DRUG BOX REVIEW FORMAT

GENERIC NAME
(Common Trade Name)

Class:

The category (or categories) of drugs in which this drug is classified.

Action:

The specific effects of the drug on tissues, organs or organ systems.

Onset: *time to onset of drug action*/**Peak:** *time to peak drug concentration in serum*/**Duration:** *length of drug action*

Indications:

The indications for drug use.
Also: Other indications for use, including non-prehospital.

Contraindications:

The conditions for which the drug is not indicated.
May also include *relative contraindications.*

Side Effects:

Common side effects are underlined.

Notes:

Additional information on techniques of administration, drug interactions, assessment post administration, end points of administration, etc.

Route:

The means by which the medication may be administered safely. (approved routes in Central California EMS Agency are **underlined**)

Dosage/Route:

Approved dosages and routes of administration.

ET Dose (includes Combitube):

As indicated in the ***Central California EMS Treatment Protocols*** for adults and pediatrics.

Standing Order or Base Contact

Strengths/Size	Unit of Issue	Quantity
Concentration/volume of the prehospital packaging of this drug	Type of package	Number on each ALS Unit

Class:

Nonopioid analgesic, antipyretic

Action:

Works peripherally to block pain impulse generation and inhibit prostaglandin synthesis in the CNS leading to its analgesic and antipyretic effects.

Onset: 10 to 30 minutes **Peak:** 30 to 60 minutes **Duration:** 4 to 6 hours

Indications:

Pain control (mild to moderate, Ex: 1-5 on pain scale), blocks pain impulse generation and inhibits prostaglandin synthesis in the CNS leading to its analgesic and antipyretic effects

Contraindications:

Known hypersensitivity; severe active liver disease

Side Effects:

Nausea, upper abdominal pain, skin rash, itching, loss of appetite

Notes:

Overdose can cause hepatotoxicity. Tylenol may be administered in addition to fentanyl OR ketamine for patients with moderate to severe pain. Tylenol should not be given for fever or solely for discomfort associated with fever. Fever is a potential warning sign for sepsis, and it is important that this is not masked by prehospital administration of Tylenol.

Route:

IV, oral, rectal

Dosage/Route:

Adult Dose: 1000 mg IV over 10 minutes (Do NOT repeat)
Pediatric Dose: 15 mg/kg IV over 10 minutes, Do NOT administer in patients less than 2 years of age or less than 10 kg.

Strengths/Size	Unit of Issue	Quantity
1 g/100 ml	Pre-mixed 100 ml bag	2

Class:

Analgesic
Antipyretic
Anti-inflammatory
Anti-platelet agent

Action:

Reduces the loss of myocardium in MI.
Inhibits protaglandin synthesis for anti-inflammatory effect.
Aspirin blocks the formation of Thromboxane A_2, which causes platelets to aggregate.
Aspirin blocks pain impulses in the CNS.

Onset: 5-30 minutes **Peak:** 15-20 minutes **Duration:** 1-4 hours

Indications:

Chest pain, suggestive of an MI.

Also: Prevention of MI or reinfarction.
Prevention of TIA/CVA

Contraindications:

GI bleeding, ulcer, children with flu-like symptoms.
Hypersensitivity to this drug or non-steroidal anti-inflammatory.

Side Effects:

EENT: Tinnitis – (only in overdoses)
GI: Stomach irritation, nausea, vomiting – (with chronic use)
INTEG: Petechiae (with chronic use)

Notes:

Used to reduce the loss of myocardium in myocardial infarction. Studies show that aspirin prevents progression of MI due to progression of the thrombus. The sooner aspirin therapy is started on a patient with an acute MI, the less damage the patient has from the infarction.
Irreversible platelet aggregation inhibitor, takes 5-7 days after metabolism for body to resume aggregation. Use with caution with those on oral antidiabetic agents. May increase hypoglycemia.

Route:

Oral

Dosage/Route:

Adult Dose: 162 mg or two 81 mg tablets PO (one time dose)
Pediatric Dose: *No local application*

Standing Orders

Strengths/Size	Unit of Issue	Quantity
81 mg Tablet	Bottle	1 Bottle

ACTIVATED CHARCOAL
(Actidose, Aqua, Liqui-Char)

Class:

Chemical/adsorbent

Action:

Blocks toxic substances ingested by forming an effective barrier between any remaining particulate material and the gastrointestinal mucosa, thus inhibiting the gastrointestinal absorption. Also adsorbs an unspecified number of toxins by chemical binding.

Onset: Immediate **Peak/Duration:** Not absorbed (excreted in feces)

Indications:

Suspected overdose or ingestion of drugs
Oral poisonings

Contraindications:

GI bleeding
Active seizures or postictal state
Patient that cannot follow commands, cannot sit and sip water with an altered mental status.
No gag reflex
Hydrocarbon ingestion
Caustic ingestion

Side Effects:

GI: Vomiting, nausea, constipation, black stools

Notes:

Ipecac is inactivated if given after charcoal administration.
Ingestions which are likely to cause a rapid decrease in mental status (e.g., tricyclics, inhalants) require Base Hospital contact.
Shake vigorously prior to administration. May need to dilute contents that have settled to the bottom.
If Ipecac has been administered first, allow vomiting to stop before charcoal is given.
Does not absorb cyanide, ethanol, methanol, ferrous sulfate, caustic alkali or mineral acids.
"Gut dialysis" for theophylline, aspirin and phenobarbital.
Activated charcoal is an inert, nontoxic wood material.
Charcoal has not been shown to alter patient survival after ingestion.

Route:

Oral, Nasogastric

Dosage/Route:

Adult Dose: 50 grams PO
Pediatric Dose: Ages 1-12 years – 1 gram/kg PO.
Age under one year: Contact Base Hospital Physician

Standing Orders

Strengths/Size	Unit of Issue	Quantity
50 gm/8 oz	Pre-mixed bottle	2

ADENOSINE
(Adenocard)

Class:

Antiarrhythmic
Edogenous Nucleoside

Action:

Adenosine slows electrical conduction time through the AV node, and can interrupt reentry pathways through AV mode. Stops PSVT by blocking the AV node and usually does not cause negative inotropic effects. Also acts on SA node. Used in the emergency treatment of PSVT (paroxysmal supraventricular tachycardia).
Adenosine is a "purine nucleoside," a naturally occurring body nucleic acid. Adenosine usually does not cause change in blood pressure. Adenosine is primarily formed from the breakdown of adenosine triphosphate (ATP).

Onset: Immediate **Peak:** Immediate **Duration:** Seconds

Indications:

Conversion of PSVT to sinus rhythm
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Contraindications:

Bradycardia, second degree and third degree heart block, or sick-sinus syndrome.
Atrial fibrillation in patients with Wolfe Parkinson White Syndrome
Caution in patients taking digitalis, tegretol or dipyridamole.
Caution in asthmatic patients – potential bronchoconstriction.
Adenosine *is not effective* in converting other rhythms such as atrial fibrillation, atrial flutter, or ventricular tachycardia

Side Effects:

Metallic taste may be noticed by patient.
Affects are usually mild and short lasting.
CNS: Light-headedness, headache.
CV: Conduction delay (asystole) for several seconds, chest pain. Transient arrhythmias (V-tach, V-fib, torsade de pointes) or, facial flushing (18%), palpitations, diaphoresis
RESP: Dyspnea (12%)
GI: Nausea

Notes:

Adenosine should be administered after vagal attempts.
Adenosine is antagonized by methylxanthines (theophylline, caffeine) and may need increased doses or may not respond because of the competition for receptor sites. Converts PSVT to sinus rhythm in approximately 90% of cases. PSVT may recur in up to 25% of patients initially converted by adenosine.
Adenosine may be used in patients with mild chest pain or hypotension (90-100mm Hg).
In unstable patients (i.e., acutely altered mental status, systolic blood pressure 80 mm Hg, congestive heart failure, severe chest pain or shortness of breath, heart rate greater than 250 BPM for ages less than 2 y/o or heart rate greater than 180 BPM in ages greater than 2 y/o) with *PSVT*, synchronized cardioversion is indicated.
Adenosine has a very short half-life, possibly 5-10 seconds, primarily by uptake from erythrocytes and vascular endothelial cells.

Route: Intravenous, Intraosseous

ADENOSINE
(Adenocard)

Dosage/Route:

Adenosine should be given in the IV line port closest to the patient and as proximal to the heart as possible. It should be given as a vigorous rapid IV push over 1 second with a *rapid IV flush of normal saline (20 cc)*.
Adenosine may be given in radio failure if ETA to hospital is greater than 15 minutes.

Adult Dose: 6 mg rapid IV push over 1 second with IV line wide open to flush. If patient does not convert in 2 minutes, repeat adenosine with 12 mg rapid IV push over 1 second. If the patient does not convert, a third administration of 12 mg may be administered in 1 minute. **Flush all doses with 20 cc NS.**

Pediatric Dose: 0.1 mg/kg rapid IV. Maximum first dose 6 mg. If no change, repeat in 2 minutes. at 0.2 mg/kg rapid IV push. Maximum single dose 12 mg. **Flush all doses with 10 cc NS.**

Base Contact Required unless in Radio Failure

Strengths/Size	Unit of Issue	Quantity
6 mg/2ml	Single Dose Vial	5

ALBUTEROL SULFATE
(Ventolin, Proventil)

Class:

Bronchodilator/Beta$_2$ Agonist
Sympathomimetic/Sympathetic Agonist

Action:

Albuterol works by causing relaxation of the bronchial smooth muscle in the bronchial tree and stimulates adrenergic receptors of the sympathetic nervous system. Beta$_2$ selective.
Prevents exercise-induced bronchospasm.

