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Classification
Antidysrhythmic

Prehospital Indications
Cardiac Dysrhythmia:
   - SVT - Narrow Complex: HR ≥ 150 for adults; ≥180 for a child; and ≥220 for infants
   - Perfusing unresponsive to Valsalva
   - Poorly perfusing (if alert)
   - Regular/Monomorphic Wide Complex Tachycardia with adequate perfusion

Other Common Indications
Used in hospital setting as part of drug combination for cardiac “stress testing” and diagnosis of pulmonary hypertension

Adult Dose
6 or 12mg rapid IVP (per protocol), within 1-3 seconds, followed by a rapid flush of 10mL of NS
If no conversion after 1-2 minutes, may repeat 12mg rapid IVP followed by rapid flush of 10mL of NS.

Pediatric Dose
0.1mg/kg (3mg/mL) rapid IVP, dose per MCG 1309, maximum 6mg, followed by a rapid flush of 10mL NS
If no conversion after 1-2 minutes, may repeat one time 0.2mg/kg (3mg/mL) followed by a rapid flush of 10mL NS, dose per MCG 1309, maximum 12mg

Mechanism of Action
Slows conduction through the AV node and interrupts AV reentry pathways as well as conduction through the sinoatrial (SA) nodes

Pharmacokinetics
Onset immediate, Duration < 10 secs

Contraindications
Should not be used for sinus tachycardia, despite rate >150
2nd and 3rd degree heart block without pacemaker
Sinus Node Disease (Sick Sinus Syndrome)
Wolff-Parkinson-White (WPW) Syndrome or ECG consistent with WPW
Atrial flutter or fibrillation
Heart transplant – Base contact required, as noted “super-sensitivity” of transplanted heart to adenosine

Interactions
Potentiated by blocker of nucleoside transport [e.g., carbamazepine (Tegretol)]
Antagonized by methylxanthines such as caffeine and theophylline

Adverse Effects
- Blurred vision
- Bradycardia / Asystole
- Chest pain / Chest pressure
- Dyspnea
- Head pressure
- Hypotension
- Lightheadedness / Dizziness
- Metallic taste / Throat tightness
- Numbness / Tingling
- Palpitations
Prehospital Considerations

- Cannulate a large proximal vein with an 18-20g catheter. Use IV port closest to patient and immediately flush with 10mL Normal Saline to ensure rapid administration of drug.
- Run a 6 second ECG strip before, during and after drug administration.
- Patients usually have a 10 second period of escape beats or asystole before the sinus node starts up again. This is 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 cause successful cardioversion.
Classification
Sympathomimetic, B₂ Receptor Agonist, Bronchodilator

Prehospital Indications
Cardiac Dysrhythmia: suspected hyperkalemia causing bradycardia
Respiratory Distress: bronchospasm caused by acute asthma, bronchitis, bronchiolitis, COPD, drug overdose, near drowning, pulmonary edema, and/or toxic gas inhalation
Pulmonary Edema/CHF: persistent wheezing despite CPAP
Traumatic Injury: suspected hyperkalemia in the setting of crush injury or potential for development of crush syndrome (administer prior to release of crushed tissue)

Other Common Indications
None

Adult Dose
Cardiac Dysrhythmia/Crush – Evidence of or suspected hyperkalemia
5mg (6mL) via neb, repeat continuously until hospital arrival
Crush – at risk for Crush Syndrome
5 minutes prior to extrication: 5mg (6mL) via mask nebulization x2 for a total dose of 10mg
Respiratory Distress, Pulmonary Edema/CHF with wheezing, Allergic Reaction with wheezing, Inhalation Injury with wheezing
5mg (6mL) via neb
May repeat x2 prn for wheezing

Pediatric Dose
Crush – Evidence of or suspected hyperkalemia
5mg (6mL) via neb, repeat continuously until hospital arrival
Crush – at risk for Crush Syndrome
5 minutes prior to extrication: 5mg (6mL) via neb, repeat immediately x1
Respiratory Distress, Allergic Reaction with wheezing, Inhalation Injury with wheezing
< 1 year of age 2.5mg (3mL) via neb
≥ 1 year of age 5mg (6mL) via neb
Repeat x2 prn, maximum 3 total doses prior to Base contact

Mechanism of Action
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 with mild effect on heart rate.

