# Rice County Emergency Medical Services

## Drug Formulary

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Adenocard/Adenosine

Class
An endogenous nucleoside

Effect
1. Slows conduction time through the AV node and other atrial tissue
2. Possibly by slowing phase 0 of the action potential
3. Creates a bi-directional block in the slow-conducting region of tissue involved in reentrant rhythms thus terminating reentrant rhythms

Uses
PSVT, SVT including WPW

Dosages
Initial Dose: 6mg fast IVP (within 1-2 seconds) followed immediately with 10-20cc saline flush
Subsequent Doses: 2nd/3rd dose of 12mg delivered as above
Max Dose: 30mg

Side Effects
Palpitations, Chest Pain, Hypotension, Dizziness, Paresthesia in arms, Nausea/Vomiting, Dysrhythmia including heart blocks, bradycardia and asystole.

Contraindications
Second or Third Degree AV Block
Other bradycardia's
Sick Sinus Syndrome
Hypersensitivity

Precautions
1. Administer in large vein at most proximal IV port
2. Arrhythmias upon conversion of SVT are very common and usually transient.
3. Antagonized by methylxanthines such as caffeine and theophylline
4. Actions may be inhibited by patients on certain breathing medications, particularly aerosols.
5. Potentiated by dipyridamole
6. Administer with caution in asthma patients.
7. A-fib and A-flutter will be refractory to adenocard
8. Pregnancy risk category: C

Antidote
Treat Symptomatically
Due to extremely short half-life, no antidote is usually required.
**Class**  
Beta II agonist

**Effect**  
1. Relaxes smooth muscle of the bronchi, uterus and vascular supply to skeletal muscle  
2. Does not pass the blood-brain barrier  
3. Increases cyclic AMP levels which are associated with relaxation of bronchial smooth muscle and inhibition of release of mediators from mast cells.

**Uses**  
Bronchial Asthma  
Reversible bronchospasm associated with bronchitis and emphysema

**Dosage**  
Adult: 2.5 mg in 3cc NS (0.083% solution) prn every 5 min as needed  
Pediatric: 1.75-2.5mg of above solution prn every 5 min as needed

**Side Effects:**  
Tremor, Dizziness, Nervousness, Headache, Insomnia, Tachycardia, HTN, pharyngitis, nasal congestion, nausea, dyspepsia, bronchospasm, cough, bronchitis, wheezing.

**Contraindications**  
Hypersensitivity

**Precautions**  
1. Extreme caution in warranted in patients with cardiovascular disorders, especially coronary insufficiency, arrhythmias and HTN. Use caution if PMH of seizures, hyperthyroidism or diabetes.  
2. Do not give at same time of administration of aerosol bronchodilators or epi  
3. Use caution if pt is on MAO inhibitors or tricyclic antidepressants  
4. Beta-Blocking agents and albuterol may inhibit the effect of each other  
5. Pregnancy risk category: C

**Antidote**  
Beta Blockers, be aware of the potential of inducing an asthma attack  
Discontinue nebulization  
Supportive care treating symptomatically  
Avoid sympathomimetics
Amiodarone

Class
Class III Antiarrhythmic

Effect
1. Prolongs Phase 3 of the Action Potential
2. Increases refractory period via sodium and potassium channel effects and slows intracardiac conduction of the cardiac action potential via sodium channel effects
3. Multichannel blocker-Sodium, potassium, calcium channel, noncompetitive Alpha/Beta-Blocker

Uses
Ventricular tachyarrhythmia's including: V-tach and V-Fib
Stable irregular narrow complex tachycardias such as uncontrolled A-Fib with stable BP.

Dosages
Adult Ventricular arrhythmias: Initial bolus of 300mg can be given via IV/IO push with a repeat dose of 150mg after 5 minutes if needed.
Adult Irregular Narrow Complex Tachycardia: Initial dose of 150mg to be administered over 10 minutes. May repeat once if needed. If successfully converted: Administer 1mg/min infused for first six hours.
Pediatric: Initial bolus of 5mg/kg via IV/IO push up to adult dose of 300mg. May be repeated x2 every 5 minutes as needed at 5mg/kg via IV/IO push.
Maintenance Infusion for Post-Arrest: 0.75mg/minute. Accomplish this by mixing 900mg into 500cc NS IV and using 60gtt set, run at 25gtt/min. CONSULT PHYSICIAN FOR PEDIATRIC INFUSIONS.
**NOTE: AEMT’s may not administer/monitor maintenance infusions of Amiodarone

Side Effects:
Interstitial lung disease, hypo/hyperthyroidism, increased liver enzymes, epididymitis, gynecomastia, bluish/grey (dusking) skin.

