EMS MEDICATION FORMULARIES

ACETAMINOPHEN

Scope | EMT | ACT | Paramedic

Generic Name:	**Acetaminophen** (a-seet-a-**min**-oh-fen)
Trade Name:	Tylenol
Chemical Class:	N/A
Therapeutic Class:	Antipyretics, non-opioid analgesics
Actions:	Inhibits the synthesis of prostaglandins that may serve as mediators of pain and fever, primarily in the CNS. Has no significant anti-inflammatory properties or GI toxicity.
Pharmacokinetics:	Absorption: Well absorbed following oral administration. Rectal absorption is variable. Distribution: Widely distributed. Crosses the placenta; enters breast milk in low concentrations. Metabolism and Excretion: 85–95% metabolized by the liver (CYP2E1 enzyme system). Metabolites may be toxic in overdose situation. Metabolites excreted by the kidneys. Half-life: Neonates: 7 hr; Infants and Children: 3–4 hr; Adults: 1–3 hr.
Indications:	Treatment of fever in pediatrics
Contraindications:	Previous hypersensitivity; Products containing alcohol, aspartame, saccharin, sugar, or tartrazine (FDC yellow dye #5) should be avoided in patients who have hypersensitivity or intolerance to these compounds; Severe hepatic impairment/active liver disease.
Precautions: ***Pregnancy Cat. B***	Hepatic disease/renal disease (lower chronic doses recommended); Alcoholism, chronic malnutrition, severe hypovolemia or severe renal impairment; Chronic alcohol use/abuse; Malnutrition; OB: Use in pregnancy only if clearly needed Lactation: Use cautiously Pedi: Neonates (safety and effectiveness not established).
Side Effects:	CNS: agitation, anxiety, headache, fatigue, insomnia Resp: atelectasis, dyspnea CV: hypertension, hypotension GI: HEPATOTOXICITY, constipation, nausea, vomiting F and E: hypokalemia GU: renal failure (high doses/chronic use). Hemat: neutropenia, pancytopenia. MS: muscle spasms, trismus.
Interactions:	Chronic high-dose acetaminophen (2 g/day) may increase risk of bleeding with warfarin (INR should not exceed 4). Hepatotoxicity is additive with other hepatotoxic substances, including alcohol
Administration:	*Pediatric* Administer 15 mg/kg oral with temperature > 102° F
Supply:	160 mg in 5 mL UD solution 160 mg in 5 ml elixer
Notes:	

ADENOSINE (Adenocard®)

Scope	ACT	PARAMEDIC

Generic Name:	**Adenosine (ah-den'oh-seen)**
Trade Name:	Adenocard®
Chemical Class:	Endogenous nucleoside
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 (PSVT). It can effectively terminate rapid 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. A single bolus of the drug was effective in converting PSVT to a normal sinus rhythm in a significant number (90%) of patients in initial drug studies.
Pharmacokinetics:	Cleared from plasma in less than 30 seconds; $t_{½}$ = 10 seconds
Indications:	• Unstable narrow QRS tachycardia refractory to vagal maneuvers. • Stable, regular, monomorphic wide-complex tachycardia.
Contraindications:	• Second- or third-degree heart block. • Sick sinus syndrome. • Hypersensitivity to the drug. • Bradycardia. • Broncho-constrictive lung disease (i.e. asthma). • Irregular wide-complex tachycardias
Precautions: ***Pregnancy Cat. C***	Adenosine typically causes dysrhythmias at the time of cardioversion. These generally last a few seconds or less and may include PVCs, PACs, 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.
Side Effects:	*CNS:* dizziness, headache *CV:* dysrhythmia outlined under precautions, chest pain, facial flushing, palpitations, diaphoresis *GI:* nausea *RESP:* chest pressure, dyspnea
Administration:	*Adult*: Administer 6 mg IV over 1 to 3 seconds. If not effective after 2 minutes, give 12 mg IV over 1 to 3 seconds. *Pediatric*: Administer 0.1 mg/kg IV over 1 to 3 seconds (maximum first dose 6 mg) **[per MCP]**. If not effective after 2 minutes, administer 0.2 mg/kg IV over 1 to 3 seconds (maximum second dose 12 mg).
Supply:	Vials or prefilled syringes containing 6 mg in 2 mL and/or 12 mg in 2 mL
Notes:	• Give Adenosine rapidly over 1 to 3 seconds, into the medication administration port closest to the patient, through a large (e.g., antecubital) vein followed by a 10 mL Normal Saline flush and elevation of the arm. • Higher doses than usual may be needed for patients receiving Theophylline preparations or consuming large quantities of Caffeine. • Dipyridamole (Persantine) can potentiate the effects of Adenosine. The dosage of Adenosine may need to be reduced in patients receiving Dipyridamole. • Use of Adenosine for irregular wide-complex tachycardias may cause degeneration of the rhythm to VF.

ALBUTEROL (Proventil®)

Scope	EMT	ACT	Paramedic

Generic Name:	**Albuterol (al-byoo'ter-ole)**
Trade Name:	Airet®, Proventil®, Repetabs®, Respirol®, Ventolin®, Volmax®; Combivent® (combined with Ipratropium Bromide)
Chemical Class:	Sympathomimetic amine; β_2-adrenergic agonist
Therapeutic Class:	Antiasthmatic; bronchodilator
Actions:	Albuterol is a selective β_2-adrenergic agonist with a minimal number of side effects. It causes prompt bronchodilation and has a duration of action of approximately 5 hours.
Pharmacokinetics:	Onset 5 to 15 minutes. Peak 1 to 1½ hours. Duration 4 to 6 hours. $t_{½}$ = 2½ to 4 hours.
Indications:	• Bronchial asthma. • Reversible bronchospasm associated with chronic bronchitis and emphysema. • Anaphylactic respiratory distress. • Crush syndrome **[per MCP]**.
Contraindications:	• Hypertension • Tachycardia (HR greater than 130 adult, HR greater than 150 child). • Severe cardiac disease. • Hypersensitivity to the drug.
Precautions: ***Pregnancy Cat. C***	• Hyperthyroidism. • Diabetes mellitus. • Convulsive disorders.
Side Effects:	*CNS:* dizziness, headache, stimulation, tremors *CV:* chest pain, dysrhythmias, hypertension, palpitations, tachycardia *GI:* nausea, vomiting
Administration:	Using a small volume nebulizer, adjust the oxygen flowmeter to 6 to 10 L/minute to produce a steady, visible mist. *Adult* Give 2.5 mg (3 mL of 0.083% solution) with a mouthpiece, facemask, or CPAP. *Pediatric* Give 2.5 mg (3 mL of 0.083% solution) with a mouthpiece, blow-by, or CPAP.
Supply:	Unit dose vials containing 2.5 mg in 3 mL.
Notes:	• The possibility of developing unpleasant side effects increases when Albuterol is administered with other sympathetic agonists. • β-blockers may blunt the pharmacological effects of Albuterol. • 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. Overdoses of inhalers cause bronchial constriction and possibly death.

AMIODARONE (Cordarone®)

Scope | **ACT** | **PARAMEDIC**

Generic Name:	**Amiodarone (a-mee'oh-da-rone)**
Trade Name:	Cordarone®, Pacerone®
Chemical Class:	Iodinated benzofuran derivative
Therapeutic Class:	Antiarrhythmic
Actions:	Amiodarone prolongs myocardial action potential and effective refractory period and causes noncompetitive α- and β-adrenergic inhibition. Amiodarone suppresses atrial and ventricular ectopy (PSVT, AF, ATach, VT, VF, etc.) and slows conduction through the AV node (ventricular rate control; useful in WPW). Amiodarone also causes vasodilation resulting in reduced cardiac work.
Pharmacokinetics:	$t_{½}$ = 20 to 47 days
Indications:	• Shock refractory ventricular fibrillation and pulseless ventricular tachycardia • Ventricular tachycardia • Wide-complex tachycardia of unknown type (regular rhythm)
Contraindications:	• Cardiogenic shock (SBP <90 mm Hg) • Marked sinus bradycardia • Second- or third-degree heart block • Hypersensitivity to the drug • Torsades de pointes
Precautions: ***Pregnancy Cat. D***	• May worsen existing or precipitate new dysrhythmias, including torsades de pointes and VF. • 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. • Use with caution in pregnancy and with nursing mothers.
Side Effects:	*CNS:* dizziness, headache *CV:* bradycardia, cardiac conduction abnormalities, CHF, dysrhythmias, hypotension, SA node dysfunction, sinus arrest *RESP:* dyspnea, pulmonary inflammation
Administration:	*Adult*: **VF and pulseless VT:** Give 300 mg IV/IO. Give additional 150 mg IV push in 3 to 5 minutes for refractory or recurrent VF/VT. **VT with pulse:** Give a slow infusion of 150 mg over 10 minutes. Mix in 100 mL of NS and infuse at 150 gtts/minute (15 drop set). *Pediatric*: **VF and pulseless VT:** Give 5 mg/kg IV/IO. May repeat up to 2 times for refractory VT/pulseless VT. Maximum single dose 300 mg. **VT with pulse:** Give an infusion of 5 mg/kg. Mix in 100 mL of NS and infuse at 75 gtts/minute (15 drop set). Maximum dosage is 300 mg. *Slow Infusion*: 1 mg/minute. Mix 150 mg in 250 mL NS and infuse at 100 gtts/minute (60 drop set).
Supply:	Vial containing 150 mg in 3 mL.
Notes:	

