RED	Not authorized
YELLOW	Authorized by LEMSA Medical Director per Title 22, Division 9, Chapter 3.1, § 100066.02/ 100066.04[L] or by California EMSA-approved LOSOP[S]
GREEN	Authorized by state regulation and local protocol

This document contains the authorized medications for EMT/AEMT/Paramedics or supervised EMT/AEMT/Paramedic students to administer when on-duty as part of the organized EMS system, while at the scene of a medical emergency or during transport, or during interfacility transfer. This document is not comprehensive, refer to the individual treatment protocols for additional information.

ACETAMINOPHEN (IV)

EMT	AEMT	PARAMEDIC

Class
- Analgesic, antipyretic

Mechanism of Action
- Mechanism of action unclear; may work peripherally to block pain impulse generation; may also inhibit prostaglandin synthesis in CNS.

Indications	Contraindications
• Management of acute pain • Protocols: S-141, S-173	• Severe acute liver disease • Known or suspected total dose exceeding 4,000 mg in a 24-hour period • <2 years of age • Pregnancy with pain from active labor

Adult Dose	Pediatric Dose
• Acetaminophen 1,000 mg IV over 15 min	• Acetaminophen IV per drug chart in 100 ml of NS over 15 min

Adverse Effects
- Nausea/vomiting
- Skin rash
- Itching
- Overdose can cause hepatotoxicity

Notes
- Remember to consider non-pharmacologic pain treatments, e.g., place in position of comfort, apply ice packs/splints PRN, and verbal reassurance.
- If patient refuses or has contraindications to acetaminophen, may treat as moderate pain with fentanyl or morphine.

ACTIVATED CHARCOAL

EMT	AEMT	PARAMEDIC

Class
- Antidote

Mechanism of Action
- Adsorbs a variety of drugs and chemicals (e.g., physical binding of a molecule to the surface of charcoal particles); desorption of bound particles may occur unless the ratio of charcoal to toxin is extremely high.

Indications	Contraindications
• Management of overdose and poisoning • Protocols: S-134, S-165	• Caustic agents, hydrocarbons, or liquid ingestions (e.g., alcohols)

Adult Dose	Pediatric Dose
• Activated charcoal 50 gm PO	• Activated charcoal per drug chart PO

Adverse Effects
- Nausea/vomiting

Notes
- Due to risk of charcoal aspiration, do not administer activated charcoal to a patient anticipated to have a decline in mental status over the next 30-60 minutes.
- Does not effectively bind to or adsorb certain ions like metals (iron, lithium, sodium), electrolytes (potassium, magnesium), and acids/alkalis.
- Authorized to administer activated charcoal on standing order, if recommended by Poison Control Center.
- The 24-hour toll-free telephone number to Poison Control Center is (800) 222-1222.
- Shake vigorously before use because separation occurs while it is stored.

ADENOSINE

EMT	AEMT	PARAMEDIC

Classification
- Antidysrhythmic

Mechanism of Action
- Slows conduction through the AV node and interrupts AV reentry pathways as well as conduction through the SA nodes.

Indications	Contraindications
• Management of supraventricular tachycardia (SVT) • Protocols: S-127, S-163	• Second- or third-degree AV block (without pacemaker) • Sick sinus syndrome

Adult Dose	Pediatric Dose
• Adenosine 6 mg rapid IV/IO followed by 20 mL NS rapid IV/IO • If no conversion, adenosine 12 mg rapid IV/IO followed by 20 mL NS rapid IV/IO, MR x1	• Adenosine per drug chart rapid IV/IO, followed with 20 mL NS rapid IV/IO, MR x2

Adverse Effects
- Flushing
- Sweating
- Dizziness
- Nervousness
- Hypotension
- Feeling of impending doom
- Severe bronchospasm in patients with asthma
- Paresthesia

Notes
- For stable patients, use Valsalva maneuver prior to administration. Discontinue Valsalva maneuver after 5-10 seconds if no conversion.
- Ideally, cannulate a proximal vein with an 18-20g catheter. Use the IV port closest to the patient and rapidly flush with 20mL normal saline immediately.
- Run a 6-second ECG strip before, during, and after drug administration.
- Patients frequently have a brief period of escape beats or asystole before the sinus node starts up again. This may be perceived as a feeling of impending death and can be extremely frightening for patients.
- If the wide-complex tachycardia is ventricular in origin, adenosine is highly unlikely to result in cardioversion.
- Bronchospasm may occur in patients with a history of airway disease, such as asthma or COPD.

ALBUTEROL / LEVALBUTEROL

EMT	AEMT	PARAMEDIC

Classification
- Beta-2 receptor agonist

Mechanism of Action
- Albuterol: Selective beta-2 adrenergic agonist that causes relaxation of smooth muscles in the bronchial tree, decreasing airway resistance, facilitating mucous drainage and increasing vital capacity; shifts potassium intracellular; has mild beta-1 activity that may increase heart rate.
- Levalbuterol: Relaxes bronchial smooth muscle by action on beta-2 receptors; less likely to cause tachycardia than albuterol.