Pharmacokinetics
Onset 5-15 min inhaled, Duration 3-6 hours for bronchial smooth muscle relaxation, Duration 3-4 hours for hyperkalemia shifting potassium intracellular

Contraindications
Do not use for patients with a known hypersensitivity/allergy to the drug

Interactions
Administer with extreme caution to patients being treated with MAO inhibitors or tricyclic antidepressants
Beta blocking agents and Albuterol may each inhibit the effects of the other, monitor closely

Adverse Effects
Anxiety/Tremors
Hypertension
Hypokalemia

May be utilized upon completion of EMS Update 2018 training
Palpitations/Tachycardia

Prehospital Considerations
- Young children 2-6 years old may be more prone to adverse effects
- Don’t assume patients have administered their own drug properly. Do not include home doses of albuterol in your total drug administration consideration.
Classification
Antidysrhythmic

Prehospital Indications
Cardiac Arrest – Non-Traumatic (adult and pediatric): pulseless ventricular tachycardia or ventricular fibrillation persistent/recurrent after defibrillation x2

Other Common Indications
Ventricular tachycardia with pulses and adequate perfusion,
Atrial fibrillation or atrial flutter with rapid ventricular rate unresponsive to other treatments

Adult Dose
300mg (6mL) IV/IO
May repeat 150mg (3mL) IV/IO x1 prn after 2-cycles of CPR, max total dose 450mg

Pediatric Dose
5mg/kg (50mg/mL) IV/IO dose per MCG 1309, max total dose 300mg

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

Pharmacokinetics
Onset minutes after IV bolus administration

Contraindications
None in cardiac arrest

Interactions
None in cardiac arrest

Adverse Effects
Bradyarrhythmias
Congestive heart failure
Hypotension

Prehospital Considerations
- Monitor heart rate, blood pressure, and cardiac rhythm closely post resuscitation
- Should not be used routinely in cardiac arrest. For use only in ventricular fibrillation or ventricular tachycardia without pulses unresponsive to attempted defibrillation x2
Classification
    Non-steroidal anti-inflammatory drug (NSAID)
    Platelet Inhibitor

Prehospital Indications
    Chest Pain – Suspected Cardiac
    Chest Pain – STEMI

Other Common Indications
    Mild to moderate pain
    Prophylactic use in the primary prevention of cardiovascular disease

Adult Dose
    325mg nonenteric/chewable tablets PO

Pediatric Dose
    Not recommended for pediatric administration in the out-of-hospital setting

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

Pharmacokinetics
    Onset is 5-30 min,

Contraindications
    Known aspirin allergy, bleeding GI ulcers
    Should not be administered to pediatric patients

Interactions
    Anticoagulants and alcohol abuse potentiates risk of bleeding

Adverse Effects
    GI bleeding
    Prolonged bleeding time

Prehospital Considerations
    • Chewing allows for rapid absorption. Chewable preparations are preferred, because it is less likely to provoke nausea but the pill can also be swallowed if chewable not available.
    • A significant portion (7%) of patients with asthma may have aspirin sensitivity. Careful respiratory monitoring should be performed on all patients with history of asthma who receive aspirin in the prehospital setting.
    • Tinnitus can be a clinical symptom of aspirin overdose
Medical Control Guideline: DRUG REFERENCE - ATROPINE

Classification
Anticholinergic

Prehospital Indications
Cardiac Dysrhythmia: symptomatic bradycardia in adults; suspected AV Block or increased vagal tone in pediatrics
Hazmat exposure: organophosphate/pesticide/nerve agent poisoning with heart rate < 60 bpm, respiratory depression and/or extreme salivation

Other Common Indications
End-of-life care, to dry secretions for patient comfort
Eye disorders requiring mydriasis (pupillary dilation) for treatment/testing, administered as eye drop
GI disorders caused by hypermobility (chronic diarrhea, irritable bowel syndrome)

Adult Dose
Cardiac Dysrhythmia
0.5mg (5mL) IV/IO push repeat every 3-5 min prn, maximum total dose 3mg
Organophosphate poisoning
2mg (20mL) IV/IM/IO, may repeat every 5 min until patient is asymptomatic

Pediatric Dose
Cardiac Dysrhythmia
0.02mg/kg (0.1mg/mL) IV/IO, dose per MCG 1309, may repeat x1 in 5 min
Organophosphate poisoning
0.05mg/kg (0.1mg/mL) IV/IM, may be repeated every 5 min, maximum total dose 5mg

Mechanism of Action
Competitively inhibits action of acetylcholinesterase on autonomic effectors innervated by postganglionic nerves

Pharmacokinetics
Peak effect in 20-30 min IM, 2-4 min IV/IO, duration 4 hr,

Contraindications
Glaucoma
Tachycardia
Thyrotoxicosis

Interactions
None for IV/IM/IO administration

Adverse Effects
Dry mouth / Thirst
Dysrhythmias
Flushed dry skin
Hypertension / Hypotension
Hyperthermia
Increased intraocular pressure
Mydriasis (pupil dilation)

