

Medications

Pharmacology Review 9-3

MEDICATIONS

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MEDICATIONS
PHARMACOLOGY REVIEW

I. ACTIONS OF DRUGS

- a. Local Effects
- b. Systemic Effects

II. EFFECTS DEPEND UPON

- a. Age of Patient
- b. Condition of Patient
- c. Dosage
- d. Route of Administration

III. ROUTE OF ADMINISTRATION

- a. Intravenous (IV)
 - Most Rapidly Effective
 - Most Dangerous
 - Give Slowly Through an Established IV Line
- b. Intraosseous (IO)
 - IO To Be Given Only If IV is Unobtainable in an Unconscious Patient.
- c. Intramuscular (IM)
 - Takes Longer to Act
 - Longer Duration of Action
 - Deltoid or Gluteus Maximus Site
 - Absorption Very Dependent on Blood Flow
- d. Subcutaneous (SQ)
 - Slower and More Prolonged Absorption
 - Under Skin of Upper Arms, Thigh, Abdomen
- e. Inhalation
 - Bronchodilators
 - Steroids
- f. Endotracheal (Only administer through ET as a last resort)
 - Epinephrine, Atropine, Lidocaine, Narcan
 - Dilute Usual IV Dose with 10cc of Sterile Water
 - Medication Dose Must Be Doubled.
- g. Sublingual (SL)
 - Rapid Absorption
- h. Oral (PO)
 - Instant Glucose
 - Baby Aspirin
- i. Rectal (PR)
 - Rapid but Unpredictable Absorption

IV. RATES OF ABSORPTION

- a. Directly Related to Route of Administration
 - IV (Fastest)
 - IO
 - IM
 - SL
 - SQ
 - PO (Slowest)

V. ELIMINATION

- a. Many Methods
- b. Usually Metabolized by the Liver
- c. Eliminated by the Kidneys, Lungs, Skin

VI. TERMS

- a. Indications – Conditions Drugs Used For
- b. Contraindications – Conditions Drugs Not To Be Used For
- c. Depressants - Lessens / Decreases Activity
- d. Stimulant - Increases Activity
- e. Physiologic Action - Action From Normal Body Amounts of Drug
- f. Therapeutic Action - Beneficial Action Expected
- g. Untoward Reaction - Harmful Side Effect
- h. Irritation - Damage to Tissue
- i. Antagonism - Opposition Between Effects of Drugs
- j. Cumulative Action - Increased Action After Several Doses
- k. Tolerance - Decreased Effects After Repeated Doses
- l. Synergism - Combined Effects Greater Than Sum of Parts
- m. Potentiation - Enhancement of One Drug by Another
- n. Habituation - Drug Necessary for Feeling of "Well Being"
- o. Idiosyncrasy - Unexpected, Abnormal Response to a Drug
- p. Hypersensitivity - Exaggerated Response, Allergy

VII. AUTONOMIC NERVOUS SYSTEM

- a. Parasympathetic - Controls Vegetative Functions
- b. Sympathetic - " Fight or Flight "

VIII. PARASYMPATHETIC NERVOUS SYSTEM

- a. Mediated by Vagus Nerve
- b. Acetylcholine is Transmitter (Cholinergic)
- c. Atropine is Acetylcholine Blocker

IX. SYMPATHETIC NERVOUS SYSTEM

- a. Mediated by Nerves from Sympathetic Chain
- b. Norepinephrine is Transmitter (Adrenergic)
- c. Epinephrine is Released from Adrenals

X. SYMPATHETIC RECEPTORS

- a. Alpha
- b. Beta

XI. COMMON SYMPATHETIC AGENTS

- a. Epinephrine (*Adrenalin*) - predominately BETA
- b. Dobutamine (*Dobutrex*) - predominately BETA, slight ALPHA
- c. Norepinephrine (*Levophed*) - predominately ALPHA
- d. Dopamine (*Intropin*) - BETA at low dose: ALPHA at high dose
- e. Phenylephrine (*Neo-Synephrine*) - pure ALPHA

XII. SYMPATHETIC BLOCKERS

- a. Propranolol (*Inderal*) - BETA (*Blocker*)

XIII. DRUG ADMINISTRATION

- a. Appropriate
 - Medication selection based on protocol
 - Visually examine medication for particulates or discoloration and expiration date
 - Contraindications are reviewed prior to administration
 - Route is determined by protocol
 - Dose selection based on protocol
 - Dilution is per protocol
 - Rate is per protocol

MEDICATIONS**ADENOSINE (*Adenocard*)****P****EMT – P****P**

ACTIONS	Slows conduction time and can interrupt re-entrant pathways through the AV node Slows the sinus rate
INDICATIONS	Supra Ventricular Tachycardia (SVT) Consider in Regular Wide Complex Tachycardia Paroxysmal Supra Ventricular Tachycardia (PSVT) Wolf Parkinson White (WPW)
CONTRAINDICATIONS	Second or third degree AV block, sick sinus syndrome Atrial fibrillation Atrial flutter Ventricular tachycardia Hypersensitivity to Adenosine
PRECAUTIONS	It is helpful to inform the patient of likely side effects prior to medication administration
SIDE EFFECTS	Facial flushing Shortness of breath Chest pain Palpitations Brief period of sinus arrest /Transient Dysrhythmias Headache Lightheadedness Hypotension Nausea
ADULT DOSAGE	<u>Initial Dose</u> 6 mg rapid IVP (over 1-3 sec) immediately followed with a 20 mL saline flush <u>Repeat Dose</u> If no response is observed after 1 min., administer 12 mg rapid IVP (over 1-3 sec) immediately followed with a 20 mL saline flush. Max dose 30 mg
PEDIATRIC DOSAGE	<u>Initial Dose</u> 0.1 mg/kg rapid IVP followed with a 10 mL saline flush <u>Repeat Dose</u> If no response is observed after 1-2 min., administer 0.2 mg/kg rapid IVP followed with a 10 mL saline flush. Max dose 0.5 mg/kg up to 6mg
KEY POINTS	<ul style="list-style-type: none"> • Adenosine has a short half life, and should be administered rapidly followed by a rapid IV/IO flush • Reassess after each medication administration, refer to the appropriate protocol and treat accordingly. • Perform a 12 Lead EKG prior to the administration of Adenosine and after the rhythm converts • Record rhythm during and post administration