Contraindications
No contraindications for pulseless arrest patients who are in V-fib or V-Tach.
Allergic/hypersensitivity to Amiodarone
Bradycardias, 2nd Degree and 3rd Degree AV blocks
Neonates

Precautions
Use caution with perfusing arrhythmias in patients with CHF.

Antidote
Stop infusion and treat symptomatically
**Aspirin (ASA)**

**Class**
- acetylsalicylic acid
- Nonsteroidal anti-inflammatory (NSAID)

**Effect**
1. Analgesic by decreasing sensitivity of peripheral pain receptors, inhibiting the conversion of arachidonic acid and prostaglandins.
2. May interfere with transmission of pain impulses at subcortical brain centers
3. Anti-inflammatory by decreasing capillary permeability
4. Reduces leakage of fluid into surrounding tissues
5. Antipyresis
6. Decreased Platelet aggregation
7. Inhibition of prothrombin formation

**Uses**
- Prophylaxis of thromboembolic complications such as acute chest pain of a cardiac nature.
- Analgesic for pain associated with inflammatory states
- Fevers
- Treatment of inflammatory conditions such as arthritis

**Dosages**
- 81-324mg for chest pain associated with suspected cardiac nature.
- 325-650mg for generalized pain

**Side Effects**
- Gastric distress, heartburn, nausea, wheezing, bleeding problems, GI Bleed, Reye's Syndrome in Children.

**Contraindications**
- Hypersensitivity
- Severe GI disorders
- Severe anemia or hemophilia
- 3rd trimester pregnancy

**Precautions**
- Generalized anemia or PMH of bleeding disorders such as GI bleed
- Asthma Patients
- Pregnancy Risk Category: C, D in third trimester

**Antidote**
- Activated Charcoal and possibly gastric lavage in Emergency Room
Rice County Emergency Medical Services

Atropine

**Class**

Anticholinergic also referred to as a parasympatholytic or an antimuscarinic

**Effect**

Competitive antagonist of acetylcholine at muscarinic receptor sites
Increases heart rate in therapeutic doses

**Uses**

Symptomatic pulsatile bradycardia
Bradycardic heart blocks with exception to 3rd degree heart block
Organophosphate poisoning
  - D - Defecation/Diarrhea
  - U - Urination/Incontinence
  - M - Miosis (Pupil constriction)
  - B - Bradycardia, Bronchospasm
  - E - Emesis (Vomiting)
  - L - Lacrimation (Eye Watering)
  - S - Salivation, Seizures, Sweating

**Dosages**

*Adult Symptomatic Pulsatile Bradycardia:* 0.5 mg every 3-5 minutes to a max of 3mg
*Pediatric Symptomatic Pulsatile Bradycardia:* 0.02mg/kg every 3-5 minutes to max of 0.5mg
*Organophosphate Poisoning:* 2mg every 5 minutes as needed with no max dose.

**Side Effects**

Dry mouth, pupil dilation, flushed skin, tachycardia, hypertension, blurred vision

**Contraindications**

Tachycardia
CHF
Hypersensitivity
Relatively contraindicated in 3rd degree heart blocks

**Precautions**

Still may be considered by some in use of Asystole/PEA as this is old ACLS recommendation
May cause bradycardia (paradoxically) by administering too slowly
Decreases secretion of insulin
Antihistamines, nitrates, antiarrhythmics and tricyclic's may increase side effects

**Antidote**

Physostigimine
Dextrose

**Class**
Carbohydrate

**Effect**
Provides a source of glucose for metabolism, thus increasing blood sugar levels

**Uses**
- Hypoglycemia (Blood sugar less than 60 with signs and symptoms)
- Seizures, Unconscious/Unknown patients with known history of diabetes who is absolutely or relatively hypoglycemic

**Dosages**
- **Adult:** 25 g of 50% solution - IV Slow push through large bore IV
- **Pediatric:** 12.5 g of 25% solution - IV slow push through large bore IV (relative to age/size)
  
  Accomplish 25% solution by wasting 12.5 g (25cc) of 50% solution Dextrose and draw up/mix 25cc of NS.

**Side Effects**
Hyperglycemia, Hypokalemia, Tissue necrosis if infiltration occurs, phlebitis

**Contraindications**
- Known or possible intracranial bleed
- DKA
- Delirium Tremens, Wernicke's Syndrome, Korsakoff's Syndrome

**Precautions**
- Administer slowly in large bore IV
- Do not give via IM and stop immediately if infiltration occurs
- Flush vein well following administration
- If pt is chronic alcoholic, Thiamin should also be administered.

