School Of EMS

PARAMEDIC DRUG REFERENCE BOOK

PREFACE

On behalf of the instructors and administrative team for The School of EMS, we'd like to present you with this tool to help you achieve your educational goals. This reference manual is designed to allow you to access common pre-hospital medications, focusing on field treatment and dosing. It is not intended to replace your existing protocols for your agency. It should be used as an educational guide.

This manual contains common pre-hospital medications, as well as some emergency medications that may be used during transport. The dosing and use are industry standard recommendations. It is in alphabetical order and can be downloaded and referenced from mobile devices as needed. As advances in science and medicine continue, it will be updated.

Lastly, as you begin your new careers, use the information to educate and train our workforce. We are the frontline of emergency pre-hospital care in the world, and our patients deserve the best. Thank you for everything you do.

Sincerely,

The School of EMS

ACETAMINOPHEN (Tylenol, Ofrimev)

Class: An analgesic and anti-pyretic.

Mechanism of Action:

Acetaminophen is an analgesics and antipyretics. The exact mechanism of action of acetaminophen is not known. It may reduce the production of prostaglandins in the brain. Prostaglandins are chemicals that cause inflammation and swelling. Acetaminophen relieves pain by elevating the pain threshold, that is, by requiring a greater amount of pain to develop before a person feels it. It reduces fever through its action on the heat-regulating center of the brain. Specifically, it tells the center to lower the body's temperature when the temperature is elevated.

Indications:

An effective analgesic and anti-pyretic for the treatment of fever and pain.

Contraindications:

Allergy to medication. Severe liver disease.

Dosage and Administration:

Adult: **PO:** 650-1000 mg PO q 4 hrs to a daily maximum of 3000 mg
IV: 650-1000 mg IV

Pediatric: 15 mg/kg PO or PR q 4 hrs

Duration of action:

Onset: 30-45 minutes.
Peak Effect: 30-60 minutes.
Duration: 4-6 hrs
.

Special Considerations:

Avoid in patients with severe liver disease

ACETYLCYSTEINE (Mucomyst, Acetadote)

Class: Acetaminophen antidote

Mechanism of action:

Restores glutathione concentrations within the liver. Glutathione, an antioxidant, has many actions in the body, including detoxifying substances.

Indications:

Acetaminophen overdose

Contraindications:

Known hypersensitivity, acute asthma

Adverse reactions/side effects include:

Urticaria, flushing, rash, angioedema, nausea

Drug interactions: Nitroglycerin

Dosage and administration:

Adult and pediatric: Loading dose 150 mg/kg IV, mix in 200 mL of D5W and infuse over 1 hour. 50 mg/kg IV in 500 mL of D5W and infuse over 4 hours. If IV access is not available, give 140 mg/kg orally

Duration of action:

Onset 1-minute, Peak effect 5 to 15 minutes, Duration: 100 minutes

Special considerations include:

Pregnancy safety Category B, Anaphylactoid-type reactions usually follow the first dose. Can be minimized by ensuring that the medication is infused over 1 hour

ACTIVATED CHARCOAL

Class: Adsorbent

Mechanism of Action:
Adsorbs toxic substances from the GI Tract; Onset of action is immediate.

Indications:
Most oral poisonings and medication overdoses; can be used after evacuation of poisons.

Contraindications:
Oral administration to comatose patient; after ingestion of corrosives, caustics or petroleum distillates (ineffective and may induce vomiting); simultaneous administration with other oral drugs.

Adverse Reactions:
May induce nausea and vomiting; may cause constipation; may cause black stools.

Drug Interactions:
Bonds with and generally inactivates whatever it is mixed with, e.g., syrup of ipecac.

Dosage and Administration:
Adult: 1-2 gm/kg PO or via NGT
Pediatric: 1-2 gm/kg PO or via NGT

Duration of action:
Depends upon GI function; will act until excreted.

Special Considerations:
Often used in conjunction with magnesium citrate
Must be stored in a closed container
Does **not** adsorb cyanide, lithium, iron, lead and arsenic.

ADENOSINE (Adenocard)

Class: Endogenous Nucleotide

Mechanism of action:

Slows conduction time through the AV Node; can interrupt re-entrant pathways; slows heart rate; acts directly on sinus pacemaker cells. Is drug of choice for PSVT.

Indications:

Conversion of PSVT to sinus rhythm. May convert PSVT due to Wolff-Parkinson-White syndrome.
Not effective converting atrial fibrillation / flutter.