ASPIRIN

Scope	EMT	ACT	Paramedic

Generic Name:	**Aspirin (as'pir-in)**
Trade Name:	Bayer®, Bufferin®, Ecotrin®
Chemical Class:	Salicylate derivative
Therapeutic Class:	Antiplatelet agent
Actions:	Aspirin blocks the formation of the substance thromboxane A_2, which causes platelets to aggregate and arteries to constrict. This results in an overall reduction in mortality associated with myocardial infarction. It also appears to reduce the rate of nonfatal reinfarction and nonfatal stroke.
Pharmacokinetics:	Onset 15 to 30 minutes. Peak 1 to 2 hours. Duration 4 to 6 hours. $t_{½}$ = 3 hours at low doses.
Indications:	Chest pain suggestive of an acute myocardial infarction.
Contraindications:	• Hypersensitivity to the drug, NSAIDS, and Tartrazine (FDC yellow dye #5). • Bleeding disorders including GI hemorrhage and hemophilia. • Hemorrhagic states.
Precautions: ***Pregnancy Cat. C***	Children or teenagers with flu-like symptoms (may be associated with the development of Reye's syndrome).
Side Effects:	*GI:* GI bleeding, heartburn, nausea *HEME:* prolonged bleeding time
Interactions:	When administered together, Aspirin and other anti-inflammatory agents may cause an increased incidence of side effects and increased blood levels of both drugs. Administration of aspirin with antacids may reduce the blood levels of the drug by decreasing absorption.
Administration:	Administer four (4) 81 mg chewable tablets (324 mg total dose) PO as soon as possible after the onset of chest pain.
Supply:	81 mg low dose chewable tablets or 81 mg quick absorbing powder
Notes:	

ATROPINE

Scope | **ACT** | **PARAMEDIC**

Generic Name:	**Atropine (a'troe-peen)**
Trade Name:	Atropine Care®, Atropen Autoinjector®, Atropisol®, Atrosulf-1®
Chemical Class:	Belladonna alkaloid
Therapeutic Class:	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 to 4 minutes. Duration 4 to 6 hours.
Indications:	• **[Adult]** Hemodynamically significant bradycardia (HR less than 50): o Acute altered mental status, Hypotension, ongoing chest pain, acute heart failure, or other signs of shock. o Bradycardia associated with "escape" ventricular ectopy (i.e., PVCs attributed to the underlying slow heart rate). • **[Pediatric]** Hemodynamically significant bradycardia [HR less than 60 (neonate less than 80/minute)] due to increased vagal tone or primary AV block. • Severe organophosphate poisonings (insecticides).
Contraindication:	Hypersensitivity to the drug
Precautions: ***Pregnancy Cat. C***	• 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. • 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-QRS complex. These patients require immediate pacing.
Side Effects:	*CNS:* drowsiness, confusion *CV:* angina, PVCs, tachycardia *EENT:* blurred vision, dilated pupils *GI:* dry mouth
Administration:	*Adult*: **Bradycardia:** Administer 0.5 mg IV. May repeat every 5 minutes to a total dose of 3 mg if needed. **Cholinergic Toxicity:** Give 2 mg IV. Repeat every 5 minutes if needed. *Pediatric*: **Bradycardia:** Administer 0.02 mg/kg IV/IO. May repeat once in 3 to 5 minutes if needed. (Minimum dose = 0.1 mg, maximum dose = 0.5 mg for child and 1mg for adolescent)
Supply:	Prefilled syringe containing 1 mg in 10 mL.
Notes:	

DEXTROSE (Glucose®)

Scope | **ACT** | **PARAMEDIC**

Generic Name:	**Dextrose (dex'trose)**
Trade Name:	Glucose®, Glutose®, Insta-Glucose®
Chemical Class:	Carbohydrate
Therapeutic Class:	Nutrient, caloric
Actions:	Dextrose supplies supplemental glucose in cases of hypoglycemia and restores blood sugar level to normal (80 to 120 mg/dL).
Pharmacokinetics:	N/A
Indications:	• Altered mental status of unknown etiology (GCS less than or equal to 12). • Hypoglycemia (less than 60 mg/dL) based on rapid glucose determination or clinical judgment. • Status epilepticus. • Oral hypoglycemic agent overdose. • Neonatal resuscitation not responsive to ventilation and chest compressions.
Contraindications:	No contraindications for a patient with suspected hypoglycemia.
Precautions:	• Use with caution in patients with increased intracranial pressure because the Dextrose load may worsen cerebral edema. • Localized venous irritation may occur when smaller veins are used. • Infiltration may result in tissue necrosis. • Dextrose is only administered via the IV or IO route.
Side Effects:	Tissue necrosis and phlebitis at the injection site.
Administration:	***Patient 2 years of age or older*** – If blood glucose is < 60 mg/dl, administer D50W 1 ml/kg IV/IO. Maximum dose is 25 grams ***Patient older than 1 month but younger than 2 years*** *old* – If blood glucose is < 60 mg/dl, administer 2 ml/kg of D25 IV/IO; (D25 Is prepared by mixing 25 ml NS with 25 ml D50W). ***Patient 1 month of age or younger*** – If blood glucose is < 60 mg/dl, administer 5 ml/kg Dextrose 10% IV/IO (D10 is prepared by mixing 40 ml of NS with 10 ml of D50W).
Supply:	• Prefilled syringe containing 25 g in 50 mL (50% solution) • Prefilled syringe containing 2.5 g in 10 mL (25% solution)
Notes:	• Establish a free flowing IV of Normal Saline in a large vein. Aspirate blood before and during administration of Dextrose to ensure IV patency. • Hypoglycemic states require immediate intervention. Prolonged hypoglycemia can result in permanent brain damage.

DILTIAZEM

Scope **PARAMEDIC**

Generic Name:	**Diltiazem (dil-tye-a-zem)**
Trade Name:	Cardizem, CardizemCD, CardizemLA, Cartia XT, Dilacor XR, Taztia XT, Tiazac
Chemical Class:	Calcium channel blockers
Therapeutic Class:	Therapeutic: antianginals, antiarrhythmics (class IV), antihypertensives
Actions:	Inhibits transport of calcium into myocardial and vascular smooth muscle cells, resulting in inhibition of excitation-contraction coupling and subsequent contraction.
Pharmacokinetics:	Absorption: Well absorbed, but rapidly metabolized after oral administration. Distribution: Unknown. Protein Binding: 70–80%. Metabolism and Excretion: Mostly metabolized by the liver (CYP3A4 enzyme system). Half-life: 3.5–9 hr.
Indications:	Supraventricular tachyarrhythmias and rapid ventricular rates in atrial flutter or fibrillation.
Contraindication:	Hypersensitivity; Sick sinus syndrome; 2nd- or 3rd-degree AV block (unless an artificial pacemaker is in place); Systolic BP< 90mmHg; Recent MI or pulmonary congestion; Concurrent use of rifampin.
Precautions: ***Pregnancy Cat. C***	Severe hepatic impairment, consider age related decrease in body mass, Severe renal impairment; Serious ventricular arrhythmias or heart failure.
Side Effects:	*CNS: anxiety, confusion, dizziness, drowsiness, headache, nervousness, psychiatric disturbances, weakness.* *EENT: blurred vision, disturbed equilibrium, epistaxis, tinnitus.* *Resp: cough, dyspnea.* *CV: ARRHYTHMIAS, HF, peripheral edema, bradycardia, chest pain, hypotension, palpitations, syncope, tachycardia.* *GI: constipation, diarrhea, dry mouth, dyspepsia, nausea, vomiting.* *GU: dysuria, nocturia, polyuria, sexual dysfunction, urinary frequency.* *Derm:, erythema, flushing, sweating, photosensitivity, pruritus/urticaria, rash.* *Endo: gynecomastia, hyperglycemia* *MS: joint stiffness, muscle cramps.* *Neuro: paresthesia, tremor.*
Administration:	Adult: Administer 0.25 mg/kg slow IVP. Repeat dose in 15 minutes if needed at 0.35 mg/kg slow IVP. **[per MCP]**
Supply:	• 100 mg vial requiring reconstitution with 0.9% NS diluent • 50 mg per 10 mg vial (requires refrigeration)
Notes:	

DIPHENHYDRAMINE (Benadryl®)