**Antidote**
Insulin
Diphenhydramine (Benadryl)

Class
Antihistamine

Effect
Opposes the action of histamine on the capillary bed by binding with histamine receptor sites
May inhibit MAST cell damage preventing more histamine release
Has associated sedative effects
Has anticholinergic effect thus drying secretions and mucous membranes

Uses
Allergic Reactions
Anaphylaxis given with Epi
Antidote for phenothiazine extrapyramidal side effects
Sedation

Dosages
Adult Dose: 10-50 mg via IV/IO or IM
Pediatric Dose: 1.0-2.0 mg/kg via IV/IO slow push over 5 minutes

Side Effects
Sedation, Thickened bronchial secretions, vertigo, disturbed coordination, confusion, headache,
hypotension, palpitations, tachycardia, photosensitivity, nausea/vomiting

Contraindications
Newborn or premature infants
Nursing mothers
Patients on MAO inhibitors
Hypersensitivity

Precautions
Can increase effects of epinephrine
Has additive effects with other CNS depressants
May cause paradoxical excitation in children
Causes thickening bronchial secretions in pt's with asthma
Potentiates the effects of anticholinergic drugs
Incompatible with several drugs and should not be mixed when giving IV
Use caution in patients with history of: Bronchial asthma, Hyperthyroidism, Increased intraocular
pressure, cardiovascular disease, HTN, lower respiratory disease

Antidote
Vaspressors for hypotension

Last updated: October 2011
**Dobutamine**

**Class**
Sympathomimetic

**Effect**
Beta 1 stimulant
- Produces positive inotropic and some dromotropic effects increasing cardiac output
- Has minimal effect on heart rate
- Has minimal effect on Alpha and Beta 2 receptors
- Has no effect on dopaminergic receptors

**Uses**
- CHF
- Cardiogenic Shock (When increased heart rate is not wanted)

**Dosages**
*Pediatric and Adult*: 2.5-20.0 mcg/kg/min via IV Drip
- Titrate to hemodynamic effect
  - Reported that doses as high as 40.0 mcg/kg/min has been needed to achieve hemodynamic stability.

**Side Effects**
- Mild increase in heart rate, mild hypotension, increase in ventricular ectopy, dyspnea, tachycardia, HTN, Anginal Pain

**Contraindications**
- Hypersensitivity
- Idiopathic hypertrophic sub-aortic stenosis

**Precautions**
- Monitor heart rate and blood pressure continuously to prevent adverse reactions.
- Dobutamine is ineffective in the presence of beta-blockers
- Presser effects of Dobutamine can be enhanced with concomitant use of MAO inhibitors, tricyclic antidepressants, and other sympathomimetic medications.
- Use in hypovolemic states only after adequate fluid resuscitation
- Has no effect on dopaminergic receptors

**Antidote**
- Discontinue or reduce infusion rate
- Do not use beta blockers due to Dobutamine short half-life
**Class**
Sympathomimetic

**Effect**

*Dopaminergic* - Vascular dilation in renal, coronary and mesenteric arteries.

*Beta* - Positive inotropic and dromotropic effects on the myocardium with little chronotropic effects leading to minimal increase in myocardial oxygen consumption.

*Alpha 1* - Vasoconstriction everywhere Alpha 1 receptors are present except in skeletal muscles

*Alpha 2* - Stimulation leads to effects of sympathetic nervous system by release of norepinephrine from presynaptic nerve endings.

**Uses**
Hemodynamic imbalance associated with cardiogenic shock including cardiac arrest.
Renal Failure
Shocks where vasopressors are indicated
Brady cardia

**Dosages**

*Dopaminergic Effects* - 1.0-2.0 mcg/kg/min

*Dopaminergic/Beta Effects* - 5.0-10.0 mcg/kg/min

*Beta/Alpha Effects* - 10.0-20.0 mcg/kg/min

**For cardiac/unstable hemodynamics:** Start at 5.0 mcg/kg/min and titrate to effect.

*Pediatric dosing is same as adult.*

**Side Effects**
Palpitations, Tachycardia, Hypotension, Dyspnea, HTN, Decreased Urinary Output

**Contraindications**
Ventricular arrhythmias
Pheochromocytoma

**Precautions**
Monitor BP continuously
Presser effects may be potentiated by MAO inhibitors, tricyclic antidepressants, sympathomimetics.

Concomitant use of phenytoin and dopamine may cause hypotension, bradycardia and seizures

**Antidote**
Stop infusion
Beta-Blockers or Alpha-adrenergic blockers
Haldol is a competitive antagonist of the dopaminergic receptors
Epinephrine

Class
Sympathomimetic agent, vasoconstrictor

Effect
Alpha - Peripheral vasoconstriction
Beta - Increases heart rate, myocardial contractility, stroke volume, cardiac output, increases automaticity of pacemaker cells producing atrial and ventricular irritability. Increases conduction velocity of the AV node, Bundle of His, Bundle Branches, and Perkinje Fibers. Relaxes respiratory bronchioles relieving bronchospasm. Increases excitability of myocardial cell membrane to the electrical stimulus. Decreases chemical mediator release (histamine, SRS-A, bradykinin, serotonin) during anaphylactic reaction.