Indications	Contraindications
• Management of respiratory distress (non-cardiac, anaphylaxis, and burns), suspected hyperkalemia, and specific crush injuries • Protocols: S-122, S-124, S-127, S-131, S-136, S-139, S-162, S-163, S-167, S-169, S-170	• <6 years of age (levalbuterol only)

Adult Dose	Pediatric Dose
• For respiratory distress (non-cardiac, anaphylaxis, and burns), albuterol/levalbuterol 6 mL via nebulizer, MR • For suspected hyperkalemia and specific crush injuries, continuous albuterol/levalbuterol 6 mL via nebulizer	• For respiratory distress (non-cardiac, anaphylaxis, and burns), albuterol/levalbuterol per drug chart via nebulizer, MR • For suspected hyperkalemia and specific crush injuries, continuous albuterol/levalbuterol per drug chart via nebulizer

Adverse Effects
- Tremors
- Headache
- Nervousness
- Dizziness
- Dry mouth
- Dysrhythmias
- Chest discomfort
- Palpitations
- Nausea/vomiting

Notes
- Ineffective in croup and should be avoided.
- Pediatric patients between 2-6 years of age may be more prone to adverse effects.
- Do not assume patients have administered their own drug properly. Do not include home doses of albuterol/levalbuterol in your total drug administration consideration.
- If concerned about aerosolized infectious exposure, substitute with MDI, if available.
- Patients may need to be instructed on proper use of the MDI.
- Levalbuterol may be substituted for albuterol and can be combined with ipratropium bromide. This substitution option applies to patients ≥6 years of age.

AMIODARONE

EMT	AEMT	PARAMEDIC

Classification
- Antidysrhythmic

Mechanism of Action
- Class III antidysrhythmic agent that inhibits adrenergic stimulation; affects sodium, potassium, and calcium channels; markedly prolongs action potential and repolarization; decreases AV conduction and sinus node function.

Indications	Contraindications
• Management of ventricular tachycardia and ventricular fibrillation • Protocols: S-127, S-163	

Adult Dose	Pediatric Dose
• For stable VT, amiodarone 150 mg in 100 mL of NS over 10 min IV/IO, MR x1 in 10 min • For persistent VF/pulseless VT after 3 defibrillation attempts, amiodarone 300 mg IV/IO, MR 150 mg q3-5 min (max 450 mg) • For reported/witnessed AICD firing ≥2, amiodarone 150 mg in 100 mL of NS over 10 min IV/IO, MR x1 in 10 min	• For stable VT, amiodarone per drug chart BHPO • For persistent VF/pulseless VT after 3 defibrillation attempts, amiodarone per drug chart IV/IO, MR per drug chart x2 • For reported/witnessed AICD firing ≥2, amiodarone per drug chart, MR BHPO

Adverse Effects
- Hypotension
- Worsening of dysrhythmias
- Prolonged QT interval
- Bradycardia
- AV block
- Dizziness
- Nausea/vomiting
- Burning at the IV site

Notes
- If patient is in unstable ventricular tachycardia, synchronized cardioversion should be performed first.
- Monitor the patient for hypotension and increasing PR and QT intervals.
- Risk factors for acute hypotension are patients >65 years of age with a history of myocardial infarction.
- Closely monitor heart rate, blood pressure, and cardiac rhythm during and after administration.
- Do not infuse with Ringer's lactate solution.

ASPIRIN

EMT [L]	AEMT	PARAMEDIC

Classification
- Antiplatelet agent, non-steroidal anti-inflammatory drug (NSAID)

Mechanism of Action
- Inhibits platelet aggregation and inhibits synthesis of prostaglandin by cyclooxygenase; has antipyretic and analgesic activity.

Indications	Contraindications
• Antiplatelet agent for the care of patients suspected of suffering from an acute coronary syndrome • Protocols: S-126	

Adult Dose	Pediatric Dose
• Aspirin 324 mg chewable PO	• Not indicated for use in pediatrics

Adverse Effects
- GI bleeding
- Epigastric pain
- Nausea/vomiting

Notes
- EMT: Authorized to assist patient to self-medicate own prescribed aspirin up to a maximum dose of 325 mg.
- Administer aspirin even if discomfort/pain has resolved. If aspirin is not given, document the reason.
- Aspirin may be withheld if an equivalent dose has been administered by a healthcare professional.

ATROPINE

EMT	AEMT	PARAMEDIC

Classification
- Anticholinergic, toxicity antidote

Mechanism of Action
- Blocks the action of acetylcholine at parasympathetic sites in smooth muscle, secretory glands, and the CNS; increases cardiac output, dries secretions; reverses the muscarinic effects of cholinergic poisoning.

Indications	Contraindications
• Management of unstable bradycardia and symptomatic organophosphate poisoning • Protocols: S-127, S-134, S-163, S-165	

Adult Dose	Pediatric Dose
• For unstable bradycardia, atropine 1 mg IV/IO, MR q3-5 min to max 3 mg • For symptomatic organophosphate poisoning, atropine 2 mg IV/IO. For continued signs/symptoms of SLUDGE/BBB, double prior atropine dose IV/IO q3-5 min	• For unstable bradycardia after 3 doses of epinephrine, atropine per drug chart IV/IO, MR x1 in 5 min • For symptomatic organophosphate poisoning, atropine per drug chart IV/IO. For continued signs/symptoms of SLUDGE/BBB, double prior atropine dose IV/IO q3-5 min

Adverse Effects
- Drowsiness
- Confusion
- Headache
- Palpitations
- Dysrhythmias
- Nausea/vomiting
- Pupil dilation
- Dry mouth/nose/skin
- Blurred vision
- Urinary retention
- Flushed, hot, dry skin

Notes
- May omit atropine in bradycardic patients unlikely to have clinical benefit (e.g., heart transplant patients, second-degree type II, or third-degree heart block).
- Use cautiously if myocardial infarction or ischemia is suspected, as atropine will increase myocardial oxygen demand, which may worsen the infarct.
- In organophosphate poisoning, titrate atropine to SLUDGE/BBB signs/symptoms, not to tachycardia. Cardiac monitoring should be considered in all cases of severe organophosphate poisoning.