MEDICATIONS
ALBUTEROL (Proventil / Ventolin)

I	EMT – I	I
P	EMT – P	P

<i>ACTIONS</i>	Acts directly on beta 2 adrenergic receptors to relax bronchial smooth muscle, resulting in reduced airway resistance and relief of bronchospasm
INDICATIONS	Shortness of breath caused by bronchoconstriction
CONTRAINDICATIONS	Known hypersensitivity
PRECAUTIONS	Use precaution when administering to pregnant women or patients with cardiac history
SIDE EFFECTS	Nervousness Weakness Tremor Tachycardia
ADULT DOSAGE	2.5 mg in 3 mL via unit dose nebulizer and 6 lpm oxygen
PEDIATRIC DOSAGE	2.5 mg in 3 mL via unit dose nebulizer and 6 lpm oxygen
KEY POINTS	<ul style="list-style-type: none"> • May repeat treatment if partial relief is obtained

MEDICATIONS

AMIODARONE (Cordarone)

P EMT – P P

<i>ACTIONS</i>	Prolongs the refractory period and action potential duration
INDICATIONS	Ventricular Fibrillation (refractory to shock treatment) Pulseless Ventricular Tachycardia (refractory to shock treatment) Polymorphic VT and wide complex tachycardia
CONTRAINDICATIONS	Hypersensitivity (including iodine) Cardiogenic shock Second and Third degree AV block Severe sinus bradycardia Severe sinus node dysfunction
PRECAUTIONS	
SIDE EFFECTS	Tremors, Paresthesia, Ataxia Headache, Fatigue Abdominal pain, Nausea/Vomiting, Hepatic failure Arrhythmia, Bradycardia, Sinus arrest, Heart block (Prolonged QT), Heart failure Acute Respiratory Distress Syndrome, Severe pulmonary edema Blue-Gray skin
ADULT DOSAGE	<u>Ventricular Fibrillation and Pulseless Ventricular Tachycardia</u> 300 mg IV/IO bolus Repeat Dose: 150 mg IV/IO in 3-5 minutes, Max 2.2 g IV/24hrs <u>Wide Complex Tachycardia</u> 150 mg IV/IO over 10 minutes (15 mg/min) Repeat Dose: 150 mg IV/IO every 10 minutes prn, Max 2.2 g IV/24hrs
PEDIATRIC DOSAGE	<u>Ventricular Fibrillation and Pulseless Ventricular Tachycardia</u> 5 mg/kg IV/IO bolus <u>Ventricular Arrhythmias</u> Loading dose – 5 mg/kg IV/IO over 30-60 mins
KEY POINTS	<ul style="list-style-type: none"> • Avoid excessive movement and shaking of the medication

MEDICATIONS**ASPIRIN**

B	EMT - B	B
I	EMT - I	I
P	EMT - P	P

<i>ACTIONS</i>	Blocks platelet aggregation
INDICATIONS	Chest pain suggestive of a MI 12-Lead EKG indicating a possible MI
CONTRAINDICATIONS	Hypersensitivity Active ulcer disease Impaired renal function
PRECAUTIONS	Upset stomach
SIDE EFFECTS	GI bleeding Mucosal lesions Bronchial spasm in some asthma patients
SUPPLIED	325 mg tablet or 81 mg chewable tablet
ADULT DOSAGE	325 mg tablet or 324 mg (81 mg x 4 tablets) PO

MEDICATIONS**ATROPINE SULFATE****P****EMT – P****P**

ACTIONS	Increases sinus node firing Increases conduction through the AV node by blocking vagal activity Increases cardiac output Decreases ectopic beats or fibrillation of the ventricles
INDICATIONS	Symptomatic sinus bradycardia Organophosphate poisoning/Nerve agent exposure
CONTRAINDICATIONS	Known hypersensitivity Atrial flutter/fibrillation where there is a rapid ventricular response Glaucoma – narrow angle 2 nd and 3 rd degree AV Block with wide QRS complex
PRECAUTIONS	Use with extreme caution in myocardial infarction May increase myocardial oxygen demand May trigger tachy-dysrhythmias Patient needs to be warned about side effects Doses smaller than 0.5 mg or administered too slowly may slow rather than speed up the heart rate Excessive doses in adults may precipitate ventricular tachycardia or fibrillation
SIDE EFFECTS	Dry mouth, thirst, urinary retention Blurred vision, pupillary dilation, headache Flushed skin Tachycardia
SUPPLIED	Prefilled syringes containing 1 mg in 10 mL Auto-Injector containing 2 mg (nerve agent exposure only)
ADULT DOSAGE	<u>Bradycardia</u> 0.5 mg IV/IO (1.0 mg ETT) every 5 minutes Max dose 0.04 mg/kg or 3 mg <u>Organophosphate Poisoning</u> 2 – 5mg IVP, IM, or IO every 5 min
PEDIATRIC DOSAGE	<u>Bradycardia</u> 0.02 mg/kg IV/IO, repeated X 1, 5 minutes (minimum dose 0.1 mg), Max single dose 0.5 mg CHILD / 1.0 mg ADOLESCENT, Max total dose 1.0 mg CHILD / 2.0 mg ADOLESCENT <u>Organophosphate Poisoning</u> 0.5 mg/kg IV/IO, repeat every 3-5 minutes