Onset: 5-15 minutes **Peak:** 1-1½ hours **Duration:** 3-4 hours

Indications:

Relief of bronchospasm in patients with reversible obstructive airway disease or acute attacks of bronchospasm (i.e., chronic obstructive pulmonary disease, asthma and allergic reactions).
Exercise-related bronchospasm.

Contraindications:

Contraindicated in patients actively seizing or complaint of cardiac chest pain.
Caution in patients with a history of coronary heart disease or arrhythmias.
Caution in patients receiving other sympathomimetic medications (i.e., epinephrine) or a history of using sympathomimetic drugs (i.e., cocaine, amphetamines) within the last 24 hours.

Side Effects:

CV: Tachycardia, hypertension, palpitations
CNS: Tremulousness, anxiety, headache, restlessness
RESP: Albuterol may cause worsening of bronchospasm or coughing

Notes:

Optimal nebulized albuterol delivery to the airways is given by having the patient take long slow deep breaths.
Supplemental continuous oxygen should be given in all patients receiving albuterol.
Cardiovascular side effects may be worsened in patients taking monamine oxidase inhibitors (MAO) or tricyclic antidepressants.
Tachycardia is not a contraindication to albuterol administration.

Route:

Inhaled/Nebulized

Dosage/Route:

Adult Dose: 2.5 mg/3 cc nebulized albuterol sulfate with standard acorn-type jet nebulizer using pressurized oxygen at a flow rate of 6 L/min. May repeat twice.

Pediatric Dose: 5 mg/6 cc nebulized albuterol sulfate with standard acorn-type jet nebulizer using pressurized oxygen at a flow rate of 6 L/min. May repeat twice

Standing Orders

Strengths/Size	Unit of Issue	Quantity
2.5 ml/3 cc	Unit Dose	6

AMIODARONE
(Cordarone)

Class:

Class III antiarrhythmic properties, Class I, II, IV effects.

Action:

Prolongs cardiac repolarization. Also has sodium channel blockade, beta adrenergic blockade, and calcium channel blockade effects.

Onset: Immediate **Peak:** **Duration:** 10-20 minutes

Indications:

Cardiac arrest due to V-fib or V-tach
Patient has been shocked by AICD
Patient has ROSC after AED shock.
Ventricular Dysrhythmias (V-Fib, V-Tach)
A-fib with RVR

Contraindications:

Heart rate less than 80 in patients with a pulse (i.e. ROSC)
2nd and 3rd degree heart block

Side Effects:

CNS: Hypotension, rhythm disturbances, bradycardia, CHF, cardiac arrest, shock, heart block, SIADH
RESP: Respiratory depression, pulmonary toxicity
GI: Vomiting, hepatotoxicity
SKIN: Rash
INTEG: Anaphylaxis
M/S: Rhabdomyolysis
RENAL: Acute renal failure

Notes:

Hold for heart rate less than 80 as Amiodarone may worsen/induce bradycardia.

Route:

Intravenous, Intraosseous, PO

Dosage/Route:

Adult Dose:	Cardiac Arrest (V-fib):	IV/IO: 300 mg (50 mg/ml) IV push.
	ROSC:	IV/IO: 150 mg IV push over 10 minutes, repeat in 5 minutes to a total of 300mg.
	Ventricular Tachcardia with Pulses:	IV/IO: 150 mg IV push over 10 minutes, repeat in 5 minutes to a total of 300mg.

Pediatric Dose:

1 mo-14 yrs:	Cardiac Arrest (V-fib):	IV/IO: 5 mg/kg IV push (max dose 300 mg).
	ROSC:	IV/IO: 5 mg/kg IV push over 10 minutes, repeat in 5 minutes to a total of 300mg.
	Ventricular Tachcardia with Pulses:	IV/IO: 5 mg/kg IV push over 10 minutes.
<1 month:	Not Used	

Standing Orders

Strengths/Size	Unit of Issue	Quantity
150 mg, 3 ml (50 mg/ml)	Vial	300 mg minimum

Class:

Anticholinergic (Parasympatholytic)
Antiarrhythmic

Action:

Blocks acetylcholine receptors thereby inhibiting parasympathetic (vagal) stimulation of the SA node, which causes an increase in heart rate and conduction. Enhances conduction through AV node.
↑ Heart rate (however, no inotropic effect)
↑ Cardiac Output
↓ P-R interval
Reduces smooth muscle contractions in stomach, intestinal tract, ureters and bladder.
Antisecretory action causes ↓ sweating, salivation, lacrimation, bronchial mucus and gastric secretions.

Onset: IV immediate **Peak:** 2-4 minutes **Duration:** 4 hours

Indications:	**Contraindications:**
Hemodynamically significant bradycardias	Unstable CV status in acute hemorrhage
Organophosphate poisoning or nerve gas poisoning	Tachycardia, hypersensitivity, narrow-angle glaucoma

Side Effects:
CV: Palpitations, tachycardia, hypertension, paradoxical bradycardia following low doses (less than .5 mg), CNS: Headache, nervousness, weakness, dizziness
GI: Dry mouth with thirst and dysphagia, constipation, heartburn
INTEG: Flushed, dry skin
EENT: Blurred vision, photophobia
GU: Urinary retention

Notes:
Doses less than 0.5 mg can cause paradoxical bradycardia in adults and children.
Do not exceed 3 mg total dosage, except in organophosphate poisoning.
Remove clothing immediately from organophosphate contaminated patients to prevent continued absorption. Use extreme caution to prevent self-exposure. Irrigate patient's body to dilute the chemical.
Enhanced anticholinergic effects may occur with tricyclic antidepressants, Haldol, Procainamide, Quinidine, Antihistamines and Meperidine.
May precipitate V-fib in cardiac patients who are tachycardiac.

Route: Intravenous, Intraosseous

Dosage/Route:

Adult Dose: Bradycardia (*symptomatic*): 1 mg IVP q 3-5 minutes until 3 mg total or improvement.
Pediatric Dose: Bradycardia: 0.02 mg/kg IV/IO– Minimum 0.1 mg/Maximum single dose 0.5 mg
Adult Dose: Organophosphate Poisoning: 2 mg IVP every 5 minutes. May increase to 5 mg increments. May try test dose of 0.5mg IV Push. Titrate to bronchial secretions.
Pediatric Dose: Organophosphate Poisoning: 0.05 mg/kg IV/IO every 20 minutes. Maximum single dose 0.5 mg. Titrate to bronchial secretions.

Standing Orders or Base Contact Required unless in Radio Failure, is Call Dependent

Strengths/Size	Unit of Issue	Quantity
1 mg/10 ml	Preload Syringe	4
8 mg/20 ml	Vial	1

Note: *Not used in the Central California Protocols.*

Class:

Antiarrhythmic (Class III)

Action: (Complex – not well understood)

Direct action on the myocardial membrane:

Initial release of norepinephrine causing ↑ BP, ↑ P followed by subsequent block of the release of norepinephrine from peripheral sympathetic nerves.
Spontaneous antifibrillatory effects ("chemical defibrillator").
Positive inotropic and chronotropic effects.
Bretylium acts to prolong the action potential in normal tissue, tending to prevent reentry from ischemic or infarcted tissue, which tends to normalize electrical transmission between normal/injured myocardium. This may result in a suppression of the reentry phenomenon.
Increase in impulse formation and spontaneous firing rate of pacemaker tissue.
Prolongs repolarization and refractory period, therefore producing an increase in V-fib threshold.

Onset: Immediate with delayed ventricular response to 20 min. **Peak:** 6-9 hours **Duration:** 6-24 hours

Indications:
Ventricular Fibrillation
Refractory to Lidocaine
Ventricular Tachycardia
Refractory to Lidocaine

Also: Ventricular dysrhythmia, post cardioversion.
Ventricular tachycardia with pulse after no response to other therapy.

Contraindications:
None for field use

Side Effects:
CV: Severe hypotension, bradycardia, dizziness, angina, PVCs, transient arrhythmias, transient hypertension
CNS: Headache, involuntary movement, confusion, psychosis, anxiety
GI: Nausea, vomiting (with rapid IV push), diarrhea, pain, anorexia
SKIN: Rash
MS: Weakness, pain in extremities

Notes:
Bretylium is incompatible with all medications.
Keep patient in the supine position to avoid postural hypotension, occurs in 50% of patients.
Effects may increase or decrease when used with quinidine, procainamide or propranolol.
Effects may increase when used with sympathomimetics.

Route: Intravenous, Intraosseous

Dosage/Route:
Adult Dose: V-Fib 500 mg (5 mg/kg) rapid IV push. Repeat 1000 mg (10 mg/kg) q 5-10 min. Additional doses require maximum dosage not to exceed 30 mg/kg.
V-Tach with pulse 500 mg slow IVP (over 8-10 min.).
Pediatric Dose: 5 mg/kg for V-fib.

