
# Lincoln Fire & Rescue

# Emergency Medical Services

# Drug Guide

**Last Edit: November 14, 2025**

**Changes Highlighted in Yellow**

## ***Acetaminophen***

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|---|---|
| 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<br>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 |
| Notes: | |

## ***Adenosine***

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|---|---|
| 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.<br>2. Ventricular tachycardia with a pulse, only if regular and monomorphic<br>3. PSVT with signs and symptoms of poor perfusion in pediatrics |
| Contraindications: | 1. Second- or third-degree heart block<br>2. Sick sinus syndrome<br>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.<br>2. Use with caution in patients with asthma as adenosine may induce bronchospasm. |
| Side Effects: | CNS: dizziness, headache<br>CV: dysrhythmias, chest pain, hypotension, palpitations,<br>GI: nausea<br>Resp: chest pressure, dyspnea |
| 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.<br>2. Print continuous ECG tracing prior to, during, and post administration of medication for physician review. |

## ***Albuterol***

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| 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<br>2. Reversible bronchospasm associated with chronic bronchitis, emphysema, and crush syndrome.<br>3. Anaphylactic respiratory distress |
| Contraindications: | 1. Hypertension (SBP greater than 180).<br>2. Tachycardia (HR greater than 140 in an adult or 180 in a child.<br>3. Severe cardiac disease.<br>4. Hypersensitivity to the drug. |
| Precautions: | 1. Hyperthyroidism<br>2. Diabetes mellitus<br>3. Convulsive disorder |
| Side Effects: | CNS: Dizziness, headache, stimulation, tremors<br>CV: Dysrhythmias, hypertension, palpations, tachycardia<br>GI: Nausea/vomiting |
| Notes: | 1. Using a small volume nebulizer, adjust the oxygen flow meter to 6-10 L/min to produce a steady, visible mist.<br>2. The possibility of developing unpleasant side effects increases when albuterol is administered with other sympathetic agonists.<br>3. Beta blockers may blunt the pharmacological effects of albuterol.<br>4. 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***

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|---|---|
| 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.<br>2. Ventricular tachycardia.<br>3. Wide complex tachycardia of unknown type.<br>4. ROSC from VF/VT |
| Contraindications: | 1. Cardiogenic shock<br>2. Marked sinus bradycardia<br>3. Second- or third-degree heart block<br>4. Hypersensitivity to the drug |
| 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.<br>2. May worsen existing or precipitate new dysrhythmias, including VF.<br>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.<br>4. Enters breastmilk and causes harm to the neonate |
| Side Effects: | CNS: Dizziness, headache, confusion<br>CV: Bradycardia, cardiac conduction abnormalities, CHF, dysrhythmias, hypotension, SA node dysfunction, sinus arrest<br>Resp: dyspnea, pulmonary inflammation, adult respiratory distress syndrome. |
| Notes: | 1. Never treat the combination of 3rd degree heart block and ventricular escape beats with Amiodarone, Lidocaine, or any agent that suppresses ventricular escape rhythms.<br>2. Use a medication pump to administer the amiodarone infusion. If a pump is not available, the infusion can be administered manually using a macro drip set @ 10 mL/min (100 gtts/min). |

## ***Aspirin***

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|---|---|
| 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)<br>2. Bleeding disorders including GI hemorrhage and hemophilia<br>3. Hemorrhagic states |
| Precautions: | 1. Children or teenagers with flu-like symptoms (may be associated with the development of Reye's syndrome)<br>2. Asthma |
| Side Effects: | GI: GI bleeding, heart burn, nausea/vomiting<br>HEMAT: Anemia, prolonged bleeding time |
| Notes: | |

# ***Atropine***

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|---|---|
| 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.<br>2. Pediatric calcium channel blocker overdose with bradycardia<br>3. RSI premedication (pediatric patients) |
| Contraindications: | 1. Hypersensitivity to the drug<br>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.<br>2. Avoid relying on atropine in atrial fib/flutter with a slow ventricular response due to potential aggravation of the underlying rhythm.<br>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<br>CV: Tachycardia, palpitations, arrhythmias<br>RESP: Tachypnea, pulmonary edema<br>GI: Dry mouth, constipation |
| Notes: | 1. Do not delay TCP while waiting for IV access or for waiting for atropine to take effect if patient is unstable.<br>2. Atropine is not effective for denervated transplanted hearts.<br>3. Avoid use of atropine when MAP is greater than 70. |