BUPRENORPHINE-NALOXONE

EMT	AEMT	PARAMEDIC [S]

Classification
- Buprenorphine: analgesic, opioid antagonist, opioid partial agonist
- Naloxone: opioid reversal agent

Mechanism of Action
- Exerts its analgesic effect via high affinity binding to mu-opioid receptors in the CNS; displays partial mu agonist and weak kappa antagonist activity. Naloxone is a competitive opioid antagonist.

Indications	Contraindications
• Management of opioid withdrawal and opioid use disorder • Protocols: S-145	• Any methadone use within the last 10 days • Lack of opioid withdrawal signs or symptoms • Severe medical illness (e.g., sepsis, respiratory distress) • Altered mental status • <16 years of age

Adult Dose	Pediatric Dose
• Buprenorphine-naloxone (Suboxone®) 16 mg/4 mg SL BHO (opioid withdrawal base) • For continued symptoms, repeat with buprenorphine-naloxone (Suboxone®) 8 mg/2 mg SL to a max of 24 mg/6 mg	• Not indicated for use in pediatrics

Adverse Effects
- Diaphoresis
- Abdominal pain
- Nausea
- Headache
- Withdrawal syndrome
- Palpitations

Notes
- Use of buprenorphine-naloxone is only authorized for agencies participating in the Buprenorphine Pilot Program.
- Sharp Grossmont Hospital and Palomar Medical Center – Escondido are approved opioid withdrawal bases.
- For patients with overdoses reversed by naloxone, calculate a COWS score and consider administration.
- Calculate a COWS score before and after administration.

CALCIUM CHLORIDE

EMT	AEMT	PARAMEDIC

Classification
- Electrolyte, antidote

Mechanism of Action
- Essential regulator for the excitation threshold of nerves and muscles; causes significant increase in myocardial contractility and ventricular automaticity. Antidote for some electrolyte imbalances and calcium channel and/or beta blocker toxicity.

Indications	Contraindications
• Management of suspected hyperkalemia, calcium channel blocker overdose, and specific crush injuries • Protocols: S-127, S-131, S-134, S-139, S-163, S-169	

Adult Dose	Pediatric Dose
• For PEA with suspected hyperkalemia, $CaCl_2$ 1 gm IV/IO • For suspected hyperkalemia, if widened QRS complex, immediately administer $CaCl_2$ 1 gm IV/IO • For suspected calcium channel blocker OD, $CaCl_2$ 1 gm IV/IO • For specific crush injuries, $CaCl_2$ 1 gm IV/IO over 30 sec	• For PEA with suspected hyperkalemia, $CaCl_2$ per drug chart IV/IO, MR x1 in 5 min for continued ECG findings consistent with hyperkalemia • For specific crush injuries, $CaCl_2$ IV/IO over 30 sec per drug chart, MR x1 in 5 min for continued ECG findings consistent with hyperkalemia

Adverse Effects
- Syncope
- Bradycardia
- Asystole
- Hypotension
- Nausea/vomiting
- Metallic taste with rapid injection
- Tissue necrosis at injection site

Notes
- Confirm IV is patent prior to administration, as extravasation causes severe tissue necrosis. Avoid use in small veins (feet/hands) for this reason.
- Precipitates to form calcium carbonate (chalk) when used with sodium bicarbonate. Administer calcium chloride and sodium bicarbonate in separate IV/IO or thoroughly flush in between administrations using at least 10 mL of normal saline.
- Calcium chloride contains three times more elemental calcium than calcium gluconate does. Constant ECG and vital sign monitoring are essential.
- Contact base hospital if dose exceeds par level.

DEXTROSE

EMT	AEMT	PARAMEDIC

Classification
- Glucose-elevating agent

Mechanism of Action
- Main form of glucose used by the body to create energy; elevates serum blood glucose levels.

Indications	Contraindications
• Management of hypoglycemia • Protocols: S-123, S-161	

Adult Dose	Pediatric Dose
• D_{10} 25 gm IV if BS <60 mg/dL • If patient remains symptomatic and BS remains <60 mg/dL, MR	• D_{10} per drug chart IV if BS <60 mg/dL (<45 mg/dL for neonate) • If patient remains symptomatic and BS remains <60 mg/dL (<45 mg/dL for neonate), MR

Adverse Effects
- Warmth, pain, burning, or phlebitis from IV infusion

Notes
- Confirm IV is patent prior to administration, as extravasation causes severe tissue necrosis. Use a large vein for administration and monitor the site closely.
- Immediately stop administration if extravasation occurs; document it and notify the receiving facility staff.
- Do not administer to patients with stroke unless hypoglycemia is documented.
- Repeat blood glucose level is required if patient remains on scene (AMA or release) and initial blood glucose level was abnormal.
- Repeat blood glucose is not indicated enroute if patient status is improving.
- If D_{10} not available, can dilute D_{50} to make D_{10}.

D_{50} to D_{10} mixing instructions
1. Remove 50 mL normal saline (NS) from the 250 mL NS bag
2. Add 50 mL of D_{50} (25 gm/50 mL) to 200 mL NS bag

The mixture now has 25 gm/250 mL of dextrose at 10% concentration.

DIPHENHYDRAMINE

EMT	AEMT	PARAMEDIC

Classification
- Antihistamine

Mechanism of Action
- H_1 (histamine) receptor antagonist; works on effector cells in respiratory tract, blood vessels, and GI smooth muscle; also has anticholinergic properties.