Enhances CPR during cardiac arrest by vasoconstricting, which raises coronary artery perfusion pressure as well as inotropic effect on the myocardium.

Lowers the ventricular fibrillation threshold

Uses
Cardiac Arrest
Anaphylaxis
Asthma
Bradycardia
Hypotension

Dosage
Cardiac Arrest:

Adult- 1.0mg via IV, IO or ET every 3-5 minutes (No max)

Ped Initial Dose- 0.01mg/kg (1:10,000) via IV or IO  OR  0.1 mg (1:1,000) via ET

Ped Subsequent Dose - 0.1mg/kg via IV/IO (1:1,000)

Anaphylaxis/Asthma:

Adult- 0.3-0.5mg (1:1,000) via SQ  OR  0.3-0.5mg (1:10,000) via IV for severe cases

Peds- 0.01mg/kg (1:1,000) SC or 0.01mg/kg (1:10,000) via IV for severe cases to max of 0.5mg

Bradycardia refractory to first line therapy

Adult- 1.0-10.0mcg/min titrated to effect without creating exaggerated tachycardia

Peds- 0.01mg/kg (1:10,000) via IV or IO
Epinephrine (continued)

Dosage (con't)

Hypotension

**Adult-** 1.0-10.0mcg/min titrated to effect without creating exaggerated tachycardia

**Peds-** 0.1-1.0 mcg/kg/min via IV or IO titrated to effect without creating exaggerated tachycardia.

Side Effects

Palpitations, nervousness, anxiety, nausea, sweating, hypertension, anginal pain, tachycardia, pulmonary edema, CVA

Contraindications

Hypertension

Narrow-angle glaucoma

Labor

Precautions

May be potentiated by other sympathomimetic agents, tricyclic antidepressants, MAO inhibitors and/or antihistamines.

May produce toxic effects when used concomitantly with digitalis, Isuprel, and Inderal

May produce hyperglycemia

Caution with pregnancy: decreases placental blood flow and may cause fetal distress

Sensitive to light and extreme temperatures

Antidote

Treat symptomatically and provide supportive care.

Half life is usually short and no intervention is usually required.
Rice County
Emergency Medical Services

Fentanyl Citrate

Class
Opiate Agonist

Effect
Alters the patient's pain perception of pain and acts as an analgesic by stimulating opiate receptor sites.

Uses
- Pain relief in patients experiencing extreme pain due to burns, musculoskeletal injuries or other cases where pain relief is needed.
- Cardiac chest pain where Morphine is contraindicated.

Dosage

**Adult-** 25mcg via slow IVP every 5 minutes as needed to max of 100mcg

**OR**
50mcg via IN (MAD) with half dose given per nostril. May repeat x1 in 5 minutes to max of 100mcg.

**Peds-** 0.5mcg/kg via slow IVP up to 25mcg

**OR**
1.0mcg/kg via IN (MAD) with half dose given per nostril. Max of 25mcg. May consider repeating with physician order.

Side Effects
Decreased respiratory drive, hypotension, myocardial depression

Contraindications

**Trauma-** (Head, spinal, thoracic/abdominal, other significant trauma such as multi-systems) with exception of burns without inhalation injury.

**System-** Respiratory distress/compromise (COPD/asthma), Cardiac dysrhythmias, altered LOC, Third trimester pregnancy, hypotension/suspected shock, Age less than 12 months old.

**Drugs -** Drug/ETOH intoxication, hypersensitivity, allergy to opiates/Fentanyl

Precautions
Can cause decreased respiratory drive so SpO2 and respiration status should be monitored closely. Hypotension and cardiac depression may occur so vitals should be monitored closely.

Antidote
Narcan: 2mg via IVP
Furosemide (Lasix)

Class
Loop Diuretic

Effects
Peripheral vasodilator producing venous pooling
Maintains renal medullary peritubular capillary blood flow
Inhibits reabsorption of sodium and chloride in proximal and distal tubules and the Loop of Henle

Uses
CHF, Acute Pulmonary Edema, Acute Cerebral Edema, Acute Renal Failure, Stimulate urinary output in shock states following adequate volume replacement, fluid overload, HTN

Dosages
20-80mg slow IVP

Side Effects
Electrolyte imbalance
Hyperchloremic acidosis
HTN

Contraindications
None known

Precautions
EKG and Vital Signs should be closely monitored
Reassess lung sounds frequently