Strengths/Size	Unit of Issue	Quantity
500 mg/10 ml	Ampules	Not Used in Central California Protocols

Class:

Electrolyte

Action:

Replenishes a necessary element (Ca^{++}) which is necessary for nerve and muscle function, as well as cardiac function and blood clotting. Increases contractile force (inotrope), prolongs systole, and increases myocardial automaticity.

Onset/Peak: Immediate **Duration:** ½ to 2 hours

Indications:

Hyperkalemia (except when associated with digitalis toxicity)
Calcium Channel blocker toxicity
Dialysis patients or history of renal failure (only with hyperkalemia or cardiac arrest).
Hypocalcemia
Suspected hyperkalemia or Ca Channel blocker toxicity with Ventricular Fibrillation, Ventricular Tachycardia with no pulse, or Ventricular Tachycardia.

Contraindications:

Digitalis toxicity
Hypercalcemia

Side Effects:

CV: Hypotension, bradycardia arrhythmias, cardiac arrest, venous thrombosis
CNS: Headache, confusion, psychosis, brain cell injury
GI: Nausea, vomiting, anorexia
MS: Joint pain
GU: Polyuria

Notes:

Do not mistake for calcium gluconate.
IV line must be flushed between CaCl and $NaHCO_3$ – to avoid precipitation.
Observe IV site closely. Extravasation may result in tissue necrosis. Slow IV push
Calcium should not be used routinely in the treatment of cardiac arrest. It should only be used for arrest due to suspected hyperkalemia.
V-Tach less than 120: Strongly consider diagnosis of hyperkalemia and therefore use of Calcium should be considered.
Do not administer through scalp veins on pediatrics.

Route:

Intravenous, Intraosseous

Dosage/Route:

Adult Dose: 1000 mg (10%) IV push.

Base Contact Required unless in Radio Failure, is Call Dependant

Strengths/Size	Unit of Issue	Quantity
1 gm/ml (10%)	Preload Syringe	2

Class:

Carbohydrate, Hypertonic Solution

Action:

Six-carbon sugar molecule, which is the principal form of carbohydrate utilized by the body.
Elevates blood glucose level rapidly.
Causes hyperosmolar diuresis →↓ cerebral edema.

Onset/Peak: Within one minute **Duration:** Variable

Indications:

Hypoglycemia
Also: *when associated with hypoglycemia*
- Coma, altered mental status
- Seizures of unknown etiology
- Ingestion/poisoning if coma or altered consciousness and unclear etiology

Contraindications:

Intracranial hemorrhage
Increased ICP
CVA in absence of hypoglycemia

Side Effects:

SKIN: Thrombolphlebitis at injection site, tissue sloughing, necrosis with extravasation
ENDO: Hyperglycemia

Notes:

To be given only if altered mental status more severe than disorientation to time or date and blood glucose less than 80 or after evaluating baseline blood sugar.
Utilize large vein for administration to avoid local venous irritation.
Effects may be delayed in elderly patients with poor circulation, those who have had prolonged hypoglycemia.

Route:

Intravenous, Intraosseous

Dosage/Route:

Adult Dose: 25 gram Dextrose 10% (250 mL) IVPB or Dextrose 50% (50 ml) IVP. (May repeat in 5 minutes if altered mental status persists and blood glucose with repeat fingerstick is less than 80.)

Pediatric Dose: 5 mL/kg (0.5 g/kg) IV/IO Dextrose 10% (maximum 250 mL)

Standing Orders

Strengths/Size	Unit of Issue	Quantity
25 mg/250 mL (Dextrose 10%)	Premixed 250 mL bag	2
25 mg/50 ml (Dextrose 50%)	Preload syringe	2 (Optional)

Note: Diazepam is in the EMT-P Basic Scope of Practice.
Not used in the Central California Protocols.

Class:
Benzodiazepine/Sedative/Hypnotic/Anticonvulsant

Action:
Diazepam acts on the limbic, thalamic, and hypothalamic regions of the CNS to potentiate the effects of inhibitory neurotransmitters, raising the seizure threshold in the motor cortex. Used during cardioversion and Transcutaneous Pacing to induce amnesia and sedation. Depresses reticular activating system in the brain leading to depression in level of consciousness. Also a sedative and a muscle relaxant.

Onset: Immediate **Peak:** Immediate **Duration:** 15 minutes – 1 hour

Indications:
Seizures lasting greater than 10 minutes or if in status.
Precardioversion sedation should be considered for all patients unless unconscious.
Also: Alcohol withdrawal, as a muscle relaxant, behavioral emergency.
Ischemic chest discomfort if associated with sympatho-mimetic abuse (cocaine, crack, crank).

Contraindications:
Hypersensitivity
Shock
CNS depression as a result of head injury
Respiratory depression

Side Effects:
CV: Hypotension, brady/tachycardia (rare), cardiac arrest
CNS: Confusion, drowsiness, lethargy, ataxia, psychomotor impairment
RESP: Respiratory depression
GI: Dry mouth, anorexia
INTEG: Rash
EENT: Blurred vision

Notes:
Smoking increases metabolism of benzodiazephine, monitor the patient for any changes.
Administer Diazepam only while patient is actively seizing.
Assess and monitor respirations, BP, pulse and mental status closely.
Do not mix with other drugs – may precipitate.
Check IV site closely – may cause local venous irritation.
Because of a relatively short duration of action, seizure activity may recur and additional doses may be necessary.
When administered with a narcotic, decrease the dosage.
Cimetidine, ETOH, and CNS depressants enhance sedation.

Route: Intravenous, Intraosseous, Rectal, Endotracheal

Dosage/Route:

ET Dose: If no IV access: 0.1 mg/kg via ET tube (10 mg maximum). If volume less than 1.5 ml, flush with 2 ml NS.
Adult Dose: 0.1 mg/kg slow IVP, not to exceed 10 mg per dose.
5 mg IVP if ischemic chest discomfort is associated with sympathomimetic abuse (cocaine, crank, amphetamines).
Pediatric Dose: 0.1 mg/kg slow IVP not to exceed 10 mg per dose.
If no IV in patient less than 12 years old: 0.5 mg/kg rectally (20 mg maximum) via syringe without needle. Refer to Broselow Tape.

Strengths/Size	Unit of Issue	Quantity
10mg/2ml	Vial	Not Used in Central California Protocols

Class:

Antihistamine

Action:

Diphenhydramine is an antihistamine with anticholinergic (drying) and sedative side effects.
Suppresses an allergic reaction by blocking histamine H_1 and H_2 receptor sites. Indicated for conditions of excess histamine.
Does not reverse histamine-mediated responses.
Also slight sedative, antiemetic, antitussive and antispasmodic effects.

Onset: Immediate IV/Unknown IM **Peak:** 1-4 hours **Duration:** 6-12 hours

Indications:

Anaphylaxis
Also: Phenothiazine (dystonic) reactions, mild allergic reaction, motion sickness

Contraindications:

Active bronchospasm
Use with caution in COPD

Side Effects:

CV: Palpitations, tachycardia, hypotension or hypertension
CNS: Drowsiness, headache, restlessness, disturbs coordination (convulsions in OD situations)
RESP: Dries and thickens bronchial secretions, wheezing
GI: Dry mouth, nausea, vomiting
EENT: Blurred vision, tinnitis

Notes:

Assess for dizziness and drowsiness.
Additive CNS depressant effects may occur with alcohol, sedatives, hypnotics, tranquilizers and narcotics.
Monitor airway for thickening bronchial secretions (asthmatics).

Route:

Intravenous, Intramuscular

Dosage/Route:

Adult Dose: 50 mg IVP (over 1 minute) or IM if unable to establish IV
Pediatric Dose: 1 mg/kg slow IVP or IM (50 mg maximum dose)

Standing Orders

Strengths/Size	Unit of Issue	Quantity
50 mg/1 ml	Preload Syringe/Ampule	2

Class:

Natural Catecholamine
Sympathomimetic

Action:

Varying actions dependent on the dose. Acts primarily on alpha$_1$ and beta$_1$ adrenergic receptors.
Common vasopressor which increases systolic BP and pulse pressure while maintaining renal and mesenteric blood flow in therapeutic dosages (less than 20 mcg/kg/min.).
Dopamine is commonly used in the treatment of hypotension associated with cardiogenic shock.

Dopaminergic:	Beta:	Alpha:
2-5 mcg/kg/min. Selectively dilates blood vessels to brain, kidneys, heart, and GI tract	5-10 mcg/kg/min. ↑ CO by ↑ myocardial contractility and SV and rate (inotropic and chronotropic)	Greater than 10-20 mcg/kg/min. Peripheral vasoconstriction (also maintains its beta effects).

