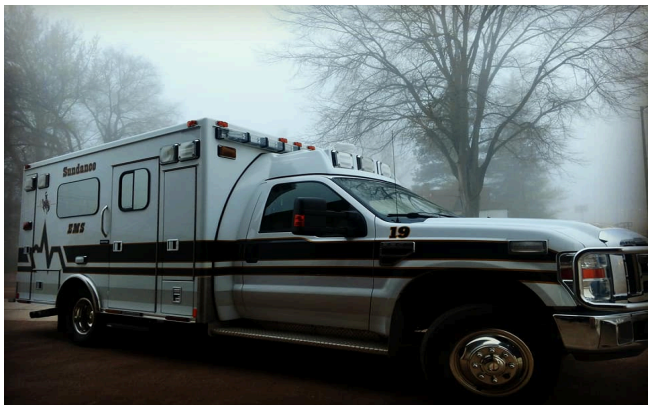

Sundance EMS Medications / Formulary

UPDATED FOR CCMSD 2020

Revised February 4 2020
Rev 1.0

Contents

Change Summary

Rev. No.	Change Summary to Formulary	Date Released

Acetaminophen
Tylenol

R	E	A	I	P	RN

Class: Antipyretic/Analgesic

Pharmacology/Actions: Fever is a complex physiologic response triggered by infectious or aseptic stimuli. Elevations in body temperature occur when concentrations of prostaglandins increase within certain areas of the brain. These elevations alter the firing rate of neurons that control thermoregulation in the hypothalamus. Although fever benefits the nonspecific immune response to invading microorganisms, it is also viewed as a source of discomfort. Acetaminophen acts by inhibiting prostaglandin synthesis in the CNS and through a peripheral action by blocking pain-impulse generation. The peripheral action is also through inhibition of the synthesis of prostaglandins, or to inhibition of the synthesis or actions of other substances, which sensitize pain receptors to mechanical or chemical stimulation.

Onset/Duration: Onset: 30-60 minutes / Duration 4 hours.

Indications: Fever-Temperature >100.4 F (38C)

Febrile seizure

Mild pain

Contraindications: Known allergy (rare)

Should be used with caution in patients with liver and renal disease.

Side Effects: None when administered in the therapeutic dosage range

Drug Interactions: Non Significant

Route: PO/PR

Supplied: 325 or 500mg tablets or 160mg/5ml liquid.

Dosage:

Adults	Pediatrics (<45g)
325-650 mg PO every 4-6 hours. Not to exceed 3 g in 24 hours.	1 g every 4 hours. Not to exceed 3 g in 24 hours.

Pregnancy Safety: Category A- Benefits should clearly outweigh the risk.

Activated Charcoal

Class: Absorbent.

Pharmacology/Actions: Activated charcoal is a fine black powder that binds and absorbs ingested toxins still present in the GI tract. It has a tremendous surface area. Once it binds and absorbs the ingested toxin, the combined complex is excreted from the body.

Onset/Duration: Onset: Immediate / Duration unknown.

Indications: Acute poisoning in alert patients within 1 hour of ingestion.

Contraindications: Poisoning by corrosive agents, cyanide, iron mineral acids, or organic solvents. Patients with altered mental status, active vomiting, absence of bowel sounds, GI perforation.

Side Effects: Vomiting, abdominal cramping, bloating, constipation, and risk of aspiration.

Drug Interactions: Non Significant

Route: PO

Dosage:

Adults	Pediatrics (<45g)
1 gram/kg PO	1 gram/kg PO

Pregnancy Safety: Category A- Benefits should clearly outweigh the risk.

Comments: Consider pre-medication with antiemetic.

May be combined with sorbitol, which acts as a laxative decreasing GI transit time. Consider Poison Control (1-800-222-1222) to determine recommended administration of activated charcoal.

Adenosine

Adenocard

Class: Endogenous nucleoside.

Pharmacology/Actions: Adenosine primarily is formed from the breakdown of adenosine triphosphate (ATP) which is found in every cell of the body and has a wide range of metabolic roles. Adenosine slows SVT by decreasing electrical conduction through the AV node without causing negative inotropic effects. It also acts directly on Sinus pacemaker cells and vagal nerve terminals to decrease chronotropic activity.

Onset/Duration: Onset: 20-30 seconds / Duration 30 seconds.

Indications: Regular narrow-complex PSVT

Regular wide-complex undifferentiated tachycardia

If V-fib, adenosine likely to have no effect

Dysrhythmias associated with bypass tracts such as WPW syndrome

Contraindications: Second – or third-degree heart block, sick sinus syndrome, known hypersensitivity

Side Effects: Facial flushing, headache, chest pain, SOB, dizziness, and nausea

Drug Interactions: Methylxanthines (ie Aminophylline, Theophylline) may decrease the effectiveness, thus requiring larger doses. Dipyridamole (Persantine, Aggrenox) can potentiate the effects, thus dosage may need to be reduced.

Route: Rapid IV push

Dosage:

Adults	Pediatrics (<45g)
Initial dose: 6 mg over 1 second,	**Initial dose:** 0.1mg/kg (max 6mg) over 2 seconds
Followed by 20mL flush; elevate extremity.	Followed by 5-10 mL flush; elevate extremity.
Additional: 12 mg in 1-2 minutes if PSVT continues	May be doubled once (max 12mg)

Pregnancy Safety: Category C – give only if potential benefits justifies risk to fetus.

Comments: Due to extremely short half-life, adenosine must be administered rapid IV push, preferable

Via large bore IV closest to central circulation as possible (i.e. AC, EJ)

Albuterol
Proventil

Class: Sympathomimetic, bronchodilator, B2-agonist.

Pharmacology/Actions: Albuterol is sympathomimetic that is selective for B2-adrenergic receptors. It relaxes smooth muscles of the bronchial tree and peripheral vasculature by stimulating adrenergic receptors of the sympathetic nervous system.

Onset/Duration: Onset: 5-15 minutes / Duration 3-4 hours.

Indications: Relief of bronchospasm in patients with reversible obstructive airway disease (i.e. acute asthma exacerbation, acute COPD, exacerbation, anaphylactic reaction).

Contraindications: Hypersensitivity, cardiac dysrhythmias associated with tachycardia.

Side Effects: Restlessness, apprehension, dizziness, palpitations, tachycardia, dysrhythmias

Drug Interactions: Other sympathomimetics may exacerbate adverse cardiovascular effects. Antidepressants may potentiate effects on the vasculature (vasodilation). B-blockers may antagonize albuterol. Albuterol may potentiate diuretic-induced hypokalemia.

Route: Inhalation

Dosage:

Adults	Pediatrics (<45g)
MDI: 1-2 inhalations (90-180 mcg) every 4 hr; use of spacer is preferred. **Nebulizer:** 2.5 mg (0.5mL of 0.5% solution) diluted to 3 ml with 0.9% NS (0.083% solution); administer over 5-15 min; may repeat q 20 min x 3.	**MDI:** 1-2 inhalations (90-180 mcg) every 4 hr; use of mask and/ or spacer is preferred. **Nebulizer:** 2.5 mg (0.5mL of 0.5% solution) diluted to 3 ml with 0.9% NS (0.083% solution); administer over 5-15 min; may repeat q 20 min x 3.

*** Note: if setting of severe asthma exacerbations, 4 inhalations or continuous nebulized Albuterol may be indicated.

Pregnancy Safety: Category C- give only if potential benefits justifies risk to fetus.

Comments: Consider use in combination with Ipratropium (Atrovent).

Albuterol may precipitate angina pectoris and dysrhythmias. Use caution in patients with diabetes mellitus, hyperthyroidism, prostatic

Amiodarone

Cordarone

Class: Class III antidysrhythmic agent (with multiple other class properties).

PHARMACOLOGY/ACTIONS: Prolongs the action potential duration and effective refractory period, and when given short-term IV, probably induces noncompetitive β-adrenoreceptor and calcium channel blocker activity.

ONSET/DURATION: Onset: within minutes / Duration: varies.

Indications: Ventricular fibrillation (V-fib)/pulseless ventricular tachycardia (V-tach). Hemodynamically unstable V-tach with a pulse. With medical control contact, Amiodarone may be used for treatment of some other atrial and ventricular dysrhythmias.

CONTRAINDICATIONS: No contraindications if in cardiac arrest or unstable dysrhythmia.

Relative: pulmonary congestion, cardiogenic shock, hypotension, bradycardia, known hypersensitivity, and sick sinus syndrome, hyperkalemia.

SIDE EFFECTS: Hypotension, headache, dizziness, bradycardia, AV conduction abnormalities, flushing, and abnormal salivation, QT prolongation

DRUG INTERACTIONS: Multiple complex drug interactions.

ROUTE: IV, IO.

Dosage:

Adults	Pediatrics (<45g)
Pulseless Arrest	
Initial: 300mg rapid IV bolus Additional: 150mg in 3-5min if needed	Initial: 5mg/kg rapid IV bolus Additional: 5mg/kg in 3-5 min if needed
Wide Complex Tachycardia	
Loading dose of 150mg in 100mL over 10 min (15 mg/min) IV/IO. May be repeated as necessary for recurrent or refractory dysrhythmias.	Loading dose 5mg/kg IV/IO over 20-60 min (max dose 15mg/kg/day).

Pregnancy Safety: Category D- Positive risk to fetus, maternal benefit may outweigh risk to fetus.

Comments: Continuous ECG monitoring is required. Slow infusion or discontinue if Bradycardia or AV blocks occur. Maintain drug at room temperature and protect from excessive heat.

Antibiotic Drips

R	E	A	I	P	RN

Class: Antibiotic/ Antifungal

PHARMACOLOGICAL ACTIONS: Treatment for known infection. Prophylactic measure for patient who may undergo surgical procedure or who has had recent exposure that indicates likelihood of resulting infection.

INDICATIONS:

 Pre-existing, diagnosed infection or suspected infection.

 Exposure that creates likelihood of resulting infection.

CONTRAINDICATIONS: Known Allergy

SIDE EFFECTS:

Impaired Renal Function

Injection site Burning

Nausea and Vomiting

Diarrhea

ADMINISTRATION/ ROUTE: IV Infusions Only

DOSE: Varies depending on the antibiotic, generally given as a "piggyback" solution. Rate should not require a titration during transport.

NOTE:

Antibiotics need to be started 15 minutes or more before the start of the transport.

Verify infusion rate as well as total time at the transferring facility prior to departure.

Monitor patient closely en-route.

Any change in rate/dosage of antibiotics during interfacility transfer requires Medical Control Order.

Discontinue and follow Anaphylaxis Protocol if needed for signs of allergic reaction and or shock. Contact Medical Control immediately.

Consider IV bolus if hypotension occurs.

If infusion is completed during transport, antibiotics should be discontinued and line kept open by infusing 0.9% Normal Saline at TKO rate.

RN may start, stop, titrate, and manage changes per physician's order set or Medical direction.

Aspirin

R E A I P RN

CLASS: Platelet aggregator inhibitor and anti-inflammatory agent.

PHARMACOLOGY/ACTIONS: Aspirin blocks the formation of the substance thromboxane A2, which causes platelets to aggregate and arteries to constrict.