Antidote
Fluid therapy
Treat symptomatically
Glucagon

Class
Naturally occurring hormone

Effect
Increases blood sugar levels
Stimulates lipolysis
Catabolizes proteins
Large amounts of glucagon exert a positive cardiotonic effect

Uses
Hypoglycemia
Sometimes used in hospital settings as an antidote for Beta-Blocker overdose

Dosage
Adult- 1.0mg via IM in large muscle
Peds- >6y/o give 1.0mg via IM in large muscle
<6y/o give 0.5mg via IM in large muscle

Side Effects
Nausea, vomiting, hyperglycemia, hypokalemia, dysrhythmias

Contraindications
Pheochromocytoma, hypersensitivity

Precautions
Patients who are IDDM will not respond quickly to glucagon and you must allow time for the medication to work.
May potentiate action of oral anticoagulants

Antidote
Insulin
**Lidocaine**

**Class**

Class 1 antiarrhythmic

**Effect**

Depresses the automaticity of the ventricular pacemaker  
Abolishment of PVC's by action above  
Elevates ventricular threshold  
Abolishment of re-entrant ventricular arrhythmias by reducing non-uniformity of repolarization in the Perkinje Fibers  
Increases electrical stimulation threshold of the ventricles during diastole  
Local anesthetic effects

**Uses**

Ventricular arrhythmia's secondary to ischemia if supraventricular rate is above 60  
Unifocal PVC's (6-8/min), Multifocal PVC's, R on T phenomenon, Couplet PVC's, Salvos, Bigeminy, V-Tach, V-Fib  
Prophylactically in AMI

**Dosage**

Adult/Ped-  
V-Fib/V-Tach: 1.0-1.5mg/kg may repeat to max of 3mg/kg  
Suppression of Ectopy: 1.0mg/kg followed by infusion of 2mg/min  
Maintenance Infusion: 2-4mg/min for ROSC who where converted using Lidocaine

**Side Effects**

Confusion, tremors, lethargy, slurred speech, muscle twitching, convulsion, hypotension, seizures, bradycardia, further arrhythmias, tinnitus, vision disturbances, anaphylaxis, diaphoresis, sensation of cold.

**Contraindications**

Hypersensitivity, Stokes-Adams Syndrome, Wolff-Parkinson-White Syndrome, Severe heart blocks, bradycardia involving ventricular escape rhythms

**Precautions**

Those with CHF, liver disease, low cardiac output states and diseased or abnormal sinus node.  
Monitor EKG and Vitals closely

**Antidote**

Discontinue administration  
Treat seizures with anticonvulsants
Magnesium

**Class**
Electrolyte

**Effect**
- Decreases release of acetylcholine from motor nerve endings
- Increases magnesium levels

**Uses**
- Seizures associated with eclampsia
- Seizure prevention in patients with eclampsia/pre-eclampsia
- Torsade's
- V-Fib refractory to other treatment
- Refractory V-fib that has been associated with low magnesium levels

**Dosages**
- Ventricular dysrhythmias and eclampsia
  - 1.0-4.0g of a 10% solution over 3 minutes via IV/IO or IM
- Pre-Eclampsia
  - 6g over 20 minutes, then 2g/hr until contractions are less than once every 10 minutes, then reduce to 1g/hr.

**Side Effects**
- Drowsiness, depressed reflexes, hypotension, respiratory depression, heart blocks

**Contraindications**
- Heart Block, Renal Failure, Recent MI

**Precautions**
- Magnesium toxicity evidenced by decreased reflexes

**Antidote**
- Calcium
Metoprolol

Class
Antihypertensive, anti-anginal, beta blocker

Action
Lowers B/P by effect of Beta Blocker
Reduces elevated renin plasma levels
Blocks Beta 2 adrenergic receptors in bronchial, vascular smooth muscle only at high doses.

Uses
Mild to moderate hypertension
Acute MI to reduce cardiovascular mortality
Angina Pectoris

Dosages
Myocardial Infarction: 5mg IV slow push every 5 min x 3 doses if HR is >110 or BP >150.

Side Effects
Hypotension, bradycardia, CHF, Palpitations, dysrhythmias, cardiac arrest, AV block, Pulmonary Edema, Chest Pain.

Contraindications
Hypersensitivity to beta blockers, cardiogenic shock, heart block (2nd/3rd degree), Sinus bradycardia, bronchial asthma.

Precautions
Pregnancy Risk Category: C, major surgery, lactation, Diabetes, renal/hepatic disease, thyroid disease, COPD, GAD, non-allergic bronchospasm, CHF, geriatric.

