patient remains hypoglycemic
Notes:	Have the patient squeeze a generous amount of gel into their mouth and allow the gel to dissolve between their cheek and gum. Emphasize to the patient to allow the gel to dissolve, not to swallow it.

Phenylephrine

Generic Name:	Phenylephrine Hydrochoride
Trade Name:	Biophen, Vazculep
Therapeutic Class:	Vasopressor
Actions:	Phenylephrine is an alpha$_1$ agonist with very little beta effect. Its major action is systemic and pulmonary arterial vasoconstriction, increasing systemic vascular resistance and systemic arterial pressure (systolic, diastolic, and mean).
Pharmacokinetics:	10-15 minutes
Indications:	1. Non-hemorrhagic hypotension in adult patients with elevated heart rate (MAP < 65, refractory to fluid boluses or other vasopressors/sympathomimetics) 2. Septic shock 3. Neurogenic shock 4. Hemorrhagic shock (only if bleeding is controlled and patient is unresponsive to NS). 5. Cardiogenic shock (only if all other vasopressors are ineffective)
Contraindications:	1. Hypertension 2. Ventricular Tachycardia
Precautions:	
Side Effects:	CNS: Headache, excitability, restlessness CV: Reflex bradycardia, arrhythmias RESP: Pulmonary edema GI: Nausea, gastric irritation
Administration:	**Hypotension with elevated heart rate:** • Adult: Administer 100-200 mcg boluses (1-2 mL every 2 minutes). Prepare Phenylephrine by adding 1 mL of Phenylephrine 10 mg/mL to 100 mL normal saline).
Notes:	In the non-hemorrhagic hypotensive patient, titrate to a Mean Arterial Pressure (MAP) of greater than 65mmHg. In the hemorrhagic hypotensive patient, permissive hypotension by titrating to a MAP of 60 mmHG. The administration of phenylephrine will be limited to **RSI Credentialed Paramedics**.

Rocuronium

Generic Name:	Rocuronium
Trade Name:	Zemuron
Therapeutic Class:	Non-depolarizing neuromuscular blocker
Actions:	Rocuronium is a non-depolarizing neuromuscular blocking agent. It competes with acetylcholine for receptor sites causing muscular paralysis; must be accompanied by adequate sedation; does not affect consciousness or pain threshold.
Pharmacokinetics:	Onset: 2-8 minutes Half-life 14-18 minutes Duration: 30 minutes
Indications:	Paralysis for RSI
Contraindications:	Known hypersensitivity to the drug
Precautions:	
Side Effects:	RESP: Bronchospasm, wheezing CV: Arrhythmias, tachycardia, transient hypotension or hypertension
Administration:	**RSI initial paralysis:** • Adult: 1 mg/kg IV, to a maximum dose of 100 mg. • Pediatric: Initial Paralysis: 1 mg/kg IV, to a maximum dose of 50 mg.
Notes:	Intensity and duration of paralysis may be prolonged by pretreatment with succinylcholine, lidocaine, quinidine, procainamide, beta-adrenergic blockers, or magnesium sulfate.

Sodium Bicarbonate

Generic Name:	Sodium Bicarbonate
Trade Name:	Sodium Bicarbonate
Therapeutic Class:	Alkalinizing agent, electrolyte supplement
Actions:	Buffers excess acid to assist returning the blood to a physiological pH, in which normal metabolic processes work more effectively.
Pharmacokinetics:	Onset: Immediate Duration: Unknown
Indications:	1. Cardiac arrest and known hyperkalemia, dialysis patient, or pre-existing bicarbonate responsive acidosis. 2. Symptomatic TCA overdose 3. Cardiac arrest secondary to agitated/combative patient emergency. 4. Crush syndrome
Contraindications:	1. Known hypersensitivity 2. Patients with metabolic or respiratory alkalosis 3. Hypocalcemia
Precautions:	1. Use with caution in patients with CHF or kidney insufficiency
Side Effects:	CV: Edema Electrolytes: metabolic alkalosis, hypocalcemia, hypokalemia
Administration:	**Cardiac arrest:** • Adult: 1 mEq/kg IVP **TCA overdose:** • Adult: 1 mEq/kg SIVP • Pediatric: 1 mEq/kg SIVP **Agitated/Combative patient who suffers cardiac arrest:** • Adult: 1 mEq/kg IVP **Crush syndrome:** • **Prior to release of compression:** ○ Adult: 50 mEq SIVP. After the first 1000 CC of NS has been infused, mix 50 mEq of Sodium Bicarbonate into the second IV bag and adjust the second IV to 500 mL per hour.
Notes:	Do not use routinely in cardiac arrest; do not mix with calcium chloride in the same IV.

Tranexamic Acid (TXA)

Generic Name:	Tranexamic acid
Trade Name:	Cyklokapron, Lysteda
Therapeutic Class:	Antifibrinolytic
Actions:	Inhibits the activation of plasminogen. Inhibits fibrin clots from being dissolved by plasmin.
Pharmacokinetics:	Onset: minutes
Indications:	1. Traumatic hypovolemic shock
Contraindications:	1. Known hypersensitivity 2. Age 12 or less
Precautions:	1. Use caution in patients with a history of thrombotic events
Side Effects:	CNS: Dizziness, seizures CV: Hypotension, blood clots
Administration:	• Adult: 2 g mixed in 100 mL NS over 10 minutes, administer using a macro drip set @ 10 mL/min (100 gtt/min).
Notes:	