ONSET/DURATION: Onset: 15-30 minutes / Duration: 4-6 hours.

INDICATIONS: Chest pain suggestive of acute coronary syndrome (ACS).

CONTRAINDICATIONS:

Absolute: known hypersensitivity, known hemorrhagic stroke.

Relative: GI bleeding, bleeding disorders, active ulcer disease, aortic aneurysm, asthma.

SIDE EFFECTS: Heartburn, GI bleeding, nausea, vomiting, wheezing, and prolonged bleeding.

DRUG INTERACTIONS: Other anti-inflammatory agents; ↓ effects with antacids and steroids; ↑ effects with anticoagulants, insulin, oral hypoglycemics, fibrinolytic agents.

ROUTE: PO (Chewable).

Dosage:

Adults	Pediatrics (<45g)
324 mg (81mgx4)	Not Indicated

If patient has taken at least 324 mg in the past 12 hours, do not give additional dose

If patient has taken less than 324 mg – give additional dose to supplement total dose to 324 mg

Pregnancy Safety: Category D – positive risk to fetus, maternal benefit may outweigh risk to fetus.

Comments: Do not substitute acetaminophen or ibuprofen.

Atropine

CLASS: Anticholinergic, Parasympatholytic**.**

PHARMACOLOGY/ACTIONS: Atropine acts by blocking acetylcholine receptors, thus inhibiting parasympathetic stimulation. Antagonizes excess muscarinic receptor stimulation caused by organophosphate insecticides or chemical nerve agents (i.e. sarin).

ONSET/DURATION: Onset: immediate / Duration: 2-6 hours

INDICATIONS:

Hemodynamically significant bradycardia

Organophosphate or nerve gas poisoning (large doses usually required).

CONTRAINDICATIONS:

Hypersensitivity

Tachycardia

SIDE EFFECTS: Blurred vision, dilated pupils, dry mouth, tachycardia, drowsiness, and confusion.

DRUG INTERACTIONS: There are few interactions in the prehospital setting.

ROUTE: IV, IO

Adults	Pediatrics (<45g)
Symptomatic Bradycardia	
0.5-1 mg IV/IO. Repeat every 3-5 min for a maximum dose of 0.04mg/kg or 3mg.	0.02mg/kg IV/IO (minimum 0.1mg, maximum 2mg). Repeat every 5-15 min until Atropine effects are observed
Anticholinesterase Poisoning	
2mg IV/IO push every 5-15 min until Atropine effects are observed.	0.02 mg/kg IV/IO (minimum 0.1mg, maximum 2mg). Repeat every 5-15 min until Atropine effects are observed.

Pregnancy Safety: Category C-Give only if potential benefits justifies risk to fetus

Comments: May worsen bradycardia associated with second-degree Mobitz type II and third-degree AV blocks. A maximum dose of 0.04 mg/kg of 3 mg should not exceed except in the case of organophosphate poisoning.

Calcium Gluconate

R E A I P RN

CLASS: Electrolyte.

PHARMACOLOGY/ACTIONS: Calcium gluconate provides elemental calcium in the form of the cation Ca2+ which is necessary for many physiologic activities. Calcium causes a significant increase in myocardial contractility. Calcium also increases cardiac muscle tone and force of systolic contractions (positive inotropic effect) making it especially useful for patients with sympathetic blockade.

ONSET/DURATION: Onset: immediate / Duration: unknown.

INDICATIONS:-

Hyperkalemia associated with known dialysis patient.

Calcium channel blocker overdose.

Toxicity from magnesium sulfate overdose.

Tetany associated with black widow spider bite. *Contact medical control

Hydrofluoric acid burns. *Contact medical control

CONTRAINDICATIONS:

Digitalis toxicity

Ventricular fibrillation

Hypercalcemia.

SIDE EFFECTS: Hypotension, bradycardia, arrhythmias, syncope, cardiac arrest, and tissue irritation.

DRUG INTERACTIONS: Will interact with sodium bicarbonate forming a precipitate.

ROUTE: IV, topical.

Adults	Pediatrics (<45g)
Systemic toxicity/Cardiac arrest	
20mL of 10% solution slow IV push over 2-5 min	2mL of 10% solution slow IV push over 2-5 min

Pregnancy Safety: Category C- give only if potential benefits justifies risk to fetus.

Comments: Calcium is no longer recommended for routine administration during cardiac arrest. Calcium should be administered slowly through a patent IV in a large vein to avoid possibility of extravasation and resultant tissue necrosis.

Dextrose 50%

R E A I P RN

CLASS: Carbohydrate.

PHARMACOLOGY/ACTIONS: The term dextrose is used to describe the six-carbon sugar d-glucose, the principal form of carbohydrate used by the body. D10% solution is used in emergency care to treat hypoglycemia and in the management of coma of unknown origin.

ONSET/DURATION: Onset: 1 minute / Duration: dependent.

INDICATIONS:
Altered mental status of unknown origin.
Hypoglycemia.
Seizures.
Head trauma with decreased mental status if unable to check blood glucose.
Hypothermia if unable to take oral nutrition safely (prolonged field setting).

CONTRAINDICATIONS: None if documented or suspected hypoglycemia.

SIDE EFFECTS: Hyperglycemia.

DRUG INTERACTIONS: None significant.

ROUTE: IV, IO.

SUPPLIED: 250 ml bag of Dextrose 10% = 25 Grams total (10 Grams/ 100ml)

Dosage:

Adults	Pediatrics (<45g)
12.5-25gm slow IV/IO; may be repeated as needed to maintain normal blood glucose.	5ml/kg IV/IO; may be repeated as needed to maintain normal blood glucose. **Neonate:** 2mL/kg 10% (D10) **> 1 month**: 5mL/kg bolus

PREGNANCY SAFETY: Category C – give only if potential benefits justifies risk to fetus.

COMMENTS: Extravasation may cause tissue necrosis, use large vein and aspirate occasionally to ensure route patency. Draw blood sample and check BGL prior to administration if possible.

Diazepam

R E A I P RN

Valium

Class: Benzodiazepine.

PHARMACOLOGY/ACTIONS: Acts on the limbic, thalamic, and hypothalamic regions of the CNS to potentiate the effects of inhibitory (GABA) neurotransmitters, raising the seizure threshold in the motor cortex.

ONSET/DURATION: Onset: 1-5 minutes IV / Duration: 15 minutes – 1 hour.

INDICATIONS: Seizure activity.

Acute anxiety states.

Premedication before cardioversion or TCP.

Acute alcohol withdrawal.

Skeletal muscle relaxation.

CONTRAINDICATIONS:

Hypersensitivity, Shock, Coma, CNS depression due to head injury, Respiratory depression

Use with caution in substance abuse patients.

SIDE EFFECTS: Hypotension, respiratory depression, ataxia, psychomotor impairments, confusion, and nausea.

DRUG INTERACTIONS: May precipitate CNS depression and psychomotor impairment in patients who are taking other CNS depressant medications. Diazepam should not be administered with other drugs because of possible precipitation.

ROUTE: IV, IO, IM, Rectal

Dosage:

Adults	Pediatrics (<45g)
2.5-5mg slow IVP every 5-10 min PRN (max dose 20mg).	Infants 30 days-5 yrs: 0.1mg/kg slow IVP every 5-10 min PRN to max 5mg or 0.2mg/kg per rectum to max 10mg. Children > 5yrs: 1mg slow IVP every 5-10 min to max 10mg or 0.2mg/kg per rectum to max 10mg.

Pregnancy Safety: Category D- positive risk to fetus, maternal benefit may outweigh risk to fetus.

Comments: DEA schedule IV drug with potential for abuse. May cause local venous irritation. Has short duration of anticonvulsant effect. Reduce dose by 50% in elderly patients or with known liver disease.

Diphenhydramine

Benadryl

Class: Antihistamine, anticholinergic.

PHARMACOLOGY/ACTIONS: Antihistamines prevent the physiological actions of histamines by blocking H1 and H2 receptor sites. It may inhibit MAST cell damage, preventing more histamine release. It also has anticholinergic and antiemetic effects.

ONSET/DURATION: Onset: maximum effects 1-3 hours / Duration: 6-12 hours.

INDICATIONS: Moderate to severe allergic reactions.

Anaphylaxis.

Acute extrapyramidal (dystonic) reactions.

Prevention of acute extrapyramidal (dystonic) reactions secondary to haloperidol or promethazine.

Nausea/vomiting (related to motion sickness and other causes).

CONTRAINDICATIONS:

Hypersensitivity

Patients taking MAO inhibitors.

Narrow-angle glaucoma (relative).

Newborns and nursing mothers.

SIDE EFFECTS: Drowsiness, disturbed coordination, hypotension, palpitations, tachycardia, bradycardia, thickening of bronchial secretions, dry mouth and throat, paradoxical excitement in children.

DRUG INTERACTIONS: CNS depressants may increase depressant effects, MAO inhibitors may prolong and intensify anticholinergic effects.

ROUTE: IV, IO, IM.

Dosage:

Adults	Pediatrics (<45g)
25-50mg IM slow IV/IO	>10kg 1-2mg/kg IV, IO, IM

Pregnancy Safety: Category C- give only if potential benefits justifies risk to fetus.

Comments: Use with caution in patients with CNS depression or lower respiratory disease such as Asthma.

Dilaudid

Hydromorphone

CLASS: Opioid agonist

PHARMACOLOGY/ACTIONS: Full opioid agonist. Hydrogenated ketone of morphine, semi-synthetic opioid with analgesic effects. Selectively binds the mu-opioid receptor which is linked through G-protiens.

ONSET/DURATION: **IV**: onset 10-15, duration: 2-3hr **IM**: onset:15min, duration: 4-5hr

INDICATIONS:
Severe Pain

CONTRAINDICATIONS:
Significant respiratory depression
Acute or severe bronchial asthma
Hypersensitivity
ICP
Naltrexone

SIDE EFFECTS: lightheadedness, dizziness, sedation, N/V, sweating, flushing, dysphoria, euphoria, dry mouth, pruritus, respiratory depression, hypotension, syncope.

DRUG INTERACTIONS: Amitriptyline, Alprazolam, Amoxapine, Buspirone, Butabarbial, Butalbital, Citalopram, clomipramine, Clonazepam, Clopidogrel, Cocain, Codeine, Diazepam, Dosyetine, Escitalopram, Ethonal, Fluoxetine, Hydrocodone, Lorazepam, Sumatriptan, Sertraline, Tramadol, Trazodone, Triazolam

ROUTE: IV / IM

Dosage:

Adult	Pediatric
0.5mg- 1mg IV/IM	0.005 mg/kg IV / IM (ages 6-10)

PREGNANCY SAFETY: Category C – give only if potential benefits justifies risk to fetus.

COMMENTS: Use with caution in patients with CNS depression or lower respiratory disease such as asthma. Use caution in elderly or debilitated patients and those with hepatic or renal disease, Addison's disease, hypothyroidism, prostatic hyperplasia, or urethral strictures.