MEDICATIONS**BiCarbonate (Sodium BiCarbonate)****P** EMT – P **P**

<i>ACTIONS</i>	Buffers metabolic acidosis Enhances the urinary excretion of tricyclics
INDICATIONS	Metabolic Acidosis from cardiac arrest (10 minutes down time) Tricyclic Overdose Hyperkalemia
CONTRAINDICATIONS	Heart Failure Seizures
SIDE EFFECTS	Tissue necrosis if infiltration Can precipitate with Calcium
ADULT DOSAGE	50mEq IVP for tricyclic overdose 50mEq or 1mEq/kg IVP for cardiac arrest – asystole or PEA 50 mEq IVP for cardiac arrest with prolonged down time(10 minutes)

MEDICATIONS**BRILINTA (ticagrelor)****P****EMT – P****P**

<i>ACTIONS</i>	A P2Y ₁₂ platelet inhibitor indicated to reduce the rate of thrombotic cardiovascular events in patients with acute coronary syndrome,
INDICATIONS	Acute Coronary Syndrome / STEMI 12-Lead EKG indicating a ST elevation MI
CONTRAINDICATIONS	History of intracranial hemorrhage Active pathological bleeding Severe hepatic impairment
PRECAUTIONS	Increased risk of bleeding Dyspnea
SIDE EFFECTS	Bleeding Dyspnea
ADULT DOSAGE	180mg PO (2 – 90mg Tablets)

MEDICATIONS**CALCIUM CHLORIDE****P****EMT – P****P**

<i>ACTIONS</i>	Reverses overdose with magnesium sulfate or calcium channel blockers (such as verapamil)
INDICATIONS	Antidote – magnesium sulfate and calcium channel blocker toxicity Hyperkalemia Beta Blocker overdose Known dialysis patient in cardiac arrest
CONTRAINDICATIONS	Hypersensitivity to calcium chloride
PRECAUTIONS	Do not infuse with sodium bicarbonate – will combine to form an insoluble precipitate Can cause ventricular fibrillation when pushed too fast or given to a patient who has been taking digitalis
SIDE EFFECTS	
ADULT DOSAGE	1 gram (10cc) slow IVP
KEY POINTS	<ul style="list-style-type: none"> Previously, calcium was used in resuscitation because it was believed to stimulate the heart to beat in asystole and to strengthen cardiac contractions in electromechanical dissociation – careful recent studies have failed to show any benefit from using calcium in cardiac arrest, and indeed the effects of calcium may be harmful in that situation

MEDICATIONS
DEXTROSE 50 % (D50)

I	EMT – I	I
P	EMT – P	P

<i>ACTIONS</i>	Restores circulating blood sugar
INDICATIONS	Hypoglycemia Altered mental status of unknown origin Coma of unknown origin Seizures of unknown origin
CONTRAINDICATIONS	Known hyperglycemia. Head trauma – unless confirmed hypoglycemia Caution with chronic renal failure Intracranial hemorrhage
PRECAUTIONS	Use with caution for stroke patients Use a large vein to administer D50
SIDE EFFECTS	Extravasation of D50 may cause necrosis Hyperglycemia May precipitate severe neurologic symptoms in alcoholics
ADULT DOSAGE	<u>Dextrose 50% (D50)</u> 25 g IV/IO
PEDIATRIC DOSAGE	2 mL/kg D25 IV/IO

MEDICATIONS

DIPHENHYDRAMINE HCL (*Benadryl*)

I	EMT – I	I
P	EMT – P	P

<i>ACTIONS</i>	Antihistamine Sedative Inhibits motion sickness (antiemetic)
INDICATIONS	Anaphylactic shock and severe allergic reaction Acute dystonia Nausea/vomiting (contact Medical Control) Extrapyramidal reaction (Parkinson-like movement disorders)
CONTRAINDICATIONS	Known hypersensitivity / Allergy Pregnancy or lactating
PRECAUTIONS	Avoid the use of Diphenhydramine in nursing mothers May induce vomiting Carefully monitor patient while awaiting for medication to take effect (effect of medication begins 15 minutes after administration)
SIDE EFFECTS	Drowsiness, confusion Blurring of vision Dry mouth Wheezing; thickening of bronchial secretions Hypotension
ADULT DOSAGE	<u>Allergic Reaction or Anaphylaxis</u> 25-50 mg IV/IO/IM
PEDIATRIC DOSAGE	<u>Allergic Reaction or Anaphylaxis</u> 1 mg/kg (without hypotension) IV/IO/IM

MEDICATIONS
DOPAMINE (Intropine)

P	EMT – P	P
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ACTIONS	Alpha and beta adrenergic receptor stimulator Dopaminergic receptor stimulator Dilates renal and mesenteric blood vessels Vasoconstriction Arterial resistance Increases cardiac output Increases preload
INDICATIONS	Cardiogenic shock Distributive Shock Cyanide poisoning (contact Medical Control)
CONTRAINDICATIONS	Known hypersensitivity /Allergy Hypovolemic hypotension VF or VT
PRECAUTIONS	Do not mix with bicarbonate, dopamine may be inactivated by alkaline solutions Extravasation may cause tissue necrosis
SIDE EFFECTS	Ectopic beats, palpitations Tachycardia, angina Nausea/vomiting VF or VT Dyspnea Headache
ADULT DOSAGE	2 -20mcg/kg/min IV drip. Start 5 micrograms/kg/minute IV/IO infusion, titrate to effect