Indications	Contraindications
• Management of allergic reactions and extrapyramidal reactions • Protocols: S-122, S-134, S-162, S-165	

Adult Dose	Pediatric Dose
• Diphenhydramine 50 mg IV/IM	• Diphenhydramine per drug chart IV/IM

Adverse Effects
- Drowsiness
- Sedation
- Seizures
- Dizziness
- Headache
- Blurred vision
- Wheezing
- Thickening of bronchial secretions
- Palpitations
- Hypotension
- Dysrhythmias
- Dry mouth
- Nausea/vomiting
- Hallucinations, confusion, and paradoxical CNS excitation can occur in children

Notes
- Administer slow IV.
- Epinephrine is the most important immediate treatment for anaphylaxis and should be administered as soon as anaphylaxis is recognized. The pharmacologic actions address the pathophysiological changes that occur in anaphylaxis better than any other medication. **Delayed epinephrine injection is associated with fatalities.**
- May be administered between epinephrine doses in anaphylaxis.

EPINEPHRINE (1:1,000)

EMT [L]	AEMT	PARAMEDIC

Classification
- Alpha/beta adrenergic agonist

Mechanism of Action
- A naturally occurring catecholamine that acts directly on alpha- and beta-adrenergic receptors. It is the most potent activator of alpha receptors, vasoconstricting the aorta and peripheral vasculature. Beta-1 stimulation increases inotropy, chronotropy, and AV conduction. Beta-2 stimulation causes bronchial smooth muscle relaxation and vasodilation to internal organs and skeletal muscles.

Indications	Contraindications
• Management of anaphylaxis, severe respiratory distress/failure, and stridor in pediatrics • Protocols: S-122, S-136, S-162, S-167, S-170	

Adult Dose	Pediatric Dose
• Epinephrine 1:1,000 (1 mg/mL) 0.5 mg IM, MR x2 q5 min	• IM: 1:1,000 per drug chart IM, MR x2 q5 min • Nebulized: 1:1,000 per drug chart (combined with 3 mL normal saline) via nebulizer, MR x1

Adverse Effects
- Nervousness/restlessness
- Headache
- Chest pain
- Tremors
- Dysrhythmias
- Nausea/vomiting
- Hypertension
- Palpitations

Notes
- EMT: Authorized to administer via auto-injector only.
- Epinephrine is the most important immediate treatment for anaphylaxis and should be administered as soon as anaphylaxis is recognized. The pharmacologic actions address the pathophysiologic changes that occur in anaphylaxis better than any other medication. **Delayed epinephrine injection is associated with fatalities.**
- Inadvertent IV injection of usual IM formulation and dose constitutes a 10-fold overdose that can result in sudden and severe hypertension and cerebral hemorrhage.
- In patients who remain hypotensive after initial IM epinephrine, administer IV fluids. Have push-dose epinephrine ready for patients unresponsive to repeated IM epinephrine and IV fluids.

EPINEPHRINE (1:10,000)

EMT	AEMT	PARAMEDIC

Classification
- Alpha/beta adrenergic agonist

Mechanism of Action
- A naturally occurring catecholamine that acts directly on alpha- and beta-adrenergic receptors. It is the most potent activator of alpha receptors, vasoconstricting the aorta and peripheral vasculature. Beta-1 stimulation increases inotropy, chronotropy, and AV conduction. Beta-2 stimulation causes bronchial smooth muscle relaxation and vasodilation to internal organs and skeletal muscles.

Indications	Contraindications
• Management of cardiac arrest and bradycardia in pediatric patients • Protocols: S-127, S-130, S-133, S-163, S-166, S-176	

Adult Dose	Pediatric Dose
• For cardiac arrest, epinephrine 1:10,000 1 mg IV/IO q3-5 min • For VF and pulseless VT, epinephrine 1:10,000 1 mg IV/IO q3-5 min, begin after second defibrillation • For cardiac arrest with hypothermia, epinephrine 1:10,000 1 mg IV/IO x1	• For cardiac arrest or newborn with HR <60, epinephrine 1:10,000 per drug chart IV/IO q3-5 min • For VF and pulseless VT, epinephrine 1:10,000 per drug chart IV/IO q3-5 min, begin after second defibrillation • For cardiac arrest with hypothermia, epinephrine 1:10,000 per drug chart IV/IO x1 • For unstable bradycardia, epinephrine 1:10,000 per drug chart IV/IO, MR x2 q3-5 minutes. MR q3-5 minutes BHO

Adverse Effects
- Nervousness/restlessness
- Headache
- Chest pain
- Tremors
- Dysrhythmias
- Nausea/vomiting
- Hypertension
- Palpitations

Notes
- During CPR, epinephrine is administered to increase systemic vasomotor tone, thereby increasing diastolic blood pressure and coronary perfusion pressure.

EPINEPHRINE (1:100,000)

EMT	AEMT	PARAMEDIC

Classification
- Alpha/beta adrenergic agonist

Mechanism of Action
- A naturally occurring catecholamine that acts directly on alpha- and beta-adrenergic receptors. It is the most potent activator of alpha receptors, vasoconstricting the aorta and peripheral vasculature. Beta-1 stimulation increases inotropy, chronotropy, and AV conduction. Beta-2 stimulation causes bronchial smooth muscle relaxation and vasodilation to internal organs and skeletal muscles.