Dobutamine

CLASS: Sympathomimetic

PHARMACOLOGICAL ACTIONS: Dobutamine is an inotropic agent whose primary activity is the stimulation of beta receptors of the heart while producing comparatively mild chronotropic, hypertensive, arrhythmogenic and vasodilative effects. It causes an increase in cardiac output (C.O) usually not associated with a marked increase in heart rate, while the stroke volume is usually increased. Systemic vascular resistance is usually decreased due to stimulation of beta 2 receptors which contributes to the increased C.O.

ONSET/DURATION: Onset**:** 1 - 2 minutes however as much as 10 minutes may be required to obtain the peak effect at a particular infusion rate/ Duration: 2 minutes.

INDICATIONS:
Severe cardiac failure secondary to AMI or cardiomyopathy
Cardiogenic shock
Septic shock
Congestive cardiac failure
Acute pulmonary edema

CONTRAINDICATIONS: Idiopathic hypertrophic subaortic stenosis

ADVERSE REACTIONS: An increase in Heart rate of 5-15 BPM**,** increase blood pressure of 10-20mmHg systolic**, v**entricular ectopics, arrhythmias**,** uncommon side effects include nausea, headache, angina, palpitations and dyspnea, may lower serum potassium/hypokalemia**, t**hrombocytopenia**,** and bronchospasms.

ROUTE: IV/ IO

SUPPLIED: Dilute 250mg in 100mL of Dextrose 5%

DOSAGE: Dose range is 2-20mcg/kg/min. May go up to 20mcg/kg/min.

OUT OF TOWN TRANSFER CONSIDERATIONS:

Ideally monitor BP continuously. Patient must be on cardiac monitor. Dobutamine is titrated according to patient response as determined by HR, presence of ectopic beats, and BP. Titrated usually in 1 - 2 mcg/kg/min increments until appropriate response is achieved. Dobutamine can be administered by a peripheral line. Dobutamine must always be administered via a volumetric infusion pump. In the case of an out of town transfer Dobutamine can be titrated, adjusted, or discontinued during the transport.

Dopamine

R E A I P RN

Intropin

Class: Sympathomimetic.

PHARMACOLOGY/ACTIONS: Dopamine is chemically related to epinephrine and norepinephrine. It acts primarily on α1- and β1-adrenergic receptors in a dose-dependent fashion. At low doses ("renal doses"), dopamine may act on dopaminergic receptors, causing renal, mesenteric, and cerebral vascular dilation. At moderate doses ("cardiac doses"), dopamine stimulates beta-adrenergic receptors, causing enhanced myocardial contractility, increased cardiac output, and a rise in blood pressure. At high doses ("vasopressor doses"), dopamine has an alpha-adrenergic effect producing peripheral arterial and venous constriction. Dopamine is commonly used in the treatment of hypotension associated with cardiogenic and vasogenic shock.

ONSET/DURATION: Onset: 2-4 minutes / Duration: 10-15 minutes.

INDICATIONS:

Hemodynamically significant hypotension in the absence of hypovolemia.

Symptomatic bradycardia.

CONTRAINDICATIONS:

Tachydysrhythmias and ventricular fibrillation

Patients with pheochromocytoma.

SIDE EFFECTS: Dose-related tachydysrhythmias, hypertension, increased myocardial oxygen demand (e.g. ischemia).

DRUG INTERACTIONS: Dopamine may be deactivated by alkaline solutions (sodium bicarbonate). MAO inhibitors may potentiate the effect of dopamine. Sympathomimetics and phosphodiesterase inhibitors exacerbate dysrhythmia response. Beta-adrenergic antagonists may blunt inotropic response. When administered with phenytoin, hypotension, bradycardia, and seizures may develop.

ROUTE: IV, IO.

Dosage:

Adults	Pediatrics (<45g)
10-20 mcg/kg/min titrated to effect	10-20 mcg/kg/min titrated to effect

Pregnancy Safety: Category C- give only if potential benefits justifies risk to fetus

Epinephrine 1:1000

R E A I P RN

Adrenaline

Class: Sympathetic agonist , sympathomimetic.

PHARMACOLOGY/ACTIONS: Epinephrine acts directly on α- and β-adrenergic receptors. Its effect on β-receptors is much more profound than its effect on α-receptors. Effects include: increased heart rate, increased cardiac contractile force, increased electrical activity in the myocardium, increased systemic vascular resistances, increased blood pressure, and increase in automaticity.

ONSET/DURATION: Onset: < 2 minutes / Duration: 5-10 minutes.

INDICATIONS: Anaphylaxis/Allergic reaction.

Severe asthma.

Cardiac arrest.

CONTRAINDICATIONS: Hypovolemic shock and severe hypertension.

RELATIVE CONTRAINDICATIONS: Coronary artery disease, Pregnancy, Severe tachydysrhythmias and PVC's, Hyperthyroidism, Cerebrovaslcular insufficiency.

SIDE EFFECTS: Tachycardia including V-tach and V-fib, palpitations, anxiety, tremor, headache, nausea, weakness, restlessness, and hypertension.

DRUG INTERACTIONS: MAO inhibitors may potentiate effects. β-adrenergic antagonists may blunt inotropic response. Sympathomimetics and phosphodiesterase inhibitors may exacerbate dysrhythmia response.

ROUTE: IV, IO, IM, and SQ.

Dosage:

Adults	Pediatrics (<45g)
Asthma/allergic reaction: 0.3mg (0.mL) IM; May repeat every 5 min	Asthma/allergic reaction: 0.01 mg/kg (0.01 mL/kg) may repeat every 5 min (0.15 mg : 0.15mL)

Pregnancy Safety: Category C- give only if potential benefits justifies risk to fetus

Comments: Be extremely cautious with dosage calculations and administration. Use with caution in patients with peripheral vascular insufficiency. Epinephrine is pH dependent and can be deactivated by alkaline solutions such as sodium bicarbonate. Effects can be intensified in patients who are taking antidepressants.

****CAUTION in patients OVER 50 years old due to cardiovascular stress. WHEN DRAWING EPI VIA NEEDLE AND SYRINGE ENSURE YOU HAVE THE CORRECT DOSED BOTTLE! You must have the 1mg/mL (1:1000) small vial. Blunt needle with 1mL syringe must be used. DO NOT draw up more than 0.3mL or 0.15mL in syringe at one time for pt use.

Epinephrine 1:10,000

Adrenaline

R E A I P RN

CLASS: Sympathetic agonist (sympathomimetic).

PHARMACOLOGY/ACTIONS: Epinephrine acts directly on α- and β-adrenergic receptors. Its effect on β-receptors is much more profound than its effect on α-receptors. Effects include: increased heart rate, increased cardiac contractile force, increased electrical activity in the myocardium, increased systemic vascular resistances, increased blood pressure, and increase in automaticity.

ONSET/DURATION: Onset: < 2 minutes / Duration: 5-10 minutes.

INDICATIONS:
Cardiac arrest
Anaphylaxis

CONTRAINDICATIONS: None in presence of cardiac arrest.

SIDE EFFECTS: Tachycardia including V-tach and V-fib, palpitations, anxiety, tremor, headache, nausea, weakness, restlessness, and hypertension.

DRUG INTERACTIONS: MAO inhibitors may potentiate effects. β-adrenergic antagonists may blunt inotropic response. Sympathomimetics and phosphodiesterase inhibitors may exacerbate dysrhythmia response.

ROUTE: IV, IO.

Dosage:

Adults	Pediatrics (<45g)
Cardiac arrest: 1 mg (10 ml) rapid IV/IO push every 3-5 minutes PRN. Anaphylaxis: 0.3-0.5 mg (3-5 ml) slow IV/IO push; may repeat every 5-20 minutes PRN Drip: 1-10 mcg/min IV (mix 1mg in 250 ml of D5W; 30mcg/min. = 2 mcg/min) titrate to effect.	Cardiac arrest: 0.01 mg/kg (0.1 ml/kg) rapid IV/IO push every 5 minutes PRN Anaphylaxis: 0.01 mg/kg (0.1 ml/kg – maximum 3 ml) slow IV/IO push; may repeat every 5-20 minutes PRN.

PREGNANCY SAFETY: Category C – give only if potential benefits justifies risk to fetus.

COMMENTS: Epinephrine is pH dependent and can be deactivated by alkaline solutions such as sodium bicarbonate. Effects can be intensified in patients who are taking antidepressants.

Etomidate

R E A I P RN

Amidate

CLASS: Short-acting non-barbiturate hypnotic.

PHARMACOLOGY/ACTIONS: Etomidate is an imidazole compound that appears to depress CNS function via GABA. Duration of action is intermediate between thiopental and methohexital, and recovery from a single dose is rapid with little residual depression. Like the barbiturates and propofol, etomidate does not induce analgesia. It has minimal histamine release, so less hemodynamic compromise.

ONSET/DURATION: Onset: <1 minutes / Duration: 3-5 minutes.

INDICATIONS:
Induction agent for rapid sequence induction.

CONTRAINDICATIONS:
Hypersensitivity

SIDE EFFECTS: Respiratory depression, arrhythmias, bradycardia, hypotension, nausea, vomiting, hiccups, laryngospasm, transient skeletal muscle movements including: myoclonus, averting movements, and eye movements.

DRUG INTERACTIONS: Effects may be increased when given with other CNS depressants or skeletal muscle relaxants.

ROUTE: IV, IO, IM.

Dosage:

Adults	Pediatrics (<45g)
0.3 mg/kg IV/IO/IM Max dose 30 mg.	0.3 mg/kg IV/IO/IM Max dose 10 mg

PREGNANCY SAFETY: Category C – give only if potential benefits justifies risk to fetus.

COMMENTS: DEA schedule II drug with potential for abuse. Fentanyl should be used with caution in elderly patients and in those with severe respiratory disorders, seizure disorders, cardiac disorders, or pregnancy. Rapid administration or large doses may cause skeletal muscle (chest wall) rigidity so severe that ventilation is difficult or impossible.

Fentanyl

Sublimaze

CLASS: Synthetic opioid agonist.

PHARMACOLOGY/ACTIONS: Analgesic with short duration of action. Minimal histamine release, so less hemodynamic compromise.

ONSET/DURATION: Onset: 5-8 minutes / Duration: 1-2 hours.

INDICATIONS:
Pain control.
Sedation for invasive procedures (TCP/cardioversion).

CONTRAINDICATIONS:
Hypersensitivity
Respiratory depression or insufficiency
Uncorrected hypotension

SIDE EFFECTS: Respiratory depression, bradycardia, hypotension, hypertension, nausea and vomiting.

DRUG INTERACTIONS: Effects may be increased when given with other CNS depressants or skeletal muscle relaxants.

ROUTE: IV, IO, IM, IN.

Dosage:

Adults	Pediatrics (<45g)
50-100mcg slow IV/IO/IM/IN every 5-15 minutes as needed to control pain. Maximum 200mcg prior to medical control contact.	0.5-2mcg/kg slow IV/IO/IM/IN every 5-15 minutes as needed to control pain. Maximum 100mcg prior to medical control contact.

PREGNANCY SAFETY: Category C – give only if potential benefits justifies risk to fetus.