## ***Calcium Chloride 10%***

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|---|---|
| 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<br>2. Known or suspected hyperkalemia (increased potassium)/Crush Syndrome<br>3. Calcium channel blocker overdose (nifedipine, verapamil, diltiazem).<br>4. Magnesium sulfate toxicity (hypermagnesemia)<br>5. Cardiac arrest secondary to agitated/combative/behavioral 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.)<br>2. Calcium chloride is not recommended in the treatment of asystole and electromechanical dissociation. |
| Precautions: | 1. Ensure administration by slow IV push<br>2. Extravasation can cause tissue necrosis at the injection site |
| Side Effects: | CNS: dizziness, syncope<br>CV: Bradycardia, cardiac arrest, dysrhythmias, heart block, hemorrhage, hypotension, shortened Q-T interval<br>GI: Nausea, vomiting |
| Notes: | 1. Do not mix with sodium bicarbonate in same IV.<br>2. Dilute calcium chloride prior to administration. |

## ***D10W***

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|---|---|
| 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 and/or signs and symptoms of hypoglycemia.<br>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.<br>2. Localized venous irritation may occur when smaller veins are used.<br>3. Infiltration may result in tissue necrosis |
| Side Effects: | Tissue necrosis and phlebitis at the injection site. |
| 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.<br>2. Hypoglycemic states require immediate intervention. Prolonged hypoglycemia can result in permanent brain damage. |

## ***Dexamethasone***

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|---|---|
| Generic Name: | Dexamethasone |
| Trade Name: | Decadron, Dexasone |
| Therapeutic Class: | Corticosteroid, anti-inflammatory |
| Actions: | Potent glucocorticoid with minimal to no mineralocorticoid activity.<br>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<br>2. Pediatric asthma or croup |
| Contraindications: | 1. Systemic fungal infection<br>2. Cerebral malaria |
| Precautions: | 1. Immunocompromised |
| Side Effects: | CNS: Headache<br>CV: Bradycardia, cardiac arrhythmias, hypertension<br>GI: Nausea |
| Notes: | |

## ***Diphenhydramine***

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|---|---|
| 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<br>2. Medication induced dystonic reactions<br>3. Anaphylaxis in conjunction with Epinephrine |
| Contraindications: | 1. Bronchial Asthma<br>2. Nursing mothers<br>3. Children less than 7 kg (6 months old)<br>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<br>CV: Hypotension, palpitations<br>GI: Dryness of mouth, nose and throat<br>RESP: Thickening of bronchial secretions, wheezing, chest tightness |
| 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.<br>2. Benedryl may be used to manage dystonic reactions which may occur after administration of neuroleptic drugs, including (trade name listed in parenthesis~~,~~ haloperidol (Haldol), metaclopramide (Reglan), prochlorperzine (Compazine), and promethazine (Phenergan). |

## ***Dopamine***

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|---|---|
| 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.<br>2. Hemodynamically significant hypotension associated with cardiogenic shock. |
| Contraindications: | 1. Hypovolemic shock; volume replacement must be accomplished prior to using dopamine.<br>2. Pheochromocytoma (tumor of the adrenal gland)<br>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<br>CV: Angina, arrhythmias, hypertension, palpitations, vasoconstriction<br>GI: Nausea, vomiting<br>RESP: Dyspnea |
| Notes: | 1. Tissue sloughing may occur with extravasation. AC veins are preferable sites.<br>2. Use a medication pump to administer the infusion. If a pump is not available, the infusion can be administered manually.<br>3. 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.<br>Dopamine Infusion Formula:<br>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***

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|---|---|
| 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<br>CSN: Tremors, nervousness |
| 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)***

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|---|---|
| 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: Immediate IV 6-12 minutes IM |
| Indications: | 1. Cardiac arrest<br>2. Symptomatic bradycardia<br>3. Anaphylaxis<br>4. Bronchial asthma<br>5. Hypotension in the ROSC or cardiogenic shock patient |
| Contraindications: | 1. Known hypersensitivity |
| Precautions: | 1. Cardiac disease<br>2. Hypertension<br>3. Tachydysrhythmias |
| Side Effects: | CNS: Anxiety, dizziness, restlessness, tremulousness, headache<br>CV: Angina, arrhythmias, hypertension, palpitations<br>GI: Nausea, Vomiting |
| Notes: | 1. 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.<br>2. 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.<br>3. Use a medication pump to administer the infusion. If a pump is not available, the infusion can be administered manually.<br>4. 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.<br>Infusion Rate (gtts/min) = ____Dose x 60 gtts/mL_____<br>Concentration of Drug in 1mL<br>5. 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***