Indications	Contraindications
• Management of severe anaphylaxis and shock • Protocols: S-122, S-126, S-127, S-138, S-143, S-162, S-163, S-168, S-177	

Adult Dose	Pediatric Dose
• Push-dose epinephrine 1:100,000 (0.01 mg/mL) 1 mL IV/IO, MR q3 min, titrate to SBP ≥90 mmHg	• Push-dose epinephrine 1:100,000 (0.01 mg/mL) per drug chart IV/IO, MR q3 min, titrate to adequate perfusion

Adverse Effects
- Nervousness/restlessness
- Headache
- Chest pain
- Tremors
- Dysrhythmias
- Nausea/vomiting
- Hypertension
- Palpitations

Notes
- Administer slowly via IV and titrate to adequate perfusion.
- Patients with anaphylaxis unresponsive to IM epinephrine and aggressive fluid resuscitation may benefit from push-dose epinephrine.

Mixing Instructions
- Remove 1 mL normal saline (NS) from the 10 mL NS syringe
- Add 1 mL of epinephrine 1:10,000 (0.1 mg/mL) to 9 mL NS syringe
- The mixture now has 10 mL of epinephrine at 0.01 mg/mL (10 mcg/mL) concentration

FENTANYL

EMT	AEMT	PARAMEDIC

Classification
- Synthetic opioid, opioid analgesic

Mechanism of Action
- Opioid agonist-analgesic; inhibits ascending pain pathways, thus altering pain perception; increases pain threshold; produces analgesia, respiratory depression, and sedation.

Indications
- Management of acute pain
- Protocols: S-141, S-173

Contraindications
- Pregnancy with pain from active labor

Adult Dose
- IV:
  - Up to 100 mcg IV
  - MR up to 50 mcg IV q5 min x2
  - Maximum total dose 200 mcg IV
- IN:
  - Up to 50 mcg IN
  - MR up to 50 mcg IN q15 min x2
  - Maximum total dose 150 mcg IN

Pediatric Dose
- IV:
  - <10 kg: Fentanyl IV per drug chart. MR at half initial IV dose BHO
  - ≥10 kg: Fentanyl IV per drug chart. MR at half initial IV dose
- IN:
  - <10 kg: Fentanyl IN per drug chart. MR at initial IN dose BHO
  - ≥10 kg: Fentanyl IN per drug chart. MR at initial IN dose

Adverse Effects
- Confusion
- Paradoxical excitation
- Delirium
- Sedation/drowsiness
- CNS depression
- Respiratory depression
- Apnea
- Dyspnea
- Dysrhythmias
- Hypotension
- Syncope
- Nausea/vomiting
- Abdominal pain

Notes
- Remember to consider non-pharmacologic pain treatments, e.g., place in position of comfort, apply ice packs/splints PRN, and verbal reassurance.
- Closely monitor respiratory status (including capnography) after administration.
- An initial dose of 100 mcg IV or 50 mcg IN is well tolerated in most adults.
- In opioid-naive or elderly patients, start with a lower dose. For elderly patients not taking opioids, 25 mcg is frequently sufficient for pain relief. Consider beginning with 25 mcg and titrating up in increments of 25 mcg to achieve pain relief without respiratory depression.
- For pediatric patients >36 kg or longer than the LBRT, rather than administering the maximum dose, use weight-based dosing for both initial and repeat doses. It is acceptable to round doses (up or down) to the nearest 5 mcg.

GLUCAGON

EMT	AEMT	PARAMEDIC

Classification
- Glucose-elevating agent, antidote

Mechanism of Action
- A hormone naturally produced by pancreatic alpha cells of the islets of Langerhans. Causes breakdown of glycogen (stored in the liver) to glucose and inhibits the synthesis of glycogen from glucose. These combined actions increase blood glucose levels.

Indications	Contraindications
• Management of hypoglycemia and beta blocker overdose with cardiac effects • Protocols: S-123, S-134, S-161	

Adult Dose	Pediatric Dose
• For hypoglycemia, glucagon 1 mL IM • For beta blocker overdose, glucagon 1-5 mg IV, MR 5-10 min, for a total of 10 mg	• Glucagon per drug chart IM

Adverse Effects
- Dizziness
- Headache
- Hypotension
- Tachycardia
- Nausea/vomiting
- Rebound hypoglycemia

Notes
- AEMT: Authorized to administer via IM only.
- Use mixture immediately after reconstitution of dry powder.
- Patient usually awakens from hypoglycemic coma in 5-20 minutes after glucagon injection. PO carbohydrates should be given as soon as possible after patient regains consciousness and is able to maintain airway.
- Anticipate nausea/vomiting following administration of glucagon.

IPRATROPIUM BROMIDE

EMT	AEMT	PARAMEDIC

Classification
- Anticholinergic

Mechanism of Action
- Anticholinergic (parasympatholytic) agent; inhibits vagally mediated reflexes by antagonizing acetylcholine action; prevents increase in intracellular calcium concentration that is caused by interaction of acetylcholine with muscarinic receptors on bronchial smooth muscle.

Indications	Contraindications
• Management of respiratory distress (non-cardiac) • Protocols: S-122, S-136, S-162, S-167	

Adult Dose	Pediatric Dose
• Ipratropium bromide 2.5 mL 0.02% via nebulizer added to first dose of albuterol/levalbuterol	• Ipratropium bromide per drug chart via nebulizer added to first dose of albuterol/levalbuterol

Adverse Effects
- Headache
- Dizziness
- Nervousness
- Tremors
- Dyspnea
- Worsening COPD symptoms
- Hypertension
- Tachycardia
- Palpitations
- Flushing
- Dry mouth
- Nausea/vomiting
- GI discomfort

Notes
- If concerned about aerosolized infectious exposure, substitute with MDI, if available.
- Patients may need to be instructed on proper use of the MDI.