COMMENTS: DEA schedule II drug with potential for abuse. Fentanyl should be used with caution in elderly patients and in those with severe respiratory disorders, seizure disorders, cardiac disorders, or pregnancy. Rapid administration or large doses may cause skeletal muscle (chest wall) rigidity so severe that ventilation is difficult or impossible.

Furosemide

R E A I P RN

Lasix

CLASS: Loop Diuretic

PHARMACOLOGY/ACTIONS: Inhibits loop of Henle and proximal and distal convoluted tubule sodium and chloride resorption causing profound increase in urine output.

ONSET/DURATION: Onset IV = 5min, IM = 10-30min / Duration IV= 2hrs, IM = 4-8hrs

INDICATIONS:
Edema
Pulmonary Edema, Acute
Hypertension
Hypercalcemia
CHF

CONTRAINDICATIONS:
Anuria
Electrolyte imbalances
Allergy to sulfonamides/Sulfas
Hypersensitivity

SIDE EFFECTS: Dizziness, nausea, vomiting, weakness, muscle cramps, hypokalemia, hypomagnesemia, orthostatic hypotension, Blurred vision, abd cramps, diarrhea, hyperglycemia, tinnitus, paresthesia, photosensitivity.

DRUG INTERACTIONS:
Desmopressin
Diuretics
Sotalol
NSAIDS
Lithium

ROUTE: IM/IV

Dosage:

Adults	Pediatrics (<45g)
20-40 mg IV/IM x 1 dose	0.5-1 mg/kg IV/IM every 6-12 hours or 1 mg/kg IV/IM x 1 dose

PREGNANCY SAFETY: .Class C, Passed during Lactation

Comments: Use caution in elderly patients, patients with hepatic and renal disease, urinary retention, arrhythmias, gout, SLE, Diabetes mellitus

Glucagon

R E A I P RN

CLASS: Pancreatic hormone, insulin antagonist.

PHARMACOLOGY/ACTIONS: Glucagon is a protein secreted by the alpha cells of the pancreas. It increases blood glucose by converting glycogen in the liver into glucose. Glucagon also has positive inotropic action on the heart and decreases renal vascular resistance which makes it useful in beta-blocker and calcium channel blocker overdose.

ONSET/DURATION: Onset: 1 minute / Duration: 60-90 minutes.

INDICATIONS:
Persistent hypoglycemia despite glucose supplementation.
Hypoglycemic patient where unable to establish IV access.
Beta-blocker or calcium channel blocker toxicity.

CONTRAINDICATIONS:
Hypersensitivity (allergy to proteins). Relative in patient with no glycogen storage (malnutrition, alcoholism).

SIDE EFFECTS: Tachycardia, hypotension, 25rticarial, nausea, and vomiting.

DRUG INTERACTIONS: Effects of anticoagulants may be increased if given with glucagon. Do not mix with saline.

HOW SUPPLIED: Glucagon must be reconstituted with provided diluent before administration. Dilute 1 unite (1 mg) white powder in 1 ml of diluting solution (1 mg/ml).

ROUTE: IV, IO, IM.

Dosage:

Adults	Pediatrics (<45g)
Hypoglcemia: 1 mg IM; may repeat in 7-10 minutes. B-blocker or calcium channel toxicity: 2 mg IV initially, may require higher doses.	Hypoglycemia: 0.5-1 mg IM β-blocker and calcium channel toxicity: safety and efficacy have not been established.

PREGNANCY SAFETY: Category B – unproven or unknown risk to fetus, and no risk in later trimesters.

COMMENTS: Glucagon should not be considered a first-line choice for hypoglycemia. IV glucose will need to be administered if the patient does not respond to a second dose of glucagon. Do not give more than 2 doses of Glucagon as maximal glycogen release from the liver has occurred.

Oral Glucose

Glutose

CLASS: Oral hypoglycemic agent, carbohydrate (sugar).

PHARMACOLOGY/ACTIONS: Elevates blood glucose. Causes hyperosmolar diuresis and decreases cerebral edema.

ONSET/DURATION: Onset: 10 minutes / Duration: varies.

INDICATIONS: Hypoglycemia, seizures, and/or altered mental status and unable to determine blood sugar level.

CONTRAINDICATIONS: Unconscious, unable to protect airway.

SIDE EFFECTS: May be aspirated if patient is unable to protect airway.

DRUG INTERACTIONS: None

HOW SUPPLIED: Gel in 15 gm/tube (single use).

ROUTE: Oral.

Dosage:

Adults	Pediatrics (<45g)
10-20 grams; may be repeated in 10 minutes if necessary. Check BGL with glucometer if available.	5-20 grams; may be repeated in 10 minutes if necessary. Check BGL with glucometer if available.

PREGNANCY SAFETY: Category C – give only if potential benefits justifies risk to fetus.

COMMENTS: Because changes in level of consciousness can change rapidly in patients with hypoglycemia, it is important to ascertain the patient's ability to swallow an oral preparation without airway compromise.

Haloperidol

Haldol

CLASS: Antipsychotic/ neuroleptic.

PHARMACOLOGY/ACTIONS: The medication is thought to block dopamine 2 receptors in the brain, altering mood and behavior.

ONSET/DURATION: Onset: 10-60 minutes/ Duration: 12-24 hours.

INDICATIONS:
Acute psychotic episodes.
Emergency sedation for severely agitated and aggressive or delirious patients who present a danger to themselves or others.

CONTRAINDICATIONS:
Hypersensitivity
CNS depression
Combativeness from trauma or pregnancy.
Severe liver or cardiac disease.

SIDE EFFECTS: Dose-related extrapyramidal reactions, pseudoparkinsonism, akathisia, dystonias, orthostatic hypotension, nausea and vomiting, blurred vision.

DRUG INTERACTIONS: Other CNS depressants may potentiate effects. Haldol may inhibit vasoconstrictor effects of epinephrine.

ROUTE: IM/ IV/ IO

Dosage:

Adults	Pediatrics (<45g)
2-5mg IM or slow IVP. May repeat PRN per Medical Control.	NOT INDICATED.

PREGNANCY SAFETY: Undetermined. Category C-give only if potential benefits justifies risk to fetus.

COMMENTS: Do not use in patients with suspected head injury. Administer diphenhydramine for patients with dystonic reactions. Fluid challenge is indicated with significant drop in blood pressure. Cardiac monitoring for prolongation of QT interval required with IV administration.

Ibuprofen

CLASS: NSAID

PHARMACOLOGY/ACTIONS: It is a non-selective inhibitor of cyclo-oxygenase-1 (COX-1) and Cyclooxygenase-2 (COX-2). Although its anti inflammatory properties may be weaker than those of some other NSAIDs, it has a prominent analgesic and antipyretic role. Its effects are due to the inhibitory actions on cyclo-oxygenases, which are involved in the synthesis of prostaglandins. Prostaglandins have an important role in the production of pain, inflammation and fever.

ONSET/DURATION: Onset: 30-60 min / Duration : 4-6 hours

INDICATIONS: Fever reduction, Pain

CONTRAINDICATIONS: Hypersensitivity, Do not use in patients with renal impairment. Angioedema,

SIDE EFFECTS: Nausea, vomiting, headache, dizziness, rash, flatulence, heartburn, anemia, hypokalemia, cardio vascular risks, peptic ulcer, GI bleed

DRUG INTERACTIONS: ACE- inhibitors, Antacids, anticoagulants, Diuretics, salicylates, corticosteroids, Insulin, antibiabetics, nifedipine, phenytoin, verapamil, ginkgo biloba

ROUTE: PO

Dosage:

Adults	Pediatrics (<45g)
600 mg PO every 8 hours	10 mg/kg PO every 8 hours

PREGNANCY SAFETY: Category B (D in 3rd trimester)

Ipratroprium Bromide

Atrovent

CLASS: β2-agonist.

PHARMACOLOGY/ACTIONS: Ipratropium is an anticholinergic bronchodilator which is chemically related to atropine. Ipratropium is a parasympatholytic used in the treatment of respiratory emergencies. It causes bronchodilation and dries respiratory tract secretions. Ipratropium acts by blocking acetylcholine receptors, thus inhibiting parasympathetic stimulation.

ONSET/DURATION: Onset: 5-15 minutes / Duration: 4-6 hours.

INDICATIONS: Treatment of bronchial asthma, reversible bronchospasm associated with chronic bronchitis or emphysema.

CONTRAINDICATIONS: Known hypersensitivity to atropine or its derivatives. Not indicated as a single agent for acute treatment of bronchospasm where rapid response is required.

SIDE EFFECTS: Tachycardia, paradoxical bronchospasm may occur.

DRUG INTERACTIONS: None reported.

ROUTE: Inhalation.

Dosage:

Adults	Pediatrics (<45g)
500 mcg (one unit dose vial) administered by nebulizer.	NOT INDICATED.for children 12 and under. Over 12, same dose as adult.

.*** Generally used in conjunction with first Albuterol dose, subsequent nebulizers should be with Albuterol only.

PREGNANCY SAFETY: Category B – unproven or unknown risk to fetus, and no risk in later trimesters.

COMMENTS: Vital signs must be monitored during therapy with ipratropium. Caution should be used when administering to elderly patients and those with cardiovascular disease and hypertension. Use caution in patients with significant tachycardia (120+), prostatic hypertrophy, narrow angle glaucoma or bladder neck obstruction.

Ketamine Hydrochloride

CLASS: Non-barbiturate anesthetic

PHARMACOLOGY/ACTIONS: Ketamine is a dissociative anesthetic agent, structurally similar to phencyclidine (PCP), which interrupts the connection between the thalamo-neocortical tracts and the limbic system. In addition, it stimulates many different receptors, including the opiod and catecholamine receptors. It is unique among sedative agents in that it also provides analgesia in addition to the amnestic and sedative effects. The sympathomimetic effects cause an increase in heart rate, blood pressure, and cardiac output. It is also a bronchodilator, and thus may be beneficial in patients with bronchospasm requiring intubation.
ONSET/DURATION: Onset: 1-2 minutes IV and 3-8 minutes IM/ Duration: 10-20 minutes.

INDICATIONS:
As a sedative in Excited Delirium or combative patient.
As an induction agent in the performance of Rapid Sequence Induction procedure.
As an agent to maintain continued sedation of the intubated patient post induction.

CONTRAINDICATIONS: Known Hypersensitivity, thyrotoxicosis, CHF, angina, aneurysm, and hypertension.

SIDE EFFECTS: Hallucinations, vivid dreams, hypertension, increased cardiac output, tonic-and clonic movements, nystagmus, and hyper salivation.
DRUG INTERACTIONS: Many drugs may affect the metabolism of ketamine. However, there are no drugs with which the addition of ketamine would be contraindicated.