Onset: Immediate **Peak:** Unknown **Duration:** 10 minutes

Indications:
Shock non-traumatic (with pulmonary edema)

Also: Septic shock, neurogenic shock (after fluid bolus)

Contraindications:
Hypovolemic shock without adequate volume replacement
V-fib, or ventricular irritability
Tumor of adrenal gland

Side Effects:
CV: Tachycardia, hypertension, ↓ cardiac output, ventricular tachyarrhythmias, palpitations, anginal pain, ↑ O_2 demand
CNS: Headache
GI: Nausea, vomiting
INTEG: Necrosis at injection site with extravasations

Notes:
Dopamine can be deactivated by alkaline solutions such as sodium bicarbonate.
MAO inhibitors and bretylium may potentiate the effect of dopamine.
Dopamine is a potent drug. Monitor BP and P continuously. Observe for decrease in pulse pressure.
Monitor infusion rate closely (utilize mini-drip).
Incompatible with Furosemide.
Observe IV site closely for extravasation and tissue sloughing.
Should not be administered in the presence of severe tachydysrhythmias or ventricular tachycardias.
Dopamine is inactivated by Sodium Bicarbonate, and acidosis decreases effectiveness.
10% increase in heart rate may risk myocardial ischemia. Lidocaine may be helpful in suppression of ectopy.

Route: Intravenous piggyback only

Dosage/Route:
Adult Dose: (Continuous IV drip)
Add 400 mg to 250 ml NS with pediatric tubing (concentration 1600 mcg/ml).
Start at 5 mcg/kg/min. and increase dose every 5 min. until systolic BP = 90 or a maximum of 30 mcg/kg/min.

Strengths/Size	Unit of Issue	Quantity
400 mg/5 ml	Ampule/Vial Preload Syringe	1

EPINEPHRINE
(Adrenalin)

Class:

Natural Catecholamine/Sympathomimetic

Action:

Potent catecholamine with Alpha and Beta effects; Rapid onset (90 sec.) but brief (less than 5 min.) duration if given IV; Effects steady (onset 6-15 min.) and prolonged (15 min.) if given SQ.
Epinephrine causes vasoconstriction in the arterioles of the skin, mucosa, and splanchnic areas, and antagonizes the effects of histamine.

Alpha Effects:	Beta Effects:	Beta Effects (Continued):
↑ Resp. tidal volume and vital capacity by vasoconstriction of arterioles in lungs (↓ edema) Vasoconstriction in skin, kidneys, stomach, intestines, liver and pancreas	↑ heart rate ↑ force of contraction ↑ AV-node conduction ↑ spontaneous contraction ↑ cardiac output ↑ tidal volume	↑ coronary blood flow ↑ O_2 consumption ↑ myocardial irritability Bronchodilation Vasodilation of circulation to heart and skeletal muscle

Onset: IM/IV immediately **Peak:** IM/IV 5 min. **Duration:** IM/IV 5 min.-1 hr.

Indications:
IV:
- PEA
- Pulseless Ventricular fibrillation/ventricular tachycardia
- Asystole
- Profound symptomatic bradycardia
- Severe Anaphylactic Shock

IM:
- Shortness of breath with bronchospasm (asthma, COPD, patients that are less than 70 years)
- Acute allergic reaction (anaphylaxis)
- Anaphylactic shock

Contraindications (for patients with pulse, under the following conditions):
Cardiac ventricular dysrhythmias
Severe hypertension
Coronary artery disease
Tachydysrhythmias
Hypovolemic shock
Chest pain of cardiac origin

Side Effects:
CV: Tachycardia, palpitations, chest pain, hypertension, V-tach, V-fib
CNS: Headache, tremors, anxiety, dizziness, restlessness, convulsions
GI: Nausea, vomiting, anorexia, cramps
INTEG: Pallor, flushing, sweating, painful blanching at injection site

Notes:
Flush well with normal saline if given in same line with Sodium Bicarbonate (inactivated by alkaline solutions, including furosemide).
Use with caution with patient greater than 70 years, or with hypertension.
Monitor Blood Pressure, Pulse and EKG closely.
Be extremely cautious with dosage calculations and administration. (Check type of solution, concentration, dosage and route.)
No epinephrine given for mild allergic reactions.

Route:

Intravenous, IVPB infusion, Intraosseous, Intramuscular, Nebulized

EPINEPHRINE
(Adrenalin)

Dosage/Route:

Cardiac Arrest
Adult Dose: 1 mg of 1:10,000 (10 ml) IVP. Repeat every 3-5 minutes.
Pediatric Dose: 0.01 mg/kg of 1:10,000

Asthma/Respiratory Distress:
Adult Dose: 0.01 mg/kg 1:1000 IM (maximum single dose 0.4 mg). May repeat in 15 minutes with Base Hospital Contact.
Pediatric Dose:
Intramuscular (for severe respiratory distress due to bronchospasm) 0.01 mg/kg 1:1000 (1mg/1ml) IM (maximum single dose 0.4 mg).
Nebulized (for croup with severe inspiratory stridor only): 0.5 mg/kg 1:1,000 (1 mg/1ml) vis nebulizer. Maximum dose 5 mg.

Anaphylaxis:
Adult Dose: 0.4 mg IM (1:1000). Every 5 minutes while severe symptoms persist, maximum 3 doses. Maximum single dose 0.4 mg IM

Pediatric Dose: 0.01 mg/kg IM (1:1000) – Every 5 minutes while severe symptoms persist, maximum 3 doses. Maximum single dose 0.4 mg IM.

Anaphylactic shock (severe):
Only to be administered to anaphylactic shock refractory to IM epinephrine

Adult Dose: Epinephrine infusion 1 mg in 250 ml normal saline. Start at 2 mcg/min (1 drop every 2 seconds) and titrate carefully to target systolic blood pressure > 90 mmHg. Maximum dose of 8 mcg/min (2 drops per second)

Pediatric Dose: Epinephrine infusion 1 mg in 250 ml normal saline. Start at 1 mcg/min (1 drop every 4 seconds and titrate carefully to target age-appropriate blood pressure. Maximum dose 8 mcg/min (2 drops/second).

Pediatric Bradycardia:
0.01 mg 1:10,000 IV/IO every 3-5 minutes

Refer to Length Based Color Tape for specific pediatric drug doses

Standing Orders or Base Contact Required, Call Dependent

Strengths/Size	Unit of Issue	Quantity
1:1000 1 mg/1ml	Ampule	5
1:10,000 1 mg/10 ml	Preload Syringe	6
1:1000 mg/ml – 30 ml	Multi-Dose Vial	1

Class:

Narcotic analgesic/synthetic opioid agonist

Action:

Analgesic with short duration of action.
Minimal histamine release with minimal hemodynamic compromise and minimal nausea/vomiting.

Onset: Immediate IV/IO
7-8 min. IM
1-2min. IN

Peak: IV/IO/IN: 5 min. / IM: 10-12 min.

Duration: 0.5 – 1 hour (all routes)

Indications:

See individual protocols.
Analgesia after ALS airway (see ETT / i-Gel procedures.)

Contraindications:

Altered mental status
Shock/hypotension
Allergy to Fentanyl

Side Effects:

CNS: Bradycardia, sedation hypotension. Hypertension and rigid chest syndrome are rare.
RESP: Respiratory depression
GI: Nausea and vomiting

Notes:

Monitor blood pressure, respirations, and mental status carefully.
Be prepared for respiratory depressions. Have equipment to assist respirations, and Naloxone (Narcan) prepared for drug reversal if necessary.
Hypotension after Fentanyl should be treated with fluids.
Use with Caution:
Multi-system trauma
Patients in whom respiratory depression should be avoided (asthma/COPD) SOB
Patients in whom CNS (mental status) depression should be avoided (head injury)
Elderly patients generally require smaller doses and are more susceptible to hypotension.
Side effects are increased by alcohol or drugs that are CNS depressants and other narcotics.

Route:

Intravenous, Intramuscular, Intranasal, PO

Dosage/Route:

Adult Dose: If severe pain, Systolic BP greater100, and normal mental status.

IV/IM/IN: 25-100 mcg. Repeat every 5 minutes as needed to a total of 100 mcg.

Pediatric: IV/IM/IN: 1 mcg/kg. Repeat every 5 minutes as needed to a total of 100 mcg.

Standing Order or Base Contact Required in Radio Failure, is Call Dependent.

Strengths/Size	Unit of Issue	Quantity
250 mcg in 5 ml	Ampule	100 mcg minimum

FUROSEMIDE
(Lasix)

Class:

Diuretic/Loop Diuretic

Action:

Inhibits reabsorption of sodium and chloride in the proximal tubule and loop of Henle (↓ extracellular volume).
Promotes diuresis.
Reduces cardiac preload by increasing venous vasodilation – quick onset but has transient effects.

Onset of Action: IV – 2-5 minutes **Peak:** 30 minutes **Duration:** 2 hours

Indications:

Congestive heart failure
Pulmonary edema
(Hepatic or renal disease)

Contraindications:

Hypotension
Dehydration/Hypovolemia
Pregnancy (fetal abnormalities)
Hypersensitivity
Electrolyte depletion (hypokalemia)
Pneumonia – increases morbidity/mortality

Side Effects: (Few in Emergency Use)

CV: Postural hypotension, vascular collapse, embolus, ECG changes with electrolyte disturbances
CNS: Dizziness, weakness
GI: Nausea, vomiting, diarrhea
INTEG: Flushing, pruritis, hypersensitivity to sunlight
EENT: Blurred vision, tinnitus (with rapid IV administration)
GU: Urinary frequency, hyperglycemia, hypokalemia, hyponatremia, hypochloremia

Notes:
Interferes with antidiabetic agents – baseline blood sugar helpful.
Monitor blood pressure and heart rate and check lung sounds to monitor effectiveness.
Dosages may be increased for patients with renal problems or already taking furosemide.
Give slowly IV (20 mg/min.)
Protect from light; do not use if solution is discolored or yellow.
Patients with known sulfonamide hypersensitivity may manifest an allergic reaction to furosemide.
May cause excessive loss of K+ in patients receiving digitalis → dig toxicity.
Inhibited diuretic effect with non-steroidal anti-inflammatories.