KETAMINE

EMT	AEMT	PARAMEDIC

Classification
- Analgesic (in sub-dissociative doses)

Mechanism of Action
- Dissociative anesthetic; produces a cataleptic-like state in which the patient is dissociated from the surrounding environment by direct action on the cortex and limbic system; noncompetitive NMDA receptor antagonist that blocks glutamate; low (sub-dissociative) doses produce analgesia.

Indications
- Management of acute pain
- Protocols: S-141

Contraindications
- Sedation
- Use of dissociative dose ranges
- <15 years of age
- GCS <15
- Pregnant patient
- Known or suspected alcohol or drug intoxication

Adult Dose
- IV: 0.3 mg/kg in 100 mL of NS over 10 min IV. Maximum for any IV dose is 30 mg. MR x1 in 15 min if pain remains moderate or severe. Maximum total dose 60 mg IV.
- IN: 0.5 mg/kg IN (50 mg/mL concentration). Maximum for any IN dose is 50 mg. MR x1 in 15 min if pain remains moderate or severe. Maximum total dose 100 mg IN.

Pediatric Dose
- Not indicated for use in pediatrics

Adverse Effects
- Hypertension
- Hallucinations
- Nausea/vomiting
- Nystagmus
- Bronchodilation
- Tachycardia
- Increased secretions
- Hypersalivation
- Laryngospasm

Notes
- Not authorized for sedation.
- Not authorized for use in dissociative dose ranges. To reduce the risk for dissociative states, maximum total dose administered is not to exceed 60 mg IV or 100 mg IN.
- Administration results in elevated heart rate and blood pressure. Do not administer to patients who cannot tolerate these changes in vital signs.
- Rapid administration can result in respiratory and potentially cardiac arrest. Administer slowly.
- Do not infuse with Ringer's lactate solution.

LIDOCAINE

EMT	AEMT	PARAMEDIC

Classification
- Antidysrhythmic, anesthetic

Mechanism of Action
- Class 1b antidysrhythmic; combines with fast sodium channels and thereby inhibits recovery after repolarization, resulting in decreasing myocardial excitability and conduction velocity.

Indications	Contraindications
• Management of ventricular tachycardia and ventricular fibrillation, and as a local anesthetic for the IO procedure in conscious adults • Protocols: S-104, S-127, S-163	• Cardiac pre-excitation syndromes, e.g., Wolff-Parkinson-White (WPW) syndrome, Lown-Ganong-Levine (LGL) syndrome

Adult Dose	Pediatric Dose
• For stable VT, persistent VF/pulseless VT after 3 defibrillation attempts, and reported/witnessed AICD firing ≥2, lidocaine 1.5 mg/kg IV/IO, MR at 0.5 mg/kg IV/IO q5 min to max 3 mg/kg • For IO procedure in conscious adult patients, slowly infuse lidocaine 40 mg IO prior to fluid/medication administration	• For stable VT, lidocaine per drug chart BHPO • For persistent VF/pulseless VT after 3 defibrillation attempts, lidocaine per drug chart IV/IO, MR per drug chart x1 q5 min • For reported/witnessed AICD firing ≥2, lidocaine per drug chart, MR BHPO

Adverse Effects
- Drowsiness
- Confusion
- Seizures
- Slurred speech
- Hypotension
- Dysrhythmias
- Cardiac arrest
- Nausea/vomiting

Notes
- If patient is in unstable ventricular tachycardia, synchronized cardioversion should be performed first.
- Adult doses should be given in increments rounded (up or down) to the nearest 20 mg amount.
- Lidocaine jelly may be applied to an ET tube for intubation or on a nasopharyngeal airway.

MAGNESIUM SULFATE

EMT	AEMT	PARAMEDIC

Classification
- Antidysrhythmic, electrolyte

Mechanism of Action
- Depresses CNS, blocks peripheral neuromuscular transmission, produces anticonvulsant effects; decreases amount of acetylcholine released at end-plate by motor nerve impulse. Slows rate of sinoatrial (SA) node impulse formation in myocardium and prolongs conduction time.

Indications	Contraindications
• Management of preeclampsia and eclampsia • Protocols: S-133, S-166	• Myasthenia gravis • Hypermagnesemia • Renal failure

Adult Dose	Pediatric Dose
• Magnesium sulfate 4 gm in 100 mL of NS over 20 min IV/IO	• Not indicated for use in pediatrics

Adverse Effects
- Respiratory depression or apnea
- Bradycardia
- Hypotension
- CNS depression
- Flushing and sweating

Notes
- Magnesium sulfate is the antiseizure medication of choice in the setting of preeclampsia/eclampsia. The primary reason for administering magnesium sulfate is to prevent recurrent seizures (i.e., prophylaxis) rather than for control of the initial seizure, which is usually short in duration.
- Preeclampsia is rare before 20 weeks gestation or after 48 hours post-delivery; however, may occur up to 6 weeks postpartum.
- Headache or shortness of breath is frequently the presenting symptom of postpartum preeclampsia. Elevated blood pressure is an inconsistent finding.
- Rarely, eclamptic seizures can present as focal or multifocal seizures.
- Seizing patients at ≥20 weeks gestation or up to 6 weeks postpartum should be assumed to have eclampsia and treated accordingly.
- Seizures consistent with other etiologies (e.g., hypoglycemia, alcohol withdrawal, known seizure history) should be treated in addition to eclampsia.
- If the patient receives too much magnesium, this may result in magnesium toxicity. Symptoms of magnesium toxicity typically appear in this order: loss of deep tendon reflexes, respiratory paralysis, cardiac conduction changes (prolongation of PR, QRS, and QT intervals), then cardiac arrest. Calcium is the antidote and reverses magnesium toxicity.
- Apply pacing pads to patients with second- or third-degree heart block requiring magnesium.