ROUTE: IV/ IO/ IM
SUPPLIED: 500mg/ 10mL 50mg/mL

Dosage:

Adults	Pediatrics (<45g)
Excited Delirium 5mg/kg (IM) (max 300mg) Rapid Sequence Induction / Post Intubation/ Dissociative Sedation. 1-2mg/kg (IV or IO) 5mg/kg (IM)	>10 kg: 1-2 mg/kg IV, IO, IM

PREGNANCY SAFETY: Category C – give only if potential benefits justifies risk to fetus.
COMMENTS: Use with caution in patients with CNS depression or lower respiratory disease such as asthma. When Ketamine is given, Pulse Oximetry and constant patient engagement of the patient must be performed. End Tidal Capnography and EKG monitoring should be performed when available and appropriate. Some patients experience an “emergence phenomenon” in which a patient experiences disturbing dreams as they emerge from Ketamine induced sedation. Emergence phenomena are less of a concern when Ketamine is used as an induction agent for RSI. Because of the risk of hyper salivation and possible aspiration, suctioning equipment must be immediately available when this medication is given. Patient will require very frequent to continuous monitoring of oral secretions.

Lactated Ringers

CLASS: Isotonic Chrystaloid Solution

PHARMACOLOGY/ACTIONS: Lactated Ringers (LR) is a balanced resuscitation fluid. Balanced resuscitation fluids have an electrolyte composition similar to human blood plasma. In contrast to sodium chloride 0.9% (NaCl 0.9%), LR has less chloride, a small amount of additional electrolytes, and an anion buffer (lactate). LR has a strong ion difference (SID) of +28. The SID is the difference between the concentrations of strong cations and strong anions. While a detailed explanation of the SID is beyond the scope of this guide, it is useful to know that the administration of a resuscitation fluid with a SID less than the serum bicarbonate level (normal range 22–26 mmol/L) will lead to a more acidotic state (↓pH) and the administration of a resuscitation fluid with a SID greater than the serum bicarbonate level leads to a more alkalotic state (↑pH).

ONSET/DURATION: Onset: Immediate Duration: Varies, depending on disease process.

INDICATIONS:
Dehydration
Hypovolemia
Burns
Ocular irrigation

CONTRAINDICATIONS: Profound liver failure (LR may increase the lactate level, but it should be noted that the lactate in LR is in the form of sodium lactate, not lactic acid and it will not make the patient more acidotic).

SIDE EFFECTS/ ADVERSE REACTIONS: Rare in emergency setting. May cause fluid overload/ pulmonary edema

DRUG INTERACTIONS: The calcium in LR can bind to the citrated anticoagulant in blood products and lead to inactivation of anticoagulant and promote the formation of clots in donor blood. For this reason, LR is contraindicated as a diluent for red blood cell infusions.

ROUTE: IV/ IO

SUPPLIED: 100mL, 500mL, 1000mL

Dosage:

Adults	Pediatrics (<45g)
Bolus Dose: 20mL/kg, repeat to titrate to MAP of 60mmHg. (Sepsis) 30mL/kg, repeat to titrate to MAP of 60mmHg. **Maintenance Infusion (per hour):** 4 mL/kg for the first 10ks of a patient's weight 2 mL/kg for the next 10kg of a patient's weight 1 mL/kg for the rest of the patient's weight **Ocular Irrigation**: Flush continuously for 20 minutes.	**Bolus Dose**: Neonates: 10mL/kg, repeat one time. (Slow, over 30 to 60 min) Pediatrics >30 days: 20mL/ kg repeat as needed titrate MAP of 60mmHg. **Maintenance Infusion (per hour)**: 4 mL/kg for the first 10ks of a patient's weight 2 mL/kg for the next 10kg of a patient's weight 1 mL/kg for the rest of the patient's weight **Ocular Irrigation**: Flush continuously for 20 minutes

PREGNANCY SAFETY: Category C – give only if potential benefits justifies risk to fetus.

COMMENTS:
Fluids should be administered judiciously to patients with evidence of or a history of heart failure.
Because LR is slightly hypotonic, large volumes may increase intracranial pressure.

Lidocaine 2%

Xylocaine

CLASS: Antidysrhythmic (Class IB), local anesthetic.

PHARMACOLOGY/ACTIONS: Local anesthetic properties in small local doses.

ONSET/DURATION: Onset: 30-90 seconds.

INDICATIONS: Anesthesia for initial IO line flush.

CONTRAINDICATIONS: Hypersensitivity to the drug.

SIDE EFFECTS: Limited at IO anesthetic dose. Higher doses may cause hypotension, bradycardia, confusion, dizziness, seizures, and slurred speech.

DRUG INTERACTIONS: Limited interactions at IO anesthetic dose.

ROUTE: IO.

Dosage:

Adults	Pediatrics (<45g)
20 - 40 mg (1-2 ml) IO flush for pain control prn. (slow over 2 min)	0.5 mg/kg IO flush for pain control prn.

PREGNANCY SAFETY: Category B – unproven or unknown risk to fetus, and no risk in later trimesters.

Lidocaine Drip

CLASS: Antidysrhythmic (Class IB), local anesthetic.

PHARMACOLOGY/ACTIONS: Suppresses automaticity and shortens the effective refractory period and action pential duration of His-Purkinje fibers and suppresses spontaneous ventricular depolarization during diastole. Therapeutic levels do not significantly affect conductive atrial tissue and AV conduction. Drug seems to act preferentially on diseased or ischemic myocardial tissue; exerting its effects on the conductive system, it inhibits reentry mechanisms and halts ventricular arrhythmias

ONSET/DURATION: Onset = immediate Duration= 10-20min

INDICATIONS: Rapid Sequence Intubation for head injury, Ventricular arrhythmias from MI, Cardiac Manipulation, Cardiac glycosides.

CONTRAINDICATIONS:
Hypersensitivity to the drug. WPW, Stoke-Adams syndrome, Severe hypertension, spinal deformities, neurologic disorders.

SIDE EFFECTS: seizure, anxiety, lethargy, confusion, tremor, restlessness, bradycardia, cardiac arrest, hypotension, tinnitus, vision changes, nausea, vomiting, respiratory arrest, status asthmatics, rash

DRUG INTERACTIONS: Antiarrhythmics (phenytoin, procainamide, propranolol, quinidine)

ROUTE: IV

Dosage:

Adults	Pediatrics (<45g)
RSI dose= 1.5mg/kg IV 2-3min prior to intubation **Mix 1gram in 100mL. Usual dose = 1-4mg/min** 1mg/min = 6ml/hr 2mg/min = 12mL/hr 3mg/min = 18 mL/hr 4mg/min = 24mL/hr **Cardiac Dosing** 50mg – 100mg IV bolus given at 25-50mg/minute. If no Clinical response repeat bolus after 5minutes. (DO NOT EXCEED 300mg total bolus during 1hr period) Continuous infusion of 1-4mg/min (A reduction in amount maybe needed in pt with heart failure or hepatic disease.)	**RSI dose=** 1-2 mg/kg IV 2-5min prior to intubation **Infusion rate** 20-50 mcg/kg/min (2grams diluted in 500mL of fluid)

PREGNANCY SAFETY: Category B – unproven or unknown risk to fetus, and no risk in later trimesters.

Lorazepam

Ativan

CLASS: Short-acting benzodiazepine.

PHARMACOLOGY/ACTIONS: Lorazepam is a water-soluble short-acting benzodiapezine with anticonvulsant, anxiolytic, sedative, and hypnotic effects. It acts on the limbic, thalamic, and hypothalamic regions of the CNS to potentiate the effects of inhibitory (GABA) neurotransmitters. Like diazepam, it suppresses the spread of seizure activity through the motor cortex of the brain while not abolishing the abnormal discharge focus.

ONSET/DURATION: Onset: 1-5 minutes IV, 15-30 minutes IM / Duration: 6-8 hours.

INDICATIONS:
Seizure activity.
Acute anxiety states.
Premedication before cardioversion or TCP.
Chemical restraint in combative patient.

CONTRAINDICATIONS:
Hypersensitivity and pregnancy.
Respiratory depression, glaucoma, and psychosis. (Relative)

SIDE EFFECTS: Hypotension, respiratory depression, apnea, and anterograde amnesia.

DRUG INTERACTIONS: Alcohol, CNS depressants, and anticonvulsants may precipitate CNS depression. Cimetidine increases plasma levels and potential toxicity.
ROUTE: IV, IO, IM, IN.

Dosage:

Adults	Pediatrics (<45g)
Seizures: 2-4 mg slow IV/IO push, may be repeated in 3-5 minutes if necessary. **Sedation/severe anxiety**: 0.5-2mg slow IV/IM/IN push.	**Seizures**: 0.05-0.1 mg/kg slow IV/IO push, may be repeated in 3-5 minutes if necessary; maximum single dose 2 mg.

PREGNANCY SAFETY: Category D – positive risk to fetus, maternal benefit may outweigh risk to fetus.

COMMENTS: DEA schedule IV drug with potential for abuse. Because lorazepam is a relatively short-acting drug, seizure activity may recur requiring additional dosing. Resuscitation equipment should be readily available. Shelf life of unrefrigerated lorazepam is 60 days, expiration dates and medication rotation must be monitored.

Magnesium Sulfate

CLASS: Electrolyte.

PHARMACOLOGY/ACTIONS: Magnesium acts as a physiologic calcium channel blocker and blocks neuromuscular transmission, thereby providing electrical stability in the myocardium. Affects impulse formation and conduction time in the myocardium, thus reduces incidence of dysrthymias associated with hypomagnesemia or prolonged QT interval. Also has anticonvulsant properties thought to be produced by CNS depression.

ONSET/DURATION: Onset: immediate / Duration: 30 minutes.

INDICATIONS:
Torsades de pointes (polymorphic V-tach).
Eclampsia.
Reactive airway disease refractory to other treatments.

CONTRAINDICATIONS: Myocardial damage, heart block, and renal disease.

SIDE EFFECTS: Respiratory depression, CNS depression, hypotension, pulmonary edema, flushing and swelling.

DRUG INTERACTIONS: Neuromuscular blocking agents and CNS depressants add to respiratory depression and apnea.

ROUTE: IV, IO

Dosage:

Adults	Pediatrics (<45g)
Torsades de pointes: 1-2gm slow IV/IO push **Eclampsia:** 4g 250mL Lactated Ringer's IV/IO infused over 10-20 minutes. **Reactive airway disease**: 2-4g/ 50mL NS IV/IO infused over 20 minutes.	**Torsades de pointes**: 25-50mg/kg slow IV/IO push, maximum of 2grams. **Reactive airway disease**: 25-50mg/kg in 50 ml NS IV/IO infused over 20 minutes, maximum 2 grams

PREGNANCY SAFETY: Category A – considered safe during pregnancy.

COMMENTS: Administer magnesium sulfate slowly at no more than 1 gram/minute, no matter what the clinical condition. Calcium chloride or gluconate can be used as an antidote if serious side effects occur. Early indicators of magnesium toxicity include cathartic effect, profound thirst, flushed, sedation, confusion, depressed reflexes, and muscle weakness.

Mark I Kit

CLASS: Atropine: antimuscarinic, parasympathetic blocker./ 2-PAM (Pralidoxime): Antidote to cholinesterase inhibitors, organophosphate chemicals, organophosphate pesticides.

PHARMACOLOGY/ACTIONS: Pralidoxime is used together with atropine to treat poisoning caused by organic phosphorous pesticides, and organophosphate chemicals (nerve gas).

ONSET/DURATION: Onset- seconds to hour / Duration

INDICATIONS: Counteract effects of exposure to nerve agents such as Sarin, Suman, Tabun, & Vx.

