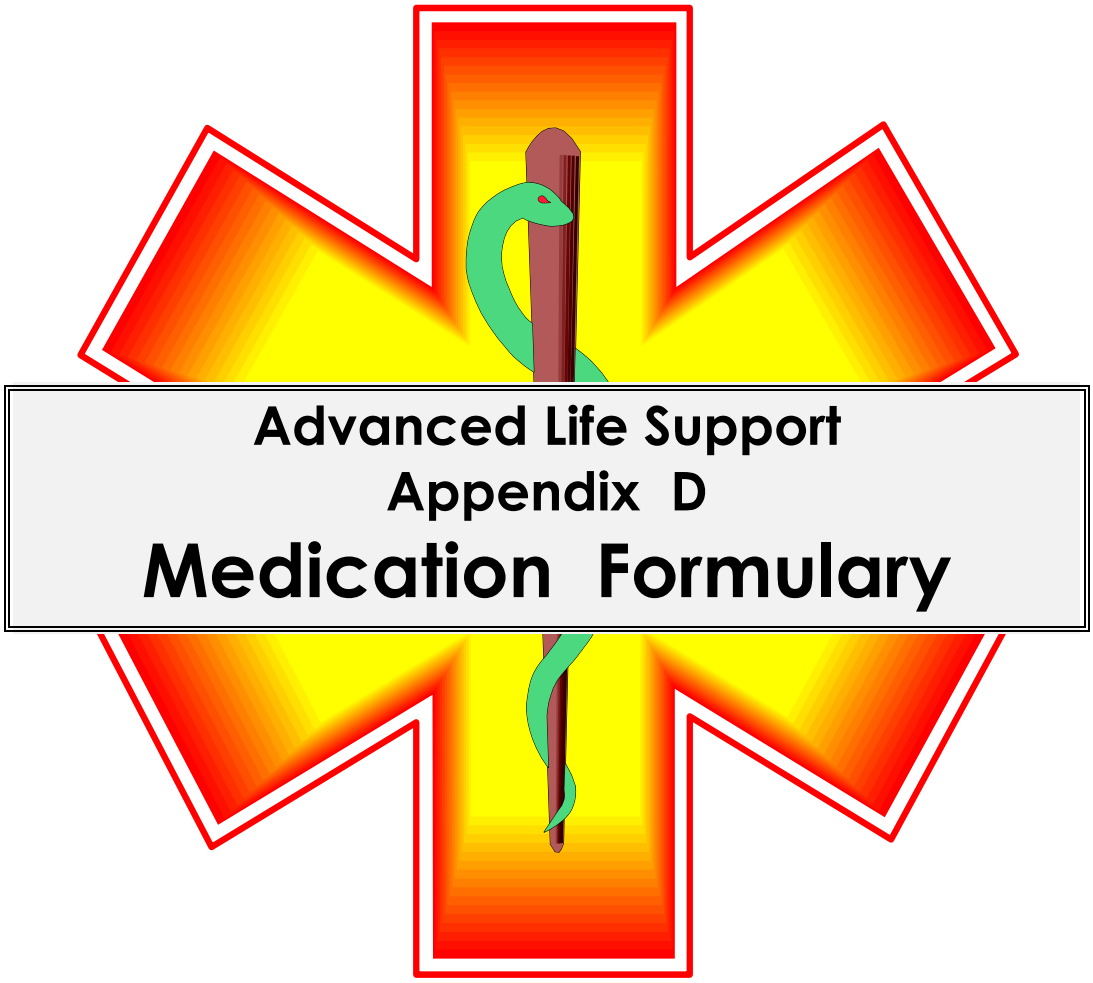

Advanced Life Support
Appendix D
Medication Formulary

Critical Care & Paramedic	Medication Formulary	Appendix D
		Revised: 6/8/16
	Does not include Haz-Mat Protocol medications	Effective: 6/8/16

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ADENOSINE (Adenocard)

Class

Antiarrhythmic

Description

Adenosine is a naturally occurring nucleoside that slows AV conduction through the AV node. It has an exceptionally short half-life and a relatively good safety profile.

Mechanism of Action

Adenosine decreases conduction of the electrical impulse through the AV node and interrupts AV re-entry pathways in PSVT. The half-life of Adenosine is about 5 seconds. Because of its rapid onset of action and very short half-life, the administration of Adenosine is sometimes referred to as chemical cardioversion.

Indications

Adenosine is used in PSVT refractory to common vagal maneuvers.

Contraindications

Adenosine is contraindicated in patients with second or third degree heart block, sick sinus syndrome, or those with known hypersensitivity to the drug.

Precautions

Adenosine typically causes arrhythmias at the time of cardioversion; in extreme cases transient asystole may occur. Adenosine should be used cautiously in patients with asthma.

Side Effects

Facial flushing, headache, shortness of breath, dizziness and nausea.

Interactions

Methylxanthines (Aminophylline and Theophylline) may decrease the effectiveness of Adenosine, requiring larger doses. Dipyridamole (Persantine) can potentiate the effects of Adenosine.

Dose / Route

Adult: 6 mg rapid **IV/IO** push - (20 ml flush), / 12mg **IV/IO** push - (20 ml flush) - second dose

Pedi: 0.1 mg/kg, rapid **IV/IO** *(6 mg max),* / 0.2 mg/kg, **IV/IO** *(12 mg max)* - second dose

Protocols

Adult - III.R	Pedi - P10

ALBUTEROL (Proventil)

Class

Sympathetic Agonist

Description

Albuterol is a sympathomimetic that is selective for Beta-2 adrenergic receptors.

Mechanism of Action

Albuterol is a selective Beta-2 agonist with a minimal number of side effects. It causes prompt bronchodilation and has a duration of action of approximately 5 hours.

Indications

Bronchial asthma, reversible bronchospasm associated with COPD and emphysema.

Contraindications

Known hypersensitivity to the drug.

Precautions

Use caution when administering this drug to elderly patients and those with cardiovascular disease or hypertension. If possible, peak flow rate should be measured before and after administration.

Side Effects

Palpitations, anxiety, dizziness, headache, nervousness, tremor, hypertension, arrhythmias, chest pain, nausea, vomiting.

Interactions

The possibility of developing unpleasant side effects increases when administered with other sympathetic agonists. Beta blockers may blunt the effects of Albuterol.

Dose / Route

Adult: Albuterol (Proventil) 0.083% 2.5 mg (in 3 ml) (unit dose) via **Nebulizer**

Pedi: Albuterol (Proventil) 0.083% 2.5 mg (in 3 ml) (unit dose) < 6 months, ½ unit dose , via **nebulizer.**

Protocols

Adult - III.H, III.I, III.J, III.L **Pedi - P6, P7**

AMIODARONE (Cordarone)

Class

Antiarrhythmic Agent / Cardiac Ion channel blocker

Description

Amiodarone is a Class III antiarrhythmic agent used to treat ventricular arrhythmias unresponsive to other antiarrhythmics.

Mechanism of Action

Amiodarone prolongs the action potential duration in all cardiac tissues. It blocks potassium, sodium, and calcium channels along with adrenergic beta receptors. Slows heart rate.

Indications

Management of SVT (A-fib/flutter) and ventricular arrhythmias (V-tach, V-fib.)

Contraindications

Breast-feeding patients in cardiogenic shock, severe sinus node dysfunction resulting in marked bradycardia, 2nd or 3rd degree AV block, symptomatic bradycardia, or known hypersensitivity.

Precautions

Amiodarone should be used with caution in patients with latent or manifest heart failure because failure may be worsened by its administration.