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|---|---|
| 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: | Tachycardia |
| Side Effects: | Tachycardia |
| Notes: | Due to rebounding, all children who receive racemic epinephrine should be transported to the hospital. |

# ***Etomidate***

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|---|---|
| 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<br>2. Hypersensitivity to the drug |
| Precautions: | 1. Marked hypotension<br>2. Severe asthma<br>3. Severe cardiovascular disease |
| Side Effects: | CNS: myoclonic skeletal muscle movement, pain on injection<br>CV: hypotension or hypertension, tachycardia or bradycardia<br>GI: nausea, vomiting<br>RESP: Apnea, hyperventilation or hypoventilation, laryngospasm |
| 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.<br>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.<br>3. Etomidate should be diluted prior to administration to lesson vascular irritation. |

## ***Fentanyl***

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|---|---|
| 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<br>2. Maintenance of analgesia in tracheal intubation<br>3. Premedication (transcutaneous pacing or synchronized cardioversion) |
| Contraindications: | 1. Severe hemorrhage or shock<br>2. Known hypersensitivity |
| Precautions: | 1. Bradyarrhythmia's as fentanyl can produce bradycardia.<br>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.<br>3. Respiratory support therapy equipment should be available for treatment of possible respiratory depression. |
| Side Effects: | RESP: Apnea, laryngospasm, bronchospasm, respiratory depression.<br>CV: Arrhythmias, bradycardia, circulatory depression, hypotension.<br>CNS: Confusion, drowsiness.<br>GI: Nausea, vomiting. |
| Notes: | 1. The preferred route of administration is IV, however, if unable to establish vascular access Fentanyl may be administered IN or IM for pain management purposes only.<br>2. Alterations in respiratory rate may last longer than the analgesic effect.  Large doses may produce apnea.<br>3. Fentanyl appears to have less emetic activity than other narcotic analgesics.<br>4. Use of SpO2 and waveform capnography in all patients given controlled medications to monitor respiratory changes.<br>5. Dilute IV administration to lessen the change of side effects. |

## ***Glucagon***

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|---|---|
| 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)<br>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<br>CV: hypotension<br>GI: Nausea, vomiting |
| Notes: | 1. Glucagon has a delayed response, and providers shall encourage/initiate transport.<br>2. Nausea and vomiting are more common in the pediatric pt who received glucagon by any route.<br>3. If patient has prescribed IN Glucagon, it may be administered. |

## ***Hydroxocobalamin***

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|---|---|
| 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<br>CV: Tachycardia, chest pain<br>RESP: Shortness of breath<br>GU: Urinary discoloration |
| Notes: | 1. Preparation of solution for infusion:<br>a. 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).<br>b. 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***

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|---|---|
| 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: | CV: Tachycardia, palpitations,<br>CNS: Blurred vision, dizziness, headache, anxiety<br>GI: Nausea, vomiting |
| Notes: | |

# ***Ketamine***

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|---|---|
| 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.<br><br>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.<br>Half-life: 45 minutes |
| Indications: | 1. Low dose for analgesia especially in traumatic hypotension/shock patients<br>2. CPR induced conscious sedation<br>3. Pharmacological restraint in agitated/combative patient<br>4. RSI<br>5. Pharmacological consideration for intubated patients<br>6. Seizures |
| Contraindications: | Pt with history of schizophrenia, tendency to exacerbate condition<br>Use with c*aution in patients with severe hypertension where worsening HTN is detrimental* |
| Precautions: | Acute alcohol intoxication may precipitate death.<br>May precipitate dysphoria and confusion (emergence phenomenon); mitigate with verbal direction, if unsuccessful use low dose midazolam to control agitation |
| Side Effects: | RESP: Bronchodilation<br>CV: Increased CO, increased BP<br>CNS: dream-like state, drowsiness, dizziness, diplopia, confusion, hallucinations<br>GI: Nausea, vomiting, increased pharyngeal secretions |
| Notes: | 1. ***Must be diluted prior to administration.*** Ketamine is highly irritating to vessels.<br>2. Use of SpO2 and waveform capnography in all patients given controlled medications to monitor respiratory changes.<br>3. If administered too rapidly or too high a dose, transient respiratory depression may occur.<br>4. Once ketamine is used for analgesia, another analgesic choice cannot be used unless authorized by receiving hospital physician.<br>5. Children metabolize ketamine faster than adults.<br>6. The elderly metabolize ketamine slower than adults.<br>7. Do not use during pregnancy, ketamine crosses placental barrier, unknown effect on developing fetus. |