Route:

Intravenous

Dosage/Route:

Adult Dose:	Pulmonary edema:	If transport time is greater than 30 minutes 40 mg slow IV push if no improvement with initial dose of nitroglycerin.
	Dissecting aneurysm:	20-40 mg IV, slow IV push. Base Contact Required
Pediatric Dose:	1 mg/kg IV	Slow IV push

Standing Orders

Strengths/Size	Unit of Issue	Quantity
40 mg/4 ml	Ampule/Vial	2

Class:
Antihypoglycemic Agent/Insulin Antagonist
Pancreatic Hormone

Action:

Glucagon is a protein secreted by the alpha cells of the pancreas.
Causes an increase in blood glucose concentration by converting liver glycogen to glucose (glycogenolysis).
Glucagon inhibits glycogen synthesis. Glucagon exerts positive inotropic action on the heart and decreases renal vascular resistance.
Smooth muscle relaxant of bronchi, esophagus, stomach, duodenum, small bowel, and colon.

Onset of action: 5-20 minutes **Peak:** 30 minutes **Duration:** 60-90 minutes

Indications:

Hypoglycemia
Altered mental status (known diabetic, only if IV cannot be established and accucheck/chemstrip less than 80)
Status epilepticus (known diabetic only if IV cannot be established and accucheck/chemstrip less than 80)

Also: Consider with beta-blocker or calcium channel O.D. with hemodynamic compromise.

Contraindications:

Hypersensitivity (allergy to pork or beef protein)

Side Effects:
CV: Tachycardia, hypotension
CNS: Headache
GI: Nausea, vomiting
INTEG: Urticaria

Notes:
Exogenous glucagon stimulates release of catecholamines.
To be given if altered mental status and blood glucose with accucheck or chemstrip less than 80.
Use with caution in patients with renal or cardiovascular disease.
Only effective if there are sufficient stores of glycogen in the liver, i.e. will probably not work in severe alcoholic, malnourished patient, or infants.
Diabetic patient usually responds in 15 minutes when given IV, IM.

Route:
Intravenous, Intramuscular

Dosage/Route:
Adult Dose: 1 mg IM. Mix with diluent provided only. No substitution.
Pediatric Dose: Rarely used.

Standing Orders

Strengths/Size	Unit of Issue	Quantity
1 unit of powder plus 1 ml solution (must be reconstituted until clear of precipitate)	Ampule	2

Note: *Not used in the Central California Protocols.*

Class:
Emetic/GI decontaminant

Action:
Induces vomiting in overdoses and poisonings of non-caustic substances.
Action by irritation of stomach mucosa and centrally by stimulating the chemoreceptor trigger zone in the medulla.
Contains cephaeline which produces or causes the emesis.

Onset: 10-30 minutes in most patients **Peak:** Unknown **Duration:** 20-25 minutes after onset

Indications:

Poison ingestion/Toxic overdose
Pediatric (greater than one year of age) – Oral ingestion in the conscious patient
Significant Iron ingestion and long transport time.

Contraindications:

Coma, shock, seizures
Patients unable to sit upright
Antiemetic poisoning
Petroleum distillate, hydrocarbons, strong acid or base poisoning, caustics
OD that may cause a rapid decrease in mental status (Tricyclic anti-depressant)
Do not Ipecac anyone who has absent gag or if unable to sit unassisted.
Do not Ipecac anyone who is deteriorating rapidly and is unlikely to be awake in 30 minutes (i.e., as mixed Valium and ETOH or phenothiazines).
Do not Ipecac hydrocarbon or caustic ingestions or anyone who is seizing or postictal.
Patients with Nissin fundoplication or Gastric Bypass

Side Effects:
CV: Hypertension, hypotension, arrhythmias, bradycardia
CNS: Headache, convulsions
GI: Diarrhea, stomach cramps
INTEG: Sweating

Notes:
Derived from a Brazilian dried root *cephaelis ipecacuanha*.
Save emesis for inspection and evaluation.
Administer only if within one hour of time of ingestion.
Monitor and assure a patent airway. Do not Ipecac anyone who has absent gag or if unable to sit unassisted.
Do not use Ipecac if less than one year of age.
Do not administer with activated charcoal.
Ipecac is commonly used by bulemics.

Route: Oral

Dosage/Route:

Adult Dose: 30 ml followed by 200-250cc (8oz) water. May repeat in 30 minutes if no response.
Pediatric Dose: 15 ml followed by 200-250cc (8oz) water. May repeat in 30 minutes if no response.
Do not administer if less than 1 year of age!

Base Hospital Order Only

Strengths/Size	Unit of Issue	Quantity
30 ml	Bottles	2

Note: *Not used in the Central California Protocols.*

Class:

Synthetic Catecholamine
Beta Adrenergic Agonist
Sympathomimetic (pure beta)

Action:

Acts directly on cardiovascular system (↑ cardiac output) and respiratory stimulation of beta receptors:

Positive chronotrope
Positive inotrope
↑ automaticity
↑ myocardial oxygen consumption with poor coronary perfusion
Vasodilation (↓ PVR) with ↑ preload
Hypertension
Bronchodilation
Relaxation of the GI tract

Onset: Immediate **Peak:** Unknown **Duration:** 1-2 hours

Indications:

Symptomatic bradycardia (refractory to Atropine)

Also: Bronchial asthma, asystole

Contraindications:

Tachycardia
Hypertension
Cardiogenic Shock
Digitalis toxicity

Side Effects:

CV: Palpitations, tachycardias, hypertension, anginal pain, flushing
CNS: Headache, restlessness, anxiety
GI: Nausea, vomiting, anorexia
GU: Polyuria, dysuria

Notes:

Watch for widening pulse pressure.
Monitor heart rate, ECG (ventricular irritability) and BP continuously.
Incompatible with lidocaine, calcium preparations and sodium bicarbonate.
Use with extreme caution in recent MI (significantly increases myocardial oxygen demand).

IVP: Dilute 1 ml (0.2 mg) to 10 ml with NS – Give 0.02 mg-0.06 mg
SIVP: 1 ml-3 ml over 2 minutes with free flowing IV
IVPB: 1 mg in 250 cc D_5W 2-20 mcg/minute

KETAMINE
(Ketalar)

Class:

Analgesic
General anesthetic, dissociative anesthetic
Schedule III Drug

Action:

Blocks pain receptors and minimizes spinal cord activity, affecting the brain's association pathways between the thalamus and the limbic system.

Onset: 30 seconds **Peak:** 30 seconds to 5 minutes **Duration:** 10-15 minutes

Indications:

Pain control

Contraindications:

Known hypersensitivity, infants younger than 3 months of age, pregnancy, angina, heart failure, suspected cardiac pain, suspected aortic dissection, suspected hypertensive crisis, suspected traumatic brain injury or GCS less than 15, patients under influence of methamphetamine, PCP, or other stimulant drugs, patients with active psychosis

Side Effects:

Hypertension, hallucinations, nausea/vomiting, nystagmus, bronchodilation, tachycardia, increased secretions, hypersalivation, laryngospasm, respiratory depression, mild to moderate elevations in blood pressure and heart rate.

Notes:

Use with caution in any patient with the potential for increased ICP, including those with head trauma, intracranial mass lesions, intracranial bleeding, or hydrocephalus. No repeat doses, do NOT combine with Fentanyl.

Route:

IV, IM, IN

Dosage/Route:

Adult Dose: 0.25 mg/kg in 100 mL normal saline IV infusion over 10 minutes or 0.25 mg/kg IM/IN (max. Dose by any route is 25 mg) **DO NOT REPEAT**
Pediatric Dose: *No local application*

Strengths/Size	Unit of Issue	Quantity
50 mg/10 ml 500 mg/10 ml	Preload or Vial	25 mg

LIDOCAINE
(Xylocaine)

Class:
Antiarrhythmic (Class I-B)
Local Anesthetic

Action:

Decrease ventricular depolarization. Delays ventricular automaticity at the His-Purkinje system. Lidocaine reduces ventricular excitability and raises the ventricular fibrillation threshold.
Direct action on the heart to suppress ventricular arrhythmias without ↓ force of contractions. However, lidocaine does depress the conduction velocity through ischemic tissue and depresses the increased automaticity seen in ischemic tissue.
A therapeutic blood level of a 100 mg (*based on a 70 kg patient)* bolus of lidocaine is maintained for approximately 20 minutes.