Simple calculation for approx 5 mcg/kg/min (must be 1600 mcg/ml concentration)
 *Take the Patients weight in lbs and remove the last digit (175lbs = 17)
 * Subtract 2 from that figure (17-2=15)
 *This gives you the number of drops per min using a 60gtts set. (titrate to desired effect)

Example: 175lbs patient.
 175 remove the 5 is 17
 17 – 2 =**15 drops per min** (approx 5 mcg/kg/min)

MEDICATIONS
DuoNeb

I	EMT – I	I
P	EMT – P	P

ACTIONS	<p>(Albuterol) Parasympatholytic bronchodilator Dries respiratory tract secretions</p> <p>(Ipratropium – Atrovent) B₂ selective bronchodilator Increases HR</p>
INDICATIONS	<p>Asthma exacerbation COPD exacerbation Patients that have used their prescribed inhaler more than once Pulmonary edema with wheezing</p>
CONTRAINDICATIONS	<p>Known hypersensitivity /Allergy Allergy to peanuts Acute myocardial infarction Arrhythmias</p>
PRECAUTIONS	<p>Cardiovascular disease Hypertension history CHF</p>
SIDE EFFECTS	<p>Palpitations Anxiety Nausea Dizziness</p>
ADULT DOSAGE	Unit dose inhaled via nebulizer. May repeat as needed

MEDICATIONS		
EPINEPHRINE (Adrenaline)		
	I	EMT – I
	P	EMT – P
ACTIONS	Alpha and Beta adrenergic agonist Bronchodilation Increases heart rate and automaticity Increases cardiac contractility Increases myocardial electrical activity Increases systemic vascular resistance Increases blood pressure	
INDICATIONS	Cardiac arrest Allergic reaction/Anaphylaxis Respiratory distress Acute Asthma Pediatric Bradycardia	
CONTRAINDICATIONS	Hypersensitivity Tachycardia Hypertension Hypothyroidism Angina / Chest pain Coronary artery disease	
PRECAUTIONS	Pregnancy Blood pressure, pulse, and EKG must be routinely monitored	
SIDE EFFECTS	Palpitations, ectopic beats, tachycardia Anxiety / Tremors Hypertension VF / VT Angina	
ADULT DOSAGE	<p><u>Asthma and Anaphylaxis</u> Mild Reaction (1-1,000) 0.3-0.5mg SQ Consider 1:1000 2mg mixed with 1ml NS in nebulizer for Asthma</p> <p><u>Severe Anaphylaxis</u> (1:10,000) 0.5 mg slow IV/IO over 5 minutes - EMT-P Only</p> <p><u>Cardiac Arrest</u> 1:10,000 1 mg IV/IO every 3-5 minutes – EMT-P Only</p>	
PEDIATRIC DOSAGE	<p><u>Asthma and Anaphylaxis</u> Mild Reaction Ages 10-16 yrs (1:1,000) 0.03 mg/kg SQ Under 10 yrs (1:1,000) 0.01mg/kg SQ May use 1:1000 2mg mixed with 1ml NS in nebulizer aerosolized</p> <p><u>Severe Anaphylaxis Pending Arrest</u> Ages 10-16 yrs (1:10,000) 0.01mg/kg IV/IO over 5 minutes – EMT-P Only</p> <p><u>Cardiac Arrest</u> 1:10,000 0.01 mg/kg IV/IO push 0.1ml/kg – EMT-P Only or 0.1 mg/kg 1:1000 ETT 0.1ml/kg – EMT-P Only</p>	
KEY POINTS	Administer SQ dose prior to contacting Medical Direction. IV dose in non-cardiac patient consult Medical Direction	

MEDICATIONS
Fentanyl (Sublimaze)

I	EMT – I	I
P	EMT – P	P

ACTIONS	Analgesic anesthetic narcotic
INDICATIONS	Pain Management Acute Coronary Syndrome STEMI
CONTRAINDICATIONS	Hypersensitivity Hemorrhage Shock
SIDE EFFECTS	Decreases in Respiratory Apnea Bradycardia Muscle Rigidity
ADULT DOSAGE	25-50mcg IV, IM, or Intranasal (May repeat @ 25mcg)
Pediatric Dose	Children 2-12 years of age 1mcg/kg IV, IM, or Intranasal

MEDICATIONS**FUROSEMIDE (*Lasix*)****P****EMT – P****P**

ACTIONS	Potent diuretic Decreases preload Vasodilator
INDICATIONS	Acute pulmonary edema Congestive heart failure Acute pulmonary edema secondary to hypertension
CONTRAINDICATIONS	Pregnant patient Hypokalemia Pregnancy Dehydration Pneumonia Allergy to Lasix
SIDE EFFECTS	Hypokalemia Dehydration Depletion of potassium Hypotension
ADULT DOSAGE	0.5 – 1.0mg/kg SLOW IVP or double the daily oral dose. 100mg maximum dose
PEDIATRIC DOSAGE	1 mg/kg slow IVP
KEY POINTS	