Prehospital Considerations
- Use cautiously if myocardial infarction and/or ischemia is suspected, as atropine will increase myocardial O2 demand, which may worsen the infarct.
- Bradycardia due to 2nd degree type II and 3rd degree heart blocks will not improve with atropine; if treatment indicated, transcutaneous pacing (TCP) should be performed.
Classification
Electrolyte

Prehospital Indications
Cardiac Arrest – Non-Traumatic: suspected hyperkalemia, patients with renal failure
Cardiac Dysrhythmia: suspected hyperkalemia causing bradycardia
Overdose / Poisoning / Ingestion: calcium channel blocker toxicity
Traumatic Injury: suspected hyperkalemia in the setting of crush injury or potential for development of crush syndrome (administer prior to release of crushed tissue)

Other Common Indications
Acute hypocalcemia with or without tetany
Topically for hydrofluoric acid burns
Calcium channel blocker overdose

Adult Dose
Cardiac Arrest
1gm (10mL) IVP/IO
Cardiac Dysrhythmia/Crush - Suspected hyperkalemia
1gm (10mL) slow IV/IO push, may repeat x1 for persistent symptoms / ECG abnormalities
Overdose / Poisoning / Ingestion - Suspected Calcium Channel Blocker Overdose
1g (10mL) IV slow push over 60 seconds

Pediatric Dose
Crush - Suspected hyperkalemia
20mg/kg (100mg/mL) slow IV/IO push, dose per MCG 1309, repeat x1 for persistent ECG abnormalities
Overdose / Poisoning / Ingestion - Suspected Calcium Channel Blocker Overdose
20mg/kg (100mg/mL) IV slow push over 60 seconds, dose per MCG 1309

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 blocker toxicity.

Pharmacokinetics
Onset and peaks immediately, duration varies

Contraindications
Hypercalcemia
Ventricular fibrillation

Interactions
Inactivates or minimizes the effects of catecholamines if not flushed properly
Can cause cardiac standstill in patients taking Digoxin

Adverse Effects
Cardiac arrest
Hypotension or hypertension
Pain and burning at injection site
Tingling sensations

Prehospital Considerations
- Precipitates to form calcium carbonate (chalk) when used with sodium bicarbonate. Administer calcium
Medical Control Guideline: DRUG REFERENCE – CALCIUM CHLORIDE  Ref. No. 1317.11

- Chloride and sodium bicarbonate in separate IV/IO or thoroughly flush in between administrations using at least 10mL of normal saline
- Confirm IV is patent prior to administration as extravasation causes severe tissue necrosis
Classification
Carbohydrate

Prehospital Indication
Hypoglycemia: blood glucose < 60mg/dL

Other Common Indications
None

Adult Dose
Dextrose10% in water, 125 mL IV and reassess, if patient remains symptomatic, repeat x1 for a total of 250 mL

Pediatric Dose
<24 kg: Dextrose 10% in water, 5mL/kg IV in 1mL/kg increments dose per MCG 1309, reassess for clinical improvement after every 1mL/kg. Administer slow IVP. May repeat as needed, maximum total dose 5mL/kg. Recheck glucose prn after 3mL/kg infused.

= or >24 kg, Dextrose 10% in water, administer 125mL IVPB and reassess, continue infusion as needed with maximum dose of 5mL/ kg

Mechanism of Action
Principal form of glucose (sugar) used by the body to create energy

Pharmacokinetics
Onset < 1min, peak effect dependent upon degree and cause of hypoglycemia

Contraindications
None

Interactions
None

Adverse Effects
Pain or burning at injection site
Phlebitis or thrombosis in vein of administration

Prehospital Considerations
- Confirm the IV line is patent prior to administration as severe tissue necrosis may occur with extravasation.
- Report and record blood glucose levels before and after administering this solution.
Classification

Antihistamine

Prehospital Indications

Allergic Reaction: itching and/or hives
Dystonic Reaction

Other Common Indications

Over-the-counter sleep aid, prevention or treatment of motion sickness, nausea and vomiting
Mild Parkinson’s disease
Prevention of extrapyramidal symptoms in patients on antipsychotic medications

Adult Dose

50mg slow IV push or 50mg IM, may repeat in 15 min x1, total maximum dose 100mg

Pediatric Dose

1mg/kg slow IV push one time, dose per MCG 1309, if unable to obtain venous access 1mg/kg deep IM, dose per MCG 1309

Mechanism of Action

Histamine H1- receptor antagonist of effector cells in respiratory tract, blood vessels, and GI smooth muscle. Possesses anticholinergic properties, resulting in antidyskinetic properties.