Onset: 1-2 minutes **Peak:** 2-4 minutes **Duration:** 10-20 minutes IV

Indications:
Ventricular fibrillation
Ventricular tachycardia
PVCs with frequent couplets or repeated non-sustained
V-Tach (three or more PVCs in a row)
Wide-complex tachycardia of uncertain origin
Also: Post-defibrillation or cardioversion

Contraindications:
Hypersensitivity to this drug
Severe AV blocks
Atrial arrhythmias
Heart rate less than 60

Side Effects:
CV: Hypotension, Bradycardia
CNS: Confusion, dizziness, drowsiness, numbness, headache, convulsions in high doses
RESP: Respiratory depression
GI: Vomiting
INTEG: Rash, urticaria
EENT: Tinnitus, blurred vision

Notes:
Suppress cough and gag reflexes.
Beta-blockers decrease metabolism of lidocaine by the liver. Watch for toxicity.
Lidocaine drips are discouraged in the field (except with long transports – greater than 30 minutes) due to difficulty in maintaining a specific drip rate.
If patients are greater than 70 years old, in shock, CHF, liver failure or currently taking tocainide (Tonocard), cut all doses by one-half, after conversion (half dose = 50 mg). Patient weights less than 50 kg receives 1 mg/kg.
Administration requires cardiac monitoring.
Standard dosage for lidocaine is 1-1.5 mg/kg IV.

Route: Intravenous, IVPB Infusion, Intraosseous, Endotracheal, Intramuscular, Subcutaneous

Dosage/Route:

ET Dose:	2% Lidocaine 3.0 mg/Kg preload. This will result in therapeutic levels that last for one hour.
Adult Dose:	100 mg IV/IO push 50 mg/minute, q 5 minutes, max of 300mg
Lidocaine Drip:	Pre-mixed bag 1 gm Lidocaine/250 ml D5 at 2 mg/min. (= 30 microdrops/minute) (Half dose = 1 mg/min. = 15 microdrops/minute)
Converted Dysrhythmia:	If converted, 100 mg IV/IO over 2 minutes
Pediatric Dose:	1 mg/kg IVP maximum 50 mg. Refer to Broselow Tape.

Standing Orders or Base Contact Required unless in Radio Failure, is Call Dependent

Strengths/Size	Unit of Issue	Quantity
2% 100 mg/5 ml	Preload Syringe	4
1 gm Lidocaine/250 ml D5	Pre-mixed Bag	1

Class:
Anticonvulsant
Electrolyte Replacement

Action:
CNS depressant
Acts by raising the blood level of magnesium, thereby decreasing CNS irritability, depressing the irritability of striated skeletal muscle and increasing the seizure threshold.
Anticonvulsant properties produced by decreasing the amount of acetylcholine liberated form motor nerve terminals → peripheral neuromuscular blockade.
In excessive dosages, produces vasodilation by ganglionic blockade and direct action on blood vessels.
In excessive dosages, produces respiratory depression by neuromuscular blockade.

Onset: Immediate **Peak:** Immediate **Duration:** 3-4 hours

Indications:
Eclampsia (seizures). If late pregnancy with hypertension, Midazolam to stop the seizure prior to magnesium.

Also: Refactory V-fib and V-tach
May be used for hypercalcemia with hemodynamic compromise or severe arrhythmia.
May consider for Torsades de Pointes.

Contraindications:
Hypersensitivity
Heart block
Severe renal disease
Caution in digitalized patients

Side Effects:
CV: Hypotension, circulatory collapse, reduced heart rate
CNS: Depression, flushing, drowsiness, hypothermia
RESP: Depression, failure
GI: Thirst, diarrhea
INTEG: Feeling of warmth, sweating

Notes:
Magnesium Sulfate is an optional drug approved by the EMS Authority to use in the expanded EMT-P Scope of Practice.
CNS depressant effects may be increased when used with barbiturates, narcotics and hypnotics.
Observe closely for overdose symptoms: hypotension, heart block, and respiratory paralysis.
Do not leave patient unsupervised – monitor respirations (rate and depth), pulse, EKG and BP.
Calcium chloride should be readily available as an antidote if respiratory depression ensues.
Used mostly as a drug in an interfacility transfer.

Route: Intravenous, Intraosseous, IVPB infusion.

Dosage/Route:

Adult Dose: Eclampsia (seizures): 5 grams in 250 cc NS IV infusion over 20 minutes
Torsades de Pointes: 2 gm IVP over 1-2 minutes

Pediatric Dose: Not indicated locally

Standing Orders

Strengths/Size	Unit of Issue	Quantity
5 gm/10 ml	Preload Syringe	2

Class:

Short-acting benzodiazepine/CNS agent
Sedative-Hypnotic
Anticonvulsant

Action:

Midazolam HCL is a water-soluble benzodiazepine that may be administered for conscious sedation to relieve apprehension or impair memory prior to tracheal intubation or cardioversion.
Midazolam is a CNS depressant with muscle relaxant, anticonvulsant, and anterograde amnestic effects. Intensifies activity of gamma-aminobenzoic acid (GABA), a major inhibitory neurotransmitter of the brain, by interfering with its reuptake and promoting its accumulation at neuronal synapses. This calms the patient, relaxes skeletal muscles, and in high doses produces sleep.
Also provides some retrograde amnestic effects making it useful after cardioversion.

Onset: 3-5 minutes (IV) dose dependent **Peak:** 20-60 minutes **Duration:** 2-6 hours; dose dependent

Indications:

Seizures
Premedication for tracheal intubation or cardioversion

Contraindications:

Hypersensitivity to midazolam
Shock, coma, glaucoma
Chronic renal failure
Concomitant use of barbiturates

Side Effects:

CV: Fluctuations in vital signs, hypotension
CNS: Oversedation, headache, retrograde amnesia, euphoria, drowsiness, coma
RESP: Respiratory depression, respiratory arrest, cough, laryngospasm
GI: Nausea, vomiting, hiccough (diaphragmatic spasm producing a cough/noise)
INTEG: Pain at injection site
EENT: Blurred vision, diplopia (seeing two objects), nystagmus, pinpoint pupils

Notes:

Versed is noted to be 3-4 times as potent per milligram as diazepam.
Most seizures do **not** require treatment with benzodiazepines.

Route:

Intravenous, Intramuscular, Endotracheal, Rectal, Intraosseous

Dosage/Route:

Adult: 0.1 mg/kg, Slow IVP, over 2 min (4 mg max per dose) may repeat once in 10 minutes
0.2 mg/kg, IM if no IV access (8mg max per dose). ***May not repeat without Base Contact***
Pediatric: Same as the adult dose.
Elderly: 0.5 mg slow IVP (max 1.5 mg in a 2 min period); Elderly patients age 65 or greater.

Standing Orders

Strengths/Size	Unit of Issue	Quantity
10mg/2ml	Vial	2

Class:

Narcotic Analgesic
Opioid Analgesic

Action:

Binds with opiate receptors of the CNS. Opium alkaloid that has a primary effect of analgesia.
Decreases sensitivity to pain (potent opiate derivative).
Causes peripheral vasodilation and ↓ venous return (chemical phlebotomy), ↓ systemic vascular resistance and ↑ sedative effects →↓ O_2 demands on the heart.
Alters both perception of pain and the emotional response to pain.

Onset: Immediate IV/10-30 min. IM/SQ **Peak:** 20 min. IV/30-60 min. IM/50-90 min. SQ **Duration:** 2-7 hours

Indications:	**Contraindications:**
Chest pain associated with myocardial infarction	Respiratory depression
Pulmonary edema	Asthma/COPD
Dissecting aneurysm (if hypertensive with chest pain)	CNS injury or depression/Increased ICP
Thermal and chemical burns without hemodynamic compromise	Hypersensitivity to this drug
Severe isolated extremity trauma without hemodynamic compromise	Volume depletion
	Undiagnosed abdominal pain
	Multisystem trauma

Side Effects:

CV: Hypotension, flushing, tachycardia, bradycardia, shock
CNS: Light-headedness, dizziness, sedation, hallucinations, tremor, seizure, euphoria
RESP: Respiratory depression, apnea, respiratory arrest, bronchospasm
GI: Nausea, vomiting, anorexia, dry mouth
GU: Urinary retention
INTEG: Local histamine release at injection site

Notes:

Effects may be increased when used with alcohol, other CNS depressants, tricyclics or MAO inhibitors.
Administer only if BP greater than 100 systolic. Repeat BP after each dose.
The CNS effects are promptly reversed by Naloxone, but the CV effects (↓ BP) are not reversed – hypotension should be treated with volume replacement.
Monitor VS (P, R and BP) closely – have Naloxone on hand and be prepared to assist ventilations.

Route:

Intravenous, Intraosseous, Intramuscular, Subcutaneous

Dosage/Route:

Adult Dose: 2-5 mg very slow IV every 5 minutes if necessary to a total of 10 mg. May be given IM or SQ.
Pediatric Dose: 0.1 mg/kg trauma or burns with Base Hospital contact.

Standing Orders or Base Hospital Contact Required unless in Radio Failure, is Call Dependent

Strengths/Size	Unit of Issue	Quantity
10 mg/1 ml	Vial	2

Class:

Opioid Antagonist

Action:

Acts by competing for opiate receptor sites in the brain → antidote for respiratory effects of narcotic-like drugs.

Onset: 1 min. IV, 5 min. IM/SC **Peak:** Unknown **Duration:** 1-4 hours, dependent on dose/route

Indications:

Ingestion/poisoning – only if suspected narcotic intoxication with altered mental status and respiratory depression
Coma of unknown origin

Contraindications:

Known hypersensitivity
Use with caution in narcotic-dependent patient

Side Effects:

GI: Nausea, vomiting
CV: Hypertension, tachycardia
CNS: Tremor, N/V, diaphoresis, withdrawal (opiate)

Notes:

Naloxone may potentiate some effects of Cocaine.