Side Effects

Hypotension, bradycardia, increased ventricular beats, prolonged P-R interval, prolonged QRS complex, prolonged Q-T interval. The patient should also be monitored for signs of pulmonary toxicity such as dyspnea and cough.

Interactions

Amiodarone may react with Warfarin, Digoxin, Procainamide, Quinidine, and Phenytoin.

Dose / Route

Adult: Amiodarone 300 mg **IV/IO**, - 150 mg **IV/IO** (2nd dose) - Cardiac arrest **- (V-tach / V-Fib)**
Amiodarone 150 mg (in 100ml D5W) **IV/IO** *- over 10 min* **-** Tachycardia:

Pedi: Amiodarone 5 mg/kg **IV/ IO** *- (max 300 mg)* - Cardiac arrest **- (V-tach / V-Fib)**

Protocols

Adult - III.N, III.Q, III.R **Pedi - P5**

ASPIRIN

Class

Platelet Aggregation Inhibitor

Description

Aspirin is an anti-inflammatory agent and an inhibitor of platelet function.

Mechanism of Action

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

Indications

Aspirin is used for new onset chest pain suggestive of acute myocardial infarction.

Contraindications

Known hypersensitivity. Aspirin is relatively contraindicated in patients with active ulcer disease and asthma.

Precautions

Aspirin can cause GI upset and bleeding. Aspirin should be used with caution in patients who report allergies to NSAIDS.

Side Effects

Heartburn, GI bleeding, nausea, vomiting, wheezing, and prolonged bleeding.

Interactions

When administered together, aspirin and other anti-inflammatory agents may cause an increased incidence of side effects. Administration of aspirin with antacids may reduce blood levels by reducing absorption.

Dose / Route

Aspirin 325 mg. **PO** *(chewed)*

Protocols **Adult - III.M**

ATROPINE

Class

Anticholinergic

Description

Atropine is a parasympatholytic that is derived from parts of the *Atropa Belladonna* plant.

Mechanism of Action

Atropine is a potent parasympatholytic and is used to increase the heart rate in hemodynamically significant bradycardias. Atropine acts by blocking acetylcholine receptors, thus inhibiting parasympathetic stimulation. Atropine has little or no inotropic effect. It plays an important role as an antidote in organophosphate poisonings. Reduces respiratory tract secretions.

Indications

Hemodynamically unstable bradycardia.
Organophosphate overdose.

Contraindications

Known hypersensitivity. Tachycardia or hypothermic bradycardia.

Precautions

Atropine may worsen the bradycardia associated with second-degree type II and third-degree AV blocks. In these instances, pacing should be attempted prior to administration of Atropine.

Side Effects

Blurred vision, dilated pupils, dry mouth, tachycardia, drowsiness, confusion, palpitations, anxiety, dizziness, headache, nervousness, rash, nausea, and vomiting.

Interactions

Few in pre-hospital setting. Potential adverse effects when administered with digitalis. Effects are enhanced by antihistamines, procainamide, quinadine, antipsychotics, benzodiazepines, and antidepressants

Dose / Route

Adult: Bradycardia: Atropine 0.5 mg **IV/IO** *- repeat q 5 min PRN (max 3 mg)*
Adult: Poisoning: Atropine 2 mg **IV/IM** - *(or **autoinjector**) (repeat as needed)*

Protocols

Adult - III.S, III.X

CALCIUM CHLORIDE 10%

Class

Calcium supplement

Description

Calcium Chloride provides elemental calcium in the form of the cation. Calcium is required for many physiological activities.

Mechanism of Action

Calcium Chloride replaces calcium in cases of hypocalcemia. It causes a significant increase in myocardial contractile force and increases ventricular automaticity. Calcium Chloride is an antidote for Magnesium Sulfate, and can minimize the some of the side effects of calcium channel blocker usage.

Indications

Acute hyperkalemia, acute hypocalcemia, calcium channel blocker toxicity.

Contraindications

Calcium may precipitate Digitalis toxicity in patients taking Digoxin.

Precautions

Flush IV line between administrations of Calcium Chloride and Sodium Bicarbonate to avoid precipitation.

Side Effects

Bradycardia, arrhythmias, syncope, nausea, vomiting, cardiac arrest.

Interactions

Flush IV line between administrations of Calcium Chloride and Sodium Bicarbonate to avoid precipitation. Calcium Chloride can cause elevated Digoxin levels, and Digitalis toxicity in those patients receiving Digitalis preparations.

Dose / Route

Calcium chloride 1gm **IV/IO**

Protocols **Adult - III.H, III.N, III.O, III.Q, III.S, III.X**

DEXAMETHASONE (Decadron)

Class

Synthetic glucocorticoid.

Description

A potent anti-inflammatory, also modifies the immune response. Prehospital, is generally used in the treatment of allergic reactions and asthma and to reduce swelling in the central nervous system.

Mechanism of Action

Suppresses acute and chronic inflammation, potentiates the relaxation of vascular and bronchial smooth muscle by beta-adrenergic agonists, and possibly alters airway hyperactivity.

Indications

Bronchial asthma, COPD exacerbation, and anaphylaxis. Also used for cerebral edema due to head injury or insult, as well as endocrine, rheumatic, dermatologic, ophthalmic, and hematologic disorders.

Contraindications

Known hypersensitivity, neonates, and patients with systemic fungal infections as it may exacerbate them.

Precautions

Large doses of dexamethasone may result in blood pressure increases, salt and water retention, and increases in potassium and calcium excretion. Dexamethasone suppresses the immune system and may result in masking of infection or increased susceptibility to infection. Use of dexamethasone in patients with recent MI may result in myocardial rupture.

Side Effects

Adverse reactions may include anaphylaxis, hypertension, water retention, weakness, seizures, headache, and nausea. Also causes immuno-supression.

Interactions

Dexamethasone may be less effective in the presence of phenytoin (Dilantin), phenobarbital, ephedrine, and rifampin. Hypokalemia may result if dexamethasone is administered in conjunction

Dose / Route

Adult: Dexamethasone (Decadron) 12 mg **IV/IO/IM**
Pedi: Dexamethasone (Decadron) 0.6 mg/kg I**V/IO**

Protocols

Adult - III.I, III.J, III.L **Pedi - P4**

DEXTROSE (D50) (D10)

Class

Carbohydrate

Description

Dextrose is used to describe the 6-carbon sugar D-glucose, which is the principal form of carbohydrate used by the body.

Mechanism of Action

Dextrose supplies supplemental glucose in cases of hypoglycemia.

Indications

Hypoglycemia, coma of unknown origin.

Contraindications

There are no major contraindications to the administration of Dextrose for suspected hypoglycemia.

Precautions

It is important to obtain a Glucometer reading and obtain a blood sample prior to administration of Dextrose. Infiltration can cause local tissue necrosis. Dextrose should be used with caution in patients with increased intracranial pressure, because the Dextrose load may worsen cerebral edema.

Side Effects

Tissue necrosis, phlebitis at the injection site.

Interactions

There are no interactions in the emergency setting.

In Nassau County - $D10_W$ may be used if D50 is unavailable.

Dose / Route

Adult: Dextrose (**D50**) 25 gm **IV/IO**
Pedi: Dextrose (**D10**) 0.5 gm/kg. **IV/IO**

Protocols **Adult - III.O, III.T, III.U, III.V, III.X** **Pedi - P5, P8, P9**

DIAZEPAM (Valium)

Class

Anticonvulsant and Sedative — Schedule IV drug

Description

Diazepam is a benzodiazepine that is frequently used as an anticonvulsant, sedative, or hypnotic.

Mechanism of Action

Diazepam is used primarily for its anticonvulsant properties. It suppresses the spread of seizure activity through the motor cortex of the brain, but appears not to abolish the abnormal discharge focus. It is used in the management of anxiety and stress. It is effective in treating the tremors and anxiety associated with alcohol withdrawal. It is an effective skeletal muscle relaxant, and induces amnesia.