Scope | **PARAMEDIC**

Generic Name:	**Diphenhydramine (dye-fen-hye'dra-meen)**
Trade Name:	Benadryl®
Chemical Class:	Ethanolamine derivative
Therapeutic Class:	Antihistamine, antianaphylactic (adjunct)
Actions:	Diphenhydramine is an antihistamine with anticholinergic (drying) and sedative side effects. Diphenhydramine decreases the allergic response by blocking Histamine at H_1 receptor sites.
Pharmacokinetics:	N/A
Indications:	• Anaphylaxis, *as an adjunct to Epinephrine*. • To treat dystonic reactions and extrapyramidal reactions caused by phenothiazines.
Contraindications:	• Bronchial asthma. • Nursing mothers. • Children less than 10 kg. • Glaucoma. • Hypersensitivity to the drug or other antihistamines.
Precautions: ***Pregnancy Cat. B***	Use with caution in patients with a history of hyperthyroidism, cardiovascular disease, and hypertension.
Side Effects:	*CNS:* dizziness, drowsiness, sedation, sleepiness *CV:* headache, palpitations *GI:* dryness of mouth, nose and throat *RESP:* thickening of bronchial secretions, wheezing
Interactions:	• Diphenhydramine has additive effects with alcohol and other CNS depressants (hypnotics, sedatives, tranquilizers, etc). • MAO inhibitors prolong and intensify the anticholinergic (drying) effects of antihistamines.
Administration:	*Adult* Give 25 mg IM or slow IVP *Pediatric* Give 1 mg/kg up to 25 mg IM or slow IVP
Supply:	Vial containing 50 mg in 1 mL
Notes:	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.

DOPAMINE (Intropin®)

Scope | **PARAMEDIC**

Generic Name:	**Dopamine (doe'pa-meen)**
Trade Name:	Intropin®
Chemical Class:	Catecholamine
Therapeutic Class:	Vasopressor, α- and β-adrenergic sympathomimetic
Actions:	Dopamine stimulates both adrenergic and dopaminergic receptors in a dose-dependent manner. Low doses (1-5 mcg/kg/minute) stimulate mainly dopaminergic receptors producing renal and mesenteric vasodilation. Intermediate doses (5-10 mcg/kg/minute) stimulate both dopaminergic and β_1-adrenergic receptors producing cardiac stimulation and renal dilation. Large doses (10-20 mcg/kg/minute) stimulate α-adrenergic receptors producing vasoconstriction and increases in peripheral vascular resistance and blood pressure.
Pharmacokinetics:	Onset 5 minutes. Duration less than 10 minutes. $t_{½}$ = 2 minutes.
Indications:	• Hemodynamically significant bradycardia that does not respond to Atropine and/or transcutaneous pacing. • Hemodynamically significant hypotension associated with cardiogenic shock.
Contraindications:	• Hypovolemic shock; volume replacement *must* be accomplished prior to using Dopamine. • Pheochromocytoma (tumor of the adrenal gland).
Precautions: ***Pregnancy Cat. C***	• Dopamine increases heart rate and can induce or worsen supraventricular and ventricular dysrhythmias. • Dopamine should not be administered in the presence of tachydysrhythmias or ventricular fibrillation.
Side Effects:	*CNS:* headache, nervousness *CV:* anginal pain, ectopic beats, hypertension, palpitation, tachycardia, vasoconstriction *GI:* nausea, vomiting *RESP:* dyspnea
Administration:	IV infusion at 5 to 10 mcg/kg/minute. Piggyback the Dopamine infusion into an already established IV infusion. ROSC: IV infusion at 5 to 20 mcg/kg/minute. Piggyback the Dopamine infusion into an already established IV infusion.
Supply:	Premixed Bag containing 800 mg in 250 mL (3,200 mcg/mL).
Notes:	• To prepare a Dopamine infusion, mix 200 mg Dopamine in a 250 mL bag of NS and mix well. Resultant concentration is 800 mcg/mL. Infuse using a 60 drop administration set. Use the formula below to calculate the drip rate. • Tissue sloughing may occur with extravasation. Antecubital veins are preferable sites. Monitor closely for leakage and/or infiltration.

Dopamine Infusion Formula

$$\frac{\text{Dose x weight in kg x 60 drops/min}}{\text{Concentration of drug in 1 mL}} = \text{gtts/minute}$$

EPINEPHRINE 1:1,000

Scope | EMT | ACT | PARAMEDIC

Generic Name:	**Epinephrine 1:1,000**	
Trade Name:	Adrenalin®	
Chemical Class:	Catecholamine	
Therapeutic Class:	Bronchodilator, vasopressor	
Actions:	Epinephrine is a naturally occurring catecholamine. It acts directly on α- and β-adrenergic receptors. Its effect on β-receptors is much more profound that its effect on α-receptors. The effects of Epinephrine on β_1-adrenergic receptors include a positive chronotropic effect (increased heart rate) and a positive inotropic effect (cardiac contractile force). The effects of Epinephrine on α-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 β_2-adrenergic receptors.	
Pharmacokinetics:	*IM:* Onset variable; Peak unknown; Duration 1 to 4 hours *SC:* Onset 5 to 10 minutes; Peak 30 minutes; Duration 1 to 4 hours	
Indications:	• Anaphylaxis. • Bronchial asthma. • Respiratory distress due to epiglottitis or croup **[per MCP]**.	
Contraindications:	Epinephrine should be avoided in the following patients unless signs and symptoms are severe: • Hypertension • Tachycardia • Cardiovascular disease. • Elderly • Angle closure glaucoma.	
Precautions: ***Pregnancy Cat. C***	• Hyperthyroidism. • Diabetes Mellitus. • Give Epinephrine cautiously in geriatric and cardiac patients.	
Side Effects:	*CNS:* anxiety, dizziness, restlessness, tremulousness, headache *CV:* anginal pain, dysrhythmias, hypertension, palpitations *GI:* nausea, vomiting *SKIN:* pallor	
Interactions:	Cyclic antidepressants and antihistamines may potentiate the effects of Epinephrine.	
PARAMEDIC/ACT Administration:	*Adult Anaphylaxis:*	Administer 0.3 mg IM/IM/IO. Repeat dose per MCP.
	Adult Bronchospasm:	Administer 0.3 mg IM/IM/IO. **[per MCP]**
	Pediatric Anaphylaxis:	Administer 0.3 mg for patients >30 kg. Administer 0.15 mg for patients <30 kg.
	Pediatric Cardiac Arrest:	Administer 0.1 mg/kg ET
EMT Administration:	*Adult Anaphylaxis:*	Administer 0.3 mg IM/IM/IO. Repeat dose per MCP
	Pediatric Anaphylaxis:	Administer 0.3 mg for patients
Supply:	Ampule containing 1 mg in 1 mL. Multidose Vial containing 30 mg in 30 mL.	
Notes:	The IM route is preferred for the patient in severe shock.	

EPINEPHRINE 1:10,000

Scope | **ACT** | **PARAMEDIC**

Generic Name:	**Epinephrine 1:10,000**
Trade Name:	Adrenalin®
Chemical Class:	Catecholamine
Therapeutic Class:	Bronchodilator, vasopressor
Actions:	Epinephrine is a naturally occurring catecholamine. It acts directly on α- and β-adrenergic receptors. Its effect on β-receptors is much more profound that its effect on α-receptors. The effects of Epinephrine on β_1-adrenergic receptors include a positive chronotropic effect (increased heart rate) and a positive inotropic effect (cardiac contractile force). The effects of Epinephrine on α-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 β_2-adrenergic receptors.
Pharmacokinetics:	*IV:* Onset immediate; Peak 5 minutes; Duration short
Indications:	• Cardiac arrest. • Anaphylaxis and asthma patients in severe distress.
Contraindications:	No contraindications when used for indicated conditions.
Precautions: ***Pregnancy Cat. C***	No precautions when used for indicated conditions.
Side Effects:	*CNS:* anxiety, dizziness, restlessness, tremulousness, headache *CV:* anginal pain, dysrhythmias, hypertension, palpitations *GI:* nausea, vomiting *SKIN:* pallor
Administration:	*Adult*: Give 1 mg (10 mL) IV/IO. Repeat every 3 to 5 minutes if needed. *Pediatric*: Give 0.01 mg/kg (0.1 mL/kg) IV/IO. Repeat every 3 to 5 minutes if needed. *Anaphylaxis*: 0.5 – 1 mg slow IVP **[per MCP]**
Supply:	Prefilled syringe containing 1 mg in 10 mL
Notes:	

EPIPEN®, EPIPEN JR. ®

Scope | EMT | ACT | PARAMEDIC

Drug Names:	**Epinephrine** (EpiPen®, EpiPen Jr.®)
Overview:	Epinephrine auto-injector (EpiPen®) is a life-saving self-administered medication that is prescribed by a physician to a specific patient. Epinephrine dilates the bronchioles and constricts blood vessels to treat anaphylactic shock.
Indications:	Patient exhibiting the assessment findings of an allergic reaction (shock and/or respiratory distress).
Contraindications:	No contraindications when used in a life-threatening situation.
Precautions:	Give Epinephrine cautiously in geriatric and cardiac patients.
Side Effects:	Increased pulse rate, tremors, nervousness.