Naloxone will completely or partially reverse CNS depression caused by the following agents (natural and synthetic):

Morphine	Percodan	Paregoric	Nubain	Darvon (Propoxyphene)
Heroin	Methadone	Codeine	Stadol	Lomotil
Dilaudid	Demerol	Fentanyl	Talwin	Hydromorphone

Will not reverse hemodynamic conditions.
Shorter duration of action than many narcotics – repeated doses may be necessary. Monitor patient closely on long transports.
Precipitates withdrawal in addicts (nausea, vomiting, sweating, tachycardia, increased BP, tremulousness) but not a concern if patient is hypoventilating with decreased mental status secondary to narcotic overdose.
Reverses respiratory depression of opiates – not other drug induced or pathological respiratory depression.

Route:

Intravenous, Intramuscular, Intraosseous, Endotracheal, Subcutaneous

Dosage/Route:

Adult Dose: Give 1 mg SQ (prior to IV, if narcotic OD) then (if no improvement) 1 mg IVP (after IV established). Routes include IM, and SQ.
Darvon Overdose: (Propoxyphene) 2.0 – 4.0 mg IVP.
Pediatric Dose: 0.1 mg/kg (0.025 ml/kg) IVP. Refer to Broselow Tape.

Standing Orders

Strengths/Size	Unit of Issue	Quantity
2.0 mg	Ampule/Preload	3

NITROGLYCERINE
(Nitrostat, Nitrobid)

Class:
Antianginal
Vasodilator

Action:
Dilation of vascular smooth muscle
↗ Decrease peripheral arterial resistance (afterload)
↘ Decrease in venous blood return (preload)

↓ BP and →↓ workload on the heart with ↓ O_2 demand.
Redistribution of coronary blood flow (dilation) improving the supply of O_2 to the hypoxic area through collateral coronary vessels.

Onset: SL Tablet–1-5 min. **Peak:** Same as onset **Duration:** Tablet–10-60 min.

Indications:

Chest pain (angina or MI)
Pulmonary edema
Dissecting aneurysm with hypertension and chest pain
Hypertensive emergency with chest pain or pulmonary edema

Contraindications:

Increased intracranial pressure (ICP)
Cerebral edema
Hypotension BP less than 100 systolic

Side Effects:
CV: Postural hypotension, tachycardia, CV collapse
CNS: Headache, dizziness, flushing, vertigo, weakness
GI: Nausea, vomiting, abdominal pain
INTEG: Pallor, sweating, rash, flushing

Notes:
Caution patient not to swallow or chew tablets.
Effects may be increased with narcotics, alcohol, tricyclics, beta blockers or antihypertensives.
Patients chronically taking NTG may develop a tolerance necessitating ↑ dosages.
Date the bottle once opened (discard after 2 months). Protect from light, heat and moisture.
Recheck BP and P after administration (use only if BP greater than 100 systolic).
If BP drops less than 100 systolic after administration of NTG, lay patient down. If nitropaste applied, wipe off. Consider fluid challenge to increase BP.
Be aware of paste application location during defibrillation/cardioversion, may cause arcing.

Route: Sublingual, Transdermal, Oral Spray, IV Infusion

Dosage/Route:
Adult Dose:
- Chest Pain: 0.4 mg SL if BP greater than 100; observe and check BP; repeat in 3-5 minutes if chest pain continues to a total of 3 doses.
- Pulmonary Edema: 0.4 mg (1 tablet) SL if BP is greater than 100. 0.8 mg (2 tablets) SL if BP greater than 120. 1.2 mg (3 tablets) SL if BP greater than 200. Repeat 1-3 tablets SL every 5 minutes (to a total dose of 9 tablets) until BP 100 or less, or clinical improvement (repeat doses are based on systolic BP). Check BP before each dose.

Pediatric Dose: Not indicated.

Standing Orders

Strengths/Size	Unit of Issue	Quantity
0.4 mg/Tablet	Bottle of 25 Tablets	1 Bottle

Class:

Vasodilator

Action:

Nitropaste contains a 2 % solution of nitroglycerin in an absorbent paste. Relaxation of vascular smooth muscle and consequent dilation of peripheral arteries and veins. The dilation promotes peripheral pooling thereby decreasing venous return to the heart, reducing left ventricular end-diastolic pressure and pulmonary capillary wedge pressure (preload). Arteriolar relaxation reduces arterial pressure (afterload). Dilation of coronary arteries also occurs.

Onset: 15-60 min. **Peak:** Same as onset **Duration:** 2-12 hours

Indications:

Angina pectoris
Chest pain associated with AMI
CHF w/ pulmonary edema

Contraindications:

Hypersensitivity
Hypotension
Head injury
Cerebral hemorrhage

Side Effects:

CV: Postural syncope, Reflex tachycardia, Hypotension
CNS: Transient headache
GI: Nausea and vomiting
INTEG: Allergic reaction

Notes:

Other vasodilators may have additive hypotensive effects.
Nitropaste should be spread over 2-4 inch area on skin that is free of hair (chest), and cover with transparent wrap and secure with tape.
The frequency and severity of side effects of nitropaste is usually considerably less than with the preparations because of the slower absorption and less erratic serum levels.
Do not cardiovert/defibrillate on or near nitropaste on the patients chest, paddles may cause arcing.

Route: Transdermal

Dosage/Route:

ET Dose: **N/A**

Adult dose:
Chest pain: 1 inch (B/P greater than 100)
SOB w/ PE: 1 inch (B/P greater than 100-120), 2 inches (B/P greater than 120)

Pediatric: Not recommended

Standing Orders

Strengths/Size	Unit of Issue	Quantity
Nitropaste 1-3 grams	Single patient Unit Dose	2

ONDANSETRON
(Zofran)

Class:

Antiemetic

Action:

Selective serotonin (5-HT_3) receptor antagonist
Treats and prevents nausea and vomiting

Onset: IV/IM/ODT – 2-5 min. **Peak:** **Duration:** IV/IM/ODT: 5-6 hours.

Indications:

Nausea/vomiting

Contraindications:

Hypersensitivity to ondansetron
Prolonged QT interval

Side Effects:

GEN: Fever
CNS: Headache, sedation
GI: Diarrhea, dry mouth, constipation
CARD: QT prolongation

Notes:

Monitor cardiovascular status. Rare cases of tachycardia, angina, and transient blindness have been reported.

Route:

Intravenous, Intramuscular, Oral Dissolving Tablet, PO

Dosage/Route:

Adult Dose: IV/IM: 4 mg IV over 2-5 minutes, repeat in 15 minutes
PO: 4 mg, repeat in 15 minutes

Pediatric Dose:

Greater than 1 month, less than 4 years: IV/IM: 0.15 mg/kg (max 4 mg)

Greater than 4 years PO: 4mg PO

Standing Order or Base Contact Required in Radio Failure, is Call Dependent.

Strengths/Size	Unit of Issue	Quantity
2 ml: 2 mg/ml, total 4mg 4mg	2ml vial Tablet/ODT	4 mg minimum

OXYTOCIN
(Pitocin)

Note: *Not used in the Central California Protocols.*

Class:

Oxytocic Hormone (Synthetic)

Action:

Acts on myofibrils in smooth muscle to induce uterine contractions characteristic of normal delivery.
Stimulation of uterine contractions, tamponade exposed postpartum vessels.

Onset: Within 1 minute **Peak:** Unknown **Duration:** Up to 30 min. after infusion

Indications:

Childbirth; for control of postpartum hemorrhage

Contraindications:

Hypersensitivity
Labor (1st stage)
Fetal distress or presence of second fetus
Toxemia
Placenta previa

Side Effects:

CV: Cardiac arrhythmia, fetal bradycardia, hypotension, hypertension
CNS: Convulsions, coma
GI: Nausea, vomiting, abdominal pain
INTEG: Anaphylaxis
GU: Uterine tetany or rupture

Notes:

Oxytocin stimulates the mammary glands to increase lactation.
Metabolized by the kidney and the liver.
It is essential to assure that the placenta has been delivered and that there is not another fetus present before administering oxytocin.
Utilize fundal massage and baby to breast first as a means of controlling vaginal bleeding.
Monitor maternal VS every 15 minutes. (Watch for dysrhythmias, hypertension, transient usually related to inductions.)
Incompatible with all drugs in IV solution.
Overdosage can cause uterine rupture.
When given rapidly in large amounts, may cause ↓ PVR and hypotension.

Route:

Intravenous, Intramuscular, IVPB Infusion

Dosage/Route:

Adult Dose: 20 units added to 1000 ml LR run at a rate not to exceed 250 cc/hr.
Consider 10-20 units IM if unable to start IV.

Strengths/Size	Unit of Issue	Quantity
10 units/1 ml	Ampule	Not Used in Central California Protocols

POTASSIUM CHLORIDE
(KCL)

Note: EMT-Ps may monitor IV solutions containing KCL not greater than 20 meq/L. Not carried in drug box.

Class:

Electrolyte Supplement

Action:

Maintains electrolyte balance.
Regulates nerve conduction and muscle contraction (especially cardiac).
Participates in carbohydrate utilization and protein synthesis.
Maintains acid-base balance.