MIDAZOLAM

EMT	AEMT	PARAMEDIC

Classification
- Anticonvulsant, antianxiety agent, anxiolytics, benzodiazepines

Mechanism of Action
- Binds to receptors at multiple sites within the CNS; potentiates GABA receptor system which produces anxiolytic, anticonvulsant, muscle relaxant, and amnesic effects.

Indications
- Management of seizures, sedation pre-cardioversion/pre-pacing, unable to tolerate CPAP, intubated patients with agitation, and agitated/combative patients
- Protocols: S-123, S-127, S-135, S-136, S-142, S-161, S-163, S-175, S-178

Contraindications

Adult Dose
- Status epilepticus
  - IM midazolam is the first line route of administration if an IV not already established
  - Midazolam 10 mg IM/IN, MR x1 in 5 min
  - If vascular access present, midazolam 5 mg slow IV/IO, MR x1 in 5 min
- Sedation pre-cardioversion/pre-pacing
  - Midazolam 1-5 mg IV/IO
- Unable to tolerate CPAP
  - Midazolam 0.5-1 mg IM/IN/IV
- Intubated with agitation
  - Midazolam 2-5 mg IM/IN/IV/IO, MR x1 in 5-10 min
- Psychiatric/behavioral emergencies
  - Midazolam 5 mg IM/IN/IV, MR x1 in 5-10 min

Pediatric Dose
- Status epilepticus
  - IM midazolam is the first line route of administration if an IV not already established
  - Midazolam IM/IN per drug chart, MR x1 in 5 min
  - If vascular access present, midazolam slow IV/IO per drug chart, MR x1 in 5 min
- Sedation pre-cardioversion/pre-pacing
  - Midazolam per drug chart IV/IO
- Intubated with agitation
  - Midazolam per drug chart IM/IN/IV/IO, MR x1 in 5-10 min
- Psychiatric/behavioral emergencies
  - Midazolam per drug chart IM/IN/IV, MR x1 in 10 min

Adverse Effects
- Respiratory depression or apnea
- Nausea/vomiting
- Hypotension
- Headache

Notes
- Closely monitor respiratory status (including capnography) and cardiac function after administration.
- Sedation prior to cardioversion is recommended. Consider a lower dose with attention to age and hydration status.
- For severely agitated or combative patients, IN or IM administration is the preferred route to decrease risk of injury to the patient and personnel.
- Administration in patients with alcohol intoxication can cause respiratory depression. Consider a lower dose or avoiding use.

MORPHINE

EMT	AEMT	PARAMEDIC

Classification
- Opioid analgesic

Mechanism of Action
- Opioid agonist-analgesic; inhibits ascending pain pathways, thus altering pain perception; increases pain threshold; produces analgesia, respiratory depression, and sedation.

Indications	Contraindications
• Management of acute pain • Protocols: S-141, S-173	• Pregnancy with pain from active labor

Adult Dose	Pediatric Dose
• IV: Up to 0.1 mg/kg IV. MR in 5 min at half initial IV dose. MR in additional 5 min at half initial IV dose • IM: Up to 0.1 mg/kg IM. MR in 15 min at half initial IM dose. MR in additional 15 min at half initial IM dose	• Morphine IV/IM per drug chart

Adverse Effects
- Confusion
- Sedation
- Headache
- CNS depression
- Respiratory depression or apnea
- Bronchospasm
- Dyspnea
- Hypotension/orthostatic hypotension
- Syncope
- Bradycardia
- Tachycardia
- Nausea/vomiting

Notes
- Remember to consider non-pharmacologic pain treatments, e.g., place in position of comfort, apply ice packs/splints PRN, and verbal reassurance.
- Closely monitor respiratory status (including capnography) after administration.

NALOXONE

EMT [L]	AEMT	PARAMEDIC

Classification
- Opioid reversal agent

Mechanism of Action
- Competitive inhibitor of opioid receptors in the brain. Reverses the respiratory depression associated with opioid overdose.

Indications	Contraindications
• Reversal of acute opioid toxicity • Protocols: S-123, S-134, S-161, S-165	

Adult Dose	Pediatric Dose
• Naloxone 2 mg IN/IM/IV, MR **OR** naloxone 4 mg via nasal spray preloaded single-dose device • If patient refuses transport, give additional naloxone 2 mg IM **OR** naloxone 4 mg via nasal spray preloaded single-dose device. Administer full dose in one nostril, MR	• Naloxone per drug chart IN/IV/IM, MR • For opioid-dependent patients, dilute and titrate slowly per drug chart.

Adverse Effects
- Restlessness
- Seizures
- Dyspnea
- Pulmonary edema
- Hypotension with rapid administration
- Hypertension
- Dysrhythmias
- Diaphoresis
- Nausea/vomiting
- Withdrawal symptoms in opioid-dependent patients

Notes
- EMT: Authorized to administer via IN only.
- AEMT: Authorized to administer via IN/IM only.
- Not authorized in cardiac arrest.
- Titrate IV dose to maintain adequate respiratory drive; use only enough to reverse respiratory depression.
- Duration of opioid effects may exceed that of naloxone; closely monitor patient's respiratory status.
- Naloxone may precipitate acute withdrawal symptoms or acute pulmonary edema when given to patients with opioid use disorder.
- Administration can result in the sudden onset of opiate withdrawal (agitation, tachycardia, pulmonary edema, nausea, vomiting, and, in neonates, seizures).