CONTRAINDICATIONS: Personal Prophylaxis

SIDE EFFECTS:
Blurred or double vision, Tachypnea, Tachycardia, Headache, Nausea

DRUG INTERACTIONS:
Aminophylline
Theophylline
NoDoz (Caffine Tabs)

ROUTE: IM to outer thigh muscle or upper outer quadrant of the Buttocks. DO NOT inject into areas close to hip, knee, or thighbone.

Dosage:

Adults	Pediatrics (<45g)
AtroPen- Atropine sulfate 20mg in 0.7mL **ComboPen- Pralidoxime Chloride (2PAM) 600mg in 2mL** **May repeat in 10 minutes x3 doses**	**AtroPen- Atropine sulfate 20mg in 0.7mL** **ComboPen- Pralidoxime Chloride (2PAM) 600mg in 2mL** **May repeat in 10 minutes**

PREGNANCY SAFETY: Unknown
COMMENTS: Before making patient contact, make sure appropriate decontamination has been performed including clothing removal prior to contact. All responding personnel should use caution with multiple non-traumatic patients or where vapors, clouds, or unknown types of liquids are present.
"SLUDE" acronym for signs and symptoms of nerve gas exposure
S=Salivation
L=Lacrimation (tearing)
U=Urination
D=Defecation or Diarrhea
G=GI distress
E=Emesis

Methylprednisolone

Solu-medrol

CLASS: Glucocorticoid.

PHARMACOLOGY/ACTIONS: Methylprednisolone is a synthetic steroid that suppresses acute and chronic inflammation.

ONSET/DURATION: Onset: 1-2 hours / Duration: 8-24 hours.

INDICATIONS:
Anaphylaxis/severe allergic reaction.
Severe asthma exacerbation.
COPD exacerbation.

CONTRAINDICATIONS:
Hypersensitivity
Use with caution in patients with gastrointestinal bleeding, diabetes mellitus, or severe infection.

SIDE EFFECTS: Headache, hypertension, sodium and water retention, hypokalemia, and alkalosis.

DRUG INTERACTIONS: Hypoglycemic responses to insulin and oral hypoglycemic agents may be blunted. Potassium-depleting agents may potentiate hypokalemia induced by corticosteroids.

ROUTE: IV, IO, IM.

Dosage:

Adults	Pediatrics (<45g)
125mg SLOW IV/IO/IM.	1-2 mg/kg slow IV/IO/IM

PREGNANCY SAFETY: Category C – give only if potential benefits justifies risk to fetus.

COMMENTS: Methylprednisolone should not be considered first line therapy as onset of action takes 1-2 hours.

Midazolam

Versed

CLASS: Short-acting benzodiapezine.

PHARMACOLOGY/ACTIONS: Midazolam is a water-soluble short-acting benzodiazepine that is metabolized by the liver and excreted in the urine. It binds benzodiazepine receptors and enhances GABA central nervous system effects.

ONSET/DURATION: Onset: 1-3 minutes / Duration: 2-6 hours.

INDICATIONS:
Seizure activity.
Acute anxiety states.
Premedication before cardioversion or TCP.
Chemical restraint in combative patient.
Continued sedation in paralyzed patient.

CONTRAINDICATIONS:
Hypersensitivity
Coma or shock

RELATIVE CONTRAINDICATIONS:
Glaucoma, Alcohol intoxication, Concomitant use of barbiturates, alcohol, narcotics, or other CNS depressants used by the patient.
SIDE EFFECTS: Respiratory depression, hiccups, cough, over sedation, nausea and vomiting, headache, blurred vision, fluctuation in vital signs, hypotension, and respiratory arrest.

DRUG INTERACTIONS: Sedative effect of midazolam accentuated by concomitant use of barbiturates, alcohol, or narcotics.
ROUTE: IV, IO, IM, IN.

Dosage:

Adults	Pediatrics (<45g)
1-4mg slow IV/IO/IM/IN push, may be repeated in 3-5 minutes if necessary (total maximum dose not to exceed 0.1mg/kg without medical control approval). 2-5mg slow IV/IO push in continued sedation of paralyzed patients, may be repeated as needed.	0.05-0.1mg/kg slow IV/IO/IM/IN push, may be repeated in 3-5 minutes if necessary; maximum single dose 5mg

PREGNANCY SAFETY: Category D – positive risk to fetus, maternal benefit may outweigh risk to fetus.
NOTE: in elderly or patients with known liver disease, lower dosage should be used due to impaired metabolism.
COMMENTS: DEA schedule IV drug with potential for abuse. Provide continuous monitoring of respiratory and cardiac function. Have resuscitation equipment available. Never administer as rapid push IV bolus, which may lead to profound hypotension and/or respiratory impairment.

Morphine Sulfate

CLASS: Narcotic analgesic.

PHARMACOLOGY/ACTIONS: Extremely potent narcotic analgesic. It dilates peripheral vasculature (reducing pre-load and after-load and decreasing myocardial oxygen demand). Morphine also tends to reduce the respiratory rate and tidal volume and causes pupils to constrict. It reduces apprehension and anxiety. The vasodilatation should cause no problems if patients are supine and not upright, not volume depleted, or have a decreased cardiac output. The onset of action is immediate if given IV. Peak effects are seen within 20 minutes.

ONSET/DURATION: Onset: 1-2 minutes / Duration: 2-7 hours.

INDICATIONS:
Cardiac suspected chest pain **after** administration of oxygen, aspirin, and nitroglycerin according to protocol.
Pain control in absence of hypotension.

CONTRAINDICATIONS:
Major blood loss (hypovolemia) or hypotension
Head or abdominal injuries
Increased ICP
Respiratory difficulties.

RELATIVE CONTRAINDICATIONS: Patients who have taken alcohol, tricyclic antidepressants, MAO inhibitors, or other depressants.

SIDE EFFECTS: Respiratory depression, hypotension, nausea and vomiting, decreased LOC, constricted pupils, urinary retention, and histamine release.

DRUG INTERACTIONS: CNS depressants may potentiate effects of morphine (respiratory depression, hypotension, sedation). Phenothiazines and benzodiazepines may potentiate analgesia. MAO inhibitors may cause paradoxical excitation.

ROUTE: IM, IV, IO.

Dosage:

Adults	Pediatrics (<45g)
2-5mg slow IV/IO or 5-10mg IM, repeated every 5-15 minutes as needed. May be repeated as directed by medical control. Max dose up to 20mg prior to medical control contact.	0.1mg/kg slow IV/IO/IM, repeated every 5-15minutes as needed. May be repeated as directed by medical control. Max dose up to 10 mg prior to medical control contact.

PREGNANCY SAFETY: Category B – unproven or unknown risk to fetus, and no risk in later trimesters.

COMMENTS: DEA schedule II drug with potential for abuse. Closely monitor the patient's blood pressure before and after administration of morphine. Use with caution in the elderly, those with asthma, and in those susceptible to CNS depression. Naloxone should be readily available.

Naloxone

Narcan

CLASS: Narcotic antagonist.

PHARMACOLOGY/ACTIONS: Naloxone is a narcotic antagonist which competitively binds to narcotic sites, but which exhibits almost no pharmacologic activity of its own.

ONSET/DURATION: Onset: 2 minutes / Duration: 30-60 minutes.

INDICATIONS:
Suspected narcotic overdose with any of the following: Respiratory depression, CNS depression, hypotension, and constricted pupils.
Suspected narcotic overdose of Law Enforcement K-9.

CONTRAINDICATIONS: Hypersensitivity. **Use with caution in narcotic-dependent patients who may experience withdrawal syndrome (including neonates of narcotic-dependent mothers).

SIDE EFFECTS: Tachycardia, hypertension, dysrhythmias, nausea, vomiting, diaphoresis, blurred vision, and opiate withdrawal.

DRUG INTERACTIONS: Incompatible with bisulfite and alkaline solutions.

ROUTE: IM, IV, IO, or IN.

Dosage:

Adults	Pediatrics (<45g)
0.4 – 2mg	**<45kg** 0.1 mg/kg, max single dose of 2mg **K-9** 0.01-0.04 mg/kg IV/IM/SQ

PREGNANCY SAFETY: Category B – unproven or unknown risk to fetus, and no risk in later trimesters.

COMMENTS: Naloxone may not reverse hypotension. Exercise caution when administering naloxone to narcotic addicts (may precipitate withdrawal with hypertension, tachycardia, and violent behavior).

NOTE: **The following medications may require higher doses or repeat doses: Talwin, Lomotril, Darvon, Carfentanyl, and Fentanyl.

Nitroglycerin

CLASS: Nitrate, anti-anginal / vasodilator.

PHARMACOLOGY/ACTIONS: Nitrates and nitrites dilate arterioles and veins in the periphery (and coronary arteries in high doses). The resultant reduction in preload, and to a lesser extent in afterload, decreases the workload of the heart and lowers myocardial oxygen demand.

ONSET/DURATION: Onset: 1-3 minutes / Duration: 30-60 minutes.

INDICATIONS:
Chest pain suggestive of acute coronary syndrome (ACS).
Pulmonary edema
Congestive heart failure

CONTRAINDICATIONS:
Hypersensitivity, Hypotension (SBP<100mHg), Patients <45kg, Increased intracranial pressure
Cerebral edema, Dehydration, hypotension, Aortic stenosis, Angle closer glaucoma
Recent use of erectile dysfunction drugs such as Viagra, Cialis, Levitra, Revatio, Staxyn, etc. Or women/men whom use these medications for Pulmonary Hypertension

SIDE EFFECTS: Hypotension, headache, dizziness, nausea, vomiting and diaphoresis.

DRUG INTERACTIONS: Other vasodilators may have additive hypotensive effects.

ROUTE: Sublingual
Dosage:

Adults	Pediatrics (<45g)
0.4 mg (1 tablet or spray) SL, may repeat every 5 minutes up to three doses. Consider repeat doses or NTG paste if prolonged transport per medical control.	NOT INDICATED

PREGNANCY SAFETY: Category C – give only if potential benefits justifies risk to fetus.

COMMENTS: **IV access should be established prior to administration**. Therapeutic effect is enhanced but adverse effects are increased when patient is upright.

EMT-BASICS MAY ASSIST PATIENTS WITH THEIR NITROGLYCERIN UNDER THE FOLLOWING CIRCUMSTANCES:
The medication is prescribed to the patient.
The medication is not expired.
The patient has symptoms that indicate the use of this medication and there are no contraindications.
The patient has not exceeded dose and the EMT-BASIC will deliver the proper dose via the proper route.
YOU HAVE RECEIVED VOICE AUTHORIZATION FROM MEDICAL CONTROL.

Nitrous Oxide

CLASS: Weak Inhalational Anesthetic

PHARMACOLOGY/ACTIONS: It's analgesic mechanism of action is described as opioid in nature and may involve a number of spinal neuromodulators. The anxiolytic effect is similar to that of benzodiazepine and may involve GABA receptors. Anesthesia mechanism my involve GABA and possibly N-methyl-D-aspartate receptors as well. In general the effect of nitrous oxide ceases as soon as the inhalation stops, with no residual effect.