Pharmacokinetics

Onset is 15-30 min, duration is < 10 min

Contraindications

Acute asthma attack

Interactions

Increase central nervous system depression when used with alcohol and other central nervous system depressants, or MAO inhibitors

Adverse Effects

Confusion
Drowsiness
Mild hypotension
Palpitation
Paradoxic excitement in children
Tachycardia
Wheezing

Prehospital Considerations

- Administer injection deep IM into a large muscle group (lateral thigh, gluteus).
- Diphenhydramine (Benadryl) does not treat anaphylaxis/airway edema; if signs of anaphylaxis present, administer epinephrine IM
- Use with caution in elderly as they have increased adverse effects such as confusion, drowsiness
- Use with caution on all patients with a history of asthma.
- May cause paradoxical agitation in pediatric patients.
Classification
Sympathomimetic

Prehospital Indications
Anaphylaxis
Cardiac Arrest – Non-Traumatic: cardiac arrest resuscitation, hypotension after return of spontaneous circulation (ROSC) not responsive to IV fluid resuscitation
Cardiac Dysrhythmia: symptomatic bradycardia not responsive to atropine and transcutaneous pacing
Respiratory Distress / Bronchospasm: asthma, reactive bronchospasm (unlikely to benefit in COPD)
Airway Obstruction: stridor or visible airway swelling, croup/tracheitis in pediatrics
Shock / Hypotension: non-traumatic hypotension not responsive to IV fluid resuscitation

Adult Dose
Anaphylaxis
0.5mg (1mg/mL) IM in the lateral thigh, may repeat every 10 min x2 prn, maximum total 3 doses
Cardiac Arrest
1mg (0.1mg/mL) 10mL IV/IO every 3-5 min
Non-traumatic shock (including from symptomatic bradycardia or after ROSC)
Push-dose epinephrine – mix 9mL normal saline with 1mL epinephrine 0.1mg/mL (IV formulation) in a 10mL syringe. Administer push-dose epinephrine 1mL IV/IO every 1-5 min as needed to maintain SBP >90mmHg
Respiratory Distress/Bronchospasm
0.5mg (1mg/mL) IM in the lateral thigh
Airway Obstruction - Stridor
Epinephrine (1mg/mL solution) administer 5mg (5mL) via neb, repeat x1 in 10 min prn
Airway Obstruction – Airway swelling
Epinephrine (1mg/mL) administer 0.5mg (0.5mL) IM, repeat every 10 min prn x2, maximum total 3 doses

Pediatric Dose
Anaphylaxis
0.01mg/kg (1mg/mL) IM, dose per MCG 1309, in the lateral thigh, may repeat every 10 min x2 prn for persistent symptoms, maximum total 3 doses
Cardiac Arrest
0.01mg/kg (0.1mg/mL) IV/IO, dose per MCG 1309, may repeat every 3-5 min, maximum single dose 1mg
Cardiac Dysrhythmia - Symptomatic bradycardia
0.01mg/kg (0.1mg/mL) slow IV/IO push, dose per MCG 1309
Shock / Hypotension (including hypotension after ROSC)
Push-dose epinephrine – mix 9mL normal saline with 1mL epinephrine (0.1mg/mL) IV formulation in a 10mL syringe. Administer push-dose epinephrine (0.01mg/mL), dose per MCG 1309 every 1-5 min as needed to maintain SBP >70mmHg
Respiratory Distress/Bronchospasm
Epinephrine (1mg/mL) 0.01mg/kg IM in the lateral thigh, dose per MCG 1309
Airway obstruction – Stridor from croup/tracheitis
<1 year old: Epinephrine (1mg/mL) 2.5mL via neb, dose per MCG 1309
≥ 1 year of age: Epinephrine (1mg/mL) 5mL via neb, dose per MCG 1309
Repeat x1 in 10 min prn, maximum 2 total doses prior to Base contact
Airway obstruction - Airway swelling
Epinephrine (1mg/mL) 0.01mg/kg IM dose per MCG 1309, repeat every 10 min prn x2, maximum 3 total doses prior to Base contact
Mechanism of Action
A naturally occurring catecholamine. 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.

Pharmacokinetics
Onset is < 2 min IV, 1-3 min IM; duration is 5-10 min IV, 20-30 min IM

Contraindications
None

Interactions
Can be partially deactivated by highly alkaline solutions, such as sodium bicarbonate.