Administration:	• Assure right medication, right patient, right route, and right dose.
	• Ensure medication is not discolored (liquid may not be visible inside all types of devices).
	• Remove safety cap from the auto-injector.
	• Place tip of auto-injector against the thigh and press firmly until the injector activates.
	• Hold injector firmly against thigh for a *minimum of 10 seconds* to allow for full dose delivery.
	• Record activity and time.
	• Dispose of injector in biohazard container.
	• If patient condition continues to worsen:
	  o Decreasing mental status, increasing breathing difficulty, decreasing blood pressure.
	  o Give an additional dose of Epinephrine using a second EpiPen®.

Supply:	• EpiPen® contains 0.3 mg of Epinephrine • EpiPen Jr.® contains 0.15 mg of Epinephrine
Notes:	

FENTANYL (Sublimaze®)

Scope | **ACT** | **PARAMEDIC**

Generic Name:	**Fentanyl (fen'-ta-nil)**	***DEA Class: Schedule II***
Trade Name:	Sublimaze®, Duragesic®, Fentora®	
Chemical Class:	Opiate derivative	
Therapeutic Class:	Narcotic analgesic	
Actions:	Fentanyl is a powerful synthetic opiate with mechanism of action similar to Morphine. It is considered both faster acting and of shorter duration than Morphine. Interacts with opiate receptors decreasing pain impulse transmission.	
Pharmacokinetics:	*IV:* Onset immediate. Peak effect several minutes. Duration of action 30 to 60 minutes. *IM:* Onset of action 7 – 8 minutes. Duration of action 1 – 2 hours.	
Indication:	Moderate to severe pain.	
Contraindications:	• Known hypersensitivity • Respiratory depression	
Precautions: ***Pregnancy Cat. C***	• Use with caution with suspected traumatic brain injury. • Use with caution in patients with COPD. • Use with caution in patients with cardiac bradyarrhythmias.	
Side Effects:	*CNS:* dizziness *CV:* hypotension, hypertension, bradycardia *EENT:* blurred vision *GI:* nausea, vomiting *RESP:* respiratory depression, apnea, laryngospasm *SKIN:* diaphoresis	
Administration:	*Pain* *Adult*	1 mcg/kg up to 100 mcg IM, IV, IO, IN over 1 to 2 minutes. Repeat doses require MCP order.
	Pain *Pediatric*	1 mcg/kg up to 50 mcg IM, IV, IO, IN over 1 to 2 minutes. MCP order required for pediatric patients less than 12 years of age.
	Pain *>55 years*	0.5 mcg/kg up to 100 mcg IM or IV over 1 to 2 minutes.
	Chest pain	50 mcg IV q 5 minutes (up to 150 mcg).
Supply:	100 mcg in 2 mL	
Notes:	If a subsequent dose is given prior to the peak effect of the initial dose, there is a risk of dose stacking and potential overdose.	

FUROSEMIDE

Scope	ACT	PARAMEDIC

Generic Name:	**Furosemide** (fur-**oh**-se-mide)
Trade Name:	Lasix®
Chemical Class:	Loop diuretics
Therapeutic Class:	Diuretic
Actions:	Inhibits the reabsorption of sodium and chloride from the loop of Henle and distal renal tubule. Increases renal excretion of water, sodium, chloride, magnesium, potassium, and calcium. Effectiveness persists in impaired renal function. Therapeutic Effects: Diuresis and subsequent mobilization of excess fluid (edema, pleural effusions). Decreased BP.
Pharmacokinetics:	*Absorption: 60–67% absorbed after oral administration* *Distribution: Crosses placenta, enters breast milk.* *Protein Binding: 91–99%.* *Metabolism and Excretion: Minimally metabolized by liver, some non-hepatic metabolism, some renal excretion as unchanged drug.* *Half-life: 30–60 min*
Indications:	Edema due to heart failure, hepatic impairment or renal disease. Hypertension.
Contraindications:	Hypersensitivity; Cross-sensitivity with thiazides and sulfonamides may occur; Hepatic coma or anuria; Some liquid products may contain alcohol, avoid in patients with alcohol intolerance.
Precautions: ***Pregnancy Cat. C***	Severe liver disease (may precipitate hepatic coma; concurrent use with potassium-sparing diuretics may be necessary); Electrolyte depletion; Diabetes mellitus; Hypoproteinemia; Severe renal impairment; OB, Lactation: Safety not established; Pedi: increased risk for renal calculi and patent ductus arteriosis in premature neonates; Geri: May have increased risk of side effects, especially hypotension and electrolyte imbalance, at usual doses.
Side Effects:	CNS: blurred vision, dizziness, headache, vertigo. EENT: hearing loss, tinnitus. CV: hypotension. GI: anorexia, constipation, diarrhea, dry mouth, dyspepsia, increased liver enzymes, nausea, pancreatitis, vomiting. GU: increased BUN, excessive urination, nephrocalcinosis. Derm: photosensitivity, rash, urticaria. Endo: hypercholesterolemia, hyperglycemia, hypertriglyceridemia, hyperuricemia. Hemat: hemolytic anemia, leukopenia, thrombocytopenia. MS: muscle cramps. Neuro: paresthesia. Misc: fever.
Interactions:	Increased risk of hypotension with antihypertensives, nitrates, or acute ingestion of alcohol. Increased risk of hypokalemia with other diuretics, amphotericin B, stimulant laxatives, and corticosteroids.
Administration:	*Adult* • Administer 40 mg if the patient is not currently prescribed furosemide and SBP ≥ 100 mmHg. • Administer 80 mg if the patient is currently prescribed furosemide and SBP ≥ 100 mmHg.
Supply:	• Vial containing 40 mg in 4 mL. • Prefilled Syringe containing 40 mg in 4 mL.

GLUCAGON (GlucaGen®)

Scope | **ACT** | **PARAMEDIC**

Generic Name:	**Glucagon (gloo'ka-gon)**
Trade Name:	GlucaGen®
Chemical Class:	Polypeptide hormone
Therapeutic Class:	Antihypoglycemic
Actions:	Glucagon is a protein secreted by the α 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 to 20 minutes. Glucagon is only effective if there are sufficient stores of glycogen in the liver.
Pharmacokinetics:	Onset within 15 minutes. $t_{½}$ = 3 to 6 minutes.
Indications:	When unable to obtain IV access and give Dextrose, *and:* • Altered mental status of unknown etiology (GCS less than or equal to 12). • Hypoglycemia (less than 60 mg/dL) based on rapid glucose determination or clinical judgment. • Status epilepticus. • Oral hypoglycemic agent overdose.
Contraindications:	Hypersensitivity to the drug.
Precautions: ***Pregnancy Cat. C***	Glucagon is only effective if there are sufficient stores of glycogen with the liver. In an emergency situation, intravenous Dextrose is the agent of choice.
Side Effects:	*CNS:* dizziness, headache *CV:* hypotension *GI:* nausea, vomiting
Administration:	*Adult* 1 mg IM *Pediatric* 1 mg IM
Supply:	Glucagon must be reconstituted before administration. It is supplied in rubber-stoppered vials containing 1 mg of powder and 1 mL of diluting solution.
Notes:	Glucagon may be given to reverse effects of beta-blocker drug overdoses. A significant dose is needed to be effective, usually 3 to 10 mg IV bolus followed by a 2 to 5 mg/hour infusion).

HALOPERIDOL (Haldol®)

Scope PARAMEDIC

Generic Name:	**Haloperidol (ha-loe-per'idole)**
Trade Name:	Haldol®
Chemical Class:	Butyrophenone derivative
Therapeutic Class:	Antipsychotic
Actions:	Haloperidol is a major tranquilizer that has provided effective in the management of acute psychotic episodes. Haloperidol appears to block Dopamine receptors in the brain associated with mood and behavior. Haloperidol has weak anticholinergic properties.
Pharmacokinetics:	*IM:* Peak 10-20 minutes, $t_{½}$ = 17 hours; *IV:* N/A
Indications:	Combative patients secondary to acute psychotic episodes.
Contraindications:	• Severe toxic central nervous system depression or comatose states from any cause. • Hypersensitivity to the drug. • Patients suffering from Delirium Tremens (DTs) from long-term alcohol abuse as it reduces seizure threshold. • Parkinson's disease. • Age less than 8 years. **[per MCP]**
Precautions: ***Pregnancy Cat. C***	• Haloperidol may impair mental and physical abilities. Occasionally, orthostatic hypotension may be seen in conjunction with Haloperidol use. Caution should be used when administering Haloperidol to patients on anticoagulants. • Extrapyramidal reactions have been known to occur following the administration of Haloperidol, especially in children. Diphenhydramine should be available.
Side Effects:	*CNS:* extrapyramidal symptoms, drowsiness, headache, insomnia, restlessness, seizures, vertigo *CV:* hypertension, hypotension, tachycardia *EENT:* blurred vision *GI:* nausea, vomiting, dry mouth, constipation
Administration:	*Adult* Give 5 mg IM/IV/IO. Contact **[per MCP]** for repeat dosing. *Pediatric* Contact **Medical Command Physician**
Supply:	Ampule containing 5 mg in 1 mL.
Note:	If dystonic reaction (dyskinesia) is noted secondary to Haloperidol (Haldol®) administer Diphenhydramine (Benedryl®) 25 mg IV or IM