MEDICATIONS**GLUCAGON**

I	EMT – I	I
P	EMT – P	P

ACTIONS	Accelerates the breakdown of glycogen to glucose in the liver, causing an increase in blood glucose level Relaxes smooth muscle of GI tract
INDICATIONS	Hypoglycemia when IV/IO is not able to be established and oral glucose is contraindicated Esophageal obstruction Beta Blocker overdose
CONTRAINDICATIONS	Known hypersensitivity Pheochromocytoma
PRECAUTIONS	Glucagon is only effective in patients with sufficient stores of glycogen Use caution in patients with renal or cardiovascular disease Glucagon can be administered on scene, but do not wait for it to take effect
SIDE EFFECTS	Nausea/Vomiting
ADULT DOSAGE	1mg IM for Hypoglycemia 2mg IV/IO/IM in esophageal foreign body obstruction 2 – 4mg IV/IO for hypotension / bradycardia in Betablocker overdose and Calcium Channel overdose
PEDIATRIC DOSAGE	<20kg give 0.5mg/kg IM >20kg give 1mg IM
KEY POINTS	Response is usually noticed in 5-20 minutes Glucagon is NOT a substitute for D25, or D12.5. IV must be attempted prior to administering Glucagon

MEDICATIONS
HALDOL (Haloperidol)

P	EMT – P	P
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<i>ACTIONS</i>	Antipsychotic Major tranquilizer
INDICATIONS	Combative patient Acute psychotic episodes
CONTRAINDICATIONS	Known hypersensitivity Head injury or head trauma Seizure or history of seizure Children less than 16 yes old
SIDE EFFECTS	Altered LOC/ Coma Nausea/Vomiting Hypotension Tremors Known Hypersensitivity
ADULT DOSAGE	5 mg IM/IV/IO Call Medical Direction for orders of repeat single dose after 5 minutes
KEY POINTS	The patient MUST be routinely Monitored for respiratory depression and or hypotension. The run documentation MUST clearly support the use of this medication.

MEDICATIONS**HEPARIN****P EMT – P P**

<i>ACTIONS</i>	Anticoagulant
INDICATIONS	Acute Coronary Syndrome LVAD malfunction
CONTRAINDICATIONS	Hypersensitivity to Heparin Active bleeding Trauma Severe hypertension Aortic dissection Pregnancy Major surgery within the last 14 days Symptoms of CVA
SIDE EFFECTS	Bleeding
ADULT DOSAGE	50 units/kg IV Maximum dose (4000 units)
KEY POINTS	

MEDICATIONS
KETOROLAC (Toradol)

I	EMT – I	I
P	EMT – P	P

<i>ACTIONS</i>	NSAID analgesic Reduces pain
INDICATIONS	Moderate pain Pain associated with kidney and gall stones
CONTRAINDICATIONS	Hypersensitivity including aspirin or other NSAIDS Advanced renal impairment Suspected cerebrovascular bleeding Recent GI bleeding Nursing mothers Labor and delivery Asthma
SIDE EFFECTS	Edema Hypertension Rash Nausea Drowning Dizziness
ADULT DOSAGE	30 mg IV, 60 mg IM
PEDIATRIC DOSAGE	0.15 mg/kg IV or 0.3 mg.kg IM

MEDICATIONS**LIDOCAINE (*Xylocaine*)****P****EMT – P****P**

ACTIONS	Suppresses ventricular ectopy Anesthetic
INDICATIONS	IO anesthetic
CONTRAINDICATIONS	Allergy to Lidocaine Known hypersensitivity Second or third degree heart block Bradycardia Sinus arrest Hypotension
SIDE EFFECTS	Bradycardia Hypotension Dizziness, numbness Drowsiness, confusion Seizure
ADULT DOSAGE	EZ IO anesthetic dose 1-2 cc's (20 – 40 mg IO) slowly into bone marrow prior to NS flush in conscious patient
KEY POINTS	

MEDICATIONS
LOPRESSOR (Metoprolol)

P	EMT – P	P
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ACTIONS	Beta Blocker Decreases HR Decreases systolic BP
INDICATIONS	Chest Pain with BP > 110 systolic HR >60 AMI to reduce myocardial ischemia Convert or slow ventricular response in SVT (adenosine preferred) Rate Control in SVT that will not convert
CONTRAINDICATIONS	Bronchial asthma CHF Second or third degree heart block Bradycardia Vardiogenic shock Cocaine use
SIDE EFFECTS	Bradycardia Heart block CHF Bronchospasm Hypotension
ADULT DOSAGE	5 mg IV/IO over 1 minute. May repeat 5 mg after 3 minutes if inadequate response and B/P>110 and HR>60
KEY POINTS	

MEDICATIONS
MAGNESIUM SULFATE

P	EMT – P	P
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ACTIONS	Anticonvulsant Antiarrhythmic CNS depressant
INDICATIONS	Seizures secondary to eclampsia Ventricular ectopy refractory to Amiodarone Torsades Adjunct to alleviate acute asthma attack
CONTRAINDICATIONS	Renal disease Heart blocks
SIDE EFFECTS	Respiratory depression CNS depression Hypotension Cardiac arrest
ADULT DOSAGE	1.0 – 4.0 grams SLOW IVP over 2-3 minutes (Max dose 4 grams) Asthma dose 45mg/kg IV to a total of 75mg/kg
KEY POINTS	

Approx Mag Dose	
Child < 10	1 gram
Child 10 16	1 to 2

MEDICATIONS

MARK 1 KIT - Atropine and 2-PAM Chloride

P **EMT – P** **P**

ACTIONS	<p><u>Atropine</u> Blocks a nerve agent’s effect of overstimulation and relieves smooth muscle constriction in the lungs and gastrointestinal tract</p> <p><u>2-PAM</u> Acts to restore normal functions at the nerve ending by removing the nerve agent and affecting toxin irreversibility</p>
INDICATIONS	Suspected or confirmed nerve agent exposure
CONTRAINDICATIONS	Both drugs in the kit should be used with caution (but not withheld) in patients with pre-existing cardiac disease, HTN, or CVA history
PRECAUTIONS	
SIDE EFFECTS	<ul style="list-style-type: none"> Chest pain Exacerbation of angina Induction of myocardial infarction Blurred vision Headache Drowsiness Nausea Rapid heart rate Increased blood pressure Hyperventilation
SUPPLIED	<p><u>Atropine</u> 2 mg Auto Injector</p> <p><u>2-PAM</u> 600 mg Auto Injector</p>
ADULT DOSAGE	Up to 3 Auto Injectors may be administered to one patient as determined acceptable by Medical Control based upon signs and symptoms
PEDIATRIC DOSAGE	Mark I Kits are not authorized for use in children under the age of 9 years
KEY POINTS	