Antidote
Non listed, treat symptomatically.
**Morphine Sulfate**

**Class**
Schedule II analgesic/Opium derivative

**Effect**
Combination of actions on CNS, some are stimulating and some are depressant.
Depresses respiratory, cough, and vasomotor center in medulla
Pain and anxiety are relieved by central effect which raises pain threshold, produces euphoria and sedation
Stimulates the vomiting center of the medulla
Stimulates the parasympathetic nervous system resulting in decreased peripheral resistance, increased venous capacitance, venous pooling and decreased venous return to the "right" side of heart.
Constricts respiratory bronchioles but has no effect on pulmonary vascular resistance
May decrease heart rate and myocardial oxygen consumption

**Uses**
To relieve severe pain such as in AMI, Burns and isolated trauma
CHF and Acute pulmonary edema to relieve anxiety and produce euphoria, to decrease respiratory rate and decrease venous return

**Dosages**
*Adult Dose:* 2-10 mg IVP in small increments every 3-4 minutes titrated to effect as long as BP remains >100
*Pediatric Dose:* 0.1 mg/kg IV slowly or IM (Avoid IM if patient is hypotensive or in shock)

**Side Effects**
Sedation, euphoria, hypotension, nausea/vomiting, somnolence, convulsions with large doses, bradycardia, respiratory depression.

**Contraindications**
Hypersensitivity, acute bronchial asthma, upper airway obstruction

**Precautions**
Monitor EKG, Vitals, and LOC
Extreme caution in patients with COPD and Cor Pulmonle
Correct volume depletion or hypotension before administering it
Use caution in those with bradycardia, heart blocks, pregnancy, possible head injury, intracranial lesions, hypoxia, respiratory depression, hypercapnia, cardiac dysrhythmia

**Antidote**
Narcan 2.0mg
Rice County
Emergency Medical Services

**Naloxone (Narcan)**

**Class**
Narcotic antagonist

**Effect**
Reverses effects of narcotics by competing for receptor sites
May precipitate withdrawal symptoms in patients dependent on narcotics

**Uses**
Drug of choice when nature of depressant drug is not known
To reverse effect of narcotic overdose and undesirable side effects of narcotics including: Heroin, Morphine, Meperidine, Codeine, Lomotil, Diluadid, Fentanyl Citrate, Levorphanol, Percodan, talwin, Darvon, Methadone, Nisentil
Coma of unknown cause
Treatment of respiratory depression caused by opiate partial agonists

**Doses**
*Adult Dose:* 0.4-2.0 mg IV, ET, IM or SQ fast push
*Pediatric Dose:* 0.1 mg/kg via IV, ET, IM or SQ fast push

**Side Effects**
Nausea/Vomiting, Hyperventilation, Hypertension, tachycardia, tremors, acute narcotic withdrawal which are associated with too rapid of narcotic reversal.

**Contraindications**
Hypersensitivity

**Precautions**
Combativeness in cases of withdrawal,
Narcan produces no effects of its own
Pregnancy risk category: B

**Antidote**
None required
Nitroglycerine

**Class**
Nitrate vasodilator

**Effect**
Relaxes vascular smooth muscle resulting in dilation of both arterial and venous beds including:
- Coronary artery, capillary vessels, and large veins which promotes peripheral pooling of blood and decreases venous return to the heart, reducing left ventricular and diastolic pressure (preload).
- Reduces cardiac consumption and demand
- Reduces infarction size by reducing preload

**Uses**
Relieves pain of angina pectoris, severe hypertension, refractory CHF, relief of smooth muscle spasm, dissecting aortic aneurysm.

**Dosages**
- Sublingual - 0.4mg which may be repeated every 5 minutes to a total of 3 doses
- Transdermal - 1" applied to L anterior chest

**Side Effects**
Headache, flushing, dizziness, palpitations, SL burning, orthostatic hypotension, circulatory collapse.

**Contraindications**
- Hypersensitivity to nitrates
- Severe anemia
- Hypotension (Systolic BP <100)
- Increased intracranial pressure

**Precautions**
- NTG is sensitive to the environment and should be kept at a stable temp and kept in it's dark brown bottle out of direct sunlight.
- Monitor Vitals and BP frequently and assure BP is >100 before each dose given
- If tablet does not have bitter taste or lacks the burning sensation the tablet may be outdated
- If blurred vision or dry mouth occurs, consider discontinuing or contact medical control.
- Use extreme caution if pt is taking other antihypertensive drugs or ED drugs.