Indications

Diazepam is used in major motor seizures, status epilepticus, sedation prior to cardioversion and intubation, skeletal muscle relaxant, and sedation in acute anxiety states.

Contraindications

Known hypersensitivity, shock / hypotension, and CNS depression.

Precautions

Because Diazepam is a relatively short-acting drug, seizure activity may recur. Injectable Diazepam can cause local venous irritation.

Side Effects

Hypotension, drowsiness, CNS depression, headache, amnesia, respiratory depression/arrest, blurred vision, nausea, vomiting.

Interactions

Diazepam is incompatible with many medications. Whenever Diazepam is given intravenously in conjunction with other drugs, the IV line should be adequately flushed. The effects of Diazepam can be additive when used in conjunction with other CNS depressants and alcohol.

Dose / Route

Adult: Diazepam (Valium) 2-10 mg **IV/IO/IM** *- Poison/OD/ Behavioral* - 5 mg I**V/IO/IM/PR** *- Seizures/ Sedation*
Adult: Diazepam (Valium) 5-10 mg **IV/IO/IM** *- Sedation - Medication facilitated Intubation* **(Paramedics only)**
Pedi: Diazepam (Valium) 0.1 mg/kg **IV/IO** *slowly over 2 minutes*, **PR -** *(if no access)*

Protocols **Adult - III.B, III.F, III.U, III.W, III.X, III.Y** **Pedi - P9**

DILTIAZEM (Cardizem)

Class

Calcium Channel Blocker - Class IV antiarrythmic

Description

Diltiazem is a calcium ion antagonist, causing a relaxation of vascular smooth muscle, and slowed conduction through the AV node. Diltiazem has a nearly equal effect on vascular smooth muscle and AV conduction.

Mechanism of Action

Diltiazem causes vascular dilation and slows conduction through the AV node. It slows the rapid ventricular rate associated with atrial fibrillation and atrial flutter. It is also used in the treatment of angina because of its negative inotropic effect and because it dilates the coronary arteries.

Indications

Rapid ventricular rates associated with atrial fibrillation and atrial flutter, PSVT refractory to Adenosine and angina pectoris.

Contraindications

Hypersensitivity to Calcium channel blocker, severe hypotension, AMI, CHF, cardiogenic shock, ventricular tachycardia, sick-sinus-syndrome, Wolff-Parkinson-White syndrome.

Precautions

Diltiazem can cause systemic hypotension. Caution with renal/hepatic impaired patients.

Side Effects

Diltiazem can cause bradycardia, heart block, hypotension, myocardial depression, asystole, flushing, nausea, vomiting, dizziness, headache,

Interactions

Diltiazem should not be administered to patients receiving intravenous beta-blockers because of an increased risk of congestive heart failure, bradycardia, and asystole.

Dose / Route

Diltiazem (Cardizem) 0.25 mg/kg slow **IV/IO** *(over 2 minutes) - (for A-fib / A-flutter)*

Protocols

Adult - III.R

DIPHENHYDRAMINE (Benadryl)

Class

Antihistamine

Description

Diphenhydramine is a potent antihistamine that blocks H_1 and H_2 histamine receptors.

Mechanism of Action

Diphenhydramine blocks the effects of H_1 receptor stimulation (bronchoconstriction, visceral contractions) and that of H_2 receptor stimulation (peripheral vasodilation and secretion of gastric acids).

Indications

Anaphylaxis, Allergic reactions, Dystonic (extrapyramidal) reactions due to phenothiazines

Contraindications

Asthma

Precautions

The primary drug for treatment of severe allergic reactions is epinephrine, as it reverses the effects of histamines. Diphenhydramine will block histamine receptors, preventing subsequent stimulation.

Side Effects

Sedation, dries bronchial secretions, blurred vision, headache, palpitations, tachycardia

Interactions

Potentiation can occur by the administration of CNS depressants, other antihistamines, narcotics, and alcohol.

Dose / Route

Adult: Diphenhydramine 50 mg **IV/IO/IM**

Pedi: Diphenhydramine 1 mg/kg **IV/IM**

Protocols

Adult - III.L	Pedi - P7

DOPAMINE DRIP

Class

Sympathetic Agonist

Description

Dopamine is a naturally occurring catecholamine. It acts on alpha, beta-1, and Dopaminergic adrenergic receptors. Its effect on alpha-receptors is dose dependent.

Mechanism of Action

Dopamine's effect on beta-1 receptors causes a positive inotropic effect on the heart. Dopamine also acts on alpha-adrenergic receptors causing peripheral vasoconstriction. Dopamine maintains renal and mesenteric blood flow because of its effect on the Dopaminergic receptors. Dopamine increases both systolic and pulse pressure. There is usually less effect on the diastolic pressure.

Indications

Hemodynamically significant hypotension / shock - not resulting from hypovolemia..

Contraindications

Dopamine should not be used as the sole agent in the management of hypovolemic shock unless fluid resuscitation is well under way. Pheochromocytoma.

Precautions

Dopamine can induce or worsen SVT and ventricular arrhythmias. Dopamine should not be administered in the presence of tachyarrhythmias or ventricular fibrillation.

Side Effects

Nervousness, headache, dysrhythmias, palpitations, chest pain, dyspnea, nausea, vomiting.

Interactions

Dopamine can be deactivated by alkaline solutions. If a patient is taking a monoamine oxidase inhibitor (MAOI's), the dose should be reduced. Dopamine can cause hypotension when used concomitantly with Phenytoin.

Dose / Route

Dopamine drip 5-20 mcg/kg/min **IV/IO** (*titrated to effect)*

Mix: 200 mg in 250ml NS or 400 mg in 500ml NS = *Solution concentration 800 mcg / ml*

Protocols **Adult - III.D, III.K, III.L, III.M, III.P, III.S, III.X**

EPINEPHRINE 1:1000

Class

Sympathetic Agonist

Description

Epinephrine is a naturally occurring catecholamine. It is a potent alpha- and beta-adrenergic stimulant with more profound beta effects.

Mechanism of Action

Epinephrine works directly on alpha- and beta- adrenergic receptors with effects of increased heart rate, cardiac contractile force, increased electrical activity in the myocardium, systemic vascular resistance, increased blood pressure, and increased automaticity. It also causes bronchodilation. Effects usually appear within 90 seconds of administration, and last only a short duration.

Indications

Bronchial asthma, bronchospasm, anaphylaxis.
Pediatric cardiac arrest,

Contraindications

Underlying cardiovascular disease, hypertension.

Precautions

Epinephrine should be protected from light. It also tends to be deactivated by alkaline solutions.

Side Effects

Palpitations, anxiety, tremulousness, headache, dizziness, nausea, vomiting, myocardial oxygen demand.

Interactions

Effects can be intensified in patients taking antidepressants

Dose / Route

Adult: Epinephrine (1:1000) 0.3 mg **IM/SQ**

Pedi: Epinephrine (1:1000) 0.01 mg/kg **IM** *(max. 0.3 mg)*
Epinephrine (1:1000) 0.1 mg/kg **ET** - *If no IV/IO -* - *Repeat every 3-5 minutes*

Epinephrine (1:1000) 0.05 mg/kg in 3cc NS via **Nebulizer** – *in place of Racemic Epinephrine*

Protocols **Adult - III.I, III.L** **Pedi - P1, P5, P6, P7 (P4)**

EPINEPHRINE 1:10,000

Class

Sympathetic Agonist

Description

Epinephrine is a naturally occurring catecholamine. It is a potent alpha- and beta-adrenergic stimulant with more profound beta effects.