MEDICATIONS**METHYPREDNISOLONE (Solumedrol)****P** **EMT – P** **P**

<i>ACTIONS</i>	Anti-inflammatory steroid
INDICATIONS	Anaphylaxis Asthma COPD
CONTRAINDICATIONS	NONE in emergency setting
SIDE EFFECTS	GI bleeding Prolonged wound healing Suppression of natural steroids
ADULT DOSAGE	125 mg IVP
PEDIATRIC DOSAGE	1-2 mg/kg IVP
KEY POINTS	

MEDICATIONS		
MORPHINE SULFATE		

I	EMT – I	I
P	EMT – P	P

<i>ACTIONS</i>	Narcotic Analgesic Causes peripheral vasodilation
INDICATIONS	Pulmonary edema MI pain unrelieved with nitro Pain management Pain secondary to burns
CONTRAINDICATIONS	Known hypersensitivity / Allergy Head injury or head trauma Hypotension Altered LOC Undiagnosed abdominal pain(consult Med Command) COPD Bradycardia Multiple trauma patients
PRECAUTIONS	If the patient responds with respiratory depression or hypotension, administer Narcan to reverse the effects Routinely monitor the patient’s respiratory effort and SpO ₂
SIDE EFFECTS	Respiratory depression Altered LOC, constricted pupils Bradycardia Nausea/Vomiting Hypotension
ADULT DOSAGE	2-4 mg slow IV/IO, Intranasal (If no relief, may repeat at 2 to 4 mg) For further doses over 10mg of Morphine, contact medical direction. Follow with 4mg Zofran
PEDIATRIC DOSAGE	<u>Pain Management:</u> 0.1-0.2 mg/kg slow IV, IM, SQ
KEY POINTS	

MEDICATIONS
NALOXONE (<i>Narcan</i>)

I	EMT – I	I
P	EMT – P	P

<i>ACTIONS</i>	Reverses all effects from opioid agents such as respiratory depression and all central and peripheral nervous system effects
INDICATIONS	Narcotics overdoses Altered mental status of unknown origin
CONTRAINDICATIONS	Nonee
SIDE EFFECTS	Withdrawal syndrome in addiction Ventricular dysrhythmias Cerbral edema
ADULT DOSAGE	0.4 - 2 mg IV/IO, IM, SQ, or intranasal. Administer in small doses. May repeat the initial dose if the patient becomes symptomatic again
PEDIATRIC DOSAGE	0.1 mg/kg IV/IO, IM, SQ, or intranasal. May be repeated at 0.1 mg/kg
KEY POINTS	

EDICATIONS
NITROGLYCERIN

I	EMT – I	I
P	EMT – P	P

<i>ACTIONS</i>	Decreases preload and afterload Increases coronary blood flow
INDICATIONS	Cardiac chest discomfort, angina STEMI Pulmonary edema
CONTRAINDICATIONS	Known hypersensitivity Hypotension (systolic BP <110, diastolic BP <60) Increased intracranial pressure Glaucoma CVA Erectile dysfunction drugs (contact med control)
SIDE EFFECTS	Headache Hypotension Dizziness, weakness Syncope Dilated pupils
ADULT DOSAGE	<u>Cardiac Chest Discomfort</u> 0.4 mg SL or spray May repeat every 5 minutes up to 3 doses if B/P systolic > 90mmHg <u>Pulmonary Edema with systolic BP >200</u> 1.2mg SL (3 tablets simultaneously)
PEDIATRIC DOSAGE	Not recommended in the prehospital setting
KEY POINTS	

MEDICATIONS**NITROUS OXIDE**

I	EMT - I	I
P	EMT - P	P

ACTIONS	Provides rapid, easily reversible relief of pain
INDICATIONS	Abdominal pain Chest pain secondary to infarction or angina Acute urinary retention Fractures Severe exterior burns Kidney stones Musculoskeletal trauma
CONTRAINDICATIONS	Patients under 12 years of age Severe COPD Head injury ABD pain or trauma Intoxication or drug ingestion Shortness of breath Chest trauma with a possible pneumothorax (during prolonged transport)
SIDE EFFECTS	Discontinue if any of the following arise Apnea, cyanosis Nausea/vomiting Deteriorating vital signs (administer O2 100%) Ambulance crew may experience giddiness if the vehicle is not properly vented
SUPPLIED	Nitronox, a set containing an oxygen cylinder and a nitrous oxide cylinder joined by a valve that regulates flow to provide a 50:50 mixture of the two gases - the mixture is piped to a demand valve apparatus
ADULT DOSAGE	Invert cylinder several times before use; instruct the patient to inhale deeply through a patient-held demand valve mouthpiece
PEDIATRIC DOSAGE	
KEY POINTS	<ul style="list-style-type: none"> • Self-administered by mask: a good seal around the mouth and nose is important; the gas is breathed deeply and may give relief after about two minutes; the patient should stop when relief is obtained • The paramedic should not hold the face mask in place for the patient