Adverse Effects
Anxiety
CVA or MI (rare, IV only)
Hypertension
Palpitations
Tachydysrhythmias
Tremors

Prehospital Considerations
- Inadvertent IV injection of usual IM formulation and dose constitutes a 10-fold overdose that can result in sudden severe hypertension and possible cerebral hemorrhage.
Classification
Synthetic opioid

Prehospital Indications
Multiple provider impressions: pain management

Other Common Indications
None

Adult Dose
50mcg (1mL) slow IV push or IM/IN, repeat every 5 min prn, maximum total dose prior to Base contact
150mcg

Pediatric Dose
1mcg/kg (50mcg/mL) slow IV push or IM, dose per MCG 1309, or
1.5mcg/kg (50mcg/mL) IN, dose per MCG 1309
Repeat in 5 min prn x1, maximum 2 total doses prior to Base contact

Mechanism of Action
Narcotic agonist-analgesic of opiate receptors; inhibits ascending pain pathways thus altering response to pain, increases pain threshold, produces analgesia, respiratory depression and sedation

Pharmacokinetics
Onset is immediate; peak in 3-5 min; duration is 30-60 min

Contraindications
Hypersensitivity

Interactions
Alcohol and other central nervous system depressants potentiate its effect

Adverse Effects
Chest wall stiffness / Chest wall pain
Delirium / Convulsions (uncommon)
Muscle stiffness
Nausea and vomiting (most common)
Respiratory depression

Prehospital Considerations
- Monitor respiratory status. Respiratory depression, when it occurs, may last longer than the analgesic effect.
- Administer slowly to decrease likelihood of chest stiffness, which can be life threatening.
- Onset of fentanyl is quicker and duration of action is shorter as compared to morphine. Unlike morphine, does not cause histamine release. Therefore, it is unlikely to cause hypotension in therapeutic dosages.
- Naloxone can be used for reversal if needed.
Classification
Hormone (pancreatic)

Prehospital Indications
Hypoglycemia: glucose <60mg/dL and venous access cannot be established

Other Common Indications
Clearance of impacted esophageal foreign body (via smooth muscle relaxation)
Treatment of beta-blocker overdose and/or adjunctive treatment of calcium channel blocker overdose

Adult Dose
1mg (1mL) IM, may repeat in x1 in 20 min prn

Pediatric Dose
< 1 year of age 0.5mL (1mg/mL) IM, may repeat in x1 in 20 min prn
≥ 1 year of age 1.0mL (1mg/mL) IM, may repeat in x1 in 20 min prn

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. The combined actions increase the blood levels of glucose.

Pharmacokinetics
Onset is 5-20 min; duration is 1-1.5 hr

Contraindications
In patients with known insulinoma (insulin-secreting tumor), glucagon will produce worsening hypoglycemia

Interactions
None

Adverse Effects
Hypotension
Nausea and vomiting

Prehospital Considerations
- Use mixture immediately after reconstitution of dry powder and provided solution.
- Patient usually awakens from hypoglycemic coma 5-20 min after glucagon injection. PO carbohydrates should be given as soon as possible after patient regains consciousness.
- Symptoms such as headache, nausea and weakness may persist after recovery from hypoglycemic reaction.
- Glucagon is effective only if there are glycogen stores in the liver. Therefore, it is unlike to be effective in patients with severe malnutrition, adrenal insufficiency or chronic hypoglycemia.
**Classification**
Local Anesthetic

**Prehospital Indications**
Multiple provider impressions: patients responsive to pain that have intraosseous (IO) access

**Other Common Indications**
- Topical, transmucosal or intradermal anesthesia
- Ventricular arrhythmias refractory to other treatments

**Adult Dose**
- 2% 40mg slow IO push over 2 minutes; may give second dose of 20 mg x1 prn

**Pediatric Dose**
- 2% 0.5mg/kg (20mg/mL) slow IO push over 2 minutes, dose per MCG 1309, not to exceed adult dose; may repeat second dose at half the initial dose x1 prn

**Mechanism of Action**
Inhibits sodium ion channels, stabilizing neuronal cell membranes causing a nerve conduction blockage

**Pharmacokinetics**
Onset is 2 min; peak in 3-5 min; duration is 10-20 min

**Contraindications**
None, when used for anesthesia in IO placement

**Interactions**
No significant interaction at therapeutic doses for IO placement. In larger doses, multiple interactions possible including potentiation of fentanyl and amiodarone.

**Adverse Effects**
None for IO use, high doses have been associated with increased risk of seizure

**Prehospital Considerations**
- This should be given pre-infusion if IV fluids or infusion of other medications through the IO on patients that are responsive to pain.
- Lidocaine 2% (preservative and epinephrine free) should be used.
- Slow infusion is necessary to ensure the lidocaine remains in the medullary space.
- A base order is not needed to administer lidocaine as part of the IO procedure
Classification
Sedative, benzodiazepine

Prehospital Indications
Agitated Delirium: patients requiring restraints for patient and provider safety
Behavioral / Psychiatric Crisis: patients requiring restraints for patient and provider safety
Cardiac Dysrhythmia: sedation prior to and/or during synchronized cardioversion or transcutaneous pacing
Seizure - Active

Other Common Indications
Sedation and amnestic agent in patients undergoing mechanical ventilation or painful procedures