Contraindications:

Second or third-degree " block or Sick Sinus Syndrome
Atrial flutter / atrial fibrillation
Ventricular Tachycardia
Hypersensitivity to adenosine

Adverse Reactions:

Facial flushing, shortness of breath, chest pain, headache, paresthesia, diaphoresis, palpitations, hypotension, nausea, metallic taste.

Drug Interactions:

Methylxanthines (theophylline-like drugs) antagonize the effects of adenosine.
Dipyridamole (Persantine) potentiates the effects of adenosine
Carbamazepine (Tegretol) may potentate the AV Node blocking effects of adenosine.

Dosage and Administration

Adult: 6 mg over 1-3 seconds; If no response after 1-2 minutes, administer 12 mg over 1-3 seconds, Maximum total dose = 18 mgs.

Pediatric: 0.1 mg/kg rapid IV; If no response after 1-2 minutes, administer 0.2mg/kg over 1-3 seconds, Maximum total dose = 18 mgs. Maximum single dose = 12 mgs.

Duration of action

Onset and peak effects in seconds; duration 12 seconds.

Special Considerations

Short half-life limits side effects in most patients.
Pregnancy safety: Category C.

ALBUTEROL (Proventil, Ventolin)

Class: Sympathomimetic, bronchodilator.

Mechanism of **Action:**

Selective b-2 agonist which stimulates adrenergic receptors of the sympathomimetic nervous system resulting in smooth muscle relaxation in the bronchial tree and peripheral vasculature.

Indications:

Treatment of bronchospasm in patients with reversible obstructive airway disease **(COPD/asthma).**

Contraindications:

Known prior hypersensitivity reactions to Albuterol.
Tachycardia, dysrhythmias, especially those caused by digitalis.
Synergistic with other sympathomimetics

Adverse Reactions:

Often dose-related and include restlessness, tremors, dizziness, palpitations, tachycardia, nervousness, peripheral vasodilatation, nausea, vomiting, hyperglycemia, increased blood pressure and paradoxical bronchospasm

Drug Interactions

Tricyclic antidepressants may potentate vasculature effects.
Beta-blockers are antagonistic.
May potentate hypokalemia caused by diuretics.

Dosage and Administration

Adult: Administer 2.5 mg. Dilute 0.5 ml of 0.5% solution for inhalation with 2.5 ml normal saline in nebulizer and administer over 10-15 minutes.

Pediatric: 2.5mg in 6mL NS

Duration of Action

Onset in 5-15 minutes with peak effect in 30-minutes - two hours and duration of 3-4 hours.

Special Considerations

Pregnancy Safety: Category C.
Antagonized by beta-blockers (e.g., Inderal, Metoprolol)
May precipitate angina pectoris and dysrhythmias.
Should only be administered by inhalation methodology in pre-hospital management.

AMIODARONE (Cordarone)

Class: Antidysrhythmic.

Mechanism of Action:

Prolongation of Action Potential; non-competitive alpha and beta sympathetic blocking effects; Calcium channel blocking effects.

Indications:

-Suppression of Ventricular Fibrillation/ Pulseless Ventricular Tachycardia refractory to defibrillation
-Suppression of Ventricular Tachycardia with a pulse

Contraindications:

-Allergy to Iodine
-Medication-induced Ventricular dysrhythmias.
-Torsades de Pointes.

Adverse Reactions:

Hypotension, Bradycardia, Pulseless Electrical Activity, Congestive Heart Failure.
Nausea, fever

Drug Interactions

Will precipitate with Sodium Bicarbonate: incompatible.

Dosage and Administration

VF/ Pulseless VT:

Adult: 300 mg IV Push in 14 ml Normal Saline
Repeat Dose: 150mg in 7ml Normal saline
Pedi: 5mg/kg slow IV Push over 1-2 minutes in 10 ml Normal Saline,

V TAC with a Pulse: Adult – 150mg in 100mL NS infused over 10 minutes

Duration of Action:

Onset: Within 5-15 minutes.
Peak Effect: Variable.
Duration: Variable

Special Considerations

Pregnancy safety: Category C
Administer cautiously in patients with Heart Failure or poor systolic function.

AMYL NITRITE, SODIUM NITRITE, SODIUM THIOSULFATE (Cyanide Antidote Kit)

Class: Antidote

Mechanism of Action

Amyl Nitrite: affinity for cyanide ions; reacts with hemoglobin to form methemoglobin (low toxicity)
Sodium Nitrite: same as amyl nitrite
Sodium Thiosulfate: produces thiocyanate, which is then excreted

Indications

Cyanide or hydrocyanic acid poisoning.