HYDROXOCOBALAMIN (Cyanokit®)

Scope PARAMEDIC

Generic Name:	**Hydroxocobalamin (hye-drox-oh-koe-bal'-a-min)**
Trade Name:	Cyanokit®
Chemical Class:	Vitamin B complex
Therapeutic Class:	Hematinic; vitamin
Actions:	Cyanide is an extremely toxic poison. In the absence of rapid and adequate treatment, exposure to a high dose of Cyanide can result in death within minutes due to inhibition of cytochrome oxidase resulting in arrest of cellular respiration. Specifically, Cyanide binds rapidly with cytochrome a3, a component of the cytochrome c oxidase complex in mitochondria. Inhibition of cytochrome a3 prevents the cell from using oxygen and forces anaerobic metabolism, resulting in lactate production, cellular hypoxia and metabolic acidosis. The action of Cyanokit® in the treatment of cyanide poisoning is based on its ability to bind cyanide ions to form Cyanocobalamin, which is then secreted in the urine.
Pharmacokinetics:	*N/A*
Indications:	Known or suspected cyanide poisoning.
Contraindications:	Hypersensitivity to Hydroxocobalamin or Cyanocobalamin
Precautions: ***Pregnancy Cat. C***	• Allergic reactions may include anaphylaxis, chest tightness, edema, urticaria, pruritus, dyspnea, and rash. • Hypertension.
Side Effects:	*CNS:* headache *CV:* increased blood pressure *GI:* transient chromoaturia (abnormal coloration of the urine), nausea *SKIN:* erythema, rash, injection site reactions
Administration:	*Adult* — Give 5 g IV infused over 15 minutes. If signs and symptoms persist, a repeat dose can be administered **[per MCP]**. The infusion rate for second dose is usually between 15 minutes and 2 hours. *Pediatric* — Give 70 mg/kg, up to 5 g IV infused over 15 minutes. If signs and symptoms persist, a repeat dose can be administered **[per MCP]**. The infusion rate for second dose is usually between 15 minutes and 2 hours.
Supply:	Each 5 g vial needs to be reconstituted with 200 mL of Normal Saline. Total volume prior to administration is 200 mL and contains 5 g of drug.
Notes:	• The drug substance is the hydroxylated active form of Vitamin B12. • Cyanide poisoning may result from inhalation, ingestion, or dermal exposure to various cyanide-containing compounds, including smoke from closed-space fires. The presence and extent of Cyanide poisoning are often initially unknown. There is no widely available, rapid, confirmatory cyanide blood test. Treatment decisions must be made on the basis of clinical history and signs and symptoms of cyanide intoxication. If clinical suspicion of Cyanide poisoning is high, Cyanokit® should be administered without delay. • Incompatible with Diazepam, Dobutamine, Dopamine, Fentanyl, Nitroglycerin, Pentobarbital, Propofol, Thiopental, blood products, Sodium Thiosulfate, Sodium Nitrite, and ascorbic acid. Use separate IV lines. • The standard administration drip set that comes with the Cyanokit is 20 drops/mL.

IPRATROPIUM (Atrovent®)

Scope | EMT | ACT | PARAMEDIC

Generic Name:	**Ipratropium (eye-pra-troep'ee-um) Bromide**
Trade Name:	Atrovent®
Chemical Class:	Quaternary ammonium compound
Therapeutic Class:	Bronchodilator
Actions:	Ipratropium Bromide is an anticholinergic bronchodilator that is chemically related to Atropine. Ipratropium acts by inhibiting the action of acetylcholine at receptor sites on bronchial smooth muscle, thus inhibiting parasympathetic stimulation and causing bronchodilation. Ipratropium has antisecretory properties when applied locally.
Pharmacokinetics:	Onset 5 to 15 minutes. Peak effect 1 to 2 hours. Duration of action 3 to 6 hours.
Indications:	• Bronchoconstriction in COPD, including chronic bronchitis and emphysema as an adjunct to Albuterol. • Bronchial asthma as an adjunct to Albuterol.
Contraindications:	Hypersensitivity to the drug, or to Atropine and its derivatives.
Precautions: ***Pregnancy Cat. B***	Ipratropium should be used with caution in patients with narrow-angle glaucoma, prostatic hypertrophy, or bladder-neck obstruction.
Side Effects:	*CNS:* anxiety, dizziness, headache, nervousness *CV:* palpitations *EENT:* blurred vision, dry mouth *GI:* nausea, vomiting *RESP:* bronchospasm, cough
Administration:	Using a small volume nebulizer, adjust the oxygen flowmeter to 6 to 10 L/minute to produce a steady, visible mist. *Adult* — Give 0.5 mg in 2.5 mL with a mouthpiece or facemask. Repeat doses per Medical Command. *Pediatric* — Not Administered in patients < 12 years of age.
Supply:	Unit dose vials containing 0.5 mg in 2.5 mL
Notes:	Give only one dose of Ipratropium with the initial Albuterol treatment. Ipratropium is not used as a stand alone drug.

KETAMINE (Ketalar®) (Optional)

Scope | **PARAMEDIC**

Generic Name:	**Ketamine (ket'-a-meen)**
Trade Name:	Ketalar®
Chemical Class:	Analgesic
Therapeutic Class:	General anesthetic
Actions:	Ketamine attaches to NMDA receptors which disassociates the portion of the brain that controls consciousness from the portion of the brain that controls vital bodily functions. The result is, when given in sufficient doses, anesthesia that provides pain control and amnesia while not causing hypotension or prolonged apnea.
Pharmacokinetics:	*IV:* Onset 30-40 seconds. $t_{½}$ = 5 minutes.
Indications:	1. Excited Delirium 2. Non Cardiac related pain secondary to administration of Morphine and/or Fentanyl
Contraindications:	1. Hypersensitivity to the drug. 2. Marked hypertension with potential for increased intracranial pressure (ICP). 3. Patients less than twelve (12) years of age.
Precautions: ***Pregnancy Cat. B***	In patients with cardiac diseases/syndromes, Ketamine might worsen such conditions; NOT indicated as sedation prior to cardioversion or transcutaneous pacing.
Side Effects:	*CNS:* confusion, delirium, vivid dreams *CV:* hypertension, tachycardia *GI:* nausea, vomiting, hypersalivation *RESP:* respiratory depression
Administration	*Adult:* ***Pain Augmentation (if pain persists after initial dose of first line analgesic is given)***: Administer 0.2 mg/kg IV to a maximum single dose of 20 mg. Alternatively may administer 0.5 mg/kg IM *Adult:* ***Excited Delirium:*** Administer 5 mg/kg IM or 2 mg/kg IV/IO *IV/IM:* *Pediatric:* ***Do not administer Ketamine in patients under the age of 12 years and/or 50 kg.***
Supply:	Vial contains 500 mg in 10 mL.
Notes:	1. Ketamine (in lower doses) is much more effective in relieving pain when given following a dose of an opiate analgesic. It is effective in relieving pain when combined with another opioid.

LABETALOL (Trandate®)