## ***Ketorolac***

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|---|---|
| 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<br>2. Aspirin sensitive asthma<br>3. Renal insufficiency/dialysis patient<br>4. Pregnancy<br>5. Peptic ulcer disease<br>6. Hypotension (due to potential renal toxicity) |
| Precautions: | |
| Side Effects: | CNS: Headache, drowsiness<br>GI: GI bleeding, nausea/vomiting, abdominal pain, diarrhea |
| Notes: | Consider reducing dose by 50% in patients >65 years old due to concern for age related reduction in renal function. |

## ***Lidocaine***

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|---|---|
| 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<br>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<br>CV: Hypotension, bradycardia, CV collapse, cardiac arrest<br>EENT: Tinnitus, diplopia |
| Note: | |

## ***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: Immediate Duration: 30 minutes |
| Indications: | 1. Refractory ventricular fibrillation<br>2. Torsades de pointes<br>3. Polymorphic ventricular tachycardia with a pulse<br>4. Severe asthma with severe bronchoconstriction or concern of impending respiratory failure<br>5. Pregnancy induced seizures/imminent seizures (eclampsia) |
| Contraindications: | 1. Heart block<br>2. Hypermagnesia or hypocalcemia<br>3. Known hypersensitivity |
| Precautions: | 1. If patellar reflexes disappear in the eclampsia patient, do not repeat the doses.<br>2. Magnesium sulfate should be administered slowly to minimize side effects.<br>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<br>RESP: Respiratory depression<br>CNS: Drowsiness<br>Skin: Flushing, sweating |
| Notes: | 1. Any Patient receiving intravenous magnesium sulfate should have continuous cardiac monitoring and frequent monitoring of vital signs.<br>2. Infusion may cause some hypotension that will usually respond to a fluid bolus. |

## ***Midazolam***

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|---|---|
| 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).<br>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<br>2. Sedation for RSI<br>3. Agitated/Combative patients<br>4. Pharmacological consideration for intubated patients |
| Contraindications: | 1. Hypersensitivity to the drug<br>2. Depressed vital signs<br>3. Hypotension (systolic BP less than 90 mmHg)<br>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<br>CV: Hypotension, tachycardia, PVC's<br>RESP: Bronchospasm, coughing, laryngospasm, respiratory depression and arrest |
| Notes: | 1. The effects of midazolam can be accentuated by CNS depressants such as narcotics and alcohol.<br>2. Use of SpO2 and waveform capnography in all patients given controlled medications to monitor respiratory changes.<br>3. Dilute prior to IV administration to reduce risk of hypotension. |

## ***Morphine Sulfate***

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|---|---|
| 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: Immediate Duration: 4-5 hours |
| Indications: | 1. Severe pain |
| Contraindications: | 1. Respiratory depression<br>2. Hypotension (systolic BP less than 90 mmHg)<br>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<br>RESP: Respiratory depression<br>CNS: Confusion, sedation, dizziness, euphoria, hallucinations<br>Skin: Flushing, sweating |
| Notes: | 1. Have naloxone available for administration to reverse respiratory depression and overdose.<br>2. Use of SpO2 and waveform capnography in all patients given controlled medications to monitor respiratory changes. |

# ***Naloxone***

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|---|---|
| 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: | Onset: 2 minutes IV/10-15 minutes IN Duration: 30-90 minutes |
| 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<br>CV: Hypertension, hypotension, ventricular dysrhythmias<br>GI: Nausea, vomiting |
| Notes: | 1. The duration of action of naloxone is shorter than that of narcotics. Therefore, repeat doses may be necessary.<br>2. Titrate administration of naloxone to respiratory effort rather than LOC. |

## ***Nitroglycerin***

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|---|---|
| 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<br>2. Cardiogenic pulmonary edema |
| Contraindications: | 1. Hypotension (systolic BP less than 90 mmHg)<br>2. Increased intracranial pressure<br>3. Hypersensitivity to the drug<br>4. Patient has taken erectile dysfunction (ED) medication within 48 hours<br>5. Inferior wall MI (leads II, III, AVF) |
| Precautions: | 1. Patients taking the drug routinely may develop a tolerance and require an increased dose.<br>2. Postural syncope sometimes occurs following administration of nitroglycerin; it should be anticipated, and the patient kept supine when possible.<br>3. Careful clinical or hemodynamic monitoring must be used because of the possibility of hypotension and tachycardia. |
| Side Effects: | CNS: dizziness, headache, weakness<br>CV: Dysrhythmias, palpitations, hypotension, tachycardia<br>GI: Nausea: vomiting<br>Skin: Diaphoresis, flushing, pallor, rash |
| Notes: | 1. Additive hypotension is possible when used in conjunction with antihypertensives, beta blockers, or calcium channel blockers.<br>2. Administering a fluid bolus prior to nitro will help to avoid a drop in blood pressure. |