Contraindications

Not applicable.

Adverse reactions

Excessive doses of amyl nitrite and sodium nitrite can produce severe, life-threatening methemoglobinemia. Use only recommended doses.

Drug Interactions

None.

Dosage and administration

Adult: Amyl nitrite: breathe 30 seconds out of every minute. Sodium Thiosulfate and sodium nitrite: IV per antidote kit directions.

Pediatric: Same as adult.

Duration of Action

Variable.

Special Considerations

Cyanide poisoning must be recognized quickly and treated quickly; if pulse persists, even in presence of apnea, prognosis is good with treatment. The antidote kit must be used in conjunction with administration of oxygen.

ASPIRIN

Class:

Platelet inhibitor, anti-inflammatory agent.

Mechanism of Action:

Prostaglandin inhibition (makes the platelets less sticky)

Indications:

Chest pain suggestive of Acute Myocardial Infarction.

Contraindications:

Hypersensitivity.
Gastrointestinal bleeding.
Signs and symptoms suggestive of recent cerebrovascular accident.

Adverse Reactions:

Heartburn.
GI bleeding.
Nausea, vomiting.
Wheezing in allergic patients.
Prolonged bleeding.

Drug Interactions:

Use with caution in patients allergic to NSAIDS.

Dosage and Administration:

162 mg to 324 mg PO.

Duration of Action:

Onset: 30-45 minutes.
Peak effect: variable.
Duration: Variable.

Special Considerations:

Pregnancy Safety: Category D.
Not recommended in pediatric population.

ATROPINE SULFATE

Class: Anticholinergic agent.

Mechanism of Action:

Increases conduction through the AV Node.
Increases heart rate in life-threatening brady dysrhythmias
Parasympatholytic: inhibits action of acetylcholine at postganglionic parasympathetic neuroeffector sites.

Indications:

Hemodynamically significant bradycardia.
Drug of choice for organophosphate poisoning.

Contraindications:

Tachycardia.
Hypersensitivity.
Unstable cardiovascular status in acute hemorrhage and myocardial ischemia.

Adverse Reactions:

Headache, dizziness, palpitations, nausea and vomiting.
Tachycardia, dysrhythmias, anticholinergic effects (blurred vision, dry mouth, urinary retention).
Paradoxical bradycardia when pushed slowly or at low doses.
Flushed, hot dry skin.

Drug Interactions:

Effects enhanced by antihistamines, antipsychotics, benzodiazepines and antidepressants.

Dosage and Administration:

Adult: Brady dysrhythmias: 1mg IV every 3-5 minutes as needed to a maximum total dose of 3mg

Pediatric: Brady dysrhythmias: 0.02 mg/kg IV / ET / IO (minimum single dose 0.1mg, maximum single dose 1.0 mg).

Duration of Action:

Onset: Immediate.
Peak Effect: Rapid to 1-2 minutes.
Duration: 2-6 hours**.**

Special Considerations:

Pregnancy Safety: Category C.
Moderate doses dilate pupils**.**

BENZOCAINE SPRAY (Hurricane)

Class: Topical anesthetic

Mechanism of action

Prevents impulse transmission along sensory nerve fibers and at nerve endings

Indications

Topical anesthetic. Suppresses the pharyngeal and tracheal gag reflex

Contraindications

Hypersensitivity

Adverse reactions/side effects

Signs of methemoglobinemia. Headache, light-headedness, shortness of breath, anxiety, fatigue, and tachycardia

Drug interactions

Rare and sometimes fatal cases of methemoglobinemia related to the topical or oromucosal benzocaine products. Nitrites or nitrates may induce methemoglobin formation.

Dosage and administration

Adult: 0.5- to 1-second spray; Repeat as needed.

Pediatric: 0.25- to 0.5-second spray; Repeat as needed.

Duration of action

Onset: Immediate.

Peak effect: Less than 5 minutes.

Duration: 15 to 20 minutes

Special considerations

Pregnancy safety: Category C. Quantity in a single spray varies among different manufacturers.

Potentially dangerous to use in the mouth and throat.

BUMETANIDE (Bumex)

Class: Loop diuretic

Mechanism of action

A potent loop diuretic with a rapid onset and short duration of action. Inhibits the reabsorption of sodium and chloride in the ascending limb of the loop of Henle

Indications

Pulmonary edema, heart failure

Contraindications

Hypersensitivity to bumetanide, furosemide, or sulfonamides. Hypovolemia, anuria, acid-based imbalance, electrolyte imbalance, hepatic coma. Use with caution in patients with hepatic cirrhosis, ascites, or diabetes.