Scope PARAMEDIC

Generic Name:	**Labetalol (la-bet-a-lole)**
Trade Name:	Trandate®
Chemical Class:	Beta Blockers
Therapeutic Class:	Antianginals, Anti-hypertensive
Actions:	Blocks stimulation of beta1 (myocardial)- and beta2 (pulmonary, vascular, and uterine)-adrenergic receptor sites. Also has alpha1-adrenergic blocking activity, which may result in more orthostatic hypotension.
Pharmacokinetics:	*Absorption: Well absorbed but rapidly undergoes extensive first-pass hepatic metabolism, resulting in 25% bioavailability.* *Distribution: Some CNS penetration; crosses the placenta.* *Protein Binding: 50%.* *Metabolism and Excretion: Undergoes extensive hepatic metabolism.* *Half-life: 3–8 hr.*
Indications:	Management of hypertension
Contraindications:	• Hypersensitivity to the drug • Uncompensated HF • Pulmonary edema • Cardiogenic shock • Bradycardia or heart block
Precautions: ***Pregnancy Cat. C***	Renal impairment; Hepatic impairment; Pulmonary disease (including asthma); Diabetes mellitus (may mask signs of hypoglycemia); Thyrotoxicosis (may mask symptoms); Patients with a history of severe allergic reactions (intensity of reactions may be elevated); OB: May cause fetal/neonatal bradycardia, hypotension, hypoglycemia, or respiratory depression; Lactation: Usually compatible with breast feeding (AAP); Pedi: Limited data available; Geri: Elevated sensitivity to beta blockers (risk of orthostatic hypotension); lowered initial dosage recommended.
Side Effects:	*CNS: fatigue, weakness, anxiety, depression, dizziness, drowsiness, insomnia, memory loss, mental status changes, nightmares.* *EENT: blurred vision, dry eyes, intraoperative floppy iris syndrome, nasal stuffiness.* *Resp: bronchospasm, wheezing.* *CV: ARRHYTHMIAS, BRADYCARDIA, CHF, PULMONARY EDEMA, orthostatic hypotension.* *GI: constipation, diarrhea, nausea.* *GU: erectile dysfunction, plibido.* *Derm: itching, rashes.* *Endo: hyperglycemia, hypoglycemia.* *MS: arthralgia, back pain, muscle cramps.* *Neuro: paresthesia.*
Interactions:	Since injection may be administered to patients already being treated with other medications, including other antihypertensive agents, careful monitoring of these patients is necessary to detect and treat promptly any undesired effect from concomitant administration. Labetalol HCL blunts the reflex tachycardia produced by nitroglycerin without preventing its hypotensive effect. If labetalol HCL is used with nitroglycerin in patients with angina pectoris, additional antihypertensive effects may occur.
Administration:	*Adult* Administer 10 mg slow IVP over 2 minutes **[per MCP]**. Repeat dose in 10 minutes at 20 mg if BP remains > 180/120 and symptoms remain *Pediatric* *N/A*
Supply:	Prefilled syringe or vials containing 20 mg in 4 mL
Notes:	

LIDOCAINE (Xylocaine®)

Scope | **ACT** | **PARAMEDIC**

Generic Name:	**Lidocaine (lye'doe-kane) Hydrochloride 1% or 2%**	
Trade Name:	Xylocaine®	
Chemical Class:	Amide derivative	
Therapeutic Class:	Anesthetic, local	
Actions:	Lidocaine stabilizes the neuronal membrane by inhibiting the ionic fluxes required for the initiation and conduction of nerve impulses, thereby effecting local anesthetic action.	
Pharmacokinetics:	Onset of anesthesia: 15-30 seconds. Duration 30-60 minutes.	
Indication:	Pain associated with infusing fluid under pressure via the EZ-IO system.	
Contraindications:	Hypersensitivity to the drug. Stokes-Adams syndrome. Wolff-Parkinson-White syndrome. Severe degrees of sinoatrial, atrioventricular, or intraventricular block in the absence of an artificial pacemaker.	
Precautions: ***Pregnancy Cat. B***	Use cautiously in patients with severe liver or kidney disease, hypovolemia, severe congestive heart failure, and shock.	
Side Effects:	*CNS:* seizures, tremors, twitching, dizziness, unconsciousness *CV:* bradycardia, edema, heart block, hypotension *EENT:* blurred or diplopia, tinnitus *Other:* respiratory depression, nausea, vomiting	
Administration IO Analgesia:	*Adult:*	40 mg IO. Give slowly
	Pediatric	0.5 mg/kg up to 40 mg IO.
Administration Cardiac Arrest:	*Adult*	1 – 1.5 mg/kg repeated at 0.5-0.75 mg/kg IV/IO to a maximum dose of 3 mg/kg
	Pediatric	1 mg/kg repeated at 1mg/kg IV/IO
Administration Wide Complex Tachycardia:	*Adult*	0.5-0.75 mg/kg IV/IO to a maximum dose of 3 mg/kg
	Pediatric	1 mg/kg repeated at 1mg/kg IV/IO **[per MCP]**.
Administration ROSC:	*Adult*	1g / 250 mL titrated at 1 – 4 mg/min.
Supply:	• 100mg / 5ml prefilled syringe • 1g in 250 mL	

MAGNESIUM SULFATE

Scope **Paramedic**

Generic Name:	**Magnesium Sulfate (mag-nee'see-um sul'fate)**
Trade Name:	Magnesium Sulfate Inj. 50%
Chemical Class:	Divalent cation
Therapeutic Class:	Antiarrhythmic, electrolyte
Actions:	Magnesium Sulfate is a salt that dissociates into the Magnesium cation (Mg^{2+}) 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:	Torsades de pointes. Eclampsia. Tricyclic antidepressant toxicity. Status asthmaticus non-responsive to standard medications.
Contraindications:	Third-degree AV block.
Precautions: ***Pregnancy Cat. B***	• If reflexes disappear in the eclamptic patient, do not repeat the dose. • Magnesium Sulfate should be administered slowly to minimize side effects. • Any patient receiving intravenous Magnesium Sulfate should have continuous cardiac monitoring and frequent monitoring of vital signs. • 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:	*CNS:* coma, depressed reflexes, lethargy, weakness *CV:* heart block, hypotension, bradycardia *RESP:* respiratory depression *SKIN:* flushing, sweating
Interactions:	Magnesium Sulfate can cause cardiac conduction abnormalities if administered in conjunction with Digitalis.
Administration:	*Adult* — **Torsades** administer Magnesium Sulfate 1 gram diluted in 10 ml NS over 5 – 20 min **Eclampsia:** 4 g (20% solution) IV over 5 minutes. Repeat dose (if available) in 5 minutes if seizure persists **[per MCP]**.
Supply:	Vial containing 1 g in 2 mL
Notes:	

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MIDAZOLAM (Versed®)

Scope	ACT	PARAMEDIC

Generic Name:	**Midazolam (mid-az'zoe-lam)**	***DEA Class: Schedule IV***
Trade Name:	Versed®	
Chemical Class:	Benzodiazepine	
Therapeutic Class:	Sedative/hypnotic	
Actions:	Midazolam causes central nervous systems depression via facilitation of inhibitory GABA[1] at benzodiazepine receptor sites (BZ_1 – associated with sleep; BZ_2 – 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 amnestic properties.	
Pharmacokinetics:	*IM:* Onset 15 minutes. Peak 30 to 60 minutes. *IV:* Onset 3 to 5 minutes. $t_{½}$ = 1.2 to 12.3 hours.	
Indications:	• Pre-medication sedation for transcutaneous pacing. • Sedation for endotracheal intubation only after the ET tube is inserted. • Seizures not caused by hypoglycemia • Severe agitation, tachycardia, or hallucinations caused by alcohol withdrawal • Behavioral or alcohol related agitation as an adjunct to Haloperidol.	
Contraindications:	• Hypersensitivity to the drug. • Hypotension (SBP less than 90 mm Hg). • Acute angle closure glaucoma.	
Precautions: ***Pregnancy Cat. D***	Administer cautiously when alcohol intoxication is suspected. Emergency resuscitative equipment must be available prior to the administration of Midazolam. Vital signs must be continuously monitored during and after drug administration. Midazolam has more potential than the other benzodiazepines to cause respiratory depression and respiratory arrest.	
Side Effects:	*CNS:* drowsiness, amnesia, altered mental status *CV:* hypotension, tachycardia, PVCs *RESP:* bronchospasm, coughing, laryngospasm, respiratory depression, and arrest	
Interactions:	The effects of Midazolam can be accentuated by CNS depressants such as narcotics and alcohol.	
Administration Seizures:	*Adult*	• Administer 2 mg slow IV/IO/IM. Repeated per MCP order • Midazolam may also be administered 5 mg IN if unable to readily establish IV access. • Patients age 55 or older administer 1 mg slow IV/IO/IM (IN dose remains 5 mg)
	Pediatric	• Give 0.1 mg/kg slow IV/IO/IM **[per MCP]**. • Midazolam may also be administered 0.2 mg/kg IN if unable to readily establish IV access **[per MCP]**.
Administration Behavioral:	*Adult*	• Administer 5 mg IV/IO/IM/IN. Repeated per MCP order. • Patients age 55 or older administer 2 mg slow IV/IO/IM (IN dose remains 5 mg)
Administration Post Intubation Management:	*Adult*	• Administer 2 mg slow IV/IO q 5 minutes to a maximum dose of 10 mg. Repeated doses per MCP order
Administration Pre-Medication:	*Adult*	• Administer 2 mg slow IV/IO/IM.
Supply:	Vial containing 5 mg in 1 mL.	
Notes:		