Mechanism of Action

Epinephrine works directly on alpha- and beta- adrenergic receptors with effects of increased heart rate, cardiac contractile force, increased electrical activity in the myocardium, systemic vascular resistance, increased blood pressure, and increased automaticity. It also causes bronchodilation. Effects usually appear within 90 seconds of administration, and last only a short duration.

Indications

Cardiac arrest

Contraindications

None in cardiac arrest.

Precautions

Epinephrine should be protected from light. It also tends to be deactivated by alkaline solutions.

Side Effects

Palpitations, anxiety, tremulousness, headache, dizziness, nausea, vomiting, myocardial oxygen demand.

Interactions

Effects can be intensified in patients taking antidepressants

Dose / Route

Adult: Epinephrine 1:10,000 1 mg **IV/IO** - *Repeat every 3-5 minutes*
Pedi: Epinephrine 1:10,000 0.01 mg/kg **IV/IO** - *Repeat every 3-5 minutes*

Protocols

Adult - III.N, III.O **Pedi - P1, P5, P11**

EPINEPHRINE Auto-injector

Class

Sympathetic Agonist

Description

Epinephrine is a naturally occurring catecholamine. It is a potent alpha and beta-adrenergic stimulant with more profound beta effects.

Mechanism of Action

Epinephrine works directly on alpha and beta- adrenergic receptors with effects of increased heart rate, cardiac contractile force, increased electrical activity in the myocardium, systemic vascular resistance, increased blood pressure, and increased automaticity. It also causes bronchodilation. Effects usually appear within 90 seconds of administration, and last only a short duration.

Indications

Bronchial asthma, exacerbation of COPD, anaphylaxis.

Contraindications

None in the presence of anaphylaxis
Underlying cardiovascular disease, hypertension.

Precautions

Epinephrine should be protected from light. It also tends to be deactivated by alkaline solutions.

Side Effects

Palpitations, tachycardia, angina, anxiety ,tremors, headache, dizziness, nausea, vomiting, hypertension

Interactions

Effects can be intensified in patients taking antidepressants

Dose / Route

Adult:	0.3 mg	**IM**	**Autoinjector**
Pediatric:	0.15 mg	**IM**	**Autoinjector**

Protocols

Adult - III.L	**Pedi - P7**

EPINEPHRINE DRIP

Class

Sympathetic Agonist

Description

Epinephrine is a naturally occurring catecholamine. It is a potent alpha and beta-adrenergic stimulant with more profound beta effects.

Mechanism of Action

Epinephrine works directly on alpha and beta- adrenergic receptors with effects of increased heart rate, cardiac contractile force, increased electrical activity in the myocardium, systemic vascular resistance, increased blood pressure, and increased automaticity. It also causes bronchodilation. Effects usually appear within 90 seconds of administration, and last only a short duration.

Indications

Anaphylaxis or Symptomatic bradycardia refractory to pacing.

Contraindications

Underlying cardiovascular disease, hypertension.

Precautions

Epinephrine should be protected from light. It also tends to be deactivated by alkaline solutions.

Side Effects

Palpitations, anxiety, tremulousness, headache, dizziness, nausea, vomiting, myocardial oxygen demand.

Interactions

Effects can be intensified in patients taking antidepressants

Dose / Route

Epinephrine drip 2-10 mcg/min **IV/IO**

Mix: 1 mg in 500 ml NS = *Solution concentration 2 mcg / ml*

Protocols **Adult - III.L, III.S**

ETOMIDATE (Amidate)

Class

A short-acting, intravenously administered sedative / hypnotic.

Description

Etomidate has a rapid onset of action and recovery. It has minimal cardiac and respiratory-depressive effects and causes no histamine release, so it is useful in patients with compromised cardiopulmonary function.

Mechanism of Action

Etomidate is a short acting hypnotic that acts at the level of the reticular activating system.

Indications

For procedural sedation or medication facilitated intubation (Paramedics)

Contraindications

Hypersensitivity.

Precautions

Use with caution in the elderly and in patients with hepatic disease because they are more likely to develop Etomidate-related adverse reactions.

Side Effects

Skeletal muscle: Myoclonic skeletal muscle movements, tonic movements. *Respiratory:* Apnea of short duration, hyperventilation or hypoventilation, laryngospasm. *CV:* Either hypertension or hypotension; tachycardia or bradycardia; arrhythmias. *GI:* N&V. *Miscellaneous:* Eye movements, averting movements, hiccoughs, snoring.

Interactions

Concurrent use of antihypertensive agents and Etomidate can result in hypotension. This is particularly true if any of the following agents are used with Etomidate: calcium-channel blockers, diazoxide, mecamylamine. Etomidate potentiates the effects of CNS depressants such as ethanol, general anesthetics, local anesthetics, antidepressants, H1-blockers, opiate agonists, skeletal muscle relaxants, phenothiazines, barbiturates, and benzodiazepines.

Dose / Route

Sedation: Etomidate (Amidate) 0.15 mg/kg **IV/IO** *(max 20 mg)*
Intubation: Etomidate (Amidate) 0.3 mg/kg rapid **IV/IO** push *(max 40mg)* **(Paramedics only)**

Protocols

Adult - III.B, III.F

FENTANYL

Class

Narcotic analgesic / opioid — Schedule II drug

Description

Fentanyl citrate is a potent synthetic opioid agonist. 50-100 times more potent than Morphine. Produces effects similar to Morphine. Shorter duration than other narcotic analgesics.

Mechanism of Action

Fentanyl citrate acts primarily through interaction with opioid mu-receptors located in the brain, spinal cord and smooth muscle. The primary site of therapeutic action is the central nervous system causing analgesia and euphoria, effectively treating moderate to severe pain.

Indications

Anesthesia for severe pain. Sedation for intubation or procedural sedation.

Contraindications

Known hypersensitivity, respiratory depression, severe hemorrhage, shock, and Myasthenia Gravis.

Precautions

Check for the presence of a fentanyl patch prior to administration. Resuscitation equipment and a narcotic agonist such as naloxone should be readily available to manage apnea.

Side Effects

Hypotension, bradycardia, respiratory depression, apnea, nausea/vomiting, dizziness, sedation, diaphoresis, muscle rigidity and palpitations.

Interactions

Other CNS depressants drugs (e.g. barbiturates, tranquilizers, narcotics and general anesthetics) will have additive or potentiating effects with Fentanyl and MAOI's.

Dose / Route

Fentanyl 1 mcg/kg **IV/IO/IM/IN** *(max 100 mcg)*

Protocols **Adult - III.E. III.F. III.M.**

FUROSEMIDE (Lasix)

Class

Diuretic

Description

Furosemide is a potent diuretic that inhibits sodium and chloride reabsorption in the kidneys and causes venous dilation.

Mechanism of Action

Furosemide is a loop diuretic that inhibits sodium and chloride reabsorption in the kidneys. Furosemide first causes venous dilation within 5 minutes of administration, reducing preload and decreasing cardiac work. Diuretic effects begin 5-15 minutes after administration.

Indications

Congestive Heart Failure, Pulmonary Edema.

Contraindications

It should not be administered to patients who are allergic to the sulfa class of medications. Use in pregnancy should be limited to life threatening situations in which the benefits of administration outweigh the risks.

Precautions

Dehydration, electrolyte depletion, and hypotension can result from excessive doses. Blood pressure should be frequently monitored. Furosemide should be protected from light.

Side Effects

Headache, dizziness, hypotension, volume depletion, potassium depletion, arrhythmias, diarrhea, nausea, vomiting.

Interactions

Administration with other diuretics can lead to severe volume depletion and electrolyte imbalance.