ONSET/DURATION:

INDICATIONS: Analgesia in the patient who is capable of self-administration of this medication.

CONTRAINDICATIONS: Significant respiratory compromise, suspected abnormal air-filled cavities (eg Pneumothorax, bowel obstruction, air embolism) Relative contraindications- history of stroke, hypotension, pregnancy, known cardiac conditions, known vitamin B12 deficiency.
SIDE EFFECTS:

DRUG INTERACTIONS: Alfentanil, Benzhydrocodone, Bromazepam, Buprenorphine, Butorphanol, Cisatracurium, Codine's', Desflurane, Doxylame, Fentanyl, Fibanserin, Hydrocodone, Hydromorphone, Levophannol, Lidocaine, Lofexidine, Loxapine, Meperidine, Methadone, Methotrexate, Metocloprine, Morphine, Oxycodone, Vecuronium, Verapamil

ROUTE: Inhalation

Dosage:

Adults	Pediatrics (<45g)
30%- 70% with oxygen	30% N2O with 70% O2

PREGNANCY SAFETY:

COMMENTS: Nitrous oxide should not be administered without oxygen. Do not use more than 24hrs of continuous N2O.

Ondansetron

R E A I P RN

Zofran

CLASS: Antiemetic.

PHARMACOLOGY/ACTIONS: Although not been fully characterized the released serotonin my stimulate the vagal afferents through the 5-HT3 receptors and initiate the vomiting reflex. Ondansetron selectively antagonizes the 5-HT3 receptors. It has limited effectiveness for motion sickness, consider diphenhydramine (Benadryl) for refractive nausea/vomiting in those settings.

ONSET/DURATION: Onset: 30 minutes for peak effect / Duration: 5-7 hours.

INDICATIONS: Nausea and or vomiting

CONTRAINDICATIONS:
Hypersensitivity
Hypersensitivity to drug/class (Kytril and Aloxi),
Gastric/abdominal surgery in pediatric patients.

SIDE EFFECTS: Headache, dizziness, diarrhea, rash, agitation, and prolonged QT interval.

DRUG INTERACTIONS: Apomorphine and Dronedarone.

ROUTE: IV, IO, IM, PO (oral disintegrating tablet).

Dosage:

Adults	Pediatrics (<45g)
4-8mg slow IV/IO/IM (consider Benadryl for refractory nausea/vomiting) or 4 mg PO (oral disintegrating tablet) if IV dosing is not immediately available. May administer an additional 4mg IV/IO if symptoms do not resolve following PO administration.	**1-12 years of age**: 0.15mg/kg slow IV/IO/IM **> 12 years of age**: use adult dosing or 4 mg PO (oral disintegrating tablet) if IV dosing is not immediately available for age over 4 years. Half oral disintegrating tablet (2mg SL) age 1 to 4 years. May administer additional IV/IO dose if symptoms do not resolve following PO administration.

PREGNANCY SAFETY: Category B – unproven or unknown risk to fetus, and no risk in later trimesters. Generally considered safe in pregnancy.

COMMENTS: Consider early in patients with spinal immobilization to decrease risk of vomiting and aspiration. Use caution in patients with severe liver disease, the dose should not exceed 8 mg in 24 hours. Not commonly used in patients < 1 year of age.

Oxygen

R	E	A	I	P	RN

CLASS: Gas.

PHARMACOLOGY/ACTIONS: Helps to oxidize glucose to produce ATP.

ONSET/DURATION: Onset: immediate / Duration: < 2 minutes.

INDICATIONS: May be used in any trauma and/or medical patient – specifically hypoxia, ischemic chest pain, dyspnea, CO poisoning, and cardiac arrest.

CONTRAINDICATIONS: Should never be withheld in any critically ill patient.

SIDE EFFECTS: High-concentrations of oxygen may cause decreased level of consciousness and respiratory depression in patients with chronic carbon dioxide retention (i.e. COPD).

DRUG INTERACTIONS: None.

ROUTE: Inhaled.

Dosage:

Adults	Pediatrics (<45g)
Low : 1 – 6lpm via NC **High** : 10 – 15lpm via NRB or BVM	**Low** : 1 – 6lpm via NC or blow by **High** : 10 – 15lpm via NRB or BVM

PREGNANCY SAFETY: N/A.

COMMENTS: Oxygen vigorously supports combustion.

Oxytoxin

R E A I P RN

Pitocin

Class: Pituitary hormone

Pharmacology/Actions: Exogenous hormones. Causes potent and selective stimulation of uterine and mammary gland smooth muscle. Oxytocin means “rapid birth ” and is a synthetic hormone named for the natural posterior pituitary hormone. It stimulates uterine smooth muscle contractions and helps expedite the normal contractions of a spontaneous labor. As with all signifi cant uterine contractions, a transient reduction in uterine blood fl ow occurs. Oxytocin also stimulates the mammary glands to increase lactation, without increasing the production of milk. The drug is administered in the prehospital setting to control postpartum bleeding

Onset/Duration: Onset: (IV) Immediate; (IM) within 3-5 min Duration: (IV) 20 min after the infusion is stopped.

Indications: Postpartum hemorrhage after infant and placental delivery

Contraindications: Hypertonic or hyperactive uterus Presence of a second fetus

Side Effect: Hypotension Tachycardia Hypertension Dysrhythmias Angina pectoris Anxiety Seizure Nausea and vomiting Allergic reaction Uterine rupture (from excessive administration)

Drug Interactions: Vasopressors may potentiate hypertension

Route: IV

Dosage:

Adults	Pediatrics (<45g)
Control of Postpartum Hemorrhage IM: 3-10 units IM following delivery of full placenta Bleeding Following Incomplete or Elective Abortion IV: Mix 10-40 units (1-4 mL) in 1000 mL of NS or lactated Ringer ’ s; infuse at 10-40 milliunits/min via microdrip tubing, titrated to severity of bleeding and uterine response	Not indicated

Pregnancy Safety: Category X Vital signs and uterine tone should be monitored closely.

Comments: Oxytocin can only be administered in the prehospital setting after delivery of all fetuses and placenta. If part of the Placenta did not deliver consider TXA instead.

Promethazine

R E A I P RN

Phenergan

CLASS: Phenothiazine, antiemetic.

PHARMACOLOGY/ACTIONS: Promethazine is a long-acting derivative of phenothiazine. It is a non-selective central and peripheral H1 type histamine antagonist with anticholinergic properties resulting in antiemetic and sedative effects. Antiemetic action is thought to be due to depression of CTZ in the medulla.

ONSET/DURATION: Onset: 5-20 minutes / Duration: 2-8 hours.

INDICATIONS: Prevention and treatment of nausea and vomiting in adults and pediatrics.

CONTRAINDICATIONS:
Hypersensitivity
Allergy to sulfites
Patients with respiratory or CNS depression
< 2 years of age.

SIDE EFFECTS: Hypotension, CNS depression, altered mental status, pain on injection, tissue necrosis from extravasation, extrapyramidal symptoms, and urinary retention.

ROUTE: IV, IO, IM.

Dosage:

Adults	Pediatrics (<45g)
6.25-12.5mg slow IV/ IO, dilute with 10-20mL LR or NS and administer through running IV line. 12.5-25mg IM	>2 yrs: 0.25-0.5mg/kg slow IV/ IO, dilute with 10-20mL LR or NS and administer through running IV line.

COMMENTS: Promethazine should be given through large bore veins (i.e. AC) and diluted with 10-20mL of normal saline or lactated ringer's. It may NOT be given through a hand or wrist vein. If hypotension occurs administer fluid bolus(s). Dystonia and akathisias may occur and should be treated with diphenhydramine. Elderly may become agitated or disoriented, consider reducing the dose.

Rocuronium

CLASS: Non-depolarizing neuromuscular blocking agent.

PHARMACOLOGY/ACTIONS: Prevents acetylcholine from binding to receptors on the motor end plate, thus blocking action potential transmission, and muscle contraction.

ONSET/DURATION: Onset: 1 minute / Duration: Up to 30 minutes.

INDICATIONS: Temporary paralysis to maintain or achieve elective intubation.

CONTRAINDICATIONS: Know hypersensitivity to Rocuronium Bromide or other neuromuscular blocking agents.

SIDE EFFECTS: Bronchospasm, flushing, hypotension and tachycardia have been rarely reported.

ROUTE: IV, IO

SUPPLIED: 50mg/5mL

Dosage:

Adults	Pediatrics (<45g)
Rapid Sequence Induction (RSI): 0.6 – 1.2 mg/kg IV or IO push. **For continued paralyzation in the intubated patient after initial use**: 0.5 mg/kg IV or IO Push.	NOT INDICATED

COMMENTS: Paralysis may alter the clinical exam. For example, motor seizure activity will not be seen, but the brain will continue to undergo seizure activity, and this must be treated! Also, conditions such as shock, hypoxia, pain, intracranial injury, hypoglycemia, etc. maybe the cause of this unwanted, spontaneous patient movement in the first place. These conditions must be addressed but may be masked by the paralytic agent!

Sodium Bicarbonate

CLASS: Buffer, alkalizing agent, and electrolyte supplement.

PHARMACOLOGY/ACTIONS: Sodium bicarbonate reacts with hydrogen ions to form water and carbon dioxide and thereby can act to buffer metabolic acidosis. As the plasma hydrogen ion concentration decreases, blood pH rises. Conversion of sodium bicarbonate to 3% hypertonic saline pulls fluid from swollen tissue without causing the diuresis that can lead to hypotension and a decrease in cerebral perfusion pressure. Water passively follows the movement of sodium, thereby reducing the volume of fluid and swelling within the tissue.

ONSET/DURATION: Onset: 2-10 minutes / Duration: 30-60 minutes.

INDICATIONS:
Tricyclic antidepressant overdose with wide QRS/hypotension.
Known or suspected hyperkalemia (dialysis patient in extremis).
Alkalization for treatment of specific toxidromes/rhabdomyolysis (with medical control consultation).
Traumatic head injury with signs of increased ICP.

CONTRAINDICATIONS: None if patient in extremis, metabolic and respiratory alkalosis. Use as a routine medication in cardiac arrest.

SIDE EFFECTS: Metabolic alkalosis, hypoxia, rise is intracellular PCO2 and increase in tissue acidosis, electrolyte imbalance (hypernatremia).

DRUG INTERACTIONS: Alkalization of urine may shorten elimination half-lives of certain drugs. Vasopressors may be deactivated.
ROUTE: IV, IO.

Dosage:

Adults	Pediatrics (<45g)
1mEq/kg IV/IO of 7.5% adult preparation; repeat with 0.5mEq/kg every 10 minutes as needed. 300mL of NS from a 500mL bag with 200mEq of sodium bicarbonate which translates to 4 ampules.	1mEq/kg IV/IO of 8.4% pediatric preparation; repeat with 0.5mEq/kg every 10 minutes as needed; infuse slowly and only if ventilations are adequate.

PREGNANCY SAFETY: Category C – give only if potential benefits justifies risk to fetus.

COMMENTS: Bicarb administration produces carbon dioxide, which crosses cell membranes more rapidly than bicarbonate (potentially worsening intracellular acidosis). Bicarb may worsen CHF. Maintain adequate ventilation (gas exchange) to correct most underlying metabolic/ respiratory acidosis states.