MORPHINE

Scope	ACT	PARAMEDIC

Generic Name:	**Morphine (mor'feen) Sulfate** ***DEA Class: Schedule II***
Trade Name:	Astramorph®, Duramorph®, MS Contin®, Roxanol®
Chemical Class:	Natural opium alkaloid, phenanthrene derivative
Therapeutic Class:	Narcotic analgesic
Actions:	Morphine is a central nervous system depressant that acts on opiate receptors in the brain, providing both analgesia and sedation. It increases peripheral venous capacitance and decreases venous return. Morphine also reduces myocardial oxygen demand due to both the decreased systemic vascular resistance and the sedative effects of the drug.
Pharmacokinetics:	*IM:* Onset 10 to 30 minutes. Peak analgesia 30 to 60 minutes. Duration 4.5 hours. *IV:* Peak analgesia 20 minutes. $t_{½}$ = 2.5 to 3 hours.
Indications:	• Pain associated with acute myocardial infarction unresponsive to nitrates. • Pain management unspecified
Contraindications:	• Hypotension (SBP < 90 mmHg) • Respiratory depression. • Hypersensitivity to the drug. • Multi-system trauma. • Head injury. • Altered mental status from any cause.
Precautions: ***Pregnancy Cat. B***	Morphine causes severe respiratory distress in high doses, especially in patients who already have some form of respiratory impairment. Naloxone should be readily available whenever morphine is administered.
Side Effects:	*CNS:* dizziness, drowsiness, headache, sedation *CV:* hypotension *EENT:* blurred vision, constricted pupils, diplopia *GI:* abdominal cramps, constipation, nausea, vomiting *RESP:* respiratory depression
Interactions:	The CNS depression associated with Morphine can be enhanced when administered with antihistamines, antiemetics, sedatives, hypnotics, barbiturates, and alcohol.
Administration:	*Adult* — Administer 2 mg IV/IM/IO q 5 minutes to a maximum dose of 10 mg. Additional doses per MCP order. Patients age 55 or older administer 1 mg slow IV/IO/IM q 5 minutes to a maximum dose of 10 mg. Additional doses per MCP order. *Pediatric* — Administer 0.05 mg/kg IV/IO/IM **[per MCP]**.
Supply:	• Vial containing 10 mg in 1 mL. • 10mg in 1 mL carpuject
Notes:	Discontinue the IV injection if the pain is relieved or a contraindication develops.

NALOXONE (Narcan®)

Scope | **EMT** | **ACT** | **Paramedic**

Generic Name:	**Naloxone (nal-oks'one)**
Trade Name:	Narcan®
Chemical Class:	Thebaine derivative
Therapeutic Class:	Antidote, opiate
Actions:	Naloxone is chemically similar to the narcotics. However, it has only antagonistic properties. Naloxone competes for opiate receptors in the brain. It also displaces narcotic molecules from opiate receptors. It can reverse respiratory depression associated with narcotic overdose.
Pharmacokinetics:	*IV:* Onset 2 minutes. $t_{½}$ = 64 minutes.
Indications:	• Respiratory depression caused by narcotics. • Coma unknown etiology.
Contraindications:	Hypersensitivity to the drug.
Precautions: ***Pregnancy Cat. B***	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, tachycardia, ventricular dysrhythmia *GI:* nausea, vomiting
Interactions:	Naloxone may cause narcotic withdrawal in the narcotic-dependent patient. In cases of suspected narcotic dependence, only enough drug to reverse respiratory depression should be administered.
Administration: **Paramedic / ACT**	*Adult* — *IV:* Administer 0.4 mg/minute to restore respiratory drive. *IN:* Administer 2 mg IN (1 mL in each nostril).
Administration: **EMT**	*Adult* — *IN:* Administer 2 mg IN (1 mL in each nostril).
Supply:	Vial containing 4 mg in 10 mL.
Notes:	• Unless necessary, avoid insertion of an advanced airway prior to administration of Naloxone. • Administer Naloxone by a slow IV push (0.4 mg/minute). • Reversal of the effects of narcotics may be only temporary. Titrate administration of Naloxone to respiratory rate. • Common narcotic agents include Codeine, Darvon®, Demerol®, Dilaudid®, Fentanyl, Heroin, Methadone, Morphine, Nubain®, Paregoric, Percodan®, Stadol® and Talwin®.

NITROGLYCERIN (Nitrostat®)

Scope | EMT | ACT | Paramedic

Generic Name:	**Nitroglycerin (nye-troe-gli'ser-in)**
Trade Name:	Nitrolingual®, Nitroquick®, Nitrostat®, Nitr-bid®, Nitrol®
Chemical Class:	Nitrate, organic
Therapeutic Class:	Antianginal, 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, decreased preload results in decreased pulmonary capillary hydrostatic pressure and reduction of fluid passing into the pulmonary interstitium and alveoli in cardiogenic pulmonary edema.
Pharmacokinetics:	*SL:* Onset 1 to 3 minutes. Peak 5 minutes. Duration at least 25 minutes. $t_{½}$ = 2 to 3 minutes. *TOP:* Onset 15 to 60 minutes. Peak 30 to 120 minutes. Duration 2 to 12 hours.
Indications:	• Chest pain suspected to be cardiac in origin. • Severe Hypertension • Cardiogenic pulmonary edema.
Contraindications:	• Hypotension (SBP less than 90 mm Hg). • Bradycardia (HR less than 60). • Increased intracranial pressure (i.e., CVA, head injury). • Hypersensitivity to the drug. • Patients who are using anti-impotence agents (Cialis®, Levitra®, Viagra®).
Precautions: ***Pregnancy Cat. C***	• Administer nitrates with extreme caution if at all to patients with suspected inferior wall MI with possible right ventricular (RV) involvement because these patients require adequate RV preload. • Patients taking the drug routinely may develop a tolerance and require an increased dose. • Postural syncope sometimes occurs following the administration of Nitroglycerin; it should be anticipated and the patient kept supine when possible. • 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, postural hypotension, tachycardia *GI:* nausea, vomiting *SKIN:* diaphoresis, flushing, pallor, rash
Interactions:	• Severe hypotension is possible when administered to patients who have recently ingested alcohol. • Orthostatic hypotension is possible when used in conjunction with β-adrenergic antagonists. • Administration of Nitroglycerin is contraindicated in patients who are using anti-impotence agents such as Sildenafil (Viagra®) since these agents have been shown to potentiate the hypotensive effects of organic nitrates.

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NITROGLYCERIN (Nitrostat®)

Scope	EMT	ACT	Paramedic

Administration Chest Pain:	*Adult*	Administer 0.4 mg SL. Repeat q 5 minutes, if needed, to a maximum of 3 doses.
Administration Pulmonary Edema:	*Adult*	**(SBP ≥ 110 mmHg):** Administer 0.4 mg SL. Repeated q 5 minutes to a maximum of 3 doses if needed.
Administration Severe Hypertension:	*Adult*	Administer 0.4 mg SL. Repeat q 5 minutes, if needed, to a maximum of 3 doses.
Supply:	*Tablet:* Bottle containing 0.4 mg (1/150 grain) tablets. Liquid: 400mcg metered dose spray	
Notes:	Nitroglycerin should be kept in the original glass container, tightly capped.	

ONDANSETRON (Zofran®)

Scope | **EMT** | **ACT** | **Paramedic**

Generic Name:	**Ondansetron (on-dan-she'tron)**
Trade Name:	Zofran®
Chemical Class:	Carbazole derivative
Therapeutic Class:	Antiemetic
Actions:	Ondensetron is a selective 5-HT_3 antagonist which is an effective anti-nausea and anti-emetic medication with minimal reported significant side effects. Nausea and vomiting are strongly associated with serotonin receptors of the 5-HT_3 type, present both peripherally on vagal nerve terminals and centrally in the chemoreceptor trigger zone of the area postrema.
Pharmacokinetics:	*IV:* Peak immediate. *IM:* N/A
Indications:	1. Severe vomiting or nausea. 2. Vertigo.
Contraindications:	1. Hypersensitivity to the drug. 2. Pregnancy (all trimesters). 3. Prolonged QT interval
Precautions: ***Pregnancy Cat. B***	Rarely, transient ECG changes including QT interval prolongation have been reported.
Side Effects:	*CNS:* headache, lightheadedness, seizures *CV:* angina, bradycardia, syncope, tachycardia *EENT:* blurred vision *GI:* constipation, diarrhea *RESP:* bronchospasm *SKIN:* rash
Interactions:	N/A
Administration: **Paramedic / ACT**	• Administer 4 mg IV/IM over 4 minutes. Repeat dose requires MCP order. • Administer 4 mg ODT. Place tablet on patient's tongue. The tablet dissolves quickly and can be swallowed with saliva. Repeat dose requires MCP order.
Administration: **EMT**	• *Administer* 4 mg ODT. Place tablet on patient's tongue. The tablet dissolves quickly and can be swallowed with saliva. Repeat dose requires MCP order.
Supply:	Vial containing 4 mg in 2 mL Single dose tablets

ORAL GLUCOSE (Insta-Glucose®)

Scope	EMT	ACT	Paramedic

Drug Names:	**Dextrose** (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. The preparation comes in a tube.
Indications:	Patient with altered mental status and a known history of diabetes controlled by medication.
Contraindications:	• Unresponsive. • Unable to swallow.
Side Effects:	None when given properly. May be aspirated by the patient without a gag reflex.
Administration:	• Assure signs and symptoms of altered mental status with a known history of diabetes. • Assure patient is conscious and can swallow and protect the airway. • Administer glucose: o Between cheek and gum. o Place on tongue depressor between cheek and gum.
Supply:	Tube contains 12.5 g, 15 g, or 25 g (varies per manufacturer).