Dose / Route

Furosemide (Lasix) 40-100 mg **IV/IO**

Protocols **Adult - III. K**

GLUCAGON

Class

Hormone and Anti-hypoglycemic

Description

Glucagon is a hormone secreted by the alpha cells of the pancreas. It is used to increase the blood glucose level in cases of hypoglycemia in which an IV cannot immediately be placed.

Mechanism of Action

Glucagon causes a breakdown of stored glycogen to glucose, and inhibits the synthesis of glycogen from glucose. A return to consciousness following the administration of Glucagon usually takes from 5-20 minutes. Glucagon is only effective if there are sufficient stores of glycogen in the liver. Glucagon exerts a positive inotropic action on the heart and decreases renal vascular resistance.

Indications

Hypoglycemia, Beta-Blocker overdoses.

Contraindications

Known hypersensitivity.

Precautions

Glucagon is only effective if there are sufficient stores of glycogen in the liver. Glucagon should be administered with caution to patients with a history of cardiovascular or renal disease.

Side Effects

Hypotension, dizziness, headache, nausea, vomiting.

Interactions

There are few interactions reported in the emergency setting.

Dose / Route

Adult: Glucagon 1 mg **IM / IN** - *(if no IV access)* - 1mg **IV/IO** -*Cardiac Arrest* - 1-2 mg **IV/IO** - *Poisoning*
Pedi: Glucagon 0.1 mg/kg **IM** *(if no IV access)*

Protocols **Adult - III.O, III.T, III.U, III.V, III.X** **Pedi - P8, P9**

HALOPERIDOL (Haldol)

Class

Antipsychotic Agent / Dopamine receptor antagonist

Description

Haloperidol is a potent tranquilizer.

Mechanism of Action

Inhibits central nervous system (CNS) catecholamine receptors; strong anti-dopaminergic and weak anti-cholinergic. Acts on CNS to depress subcortical areas, mid-brain and ascending reticular activating system in the brain to decrease signs and symptoms of psychosis.

Indications

Adult behavioral emergency, agitated, and aggressive patients who present a danger to themselves or to others and who cannot be safely managed otherwise.

Contraindications

Known hypersensitivity to medication, Parkinson's Disease, CNS depression, suspected head injury.

Precautions

Administering haloperidol to a patient who has a history of seizures or who is taking anti-convulsant medications may precipitate convulsion activity; haloperidol reduces the convulsion threshold and anticonvulsant medications decrease the effects of haloperidol. Geriatric patients should receive a decreased dose to reduce the possibility of side effects due to decreased liver function.

Side Effects

Respiratory depression, tachycardia, sedation with decreased LOC. Extrapyramidal symptoms (dystonic reaction), restlessness, spasms, Parkinson-like symptoms, drooling, hypotension, tachycardia, orthostatic hypotension, nausea, vomiting, blurred vision. Monitor QT interval.

Interactions

Enhanced CNS depression and hypotension in combination with alcohol, and antagonizes amphetamines and epinephrine. Other CNS depressants may potentiate effects.

Dose / Route

Haloperidol (Haldol) 2-5 mg **IM**

Protocols

Adult - III.W

HYDROCORTISONE SODIUM SUCCINATE (Solu-Cortef)

Class

Corticosteroid

Description

Solu-Cortef Act-O-Vial is a medication used to treat adrenal insufficiency in emergency situations.

Mechanism of Action

Anti-inflammatory and immunosuppressive with salt-retaining actions. Replaces the steroids that are lacking in adrenal insufficiency.

Indications

Shock due to adrenocortical insufficiency

Contraindications

None in the patients with adrenal insufficiency

Precautions

CHF, HTN, diabetes, infections.

Side Effects

Cardiac: Transient hypertension, hyperglycemia, anxiety.

Interactions

Incompatible with Heparin

Dose / Route

Hydrocortisone Sodium Succinate (Solu-Cortef) 2mg/kg **IV/IO** *(max.100mg)*

Protocols

Adult - III.D	Pedi - P10

HYDROXOCOBALAMIN (Cyanokit)

Class

Antidote. Precursor of vitamin B12. ***Optional***

Description

Hydroxocobalamin is the form of vitamin B_{12} that is produced commercially. It is not a form normally found in the human body, but is easily converted in the body to usable coenzyme forms of vitamin B_{12}. It is used (because of its affinity for cyanide ion) as a treatment for cyanide poisoning.

Mechanism of Action

Hydroxocobalamin will bind circulating and cellular cyanide molecules to form cyanocobalamin which is excreted in the urine.

Indications

The treatment of known or suspected cyanide poisoning - including smoke from closed-space fires. *(smoke inhalation)*

Contraindications

None

Precautions

Administer slowly over 15 minutes. Transient hypertension.

Side Effects

Anaphylaxis, chest tightness, edema, urticaria, pruritus, dyspnea, nausea, headache, injection site reactions and rash. A substantial increase in blood pressure may occur following Cyanokit therapy.

Interactions

There are a number of drugs and blood products that are incompatible with Cyanokit, thus a separate IV line should be used for administration.

Dose / Route

Hydroxocobalamin 5g **IV** *(over 10 min.)* * ***needs dedicated IV***

Cyanokit 5g (crystalline powder) - reconstitute vials with 0.9% normal saline.

Protocols

Adult - III.X

IPRATROPIUM (Atrovent)

Class

Anticholinergic

Description

Ipratropium is an anticholinergic that is chemically related to atropine.

Mechanism of Action

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.

Indications

Bronchial asthma, reversible bronchospasm associated with chronic bronchitis and emphysema.

Contraindications

Known hypersensitivity.

Precautions

Use caution when administering this drug to elderly patients and those with cardiovascular disease or hypertension. If possible, peak flow rate should be measured before and after administration.

Side Effects

Palpitations, anxiety, dizziness, headache, nervousness, tremor, hypertension, arrhythmias, chest pain, nausea, vomiting.

Interactions

There are few interactions in the prehospital setting.

Dose / Route

Adult: Ipratropium (Atrovent) 0.02% 500 mcg (1 unit dose 2.5 ml) via **Nebulizer**

Pedi: Ipratropium (Atrovent) 0.02% 500 mcg (1 unit dose 2.5 ml) via **Nebulizer** **≥ 6 y/o** - WITH Albuterol

250 mcg (1/2 unit dose) via **Nebulizer** **< 6 y/o** - WITH Albuterol

Protocols

Adult - III.I, III.J	Pedi - P6

KETOROLAC (Toradol)

Class

Analgesic, Anti-inflammatory

Description

Non-steroidal Anti-inflammatory agent (NSAID) Non-opioid analgesic

Mechanism of Action

Produces peripherally mediated analgesia by inhibiting prostaglandin synthesis.
Does NOT affect the CNS

Indications

Short term management of moderate to severe non-cardiac pain (trauma/burns), burns without hemodynamic compromise, isolated extremity fractures or dislocations with severe pain and long transport/disentanglements time.

Contraindications

Allergy or sensitivity to NSAIDS (ASA, Ibuprofen). Asthma, peptic ulcer, GI bleed, abdominal pain of unknown etiology, advanced renal disease.

Precautions

May increase bleeding times when administered to patients taking anticoagulants. May increase effects if lithium and methotrexate.

Side Effects

Anaphylaxis, drowsiness, edema, rash/ itch, nausea, headache, bleeding disorders.
Burning/pain at the injection site, hypertension

Interactions

May increase bleeding time in patients taking anticoagulants.
For patients on aspirin regiments contact Medical control

Dose / Route

Ketorolac (Toradol) 30 mg **IV** *(over 1 minute)* or **IM** *(ages 14 - 65 only)*

Protocols **Adult - III.E**

LIDOCAINE (Xylocaine)

Class

Antiarrhythmic (Class I.B)

Description

Suppresses ventricular ectopic activity. Increases ventricular fibrillation threshold. Decreases automaticity by slowing the rate of phase 4 depolarization.