NITROGLYCERIN

EMT	AEMT	PARAMEDIC

Classification
- Nitrate, anti-anginal

Mechanism of Action
- Nitrate enters vascular smooth muscle and is converted to nitric oxide leading to vasodilation. Relaxes smooth muscle via dose-dependent dilation of arterial and venous beds: reduces both preload, afterload, and myocardial oxygen demand. Also improves coronary collateral circulation. Lowers blood pressure, increases heart rate and occasionally causes paradoxical bradycardia.

Indications	Contraindications
• Management of discomfort/pain of cardiac origin and acute pulmonary edema • Protocols: S-126, S-136	• Use of erectile dysfunction or pulmonary hypertension medications within last 48 hours • Suspected intracranial bleed

Adult Dose	Pediatric Dose

• For discomfort/pain of cardiac origin if SBP ≥100 mmHg, NTG 0.4 mg SL, MR q3-5 min
• For CHF
  • If systolic BP ≥100 but <150: NTG 0.4 mg SL, MR q3-5 min
  • If systolic BP ≥150: NTG 0.8 mg SL, MR q3-5 min
	• Not indicated for use in pediatrics

Adverse Effects
- Headache
- Dizziness
- Weakness
- Reflex tachycardia
- Syncope
- Hypotension
- Nausea/vomiting

Notes
- EMT: Authorized to assist patient to self-medicate own prescribed NTG only.
- Examples of erectile dysfunction medications include sildenafil (Viagra), tadalafil (Cialis) and vardenafil (Levitra).
- Examples of pulmonary hypertension medications include sildenafil (Revatio) and epoprostenol sodium (Flolan, Veletri).
- Nitroglycerin is used primarily to provide pain relief from anginal chest discomfort.
- Assess the patient and document vital signs, including pain scale, before and after each administration.

ONDANSETRON

EMT	AEMT	PARAMEDIC

Classification
- Antiemetic, selective 5-HT3 antagonist

Mechanism of Action
- Mechanism of action unclear; believed to function via serotonin antagonism at central and/or peripheral receptors. Serotonin receptors of the 5-HT3 type are present both peripherally on vagal nerve terminals and centrally in the chemoreceptor trigger zone of the area of the medullary structure that controls vomiting. May cause prolongation of the QT interval.

Indications	Contraindications
• Management of nausea or vomiting • Protocols: S-120, S-139, S-169, S-174	• Known or suspected long QT syndrome • <6 months of age

Adult Dose	Pediatric Dose
• Ondansetron 4 mg IV/IM/ODT, MR x1 in 10 min	• Ondansetron IV/IM/ODT per drug chart

Adverse Effects
- Headache
- Syncope
- Wheezing
- Bronchospasm
- Dysrhythmias
- ECG changes
- Palpitations
- Hives
- Skin rash

Notes
- ECG changes include dose-dependent QT prolongation and ST-segment depression.
- May cause serotonin syndrome if co-administered with selective serotonin reuptake inhibitors (SSRIs), e.g., fluoxetine, sertraline, citalopram, escitalopram, paroxetine.

SODIUM BICARBONATE

EMT	AEMT	PARAMEDIC

Classification
- Alkalizing agent, antidote

Mechanism of Action
- Increases blood and urinary pH by neutralizing hydrogen ion concentration.

Indications	Contraindications
• Management of hyperkalemia, tricyclic antidepressant overdose, and specific crush injuries • Protocols: S-127, S-131, S-134, S-139, S-163, S-165, S-169	

Adult Dose	Pediatric Dose
• $NaHCO_3$ 1 mEq/kg IV/IO	• $NaHCO_3$ per drug chart IV/IO

Adverse Effects
- Electrolyte imbalance
- Pulmonary edema (secondary to sodium overload)
- Tremors
- Twitching
- Seizures (caused by alkalosis)

Notes
- Monitor the patient closely for signs and symptoms of fluid overload. Because the buffering action produces carbon dioxide, ensure the patient has adequate airway and ventilatory support.
- May precipitate or inactivate other medications; flush the IV line well before and after administering sodium bicarbonate. For example, precipitates to form calcium carbonate (chalk) when used with calcium chloride. Administer calcium chloride and sodium bicarbonate in separate IV/IO or thoroughly flush in between administrations using at least 10 mL of normal saline.

TRANEXAMIC ACID

EMT	AEMT	PARAMEDIC

Classification
- Hemostatic agent, antifibrinolytic agent, plasminogen inhibitor

Mechanism of Action
- Prevents clot breakdown by inhibiting the activation of plasminogen, which reduces the conversion of plasminogen to plasmin (enzyme that halts the clotting process). Increases fibrin formation, which impedes blood flow for the formation of a clot.

Indications	Contraindications
• Management of trauma-associated hemorrhage and postpartum hemorrhage • Protocols: S-133, S-139, S-166	• Isolated, severe head injury • Thromboembolic event within 24 hours (e.g., stroke, MI, DVT, PE) • Potential need for reimplantation • Mechanism of injury or delivery more than 3 hours prior to EMS care

Adult Dose	Pediatric Dose
• Tranexamic acid 1 gm/10 mL IV/IO, in 50-100 mL NS, over 10 min	• Not indicated for use in pediatrics

Adverse Effects
- Headache
- Dizziness

Notes
- Rapid infusion may cause hypotension; administer over 10 minutes.
- Slow infusion rate if nausea, vomiting, or near syncope occurs.
- May increase the risk of thromboembolic disorders.