Adult Dose
Agitated Delirium / Behavioral / Psychiatric Crisis
5mg (1mL) IM/IN/IV, repeat x1 in 5 min prn, maximum total dose prior to Base contact 10mg for Agitated Delirium (Psychiatric Crisis requires Base order for any)
Cardiac Dysrhythmia - sedation prior to synchronized cardioversion / transcutaneous pacing
2mg (0.4mL) slow IV/IO push/IM/IN, may repeat every 5 min, maximum total dose prior to Base contact 6mg
Seizure - Active
5mg (1mL) IM/IN/IV, repeat x1 in 2 min prn, maximum total dose prior to Base contact 10mg

Pediatric Dose
Agitated Delirium / Behavioral / Psychiatric Crisis
0.1mg/kg (5mg/mL) IM/IN/IV, dose per MCG 1309, repeat dosing every 5 min prn per Base order
Cardiac Dysrhythmia - sedation prior to synchronized cardioversion / transcutaneous pacing
0.1mg/kg (5mg/mL) IM/IN/IV/IO, dose per MCG 1309, repeat x1 in 2 min prn, maximum 2 doses prior to Base contact
Seizure - Active
0.1mg/kg (5mg/mL) IM/IN/IV/IO, dose per MCG 1309, repeat x1 in 2 min prn, maximum 2 doses, max single dose 5mg

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

Pharmacokinetics
Onset 3-5 min IV, 15-20 min IM, 6-14 min IN
Duration 1-6 hours IV/IM

Contraindications
Acute alcohol intoxication with altered mental status
Respiratory depression
Shock / Poor perfusion

Interactions
Risk of respiratory or central nervous system depression, increases when used with diphenhydramine, fentanyl, morphine, or other opiate or sedative medications

Adverse Effects
Hypotension
Respiratory depression / arrest

Prehospital Considerations
- Closely monitor respiratory and cardiac function after administration
• For patients with agitated delirium and violent behavior, IM/IN administration is recommended over IV for the initial dose for the safety of EMS personnel.
• If available, waveform EtCO₂ monitoring should be instituted after administration.
Classification
Opiate Analgesic

Prehospital Indications
Multiple provider impressions: pain management

Other Common Indications
None

Adult Dose
4mg (1mL) slow IV/IO push, repeat every 5 min prn, maximum total dose prior to Base contact 12mg

Pediatric Dose
0.1mg/kg (4mg/mL) slow IV/IO push, dose per MCG 1309, repeat in 5 min x1, maximum 2 total doses prior to Base contact

Mechanism of Action
Narcotic agonist- analgesic of opiate receptors; inhibits ascending pain pathways, thus altering response to pain.

Pharmacokinetics
Onset is immediate IV, 15-30 min IM; duration is 2-7 hr

Contraindications
Hypotension or evidence or poor perfusion
History of allergy to morphine or other narcotic medications

Interactions
Central nervous system depressants, sedatives, barbiturates, alcohol, benzodiazepines and tricyclic depressants may potentiate the central nervous system and respiratory depressant effects.

Adverse Effects
Decrease cough reflex
Disorientation
Hypotension
Nausea and vomiting
Respiratory depression

Prehospital Considerations
- Monitor vital signs at regular intervals
- Consider monitoring with EiCO₂ if available
- Use extreme caution in patient at risk for respiratory depression or ALOC
- Naloxone may be used for reversal of respiratory depression if needed
Classification
Opiate Antagonist

Prehospital Indications
Overdose / Poisoning/ Ingestion: suspected opiate overdose with altered mental status and hypoventilation/apnea

Other Common Indications
None

Adult Dose
2-4 mg IN (1mg per nostril or 4mg/0.1mL IN if formulation available) or 2mg IM or 0.8-2mg IV push
Maximum dose all routes 8mg, titrate to adequate respiratory rate and tidal volume

Pediatric Dose
0.1mg (1mg/mL) IM/IN/IV, dose per MCG 1309, maximum dose all routes 8mg, titrate to adequate respiratory rate and tidal volume

Mechanism of Action
Competes for and displaces narcotic molecules from opiate receptors in the brain. Reverses the respiratory depression associated with overdose of narcotic agents.