Mechanism of Action

Suppresses automaticity and raises the defibrillatory threshold of the ventricles. It also causes sedation and analgesic effects.

Indications

In Nassau County - **Pediatric** Non-traumatic V-tach or V-fib cardiac arrest.
An alternate to Amiodarone.

Contraindications

SVT, heart blocks, and bradycardias. Hypersensitive to amide-type local anesthetics.

Precautions

CHF, respiratory depression, hypovolemia, Caution with renal or hepatic impairment due to prolonged metabolic clearance.

Side Effects

Seizures, toxicity, AMS, parasthesia.

Interactions

Dose / Route

Pedi: Lidocaine 1 mg/kg **IV/IO** - *if Amiodarone is unavailable*

Protocols **Pedi - P5**

LORAZEPAM (Ativan)

Class

Anticonvulsant, antianxiety, analgesic agent. Sedative/Hypnotic Schedule IV drug

Description

Lorazepam is a benzodiazepine used in the management of status epilepticus, as an adjunct in the management of anxiety or insomnia, and for preoperative sedation.

Mechanism of Action

Lorazepam depresses the CNS by potentiating GABA, an inhibitory neurotransmitter. Therapeutic effects include sedation, decreased anxiety, and decreased seizure activity. Lorazepam is absorbed and eliminated faster than other benzodiazepines.

Indications

Used in the management of status epilepticus and as an adjunct in the management of anxiety or insomnia. Lorazepam is also used for procedural sedation. It also decreases agitation and anxiety.

Contraindications

Hypersensitivity, CNS depression, comatose, uncontrolled severe pain, narrow-angle glaucoma and lactation. (*Relative* contraindication with pregnancy)

Precautions

Lorazepam should be used with caution in patients with severe hepatic/renal/pulmonary impairment, myasthenia gravis, history of suicide or drug abuse, geriatric or debilitated patients.

Side Effects

CNS: Dizziness, drowsiness, lethargy, hangover, headache, mental depression, paradoxical excitation. *EENT:* Blurred vision. *RESP:* Respiratory depression. *CV:* Rapid IV use may cause apnea, cardiac arrest, bradycardia, and hypotension. *GI:* Constipation, diarrhea, nausea, vomiting. *Derm:* Rash. *Misc:* Physical/psychological dependence, tolerance.

Interactions

Additive CNS depression with other CNS depressants including alcohol, antihistamines, opioid analgesics, and other sedative/hypnotics including other benzodiazepines. Lorazepam may decrease the efficacy of levodopa.

Dose / Route

Adult: Lorazepam (Ativan) 2-4 mg **IV/IO/IM**
Pedi: Lorazepam (Ativan) 0.05 mg/kg **IV/IO/IM** *(slow over 2 minutes)*

Protocols

Adult - III.B, III.F, III.U, III.W, III.X, III.Y **Pedi - P9**

MAGNESIUM SULFATE

Class

Antiarrhythmic, Mineral, Electrolyte

Description

Magnesium Sulfate is a salt that dissociates into the Magnesium cation and the sulfate anion when administered. Magnesium is an essential element in numerous biochemical reactions that occur within the body.

Mechanism of Action

Magnesium Sulfate acts as a physiological calcium channel blocker and blocks neuromuscular transmission. A decreased magnesium level is associated with cardiac arrhythmias, symptoms of cardiac insufficiency, and sudden death. Hypomagnesemia can cause refractory ventricular fibrillation. Magnesium Sulfate is also a central nervous system depressant effective in the management of seizures associated with eclampsia.

Indications

Magnesium Sulfate is used in torsade de pointes (multiaxial ventricular tachycardia), refractory ventricular fibrillation, pulseless ventricular tachycardia. It is also used in severe bronchospasm, and seizures/eclampsia.

Contraindications

Shock, severe hypertension, third degree AV block, routine dialysis patients, known hypocalcemia.

Precautions

Magnesium Sulfate should be administered slowly to minimize side effects. Use with caution in patients with known renal insufficiency. Hypomagnesemia can occur, Calcium Chloride should be available as an antidote if serious side effects occur.

Side Effects

Hypotension, flushing, sweating, bradycardia, decreased deep tendon reflexes, drowsiness, respiratory depression, arrhythmia, , hypothermia, itching, and rash.

Interactions

Magnesium Sulfate can cause cardiac conduction abnormalities if administered in conjunction with digitalis.

Dose / Route

Adult: Magnesium sulfate 1-2 gm **IV/IO** - Cardiac arrest
Adult: Magnesium sulfate 2 gm **IV/IO** - in 100 normal saline *(over 10 minutes)* - Asthma, COPD, WCT, Sz, eclampsia
Pedi: Magnesium sulfate 25-50 mg/kg **IV/IO** - *(max. 2 gm)* - for torsades

Protocols

Adult - III.I, III.N, III.Q, III.U, III.Y **Pedi - P5**

METHYLPREDNISOLONE (Solu-Medrol)

Class

Anti-inflammatory Steroid

Description

Methylprednisolone is a synthetic steroid with potent anti-inflammatory properties. It is related to the natural hormones secreted in the adrenal cortex.

Mechanism of Action

The pharmacological effects of steroids are vast and complex. Effective as anti-inflammatory agents, they are used in the management of allergic reactions, asthma, and anaphylaxis. Methylprednisolone is an intermediate-acting steroid with a plasma half-life of 3 to 4 hours.

Indications

Severe anaphylaxis, asthma, or COPD, urticaria, and spinal cord injury.

Contraindications

Known hypersensitivity. Fungal infections, measles, varicella.

Precautions

Cardiac arrhythmias or circulatory collapse can occur with large rapidly administered dosages.

Side Effects

Fluid retention, congestive heart failure, hypertension, bradycardia, abdominal distention, vertigo, headache, and nausea.

Interactions

There are few in the prehospital setting.

Dose / Route

Adult: Methylprednisolone 125 mg **IV/IO/IM**
Pedi: Methylprednisolone 2 mg/kg **IV/IO** *(max - 60 mg)*

Protocols

Adult - III.I, III.J, III.L	**Pedi - P4, P6, P7**

MIDAZOLAM (Versed)

Class

Sedative and Hypnotic. Anti-anxiety. Schedule IV drug

Description

Midazolam is a benzodiazepine with strong hypnotic and amnestic properties.

Mechanism of Action

Midazolam is a potent but short-acting benzodiazepine used as a sedative and hypnotic. It is three to four times more potent than Diazepam. Its onset of action is approximately 1.5 minutes when administered IV. Midazolam has impressive amnesic properties, and like other benzodiazepines, it has no effect on pain.

Indications

Midazolam is used as for procedural sedation for cardioversion or intubation. Also used for seizures and behavioral emergencies / agitation.

Contraindications

Known hypersensitivity, narrow angle glaucoma, shock, depressed vital signs, and alcoholic coma.

Precautions

Emergency resuscitative equipment must be available prior to the administration of Midazolam. Midazolam has more potential than the other benzodiazepines to cause respiratory depression and respiratory arrest.

Side Effects

Laryngospasm, bronchospasm, dyspnea, respiratory depression and arrest, drowsiness, altered mental status, amnesia, bradycardia, tachycardia, premature ventricular contractions, and retching.

Interactions

The effects of Midazolam can be accentuated by CNS depressants such as narcotics and alcohol.