Onset: Immediate **Peak:** Immediate **Duration:** Unknown

Indications:	**Contraindications:**
Treatment of potassium deficiency.	Renal failure
Potassium (K^+) maintenance in NPO patients	Hyperkalemia

Side Effects:

CV: Dysrhythmias, cardiac arrest, respiratory depression
CNS: Muscular paralysis, paresthesias of extremities
GI: Nausea, vomiting, diarrhea, abdominal pain
Other: Hyperkalemia, venous thrombosis, post infusion phlebitis

Notes:

Infusions containing KCL may only be monitored.
EMT-Ps are not allowed to start or add KCL to IV solutions.
Monitor EKG for cardiac dysrhythmias.
May induce cardiac arrest if given as IV bolus.

Dosage/Route:

Adult Dose: Usual dose 10-40 meq added to main IV solution.

NOTE: Paramedics can only monitor IV solutions containing KCL not greater 20 meq/L.

Class:

Alkalotic Agent
Electrolyte

Action:

Sodium bicarbonate reacts with hydrogen ions (H+) to form water and carbon dioxide and acts by buffering metabolic acids. Buffers the acids present in the body during and after severe hypoxia and/or inadequate tissue perfusion.

H^+ + HCO_3 ⇄ H_2CO_3 ⇄ $H_2O + CO_2$

Acids (Strong) — Bicarbonate — Carbonic Acid (Weak)

Onset: Immediate **Peak:** Immediate **Duration:** Unknown

Indications:

Severe hyperkalemia with dysrhythmia producing hemodynamic compromise.

Prolonged cardiac arrest (medical or trauma)
Tricyclic ingestion with life-threatening dysrhythmia
DKA
Consider: Metabolic acidosis associated with vascular collapse, salicylate poisoning after volume challenge, severe ASA poisoning

Contraindications:

None for field use.

Side Effects:

CNS: Dizziness, headache, irritability, twitching, weakness, brain cell injury, seizures
RESP: Pulmonary edema, hypoventilation
GI: Gastric distention, anorexia, cramps, nausea, vomiting
GU: Renal calculi, impaired renal function, dehydration
MS: Muscle cramps, pain, tetany
INTEG: Tissue sloughing at injection site with extravasation

Notes:

Correct dosage is essential to avoid overcompensation of pH abnormalities.
Monitor ABCs during administration.
Flush IV line before and after administration (catecholamines will be inactivated, precipitate will form with Ca^{++}).
When administered, must be accompanied by adequate ventilation and oxygenation.
Do not administer to resuscitated patients in the field who have a pulse, even though respiratory arrest persists.
May worsen CHF.

Dosage/Route:

Adult Dose: In arrested patients: Consider in patients with hyperkalemia, tricyclic ingestions – 1 mEq/kg IV.
Pediatric Dose: 1 meq/kg (Dilute 1:1 to age 6 months; Maximum 2 amps – IV push. Refer to Broselow Tape.)
Not indicated in paramedic protocols.

Base Contact Required unless in Radio Failure, is Call Dependant

Strengths/Size	Unit of Issue	Quantity
44.6-50 meq/50 ml	Preload Syringe	3

TERBUTALINE SULFATE

(Brethine, Bricanyl, Brethaire Inhaler)

Note: Terbutaline is in the EMT-P Basic Scope of Practice.
Not used in the Central California Protocols.

Class:

Bronchodilator
Synthetic Sympathomimetic
Tocolytic

Action:

Decreases uterine contractions in preterm labor.
Synthetic adrenergic stimulant with selective B_2 and some alpha effects. Exerts preferential effect on bronchial smooth muscle to relax the smooth muscle and relieve bronchospasm. Effects similar to epinephrine with less cardiac effects and longer duration of action.
Relaxes smooth muscle of vascular supply to skeletal muscles and uterus, thus increasing blood supply to those areas.

Onset: 5 min. SQ **Peak:** 30-60 min. SQ **Duration:** 90 min. – 4 hrs. SQ

Indications:

Acute Asthma
COPD/Bronchitis
Preterm labor

Contraindications:

Hypersensitivity to sympathomimetic amines
Severe hypertension
Cardiac arrhythmias
Cardiac chest pain

Side Effects:

GI: Nausea, vomiting
CV: Palpitations, tachycardia, hypertension
CNS: Tremors, anxiety, muscle cramps, drowsiness, headache
RESP: Rash, dry bronchospastic cough (rarely)

Notes:

Beta blockers antagonize terbutaline.
Use with caution in patients with hypertension, coronary artery disease, cardiac arrhythmias, CHF, diabetes and seizures.
Protect from light. Do not use if discolored.
Tolerance may develop with prolonged use.
Monitor EKG.
Tachycardia is not a contraindication to using Terbutaline.
Used to reduce pre-term contractions in pregnancy.

Route:

Adult Dose: 0.25 mg SQ. May repeat one time in 20 minutes.
Inhaler – 1 puff. May repeat one time in 60 seconds.

TRANEXAMIC ACID

(TXA, Cyklokapron, Lysteda)

Class:

Hemostatic agent, antifibrinolytic agent, plasminogen inhibitor.

Action:

Inhibits the activation of plasminogen to plasmin (which breaks down fibrin clots, fibrinogen, and other plasma proteins). By hindering fibrin's breakdown, clotting factors and circulating platelet plugs can form a seal (fibrin clot) and reduce bleeding.

Onset: Unknown **Peak:** Unknown **Duration:** 7 to 8 hours

Indications:

Blunt or penetrating trauma less than 3 hours from onset with hemodynamic compromise, uncontrolled bleeding. Systolic BP less than 90 mm Hg, Age greater than 14 years old.

Contraindications:

Age 14 years and younger, greater than 3 hours post injury, traumatic arrest without ROSC, Known allergy to TXA, hemorrhagic shock stabilized by other hemostatic interventions, Non-hemorrhagic shock, subarachnoid hemorrhage, history of PE, DVT, or other thromboembolic disorder.

Side Effects:

Fatigue, headache, dizziness, abdominal and back pain, joint pain, musculoskeletal pain, anemia. Rapid infusion may cause hypotension. May increase the risk of thromboembolic disorders.

Notes:

Must be mixed into an infusion bag, typically 100 ml of NS. If care is turned over from another agency and the patient has only received 1 gram of TXA, an additional 1 gram of TXA diluted in 100 ml NS may be given over 10 minutes to achieve the total dose of 2 grams of TXA.

Route:

IV, IO

Dosage/Route:

Adult Dose: For patients greater than 14 years, 2 grams diluted in 100 ml NS IV/IO infused over 10 minutes, make sure to label bag with medication name and dose
Pediatric Dose: *No local application*

Strengths/Size	Unit of Issue	Quantity
1 gram/10 ml	Vial	2 grams

VERAPAMIL HCL

(Isoptin, Calan)

Note: *Not used in the Central California Protocols.*

Class:

Calcium Channel Blocker

Action:

Acts by inhibition of Ca^{++} ions influx in cardiac and smooth muscle cells during contraction which decreases myocardial contractility. Inhibits reentry during PSVT. Verapamil decreases atrial automaticity, reduces AV conduction velocity, and prolongs AV nodal refractory period.
Decreases the rate of ventricular response.
Decreases myocardial oxygen demand.
Peripheral vasodilation (↓ afterload).
Coronary artery and arteriole dilation.

Onset: 1-3 minutes **Peak:** 1 – 3 minutes **Duration:** 1-6 hours

Indications:
Supraventricular tachycardia (PSVT)
Atrial fibrillation with rapid ventricular response.

Also: Atrial flutter with rapid ventricular response, angina (prinzmetal's, crescendo, preinfarction and exertional)

Contraindications:
AV Block
Sick sinus syndrome
L ventricular dysfunction
Severe Hypotension/Cardiogenic Shock
Severe CHF/pulmonary failure
Atrial Fibrillation with Wolfe-Parkinson-White Syndrome

Side Effects:

CV: Hypotension, bradycardia, peripheral edema, dizziness, tachycardia, CHF, 3rd degree heart block, asystole
CNS: Dizziness, headache
GI: Nausea, constipation, vomiting

Notes:

Verapamil is an optional drug approved by the EMS Authority to use on the expanded EMT-P Scope of Practice.
Antihypertensives may enhance hypotension.
May cause heart failure in patients on beta blockers.
Do not mix with any drugs in any manner.
Monitor EKG continuously for arrhythmias, ventricular rate, increasing PR interval or dropped beats and bradycardia.
Monitor BP closely.
Use extreme caution on patients receiving beta blockers (propranolol, nadolol, timolol, etc.).
Vagal maneuvers after administration may convert SVT.
Ca^{++} may blunt hypotensive effects of verapamil.

Route:

Intravenous

Dosage/Route:

Adult Dose: 5 mg IV over 2 minutes. (If patient greater than 50 years, give over 3 minutes). Repeat dose in 5 minutes if pulse rate and symptoms do not improve. Consider Calcium Chloride 250 mg IV prior to Verapamil.
Pediatric Dose: Not recommended in prehospital.

Base Contact Required

Strengths/Size	Unit of Issue	Quantity
5 mg/2 ml	Ampule/Preload Syringe	2