**Antidote**
- Trendelenburg position
- Fluid bolus
Normal Saline

Class
Electrolyte Solution

Effect
- Increases blood pressure by increasing the amount of fluid in the vasculature
- Provides a way to inject medications by means of IV/IO

Uses
- Patients who are or at risk of becoming hypotensive
- Patients who are in need or has a potential of needing IV medication

Dosages
- Protocol dependent
- Usually administered at a minimum of TKO/KVO ("To keep open"/"Keep vein open")
- For volume expansion: Titrate to BP of >100 or adequate BP to situation

Side Effects
- Hypertension, pulmonary hypertension, fluid induced anemia

Contraindications
- None

Precautions
- Use with caution in patients with: CHF, Pulmonary edema, HTN, pediatrics, geriatrics
- Lung sounds and BP should be monitored frequently when administering bolus's

Antidote
- None - Stop/slow infusion
Promethazine (Phenergan)

Class
Antihistamine, H1 receptor antagonist.

Effect:
Acts on blood vessels, GI, respiratory system by competing with histamine for H1 receptor site
Decreases allergic response by blocking histamine.

Uses
Motion sickness, rhinitis, allergy symptoms, sedation, nausea

Doses
Adult - 12.5mg-25mg via IM, IV/IO
Ped - 0.25-0.5mg/kg via IM, IV/IO

Side Effects
Dizziness, drowsiness, poor coordination, fatigue, anxiety, hypotension, tachycardia, wheezing,
chest tightness, rash, blurred vision, dilated pupils, tinnitus

Contraindications
Hypersensitivity to H1 receptor antagonist
Acute asthma attack
Lower respiratory tract disease

Precautions
Increased intraocular pressure, renal disease, cardiac disease, HTN, seizure disorder, peptic ulcers,
hyperthyroidism, prosatic hypertrophy, bladder neck obstruction, pregnancy category C

Antidote
Treat symptomatically
Sodium Bicarbonate

Class
Electrolyte - Alkalinizing Agent

Effect
Reacts with hydrogen ions to form water and carbon dioxide to buffer metabolic acidosis
Shifts the oxyhemoglobin saturation curve, inhibiting the release of oxygen
Induces hyperosmolarity and hypernatremia
Produces paradoxical acidosis due to production of carbon dioxide, which is freely diffusible into myocardial and cerebral cells and may depress function

Uses
Severe acidosis
Cardiac arrest only after more definitive and substantiated interventions such as prompt defibrillation, effective CPR, airway management and hyperventilation with 100% oxygen and use of such drugs as epinephrine and Lidocain have been utilized.
Tricyclic antidepressant overdose
Hyperkalemia

Doses
Cardiac arrest: 1mEq/kg IVP initially. Maximum of 0.5mEq/kg may be given for subsequent doses no less than every 10 minutes.
Tricyclic antidepressant overdose: 1-3 mEq/KG IV slow push
Pediatric Doses: Same as adult

Side Effects
Gastric distention, belching/flatulence, renal calculi/crystals, alkalosis, hypernatremia, hyperkalemia, hyperosmolarity.

Contraindications
None in emergency setting

Precautions
Monitor EKG, Vitals, and pulmonary functions. Do not mix with other drugs including epinephrine as it will inactivate the opposing drugs. Be sure to flush IV/IO well before administering. Use caution with those who have renal failure. Is not an antiarrhythmic. Will worsen intracellular acidosis, and cause cerebrospinal fluid/central venous acidosis during CPR and pt may require hyperventilation.

Antidote
None needed. Treat specific side effects.
**Thiamine**

**Class**
Vitamin (B1)

**Effect**
Acts as a coenzyme in carbohydrate metabolism
Prevention of beriberi and Wernicke's encephalopathy syndrome

**Uses**
Coma of unknown origin, especially if ETOH or malnourishment is suspected.
Delirium Tremens
Suspected Wernicke's or Korsakoff's Syndrome

**Dosages**
*Adult Dose:* 100mg IV/IM over 3 minutes if alcoholism is suspected
*Pediatric Dose:* 10-50mg IV or IM

**Side Effects**
Hypotension

**Contraindications**
Hypersensitivity

**Precautions**
Thiamine deficiency has been known to occur three weeks after total absence of dietary thiamine.
Rapid administration of thiamine has been associated with hypotension. Pregnancy risk category A/C if dosage is greater than that the daily recommended daily allowance.

**Antidote**
None listed
Valium (Diazepam)

Class
benzodiazepines

Effect
Binds to a specific subunit on the GABA\textsubscript{A} receptor at a site that is distinct from the binding site of the endogenous GABA molecule. The GABA\textsubscript{A} receptor is an inhibitory channel which, when activated, decreases neuronal activity. It appears to act on areas of the limbic system, thalamus, and hypothalamus, inducing anxiolytic effects. Its actions are due to the enhancement of GABA activity. Benzodiazepine drugs including diazepam increase the inhibitory processes in the cerebral cortex.

Uses
Seizures, sedation, anxiety, and muscle spasms

Dosages
- **Adult Dose:** 5-10mg via IV/IO
- **Pediatric Dose:** 0.25mg/kg via IV/IO up to adult dose

Side Effects
Dizziness, Nausea, Impaired balance, impaired coordination, drowsiness, sedation, depression, and paradoxical tachycardia.