Pharmacokinetics
Onset is < 2 min IV, 2-10min IM; duration is 20-120 min

Contraindications
Hypersensitivity

Interactions
None

Adverse Effects
Nausea and vomiting
Sweating
Tachycardia
Agitation
Hypertension
Abdominal pain
Acute pulmonary edema

Prehospital Considerations
• Give in small increments until the desired narcotic reversal is achieved (respiratory rate 12 and adequate tidal volume).
• Duration of action of some narcotics may exceed that of naloxone; therefore, patient must be closely observed for need for repeat doses.
• Naloxone causes acute withdrawal symptoms and can precipitate acute pulmonary edema when given in large boluses to narcotic addicts. Use only enough to reverse respiratory depression.
• Naloxone is not indicated in cardiac arrest though can be given after ROSC if narcotic overdose suspected.
Classification
Nitrate Vasodilator

Prehospital Indications
Chest Pain – Suspected Cardiac
Chest Pain – STEMI
Pulmonary Edema / CHF

Other Common Indications
Rapid blood pressure lowering in hypertensive emergency

Adult Dose
Chest Pain – Suspected Cardiac / Chest Pain – STEMI
0.4 mg SL prn, repeat every 5 min prn x2, total 3 doses, hold if SBP < 100mmHg or patient has taken sexually enhancing medication within 48 hours
Pulmonary Edema / CHF
0.4mg SL, for SBP ≥ 100mmHg
0.8mg SL, for SBP ≥ 150mmHg
1.2mg SL, for SBP ≥ 200mmHg
Repeat every 3-5 min prn x2 for persistent dyspnea, assess blood pressure prior to each administration and determine subsequent dose base on SBP as listed above. Hold if SBP < 100mmHg

Pediatric Dose
Not recommended for pediatric administration

Mechanism of Action
Organic nitrate which causes systemic venous dilatation, decreasing preload. Cellular mechanism: 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 to reduce both preload and afterload, and myocardial oxygen demand. Also improves coronary collateral circulation. Lowers BP, increases heart rate and occasional paradoxical bradycardia.

Pharmacokinetics
Onset is 1-3 min SL or TM; duration is 20-30 min

Contraindications
Use of sexually enhancing/erectile dysfunction medications such as sildenafil, tadalafil or vardenafil within the past 48 hours
Hypotension with SBP < 90
Suspected cardiac tamponade

Interactions
Alcohol, opiates and antihypertensive agents may compound hypotensive effects. Patients taking sexually enhancing/erectile dysfunction medications are at risk for severe, prolonged hypotension leading to death.

Adverse Effects
Circulatory Collapse
Dizziness
Headache
Hypotension / Postural Hypotension
Syncope
Weakness

Prehospital Considerations
- Caution advised in suspected intracranial hemorrhage or stroke patients
Classification
Antiemetic

Prehospital Indications
Multiple provider impressions: Nausea and/or vomiting, or prior to fentanyl or morphine administration to reduce potential for nausea/vomiting

Other Common Indications
None

Adult Dose
4 mg ODT/IV/IM

Pediatric Dose
4 mg ODT, only for 4 years of age or older

Mechanism of Action
Mechanism of action has not been fully characterized but 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.

Pharmacokinetics
Onset is 1-5 min; duration is 4-6 hr

Contraindications
Known allergy to Ondansetron
Pregnancy, regardless of gestational age

Interactions
Amiodarone and other QT prolonging drugs (additive prolongation of QT may produce torsade de pointes/polymorphic ventricular tachycardia)

Adverse Effects
Constipation
Headache
QT prolongation
Sedation

Prehospital Considerations
- May cause prolonged QT interval. Caution in patients with known prolonged QT syndrome or recent/simultaneous use of other QT-prolonging drugs.
- Should not be administered in patients known to be pregnant, regardless of gestational age.
- Peak activity is decreased by approximately 40% in oral administration, compared to IV, due to first pass metabolism in the liver.
Classification

Gas

Prehospital Indications

Multiple provider impressions: hypoxia SPO2 <94% on room air, respiratory or cardiac arrest, shock, anaphylaxis, traumatic brain injury, carbon Monoxide exposure/poisoning/toxicity, suspected pneumothorax

Other Common Indications

Chronic hypoxia in patients with restrictive lung disease

Adult and Pediatric Dose

<table>
<thead>
<tr>
<th>Delivery Device</th>
<th>Flow Rate</th>
<th>% Delivered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal Cannula</td>
<td>1-6 L/min</td>
<td>22-44%</td>
</tr>
<tr>
<td>Simple Face Mask</td>
<td>8-10 L/min</td>
<td>40-60%</td>
</tr>
<tr>
<td>Face Mask with O2 Reservoir</td>
<td>15 L/min</td>
<td>90%</td>
</tr>
<tr>
<td>Bag-Mask with O2 Reservoir</td>
<td>15 L/min</td>
<td>90%</td>
</tr>
<tr>
<td>ET with Bag with O2 Reservoir</td>
<td>15 L/min</td>
<td>100%</td>
</tr>
<tr>
<td>ET with T-Tube</td>
<td>15 L/min</td>
<td>70%</td>
</tr>
<tr>
<td>Supraglottic Airway (King LT)</td>
<td>15 L/min</td>
<td>90%</td>
</tr>
</tbody>
</table>

Mechanism of Action

Oxygen is a tasteless, odorless gas transported by hemoglobin in the blood to organ tissues. It is required for the breakdown of glucose into a useable energy form (aerobic metabolism). Therapeutic oxygen administration increases the oxygen concentration in the alveoli, which in turn increases the oxygen saturation of available hemoglobin.