## ***Norepinephrine***

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|---|---|
| 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)<br>2. Cardiogenic shock<br>3. Septic shock<br>4. Neurogenic shock |
| Contraindications: | 1. Know allergy to norepinephrine.<br>2. Hypotension secondary to blood volume deficits |
| Precautions: | 1. Can be deactivated by alkaline solutions.<br>2. Constant monitoring of blood pressure is essential.<br>3. Extravasation can cause tissue necrosis |
| Side Effects: | 1. Anxiety<br>2. Palpitations<br>3. Headache<br>4. Hypertension |
| MAP goal: | 1. Titrate to a Mean Arterial Pressure (MAP) of greater than 65 mmHg |
| Notes: | 1. To prepare a norepinephrine infusion, mix 4 mg in a 250 mL bag of normal saline and mix well. Resultant concentration is 16 mcg/mL.<br>2. **Must be administered with an IV infusion pump.**<br>3. Administer fluid boluses prior to IV infusion. |

## ***Ondansetron***

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|---|---|
| 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.<br>2. Known hypersensitivity to the drug. |
| Precautions: | |
| Side Effects: | CNS: Headache, dizziness, fatigue, weakness<br>GI: Constipation, diarrhea, abdominal pain |
| 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<br>2. Unable to swallow<br>3. Unable to self-administer<br>4. Known hypersensitivity to the drug |
| Precautions: | |
| Side Effects: | None when given properly. May be aspirated by the patient without a gag reflex. |
| 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***

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|---|---|
| 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: | Onset: Less than 1 minute Duration: 15-20 minutes |
| Indications: | 1. Non-hemorrhagic hypotension in adult patients with elevated heart rate (MAP < 65, refractory to fluid boluses or other vasopressors/sympathomimetics)<br>2. Septic shock<br>3. Neurogenic shock<br>4. Hemorrhagic shock (only if bleeding is controlled and patient is unresponsive to NS).<br>5. Cardiogenic shock (only if all other vasopressors are ineffective) |
| Contraindications: | 1. Hypertension<br>2. Ventricular Tachycardia |
| Precautions: | |
| Side Effects: | CNS: Headache, excitability, restlessness<br>CV: Reflex bradycardia, arrhythmias<br>RESP: Pulmonary edema<br>GI: Nausea, gastric irritation |
| Notes: | 1. In the non-hemorrhagic hypotensive patient, titrate to a Mean Arterial Pressure (MAP) of greater than 65mmHg.<br>2. In the hemorrhagic hypotensive patient, permissive hypotension by titrating to a MAP of 60 mmHG.<br>3. The administration of phenylephrine will be limited to **RSI Credentialed Paramedics**.<br>4. Administer fluid boluses prior to infusion. |

## ***Rocuronium***

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|---|---|
| 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<br>CV: Arrhythmias, tachycardia, transient hypotension or hypertension |
| Notes: | Intensity and duration of paralysis may be prolonged by pretreatment with succinylcholine, lidocaine, quinidine, procainamide, beta-adrenergic blockers, or magnesium sulfate. |

## ***Sodium Bicarbonate***

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|---|---|
| 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: 1-2 hours |
| Indications: | 1. Cardiac arrest and known hyperkalemia, dialysis patient, or pre-existing bicarbonate responsive acidosis.<br>2. Symptomatic TCA overdose<br>3. Cardiac arrest secondary to agitated/combative patient emergency.<br>4. Crush syndrome |
| Contraindications: | 1. Known hypersensitivity<br>2. Patients with metabolic or respiratory alkalosis<br>3. Hypocalcemia |
| Precautions: | 1. Use with caution in patients with CHF or kidney insufficiency |
| Side Effects: | CV: Edema<br>Electrolytes: metabolic alkalosis, hypocalcemia, hypokalemia |
| 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<br>2. Age 12 or less |
| Precautions: | 1. Use caution in patients with a history of thrombotic events |
| Side Effects: | CNS: Dizziness, seizures<br>CV: Hypotension, blood clots |
| Notes: | |