MEDICATIONS		
ONDANSETRON (Zofran)		
	P	EMT – P

<i>ACTIONS</i>	Antiemetic
INDICATIONS	Nausea & vomiting
CONTRAINDICATIONS	Hypersensitivity
SIDE EFFECTS	Drowsiness, vertigo Blurred vision, headache Hypotension
ADULT DOSAGE	4 mg slow IV, IM
PEDIATRIC DOSAGE	Contact Medical Control
KEY POINTS	

MEDICATIONS
ORAL GLUCOSE

B	EMT – B	B
I	EMT – I	I
P	EMT – P	P

<i>ACTIONS</i>	Elevates blood glucose level
INDICATIONS	Correction of hypoglycemia
CONTRAINDICATIONS	Known hypersensitivity
PRECAUTIONS	Patient must be alert and able to sufficiently swallow Be alert for difficulty swallowing or choking due to the thick consistency
SIDE EFFECTS	Nausea/Vomiting
ADULT DOSAGE	One complete tube (15-25 g)
PEDIATRIC DOSAGE	Half a tube
KEY POINTS	

MEDICATIONS
OXYGEN

B	EMT – B	B
I	EMT – I	I
P	EMT – P	P

<i>ACTIONS</i>	Increases oxygen content of blood Improves tissue oxygenation Decreases energy expended for respirations
INDICATIONS	Cardiac chest discomfort Hypoxemia Cardiopulmonary arrest Trauma Shortness of breath Sedative drug administrations
CONTRAINDICATIONS	None in the prehospital setting
PRECAUTIONS	Never withhold oxygen from those who need it Be aware for respiratory depression in COPD patients on prolonged high flow oxygen Simple or partial rebreather face masks must be supplied with a minimum 10 Lpm Non-rebreather face masks must be supplied with a minimum 12 Lpm T-Piece Nebulizers must be supplied with 6 lpm
SIDE EFFECTS	High concentrations of oxygen may reduce the respiratory drive in some COPD patients; these patients should be carefully monitored
SUPPLIED	As a compressed gas in cylinders of varying sizes
ADULT DOSAGE	10-15 lpm via NRB mask, 2-6 lpm via nasal cannula, 6 lpm via small volume nebulizer, unless otherwise indicated
PEDIATRIC DOSAGE	10-15 lpm via NRB mask or 2-6 lpm via nasal cannula, or 6 lpm via unit dose nebulizer, unless otherwise indicated
KEY POINTS	

MEDICATIONS**Plavix (CLOPIDOGREL)****P****EMT – P****P**

ACTIONS	Blocks platelet aggregation
INDICATIONS	Acute Coronary Syndrome / STEMI 12-Lead EKG indicating a ST elevation MI
CONTRAINDICATIONS	Hypersensitivity Active bleeding Active ulcer disease Pathological bleeding
PRECAUTIONS	Upset stomach
SIDE EFFECTS	Nose bleeds, coughing up Chest pains Numbness in body, weakness GI bleeding Mucosal lesions
ADULT DOSAGE	600 mg tablet PO

MEDICATIONS**PRALIDOXIME CHLORIDE / 2-PAM CHLORIDE****P****EMT – P****P**

ACTIONS	Reactivates cholinesterase inactivated by organophosphate pesticides or other nerve agents, permitting degradation of accumulated acetylcholine and facilitating normal functioning of neuromuscular junctions
INDICATIONS	Antidote for organophosphate poisoning
CONTRAINDICATIONS	Hypersensitivity Children under 9 years of age or less than 50 kg
PRECAUTIONS	Not effective on blister agents, blood agents, pepper spray, mace, tear gas, or other TICs Use antidotes only when signs and symptoms of exposure are present; they will not protect if given before exposure
SIDE EFFECTS	Dizziness, blurred/double vision Nausea, headache, drowsiness Muscular weakness Hyperventilation Tachycardia Increased blood pressure
SUPPLIED	2 mL - 300 mg/mL prefilled Auto-Injector
ADULT DOSAGE	Use Auto-Injector if exposed to nerve agent Deliver Atropine 2 mg IM; Follow with 2-PAM 600 mg IM Repeat in 5-10 minutes if symptoms are still present Max 3 kits

MEDICATIONS
TNKase (Tenecteplase)

P	EMT – P	P
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ACTIONS	Thrombolytic agent; biosynthetic (recombinant DNA origin) form of human tissue-type plasminogen activator (t-PA).															
INDICATIONS	Management of Acute Myocardial Infarction (STEMI) Used in the management of Acute Myocardial Infarction for lysis (dissolving) of thrombi (clots) obstructing coronary arteries															
CONTRAINDICATIONS	<ul style="list-style-type: none"> Active internal bleeding History of CVA Recent (within two months) intracranial or intraspinal surgery or trauma Intracranial neoplasm, arteriovenous malformation, or aneurysm Known bleeding condition Severe uncontrolled hypertension 															
PRECAUTIONS	Possible bleeding involving internal bleeding at intracranial or retroperitoneal sites or bleeding from the GI, GU, or respiratory tract. Superficial or surface bleeding at vascular puncture and access sites (e.g., venous cutdowns, arterial punctures) or sites of recent surgical intervention also may occur. ¹															
SIDE EFFECTS	Bleeding															
ADULT DOSAGE	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">$<60\text{kg}$</td> <td style="width: 20%;">30mg IV</td> <td style="width: 20%;">6ml</td> </tr> <tr> <td>60 to $<70\text{kg}$</td> <td>35mg IV</td> <td>7ml</td> </tr> <tr> <td>70 to $<80\text{kg}$</td> <td>40mg IV</td> <td>8ml</td> </tr> <tr> <td>80 to $<90\text{kg}$</td> <td>45mg IV</td> <td>9ml</td> </tr> <tr> <td>$\geq 90\text{kg}$</td> <td>50mg IV</td> <td>10ml</td> </tr> </table>	$<60\text{kg}$	30mg IV	6ml	60 to $<70\text{kg}$	35mg IV	7ml	70 to $<80\text{kg}$	40mg IV	8ml	80 to $<90\text{kg}$	45mg IV	9ml	$\geq 90\text{kg}$	50mg IV	10ml
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MEDICATIONS
TETRACAINE (Pontocaine, Ophthalmic)