SODIUM BICARBONATE

Scope	ACT	PARAMEDIC

Generic Name:	**Sodium Bicarbonate (so'dee-um bye-kar'boe-nate)**
Trade Name:	N/A
Chemical Class:	Monosodium salt of carbonic acid
Therapeutic Class:	Alkalinizing agent; electrolyte supplement
Actions:	Sodium Bicarbonate is an alkalizing agent used to buffer acids present in the body during and after severe hypoxia. Sodium Bicarbonate combines with excess acids (usually lactic acid) present in the body to form a weak, volatile acid. This acid is broken down into CO_2 and H_2O. Sodium Bicarbonate is effective only when administered with adequate ventilation and oxygenation. Sodium Bicarbonate may be administered to alkalinize the urine to speed excretion of tricyclic antidepressants.
Pharmacokinetics:	Onset in seconds. Peak 1 to 2 minutes. Duration 10 minutes.
Indications:	• Prolonged cardiac arrest. • Known metabolic acidosis. • Cardiac arrest in a dialysis patient (hyperkalemia). Should be an early treatment consideration. • Tricyclic antidepressant (TCA) overdose. • Crush syndrome
Contraindications:	Hypokalemia.
Precautions: ***Pregnancy Cat. C***	Sodium Bicarbonate can cause metabolic alkalosis when administered in large quantities. It is important to calculate the dosage based on patient weight and size.
Side Effects:	• Metabolic alkalosis. • Hypernatremia. • Hypokalemia.
Interactions:	• Most catecholamines and vasopressor (e.g., Dopamine and Epinephrine) can be deactivated by alkaline solutions such as Sodium Bicarbonate; assure these drugs are not administered simultaneously. • Sodium Bicarbonate should not be administered in conjunction with Calcium Chloride. A precipitate can form and block the IV line.
Administration:	*Adult* **Cardiac arrest:** Administer 15 mEq IV/IO *Pediatric* Contact **[Medical Control]**.
Supply:	Prefilled syringe containing 50 mEq in 50 mL (8.4% solution).
Notes:	

TETRACAINE HCL

Scope	EMT	ACT	Paramedic

Generic Name:	**Tetracaine Hydrochloride Ophthalmic Solution (te-truh-keyn)**
Trade Name:	Cepacol Viractin, Pontocaine
Chemical Class:	Topical anesthetics
Therapeutic Class:	Ophthalmic drops
Actions:	Tetracaine is a topical local anesthetic for the eyes. Tetracaine works by interfering with entry of sodium ions into nerve cells. This reduces the ability of nerves to generate an impulse and send pain sensations.
Pharmacokinetics:	The systemic exposure to tetracaine following topical ocular administration of Tetracaine Hydrochloride Ophthalmic Solution 0.5% has not been studied. Tetracaine hydrochloride is metabolized by plasma pseudocholinesterases and nonspecific esterases in ocular tissues.
Indications:	Tetracaine Hydrochloride Ophthalmic Solution 0.5%, an ester local anesthetic, is indicated for procedures requiring a rapid and short-acting topical ophthalmic anesthetic
Contraindications:	Hypersensitivity; Thromboembolic disorders (current, history of, or at risk for); Acquired defective color vision (IV); Subarachnoid hemorrhage; Concurrent use of combination hormonal contraception (PO).
Precautions:	• Corneal injury with Intracameral Use. Not for injection or intraocular use. Do not use intracamerally because use of Tetracaine Hydrochloride Ophthalmic Solution 0.5% may lead to damage of the corneal endothelial cells. • Corneal Toxicity Prolonged use or abuse may lead to corneal epithelial toxicity and may manifest as epithelial defects which may progress to permanent corneal damage. • Corneal Injury due to Insensitivity Patients should not touch the eye for at least 10-20 minutes after using anesthetic as accidental injuries can occur due to insensitivity of the eye.
Side Effects:	• Severe burning, stinging, or sensitivity where the medicine is applied; • Swelling, warmth, or redness; • Oozing, blistering, or any signs of infection; or. • Eye irritation, watering, or increased sensitivity to light.
Interactions:	Tetracaine hydrochloride should not be used if the patient is being treated with a sulfonamide because aminobenzoic acid inhibits the action of sulfonamides.
Administration:	*Adult* One drop topically in the eye(s) as needed in conjunction with Morgan Lens insertion. Discard unused portion.
Supply:	
Notes:	

THIAMINE

Scope | **ACT** | **PARAMEDIC**

Generic Name:	**Betaxin, Vitamin B1**
Chemical Class:	Ethanolamine derivative
Therapeutic Class:	Vitamin
Actions:	Required for carbohydrate metabolism. Therapeutic Effects: Replacement in deficiency states.
Pharmacokinetics:	Absorption: Well absorbed from the GI tract by an active process. Excessive amounts are not absorbed completely. Also well absorbed from IM sites. Distribution: Widely distributed. Enters breastmilk. Metabolism and Excretion: Metabolized by the liver. Excess amounts are excreted unchanged by the kidneys. Half-life: Unknown.
Indications:	Treatment of thiamine deficiencies. Prevention of Wernicke's encephalopathy. Dietary supplement in patients with GI disease, alcoholism, or cirrhosis.
Contraindications:	Hypersensitivity Known alcohol intolerance or bisulfite hypersensitivity
Precautions: ***Pregnancy Cat. A***	Wernicke's encephalopathy (condition may be worsened unless thiamine is administered before glucose).
Side Effects:	*CNS: restlessness, weakness.* *EENT: tightness of the throat.* *Resp: pulmonary edema, respiratory distress.* *CV: VASCULAR COLLAPSE, hypotension, vasodilation.* *GI: GI bleeding, nausea.* *Derm: cyanosis, pruritus, sweating, tingling, urticaria, warmth.* *Misc: ANGIOEDEMA.*
Interactions:	NONE
Administration:	*Adult* Administer 100 mg IV/IM/IO
Supply:	Vial containing 100 mg in 2 mL vial
Notes:	Administer prior to Glucose or Glucagon administration

TRANEXAMIC ACID (OPTIONAL)

Scope | **Paramedic**

Generic Name: **Tranexamic Acid (tran-ex-am'-ik as-id)**

Trade Name: Cyklokapron®

Chemical Class: Amino acid derivative

Therapeutic Class: Antifibrinolytic

Actions: Inhibits plasminogen activation and plasmin activity.

Pharmacokinetics: *IV:* Onset 5-15 minutes. $t_{½}$ = 2 hours. Duration of action: approximately 3 hours.

Indications:
- Any trauma patient, 14 years of age or older, who is at high risk for ongoing internal hemorrhage meeting one or more of the following criteria:
- Systolic blood pressure less than 90 mm Hg.
- Patients over 65 years of age with systolic blood pressure less than 110 mm Hg.
- Tachycardia with heart rate greater than 120 beats per minute with signs of hypoperfusion present (confusion, altered mental status, cool extremities, etc.).
- Contact **[Medical Control]** as needed if the patient does not meet the above criteria.

Contraindications:
- Injuries greater than 3 hours old.
- Evidence of disseminated intravascular coagulation (DIC).
- Hypersensitivity to the drug.

Precautions:
- Excreted in breast milk.

Pregnancy Cat. B
- Caution in patients with history of deep vein thrombosis (DVT), pulmonary embolus, other blood clots, or severe renal failure.
- Can cause worsened coagulopathy in some patients.

Side Effects: *CNS:* anxiety, blurred vision, confusion
CV: hypotension, chest pain, tachycardia
GI: nausea, vomiting, diarrhea
RESP: shortness of breath, cough

Interactions: Female patients taking or using any form of birth control containing estrogen and progestin are at an increased risk for blood clots and this medication increases that risk significantly.

Administration:

Loading Dose	IV infusion of 1 gram Tranexamic Acid (TXA) infused over 10 minutes. Piggyback the TXA infusion into an already established IV infusion.
Maintenance Dose:	IV infusion of 1 gram Tranexamic Acid (TXA) infused over 8 hours. Piggyback the TXA infusion into an already established IV infusion.

Supply: Vial containing 1,000 mg in 10 mL.

Notes:
- To prepare loading dose, mix 1 gram TXA in 100 mL or 250 ML NS. Attach a 15 drop administration set and infuse over 10 minutes.
- To prepare maintenance infusion, mix 1 gram TXA in 100 mL or 250 ML NS. Attach a 60 drop administration set and infuse over 8 hours.
- Major external bleeding MUST be controlled by direct pressure, hemostatic dressings, and tourniquets; TXA administration does NOT control external hemorrhage.
- Be sure to CLEARLY document the mechanism of injury, the time of injury/incident, and the time that the TXA bolus was administered (as well as when the maintenance infusion was started, if applicable).