Contraindications
Ataxia, severe hypoventilation, hepatic and renal deficiencies, severe respiratory disorders, psychosis, hypersensitivity, allergic to Valium

Precautions
Use with caution in geriatric patients. Monitor EKG, vitals and respiratory status closely especially those who are hypotensive. Use caution with pregnancy as it may cross the placenta membrane causing "floppy infant syndrome".

Antidote
Flumazenil (Romazicon) 0.2mg via IV repeated every minute until pt awakes from sedation.
**Verapamil**

**Class**
Calcium channel blocker

**Effect**
- Decreases the discharge of sinoatrial node.
- Decreases AV nodal conduction while increasing AV nodal refractory period.
- Decreases activity in spontaneously active fibers by reducing the slope of phase 4 of the action potential.
- Produces vasodilation in most peripheral vascular beds and in coronary arteries of most patients who does not have atherosclerotic disease.
- Reduces after load and myocardial contractility
- Inhibits calcium ion influx through slow channels into conductile and contractile myocardial cells and vascular smooth muscle cells.

**Uses**
- PSVT that does not require electrocardioversion
- Atrial flutter and fibrillation with rapid ventricular response

**Dosages**

*Adult Dose:* 0.15mg/kg to max of 10mg IV/IO given over 1 minute. May repeat after 30 minutes with 0.15mg/kg up to an additional 10mg if initial dose has no response or not adequate.

*Pediatric Dose: 0-1y/o* 0.1-0.2mg/kg via IV/IO not to exceed 5mg
  - May repeat x1 after 30 minutes

*1-15y/o* 0.1-0.3mg/kg via IV/IO not to exceed 5mg
  - May repeat x1 after 30 minutes

**Side Effects**
- Dizziness, headache, hypotension, heart failure, bradycardia, AV block, ventricular asystole, peripheral edema, Nausea/Vomiting.

**Contraindications**
- Concomitant IV Beta Blocker Administration, shock or severe hypotension, 2nd/3rd degree AV blocks, Sick sinus syndrome (unless pacemaker is placed), WPW, Severe heart failure unless precipitated by SVT, Ventricular tachycardia.

**Precautions**
- If pt is on beta blockers, extreme caution in pregnancy, transient decrease in arterial pressure due to peripheral vasodilation.

**Antidote**
- Treat symptoms, may consider calcium chloride.
**Versed (Midazolam)**

**Class**
Benzodiazepine

**Effect**
The therapeutic as well as adverse effects of midazolam are due to its effects on the GABA<sub>A</sub> receptors; midazolam does not activate GABA<sub>A</sub> receptors directly but, as with other benzodiazepines, it enhances the effect of the neurotransmitter GABA on the GABA<sub>A</sub> receptors resulting in neural inhibition. Almost all of the properties can be explained by the actions of benzodiazepines on GABA<sub>A</sub> receptors. This results in the following pharmacological properties being produced: sedation, hypnotic, anxiolytic, anterograde amnesia, muscle relaxation and anti-convulsant.

**Uses**
Seizures
Sedation

**Dosages**
*All Ages:* 0.2mg/kg given IN via MAD up to 10mg.
(May reference dosing chart in the "Procedures" section)

**Side Effects**
Sedation, apnea, respiratory distress, lethargy, loss of coordination, dizziness

**Contraindications**
Ataxia, severe hypoventilation, hepatic and renal deficiencies, severe respiratory disorders, psychosis, hypersensitivity, allergic to Valium

**Precautions**
Use with caution in geriatric patients. Monitor EKG, vitals and respiratory status closely especially those who are hypotensive. Use caution with pregnancy as it may cross the placenta membrane causing "floppy infant syndrome".

**Antidote**
Flumazenil (Romazicon) 0.2mg via IV repeated every minute until pt awakes from sedation.
Zofran (Ondansetron Hydrochloride)

Class
Antiemetic

Effects
Blocks serotonin, both peripherally on vagal nerve terminals and centrally in chemoreceptor trigger zone. Prevents nausea and vomiting.

Uses
General treatment of nausea and vomiting

Dosages
Adult Dose: 4mg IV/IO over 2-5 minutes. May repeat x1 if needed after 15 minutes.
Pediatric Dose: 0.1mg/kg via IV/IO over 2-5 minutes. May repeat x1 if needed after 15 minutes.

Side Effects
Headache, constipation, diarrhea, rash, bronchospasm

Contraindications
Pt has known allergic reaction or hypersensitivity.

Precautions
Flush line well before and after administration.

Antidote
None noted. Treat symptomatically.