P	EMT – P	P
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<i>ACTIONS</i>	Local anesthesia for eyes
INDICATIONS	Irritation and/or pain of the eyes (With no penetrating trauma)
CONTRAINDICATIONS	Hypersensitivity or Allergy to tetracaine and other local anesthetics Penetrating or open eye injury
PRECAUTIONS	
SIDE EFFECTS	Burning sensation in eyes Redness, tearing
ADULT DOSAGE	1-2 drops in effected eye every 5-10 minutes prn for pain control
PEDIATRIC DOSAGE	
KEY POINTS	<ul style="list-style-type: none"> • Keep dropper sterile • Single patient use only

MEDICATIONS
Thiamine / Vitamin B12

P	EMT – P	P
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<i>ACTIONS</i>	Allows normal breakdown of glucose
INDICATIONS	<p>Indicated for use in adult patients only</p> <p>Altered mental status. Given prior to D50 to avoid Wernicke Karsakoff Syndrome. (alcoholic, renal failure patients, or malnourished patients may have a Thiamine deficiency)</p> <p>Alcohol abuse</p>
CONTRAINDICATIONS	None
SIDE EFFECTS	None
ADULT DOSAGE	100 mg IVP prior to administering D50

MEDICATIONS

VASOPRESSIN (*Pitressin*)

P EMT – P P

ACTIONS	Alpha agonist Causes vasoconstriction Increases smooth muscle activity
INDICATIONS	Ventricular Fibrillation Pulseless Ventricular Tachycardia
CONTRAINDICATIONS	Known hypersensitivity Nephritis (inflammation of the kidney)
PRECAUTIONS	Not recommended for responsive patients with CAD May provoke cardiac ischemia and angina
SIDE EFFECTS	Nausea/Vomiting Diarrhea Confusion Pain at IV site
SUPPLIED	20 Units / mL in a vial
ADULT DOSAGE	<u>Cardiac Arrest / Ventricular Fibrillation / Pulseless Ventricular Tachycardia</u> 40 Units IV push (administered in place of the first or second dose of Epinephrine)
PEDIATRIC DOSAGE	Not recommended for pediatric use
KEY POINTS	<ul style="list-style-type: none"> The half-life of Vasopressin is approximately 10- 20 minutes

MEDICATIONS
VERSED (Midazolam)

I	EMT – I	I
P	EMT – P	P

ACTION	Sedative and hypnotic benzodiazepine Induces amnesia
INDICATIONS	Conscious sedation Seizure Facilitate intubation Facilitate pacing / cardioversion
CONTRAINDICATIONS	Intolerance to benzodiazepines Narrow-angle glaucoma Shock Coma
SIDE EFFECTS	<p>CNS – amnesia, headache, dizziness, euphoria, confusion, agitation, anxiety, delirium, drowsiness, muscle tremor, ataxia, dysphoria, slurred speech, and paresthesia.</p> <p>Cardiovascular – hypotension, PVC’s, tachycardia, vasocagel episode</p> <p>Eye – blurred vision, diplopia, nystagmus, pinpoint pupils</p> <p>Respiratory – coughing, bronchospasms, laryngospasm, apnea, hypoventilation, wheezing, airway, obstruction, tachypnea</p> <p>Skin – swelling, burning, pain at the site of injection</p>
ADULT DOSAGE	2mg IV/IO max initial dose for sedation (may repeat as necessary) 5mg IV/IO max initial dose for seizures (may repeat as necessary) 5mg IV/IO for RSI and Violent Patients Versed may be administered IM or nasally in actively seizing or violent patients whenever IV access is not achieved.
PEDIATRIC DOSAGE	Seizures – 0.1mg/kg IV/IO/IM to a max dose of 5mg 0.2mg/kg Intranasal to a max dose of 10mg

Special Use Drugs

MEDICATIONS
DOXYCYLINE (Vobramycin)

P **EMT – P** **P**

ACTIONS	Tetracycline antibiotic
INDICATIONS	Anthrax Plague
CONTRAINDICATIONS	Allergy Pregnancy Pediatrics
SIDE EFFECTS	None
ADULT DOSAGE	100mg tablet PO. Max dose 200mg

MEDICATIONS
CIPROFLOXACIN (Cipro)

P	EMT – P	P
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<i>ACTIONS</i>	Antimicrobial
INDICATIONS	Exposure to Anthrax and other microorganisms as deemed necessary by public health and medical direction
CONTRAINDICATIONS	Hypersensitivity
SIDE EFFECTS	Nausea / Vomiting
ADULT DOSAGE	500mg tablet PO 400mg IV

MEDICATIONS
HYDROXYCOBALAMINE (Cyanokit)

P	EMT – P	P
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<i>ACTIONS</i>	Reverses cellular hypoxia in cyanide poisonings
INDICATIONS	Known or suspected cyanide poisoning
CONTRAINDICATIONS	None
SIDE EFFECTS	Hypertension Chromaturia Erythema Nausea Headache
ADULT DOSAGE	5g IV over 5 minutes May repeat in 5 minutes with Medical Command Approval