Dose / Route

Adult: Midazolam (Versed) 1- 5 mg IV/IO/IM/IN

Pedi: Midazolam (Versed) 0.2 mg / kg IM/IN *(max 5 mg) - (IN route preferred)*

Protocols **Adult - III.B, III.F, III.U, III.W, III.X III.Y** **Pedi - P9**

MORPHINE SULFATE

Class

Narcotic Analgesic / opioid — Schedule II drug

Description

Morphine is a potent CNS depressant and analgesic.

Mechanism of Action

Morphine acts on opiate receptors in the brain, providing analgesia and sedation. It increases peripheral venous capacitance and decreases venous return. Morphine also decreases myocardial oxygen demand.

Indications

Severe pain associated with myocardial infarction, burns, kidney stones, etc. It is also used for procedural sedation.

Contraindications

Volume depletion, severe hypotension, hypersensitivity, respiratory depression, undiagnosed head injury or abdominal pain.

Precautions

Morphine has a high tendency for addiction and abuse. Morphine can cause severe respiratory depression in high doses, especially in patients with respiratory impairment. Narcan should be available as an antagonist.

Side Effects

Nausea, vomiting, hypotension, respiratory depression, altered mental status, abdominal cramps, blurred vision, constricted pupils, and headache.

Interactions

CNS depression can be enhanced when administered with antihistamines, antiemetic, sedatives, hypnotics, barbiturates, and alcohol.

Dose / Route

Morphine sulfate 2-10 mg (0.1 mg/kg) **IV/IO/IM** *(max 20 mg)*

Protocols **Adult - III.E, III.F, III.M**

NALOXONE (Narcan)

Class

Narcotic Antagonist

Description

Naloxone is an effective narcotic antagonist.

Mechanism of Action

Naloxone is chemically similar to narcotics, however it has only antagonistic properties. Naloxone competes for opiate receptors in the brain, and displaces narcotic molecules from opiate receptors. It can reverse respiratory depression from narcotic overdose.

Indications

Complete or partial reversal of depression caused by narcotics. Naloxone can also be used in the treatment of coma of unknown origin.

Contraindications

Known hypersensitivity.

Precautions

Naloxone should be administered cautiously to patients who are known or are suspected to be physically dependent on narcotics. Abrupt and complete reversal by Naloxone can cause withdrawal type effects.

Side Effects

Hypotension, hypertension, ventricular arrhythmias, nausea, vomiting.

Interactions

Naloxone may cause narcotic withdrawal in the narcotic dependent patient. Only enough of the drug should be given to reverse respiratory depression.

Dose / Route

Adult: Naloxone (Narcan) - 0.4-2.0 mg *(titrated)* I**V/IO/IM/IN**

Pedi: Naloxone *titrate in increments of* 0.1 mg/kg - *until effective* **IV/O/ET/IM** ≥ 2 y/o - max 2 mg
< 2 y/o - max 1 mg

Protocols

Adult - III.A, III.E, III.O, III.T, III.X **Pedi - P2, P8**

NITROGLYCERIN

Class

Nitrate

Description

Nitroglycerin is a potent smooth muscle relaxant used in the treatment of angina pectoris.

Mechanism of Action

Nitroglycerin is a rapid smooth muscle relaxant that reduces cardiac work and to a lesser degree dilates the coronary arteries. This results in increased coronary blood flow and improved perfusion of the myocardium. Pain relief following Nitroglycerin administration usually occurs within 1 to 2 minutes, with therapeutic effects up to 30 minutes later.

Indications

Chest pain associated with angina pectoris, acute myocardial infarction, and acute pulmonary edema.

Contraindications

Hypotension, increased intracranial pressure.

Precautions

Patients taking Nitroglycerin may develop a tolerance to the drug necessitating a higher dose. Headache from vasodilation of the cerebral vessels is common. Nitroglycerin deteriorates rapidly once opened. Nitroglycerin should be protected from light.

Side Effects

Headache, dizziness, weakness, tachycardia, hypotension, orthostasis, skin rash, dry mouth, nausea, vomiting.

Interactions

Nitroglycerin can cause hypotension in patients who have recently ingested alcohol. It can cause orthostatic hypotension when used in conjunction with beta-blockers. Withold if the patient has taken Viagra/Levitra within 24 hours and Cialis/Revatio within 48 hours.

Dose / Route

Nitroglycerin 0.4 mg **SL** *OR* **SL spray**

Protocols Adult - III.K. III.M

NOREPINEPHRINE DRIP (Levophed)

Class

Sympathomimetic

Description

Norepinephrine is a naturally occurring potent vasoconstrictor and inotropic agent.

Mechanism of Action

Norepinephrine treats severe hypotension and a low total peripheral resistance. It is relatively contraindicated in patients with hypovolemia. It may increase myocardial oxygen requirements, mandating cautious use in patients with ischemic heart disease. Onset 1-3 min. Duration 5-10 min.

Indications

Shock - following volume replacement. Especially when the blood pressure is < 70 mmHg.
Post resuscitation hypotension after medical CPR - when systolic BP < 90 mmHg.

Contraindications

Hypovolemia, profound hypoxia

Precautions

Start IV in antecubital fossa (large vein) to lower risk of infiltration. When administering, continually check IV site for patency and signs/symptoms of infiltration. Continually monitor blood pressure. Do not mix with Sodium Bicarbonate; flush tubing well between drugs.

Side Effects

Tissue necrosis with infiltration. Hypertension, headache, anxiety, dysrhythmia, tachycardia, reflex bradycardia, chest pain, increased oxygen demand, nausea/vomiting.

Interactions

Should not be administered in the same line as alkaline agents (such as Sodium Bicarbonate), as alkaline solutions may inactive Norepinephrine.

Dose / Route

Norepinephrine (Levophed) (2-4 mcg/min - initial dose) **IV/IO** *(max 30 mcg/min)* - *large vein if possible*

Mix: 8 mg in 250 ml NS ***or*** 16 mg in 500 ml NS = *Solution concentration 32 mcg / ml*

Protocols **Adult - III.D, III.K, III.L, III.M, III.P** *- NOT to be used with Pediatric patients*

ONDANSETRON (Zofran)

Class

Anti-emetic / anti-nausea / seretonin receptor antagonist.

Description

Ondansetron helps to prevent nausea and vomiting by blocking 5-HT3 receptors so that serotonin is not able to bind to the receptor site and initiate a vomiting reflex.

Mechanism of Action

Ondansetron's mechanism of action has not been fully characterized. The released serotonin may stimulate the vagal afferents through the 5-HT3 receptors and initiate the vomiting reflex. Ondansetron selectively antagonizes 5-HT3 receptors.

Indications

For patients experiencing nausea and vomiting.

Contraindications

Known hypersensitivity

Precautions

Caution in liver failure patients.

Side Effects

Headache, malaise, drowsiness, fatigue, fever, rash, diarrhea, bronchospasm, arrhythmias. Rarely seen are angina chest pain, seizures, akathisia and acute dystonic reactions.

Interactions

Apomorphine, methadone, fluconazole, phenytoin, carbamazepine, rifampicin, and tramadol.

Dose / Route

Ondansetron (Zofran) 4 mg **IV/IO** *(over 2 minutes)* *or* 4 mg **ODT** (Orally Disintegrating Tablet)

Protocols **Adult - III.E, III.F, III.G**

PRALIDOXIME (2 PAM) autoinjector

Class

Cholinesterase reactivator ***Optional***

Description

A prefilled auto-injector that provides a dose of the antidote, pralidoxime chloride in a self-contained unit, specially designed for automatic self- or buddy- administration by emergency responders for the treatment of nerve agent intoxication.