Adverse reactions/side effects

Dehydration, dizziness, headache, hypotension, ECG changes due to electrolyte depletion, nausea/vomiting, itching (liver disease), fatigue.

Drug interactions

NSAIDs reduce the effects of diuretics. May increase risk of lithium poisoning. Antihypertensives can cause further hypotension.

Dosage and administration

Adult: 0.5 to 1 mg IV slowly over 1 to 2 minutes or IM

Pediatric: Not recommended for children younger than 12 years.

Duration of action

Onset: Immediate.

Peak effect: 15 to 30 minutes.

Duration: 3 to 6 hours

Special considerations

Pregnancy safety: Category C. Bumetanide does not have the vasodilatory effects of furosemide. Diuretic potency is about 40 times greater than furosemide.

CALCIUM CHLORIDE / CALCIUM GLUCONATE

Class: Electrolyte.

Mechanism of Action

Increases cardiac contractile state (positive inotropic effect).
May enhance ventricular automaticity.
Helps stabilize the cell membrane

Indications

Hyperkalemia,
Magnesium sulfate overdose
Calcium channel blocker toxicity
Crush syndrome

Contraindications:

Hypercalcemia, VF during cardiac resuscitation; digitalis toxicity.

Adverse Reactions:

Bradycardia, asystole, hypotension, peripheral vasodilatation, metallic taste, local necrosis, coronary and cerebral artery spasm, nausea, vomiting.

Drug Interactions:

Do not mix with Sodium Bicarbonate in running IV, flush prior to administration in same IV line
May worsen dysrhythmias secondary to digitalis.
May antagonize effects of Verapamil.

Dosage and Administration

Adult: 500-1000 mg of 10% solution slowly IV over 5 minutes; may repeat in 10 minutes. (Maximum: 1 gm dose)

Pediatric: 20 mg/kg/dose of 10% solution slow IV/ IO (maximum: 1 gm dose); (may repeat in 10 minutes.)

Duration of Action:

Onset: 5-15 minutes.
Peak effects: 3-5 minutes.
Duration: 15-30 minutes but may persist for 4 hours (dose dependent).

Special Considerations

Pregnancy safety: Category C.
For pediatrics: if calcium gluconate is unavailable, 1-2 ml of 10% calcium chloride solution, diluted with IV fluid, may be substituted.

CIMETIDINE (Tagamet)

Class: Antiulcer, H2 blocker

Mechanism of action

Blocks the effects of histamine at H_2 receptors of gastric parietal cells

Indications

Gastric or duodenal ulcers, GERD, adjunct in treating hives and/or itching

Contraindications

Known hypersensitivity to cimetidine or other H_2 blockers

Adverse reactions/side effects

Headache, dizziness, diarrhea, muscle aches, skin rashes, fatigue

Drug interactions

Inhibition of specific liver enzymes may result in increased plasma levels of certain drugs.

Dosage and administration

Adult: 400 mg orally four times daily; maximum is 1,200 mg/day

Pediatric: Use is not recommended. 20 to 40 mg/kg per day in divided doses

Duration of action

Onset: 60 minutes.

Peak effect: 45 to 90 minutes.

Duration: 4 to 5 hours

Special considerations

Pregnancy safety: Category B. Can be given orally or IV in conjunction with diphenhydramine for urticaria

DEXAMETHASONE (Decadron)

Class: Corticosteroid.

Mechanism of Action:
Suppresses acute and chronic inflammation, immunosuppressive effects.

Indications:
Anaphylaxis, asthma, spinal cord injury, croup, elevated intracranial pressure (prevention and treatment), as an adjunct to treatment of shock.

Contraindications:
Hypersensitivity to product.

Adverse Reactions:
Hypertension, sodium and water retention, GI bleeding. None from single dose.

Drug Interactions:
Calcium**,** Metaraminol.

Dosage and Administration:
Adult: 10-100 mg IV (1 mg/kg slow IV bolus).

Pediatric: 0.25-1.0 mg/kg/dose IV, IO, IM.

Duration of Action:
Onset: Hours.
Peak effects: 8-12 hours.
Duration: 24-72 hours.

Special Consideration: Pregnancy safety: unknown. Protect medication form heat. Toxicity and side effects with long-term use.

DEXTROSE

Class: Carbohydrate, hypertonic solution.

Mechanism of Action:
Rapidly increases serum glucose levels.