Pharmacokinetics

Onset is immediate; duration is < 2 min

Contraindications

None

Adverse Effects

High flow O2 (100%) by mask may produce a 30% decrease in coronary blood flow in as little as 5 min, and may decrease the efficiency of nitroglycerin.
In patients with COPD or other chronic lung disease, high inspired O2 concentration may decrease respiratory drive and cause CO2 retention.
O2 will dry mucus membranes.
Classification
Cholinesterase Reactivator

Prehospital Indications
HAZMAT Exposure: nerve agent or organophosphate poisoning

Other Common Indications
Antidote to toxicity from agents (neostigmine, pyridostigmine) used in treatment of myasthenia gravis

Adult Dose
Given in conjunction with atropine as a DuoDote injection – Atropine 2.1mg and Pralidoxime Chloride 600mg (2PAMCl). Medications delivered sequentially by one syringe into 2 different areas of the muscle.
- Mild Exposure DuoDote™ IM x1
- Moderate Exposure DuoDote™ IM x2, one after another
- Severe Exposure DuoDote™ IM x3, one after another

Pediatric Dose
Pediatric patients longer than the length-based resuscitation tape (Broselow™) should receive adult dose
Pediatric patients between 3-36kg body weight, based on measurement using the length-based resuscitation tape (Broselow™), should be treated as follows:
- Mild Exposure Atropine (0.1mg/mL) 0.02mg/kg IV/IM, dose as per MCG 1309
- Moderate Exposure 1 DuoDote™ IM
- Severe Exposure 1 or 2 DuoDote(s)™ IM, one after the other when applicable, based on the table below:

<table>
<thead>
<tr>
<th>Avg. Wt. (kg)</th>
<th>Color</th>
<th>Initial Emergency Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Grey</td>
<td>1 DuoDote™</td>
</tr>
<tr>
<td>6.5</td>
<td>Pink</td>
<td></td>
</tr>
<tr>
<td>8.5</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>10.5</td>
<td>Purple</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Yellow</td>
<td></td>
</tr>
<tr>
<td>16.5</td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>20.5</td>
<td>Blue</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Orange</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Green</td>
<td>2 DuoDotes™</td>
</tr>
</tbody>
</table>

Mechanism of Action
Reactivates cholinesterase by displacing the enzyme from its receptor sites. The free enzyme then can resume its function of degrading accumulated acetylcholine, thereby restoring normal neuromuscular transmission. Pralidoxime also detoxifies some organophosphates by direct chemical reaction.

Pharmacokinetics
Onset is 2-3 min; peak effect in 5-15 min; duration is 2-3 hr

Contraindications
Poisonings with carbamate insecticide Sevin, inorganic phosphates, organophosphates with no anticholinesterase

Interactions
None

Adverse Effects
- Dizziness
- Blurred vision
- Hypertension
- Laryngospasm
- Tachycardia
Medical Control Guideline: DRUG REFERENCE – SODIUM BICARBONATE  Ref. No. 1317.39

Classification
Electrolyte / Alkalinizing Agent

Prehospital Indications
Cardiac Arrest – Non-Traumatic: suspected hyperkalemia, patients with renal failure
Cardiac Dysrhythmia: suspected hyperkalemia causing bradycardia
Overdose / Poisoning / Ingestion: suspected tricyclic overdose with ECG changes
Traumatic Injury: suspected hyperkalemia in the setting of crush injury or potential for development of crush syndrome (administer prior to release of crushed tissue)

Other Common Indications
None

Adult Dose
50mEq (50mL) slow IV/IO push
For crush injury repeat x1 for persistent ECG abnormalities

Pediatric Dose
1mEq/kg (1mEq/mL) slow IV push, dose per MCG 1309
For crush injury, repeat x1 for persistent ECG abnormalities

Mechanism of Action
Increases blood and urinary pH by releasing a bicarbonate ion, which in turn neutralizes hydrogen ion concentration.

Pharmacokinetics
Onset is < 15 min (observed < 5 for tricyclic overdose); clinical effect in < 15 min; duration is 1-2 hr

Contraindications
Evidence of pulmonary edema
Hypernatremia or hypocalcemia

Interactions
Precipitates to form calcium carbonate (chalk) when used with calcium chloride or calcium gluconate.
Administer calcium chloride and sodium bicarbonate separately.
Can reduce potency of epinephrine, flush line after administration.

Adverse Effects
Extracellular alkalosis
Tissue damage if IV infiltrates
Pulmonary edema

Prehospital Considerations
- Multiple doses may be needed in TCA overdose when indicated