Sodium Chloride

R E A I P RN

CLASS: Isotonic Chrystaloid Solution

PHARMACOLOGY/ACTIONS: Sodium Chloride 0.9% is an unbalanced crystalloid fluid. While often referred to as “normal saline”, it contains a supraphysiologic concentration of chloride (154 mEq/L, 1.5 times that of plasma), 154 mEq/L of sodium, and it has a pH of 5.7 (the pH of plasma is 7.4). Simply stated, “Normal saline is not normal”. Unlike Lactated Ringers solution (LR), it does not contain an anion buffer. It has a strong ion difference (SID) of 0. The SID is the difference between the concentrations of strong cations and strong anions. While a detailed explanation of the SID is beyond the scope of this guide, it is useful to know that the administration of a resuscitation fluid with a SID less than the serum bicarbonate level (normal range 22–26 mmol/L) will lead to a more acidotic state (↓pH) and the administration of a resuscitation fluid with a SID greater than the serum bicarbonate level leads to a more alkalotic state (↑pH). The table below compares the electrolyte composition and SID of LR and NaCl 0.9% to human blood plasma (concentrations are in mEq/L):
ONSET/DURATION: Onset: Immediate / Duration: Varies depending on disease process.
INDICATIONS:
Dehydration, Hypovolemia, Shock, Ocular irrigation
CONTRAINDICATIONS: The use of 0.9%NaCl should be used with caution in patients with congestive heart failure and severe renal insufficiency.
SIDE EFFECTS: Rare in therapeutic doses.
DRUG INTERACTIONS: Few in emergency setting.
ROUTE: IV, IO.

Dosage:

Adults	Pediatrics (<45g)
Bolus Dose: 20mL/kg, repeat as needed to maintain MAP of 60mmHg. **Maintenance Infusion (per hour):** 4 mL/kg for the first 10ks of a patient's weight 2 mL/kg for the next 10kg of a patient's weight 1 mL/kg for the rest of the patient's weight **Ocular Irrigation**: Flush continuously for 20 minutes.	**Bolus Dose**: Neonates: 10mL/kg, repeat one time. Pediatrics >30 days: 20mL/ kg repeat as needed titrate MAP of 60mmHg. **Maintenance Infusion (per hour)**: 4 mL/kg for the first 10ks of a patient's weight 2 mL/kg for the next 10kg of a patient's weight 1 mL/kg for the rest of the patient's weight **Ocular Irrigation**: • Flush continuously for 20 minutes.

PREGNANCY SAFETY: Category C – give only if potential benefits justifies risk to fetus.

COMMENTS: When large amounts of Normal Saline are administered, it is quite possible for other physiological electrolytes to become depleted.

Succinylcholine

Anectine

CLASS: Depolarizing Neuromuscular Blocker

PHARMACOLOGY/ACTIONS: Succinylcholine is a quaternary ammonium compound and depolarizing agent with short-term muscle relaxant properties. Succinylcholine binds to nicotinic receptors at the neuromuscular junction and opening the ligand-gated channels in the same way as acetylcholine, resulting in depolarization and inhibition of neuromuscular transmission. Depolarization may be prolonged due to succinylcholine's resistance to acetylcholinesterases thereby leading to disorganized muscle contraction followed by skeletal muscle relaxation and flaccid paralysis

ONSET/DURATION: Onset: 30 seconds to 1 minute / Duration: 3 to 5 minutes.

INDICATIONS: To induce neuromuscular blockade for the facilitation of endotracheal intubation.

CONTRAINDICATIONS:
History of malignant hyperthermia
Burns greater than 24 hours.
Use with caution in children, cardiac disease, hepatic disease, renal disease, peptic ulcer disease, rhabdomyolysis, hyperkalemia.

SIDE EFFECTS: Muscle fasciculation.

ADVERSE REACTIONS:
Anaphylactic reactions
Bronchospasm
Cardiac arrhythmias
Malignant hyperthermia

DRUG INTERACTIONS: None noted.
ROUTE: IV, IO, IM.

Adults	Pediatrics (<45g)
1.0-1.5 mg/kg	2.0 mg/kg

PREGNANCY SAFETY: Category C – give only if potential benefits justifies risk to fetus.

COMMENTS: IV administration in infants and children can potentially result in profound bradycardia and, in some cases, asystole. The incidence of bradycardia is greater after the second dose. The occurrence of bradycardia can be reduced with the pretreatment of atropine. Phase 2 blocks-Following infusion or repeated doses of succinylcholine, phase 2 block may occur. The receptor blockade takes on characteristics of a non-depolarizing neuromuscular block.

Thiamine

CLASS: Vitamin (B1)

PHARMACOLOGY/ACTIONS: Thiamine combines with adenosine triphosphate (ATP) to form a coenzyme, thiamine pyrophosphate which is necessary for carbohydrate metabolism.

ONSET/DURATION: Onset- Unknown, Duration Unknown

INDICATIONS: Thiamine deficiency, Alcoholism

CONTRAINDICATIONS:
Hypersensitivity

SIDE EFFECTS:

ADVERSE REACTIONS: restlessness, cyanosis, CV collapse, nausea, hemorrhage, pulmonary edema, pruritus urticarial, diaphoresis, angioedema, weakness

DRUG INTERACTIONS: Alkaline solutions (carbonates, citrates, & bicatbonates)= incompatible

ROUTE: IV

Dosage:

Adults	Pediatrics (<45g)
Alcohol withdraw, acute 100mg/25gram glucose **Thiamine deficiency** 100mg/day	Thiamine deficiency 0.2-1.2mg/day (based on age)

PREGNANCY SAFETY: Unknown

COMMENTS: N/A

Toradol

Ketorolac

CLASS: NSAID, Analgesic

PHARMACOLOGY/ACTIONS: Inhibits the synthesis of prostaglandins.

ONSET/DURATION: PO: Onset 0.5-1hr / Duration 6-8hr, IV: Onset- Immediate / Duration 6-8hr
IM: Onset 10min/Duration 6-8hr.

INDICATIONS: Flank Pain, Severe pain, burns w/o hemodynamic compromise

CONTRAINDICATIONS:
Hypersensitivity
Peptic ulcer disease
GI Bleed/Perforation
Renal impairment
High risk of bleeding
Pregnancy
Aspirin or NSAID use

SIDE EFFECTS: ADB pain, Constipation/Dirrhea, dyspepsia, GI ulcers, N/V, elevated liver enzymes, HTN, Elevated liver enzymes, HA,

ADVERSE REACTIONS: HA, Heartburn, N/V/D, bloating, gas, constipation, dizziness, ringing in the ears

DRUG INTERACTIONS: Warfarin, Digoxin, Salicylate, Heparin, ASA, Diuretics, Probenecid, Lithium, Methotrexate, ACE inhibitors, Phenytoin, Carbamazepine, Fluoxetine, Thiothisene, Alprazolam, Pentoxifylline, SSRI's.
ROUTE: IV / IM / PO

Dosage:

Adults	Pediatrics (<45g)
PO: 10mg (max 40mg) IV: 10-30mg IM: 60mg	Not Recommended For Use.

PREGNANCY SAFETY: Category C

COMMENTS: Not indicated for minor or chronic painful conditions. Starting with large doses will not provide better efficacy but can increase risk of developing adverse events.

Tranaxemic Acid R E A I P RN

TXA Transexamic Acid

CLASS: Synthetic Antifibrinolytic

PHARMACOLOGY/ACTIONS: Transexamic Acid (TXA) is a synthetic amino acid (lysine) that blocks plasminogen from being converted to the enzyme plasmin. Plasmin works to break down already-formed blood clots in the human body by attacking and breaking down fibrin destroying clots in a process known as fibrinolysis. TXA is now being used to treat severely injured trauma patients who have or are at risk for severe hemorrhage.
ONSET/DURATION: Onset: 5-15 minutes / Duration: 3 hours.

INDICATIONS: Any trauma patient >14 years of age, at high risk for ongoing internal hemorrhage and meeting one or more of the following criteria:
Systolic blood pressure < 90mmHg
Patients >65 years of age with SBP <110mmHg.
Tachycardia >120 beats per minute with signs of hypoperfusion (confusion, altered mental status, cool extremities, etc.)

CONTRAINDICATIONS:
Injuries >3 hours old.
Evidence of Disseminated Intravascular Coagulation (DIC).
Patients <14 years old.
Known hypersensitivity to the drug.
SIDE EFFECTS: Nausea, vomiting, diarrhea, allergic dermatitis, and giddiness. Hypotension has been observed when intravenous injection is too rapid.
DRUG INTERACTIONS: None significant.
ROUTE: IV
SUPPLIED: 1,000mg/ 10mL.

Dosage:

Adults	Pediatrics (<45g)
Mix 1000mg (1gram) of TXA in 100mL of 0.9% Normal Saline. Infuse over 10 minutes and infuse over 10 minutes. 10gtts/mL tubing at a rate of 4 gtts/second or 1500mL/ hr on infusion pump.	**ADMINISTER WITHIN 3HRS** **Loading Dose <12yrs** = 15mg/kg IV over 10 minutes (**maximum dose 1 gram) **Subsequent dose < 12yrs** = 2mg/kg/hr IV over 8 hours or until bleeding stops **Loading Dose >12yrs** = 1 gram IV over 10 minutes **Subsequent dose >12yrs** = 1 gram IV over 8 hours.

PREGNANCY SAFETY: Category B – give only if potential benefits justifies risk to fetus.
COMMENTS: TXA should never be administered at a wide open rate. Female patients taking or using any form of birth control containing estrogen and progestin are at increased risk for blood clots.

Vasopressin

Pitressin

CLASS: Hormone, vasopressor.

PHARMACOLOGY/ACTIONS: Vasopressin acts as a non-adrenergic vasoconstrictor by direct stimulation of smooth muscle (V1) receptors. Compared to epinephrine, vasopressin continues to cause intense vasoconstriction in the presence of severe acidosis that accompanies cardiopulmonary arrest, possesses a longer duration of action, enhances myocardial oxygen delivery and may increase cardiac contractility, and does not have negative adverse effects on heart.

ONSET/DURATION: Onset: < 2 minutes / Duration: 3-8 hours.

INDICATIONS: Septic shock with hypotension refractory to 20-30mL/kg of fluid resuscitation and other vasopressors.

CONTRAINDICATIONS:
Hypersensitivity
Relative in patients with chronic nephritis, heart failure, and seizure disorder.

SIDE EFFECTS: Local or systemic allergic reactions, arrhythmias, hypertension, myocardial infarction, and bronchial constriction.

DRUG INTERACTIONS: There are no known significant drug interactions in the prehospital setting.

ROUTE: IV, IO.

PREPARED: 20units /100ml of normal saline or D5W

Dosage:

Adults	Pediatrics (<45g)
Range: 0.01 – 0.1units/ minute (Usual Dose: 0.04 units/min fixed dose) and should be titrated to MAP of 65mmHg.	NOT INDICATED.

PREGNANCY SAFETY: Category C – give only if potential benefits justifies risk to fetus.