Mechanism of Action

Reactivates cholinesterase to effectively act as an antidote to organophosphate pesticide poisoning. This action allows for destruction of accumulated acetylcholine at the neuromuscular junction. Treatment will be most effective if given within a few hours after poisoning.
Onset: minutes Peak effects: variable Duration: variable

Indications

As an antidote in the treatment of poisoning by organophosphate pesticides and chemicals. In the prehospital arena, is used when Atropine is, or has become ineffective in management of organophosphate poisoning.

Contraindications

Use with caution in patients with reduced renal function. Patients with myasthenia gravis.

Precautions

Occasionally (usually as a result of rapid injection) may cause laryngospasm and muscle rigidity. Intubation may be required. Cardiac monitoring should be considered in all cases of severe organophosphate poisoning.

Side Effects

Dizziness, blurred vision, diplopia, headache, drowsiness, nausea, tachycardia, hyperventilation, muscular weakness, excitement, and manic behavior.

Interactions

No direct drug interaction. However, patient with organophosphate poisoning should not be given barbiturates, morphine, theophylline, aminophylline, succinylcholine, reserpine, & phenothiazines.

Dose / Route

2 PAM autoinjector 600 mg **IM** - (up to 1800 mg or 3 auto-injectors)

Protocols **Adult - III.X**

RACEMIC EPINEPHRINE

Class

Sympathomimetic / bronchodilator

Description

A racemic mixture of Epinephrine. It is a sympathomimetic bronchodilator that is delivered by aerosol

Mechanism of Action

Stimulates beta-2 receptors in lungs; bronchodilation with relaxation of bronchial smooth muscles. Reduces airway resistance. Useful in treating laryngeal edema.; inhibits histamine release. Onset: within 5 minutes. Peak effect: 5-15 minutes. Duration: 1-3 hours

Indications

Bronchial asthma, prevention of bronchospasm. Croup, laryngotracheobronchitis, laryngeal edema.

Contraindications

Known hypersensitivity., hypertension, underlying cardiovascular disease, epiglottitis.

Precautions

May cause tachycardia and other arrhythmias. Monitor vital signs. Excessive use may cause bronchospasm.

Side Effects

Tachycardia, arrhythmias, palpitations, headache, nausea, vomiting.

Interactions

MAOI's may lead to hypertensive crisis. Beta blockers may negate therapeutic effects.

Dose / Route

Pedi: Racemic Epinephrine, 0.05 mg/kg in 3cc 0.9% saline *(Max. 5 ml)* via **Nebulizer**

(if unavailable, Epinephrine may be used at the same nebulizer dose)

Protocols **Pedi - P4**

SODIUM BICARBONATE

Class

Alkalinizing Agent / Hydrogen ion buffer.

Description

Sodium Bicarbonate is a salt that provides bicarbonate to buffer metabolic acidosis.

Mechanism of Action

Sodium Bicarbonate increases pH by providing the bicarbonate buffer (a weak base). Reacts with hydrogen ions to form water and carbon dioxide. Makes urine more alkaline and enhances Tricyclic Antidepressant excretion.

Indications

Tricyclic antidepressant overdose, prolonged cardiac arrest. crushing injuries. Bradycardia, wide-complex tachycardia, severe acidosis refractory to hyperventilation, and known hyperkalemia.

Contraindications

There are no absolute contraindications.

Precautions

May cause fluid retention, use with caution with CHF patients. Sodium Bicarbonate can cause metabolic alkalosis when administered in large quantities. It is important to calculate the dosage based on weight and size.

Side Effects

Extravasation may cause tissue cellulitis or necrosis at the injection site, also tissue slothing.

Interactions

Most catecholamines and vasopressors (e.g.**, Epinephrine and Dopamine) can be deactivated** by alkaline solutions such as Sodium Bicarbonate. Calcium Chloride should not be administered in conjunction with Sodium Bicarbonate, as a precipitate will form.

Dose / Route

Sodium bicarbonate 1 mEq/kg **IV/IO**

Protocols

Adult - III.H, III.N, III.O, III.Q, III.S, III.X **Pedi - P5**

SODIUM THIOSULFATE

Class

Sulfate forming compound.

Description

Used as an antidote to cyanide poisoning Thiosulfate acts as a sulfur donor for the conversion of cyanide to thiocyanate (which can then be safely excreted in the urine),

Mechanism of Action

Provides sulfane sulfur which is needed by the hepatic enzyme rhodanese to change cyanide into thiocyanate which is then excreted in the urine.

Indications

Suspected cyanide or cyanogenic poisoning with severe symptoms.

Contraindications

None in acute cyanide toxicity.

Precautions

Many patients will vomit and may aspirate if the airway is not protected.

Side Effects

Hypotension is the chief adverse reaction. Nausea/vomiting, local pain at injection site.

Interactions

None reported

Dose / Route

Sodium Thiosulfate 25% sol. 12.5g **IV/IO** (50ml NS - over 10 min.)

Protocols **Adult - III.X**

TETRACAINE 1/2 % Ophthalmic Drops

Class

Ophthalmic Anesthetic

Description

Tetracaine is an ester-type local anesthetic with an intermediate to long duration of action.

Mechanism of Action

Tetracaine, like all local anesthetics, causes a reversible blockade of nerve conduction by decreasing nerve membrane permeability to sodium. This decreases the rate of membrane depolarization thereby increasing the threshold for electrical excitability.

Indications

Ophthalmic anesthesia / chemical irritation

Contraindications

Use Tetracaine with caution in patients with known ester type anesthetic hypersensitivity. (lidocaine or benzocaine)

Precautions

After Tetracaine is applied to the eye, do not rub or wipe the eye until the anesthetic has worn off and feeling in the eye returns. To do so may cause injury or damage to the eye.
Advise patient that the drops may burn for a few seconds.

Side Effects

Minor burning, redness, irritation; dizziness, drowsiness, increased sweating; irregular heartbeat; muscle twitching or trembling; nausea or vomiting; shortness of breath or troubled breathing; unusual excitement, nervousness, or restlessness; unusual tiredness or weakness.

Interactions

The vagal effects and respiratory depression induced by opiate agonists may be increased by local anesthetics. Use of local anesthetics with rapid onset vasodilators, such as nitrates, may result in hypotension. Local anesthetics may enhance the effect of CNS depressive agents.

Dose / Route

Tetracaine eye drops - 2 drops in affected eye(s) before irrigation

Protocols **Adult - III.X**

SODIUM CHLORIDE 0.9%

Class

Isotonic crystalloid solution

Description

Because the concentration of sodium is near that of the blood, the solution is considered isotonic. Normal Saline contains 154mEq/L of sodium ions and approximately 154mEq/L of chloride ions.

Mechanism of Action

Normal saline replaces water and electrolytes.

Indications

IV access for emergency drugs; for dilution of concentrated drugs for IV infusion.
Hypovolemia, heat related problems, diabetic ketoacidosis, keep vein open.

Contraindications

Caution in patients with congestive heart failure as circulatory overload can be easily induced

Precautions

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

Side Effects

Rare in therapeutic doses.

Interactions

Few in the emergency setting

Dose / Route

IV / IO

Protocols

D5W 5% DEXTROSE / WATER

Class

Hypotonic dextrose-containing solution

Description

Mechanism of Action

D5W provides nutrients in the form of dextrose as well as free water

Indications

IV access for emergency drugs; for dilution of concentrated drugs for IV infusion.
In Nassau county - 100 ml bag for Amiodarone administration

Contraindications

D5W should not be used as a fluid replacement for hypovolemic states.

Precautions

None

Side Effects

Rare in therapeutic doses.

Interactions

Not to be used with phenytoin (Dilantin) or amrinone (Inocor)

Dose / Route

IV / IO

Protocols III.Q, III.R