Indications:
Altered level of consciousness secondary to hypoglycemia

Contraindications:
Intracranial hemorrhage
Delirium tremens

Adverse Reactions:
Extravagation leads to tissue necrosis.
Warmth, pain, burning, thrombophlebitis, rhabdomyositis.

Drug Interactions:
Sodium bicarbonate, coumadin.

Dosage and Administration
Adult: 12.5-25 gram slow IV; may be repeated as necessary.

Pediatric: 0.5-1 gram/kg/dose slow IV; may be repeated as necessary.

Duration of Action
Onset: less than 1 minute.
Peak effects: variable.
Duration: Variable.

Special Considerations
Draw blood sugar before administering.
Do not administer to patients with known CVA unless hypoglycemia documented.

DIAZEPAM (Valium)

Class: Benzodiazepine, anticonvulsant, sedative-hypnotic

Mechanism of Action

Potentiates effects of inhibitory neurotransmitters.Raises seizure threshold. Induces amnesia and sedation.

Indications

Status Seizure, Acute anxiety states, Analgesia for medical procedures (fracture reduction, cardioversion), Delirium tremens.

Contraindications:

Hypersensitivity, glaucoma. coma, shock, substance abuse, head injury.

Adverse Reactions

Respiratory depression, hypotension, drowsiness, ataxia, reflex tachycardia, nausea, confusion.

Dosage and Administration

Seizure activity: Adult: 5-10 mg IV q 10-15 minutes prn (5 mg over 5 min.) (maximum dose = 30 mgs)

Seizure activity: Pediatric: 0.2 mg/kg/dose IV every 15-30 minutes (no faster than 3 mg over 5 minutes) (max. = 10 mg).

Rectal diazepam: 0.5 mg/kg via 2” rectal catheter and flush with 2-3 ml air after administration.

Sedation for cardioversion: 5- 15 mg IV over 5-10 minutes prior to cardioversion.

Duration of Action

Onset: 1-5 minutes.
Peak effect: minutes.
Duration: 20-50 minutes.

Special Considerations

Pregnancy safety: Category D
Short duration of anticonvulsant effect.
Reduce dose 50% in elderly patient.

DILTIAZEM HCL (Cardizem)

Class: Calcium channel blocker.

Mechanism of Action:

Block influx of calcium ions into cardiac muscle
Arterial and venous vasodilator.
Reduces preload and afterload.
Reduces myocardial oxygen demand.

Indications:

Atrial flutter, /Atrial fibrillation with rapid ventricular rates.

Contraindications:

Wide-complex tachycardia
Sick sinus syndrome
Cardiogenic shock.

.

Adverse Reactions:

Bradycardia, second or third-degree AV blocks, chest pain, CHF, syncope.
V-Fib, V-tach, nausea, vomiting, dizziness, dry mouth, dyspnea, headache.

Drug Interactions:

Caution in patients using medications that affect cardiac contractility.
In general, should not be used in patients on Beta-blockers.

Dosage and Administration:

Adult: Initial bolus: 0.25 mg/ kg (average dose 20 mg) IV over two (2) minutes. If inadequate response may re-bolus in 15 minutes: 0.35 mg/kg IV over two (2) minutes.

Pediatric: not recommended.

Duration of Action:

Onset: 2-5 minutes.
Peak effect: Variable.
Duration: 1-3 hours.

Special Considerations:

Pregnancy safety: category C.
Use in caution in patients with renal or hepatic dysfunction.

DIPHENHYDRAMINE (Benadryl)

Class: Antihistamine

Mechanism of Action

Blocks cellular histamine receptors; decreases vasodilatation
Reverses extrapyramidal reactions.

Indications

Symptomatic relief of allergies, allergic reactions, anaphylaxis, acute dystonic reactions (phenothiazines).
Blood administration reactions

Contraindications

Asthma, glaucoma, pregnancy, hypertension, infants

Adverse Reactions

Sedation, hypotension, seizures, visual disturbances, vomiting, palpitations, dysrhythmias, dry mouth and throat, paradoxical CNS excitation in children.

Drug Interactions

Potentiates effects of alcohol and other anticholinergics, may inhibit corticosteroid activity

Dosage and Administration

Adult: 25 - 50 mg IM or IV or P.O.

Pediatric: 1-2 mg/kg IV, IO slowly or IM. If given PO: 5 mg./ kg. / 24 hours.

Duration of Action

Onset: 15-30 minutes.
Peak effect: 1 hour.
Duration: 3-12 hours.

Special Considerations

Not used in infants or in pregnancy: Category B.
If used in anaphylaxis, will be in conjunction with epinephrine, steroids

DOBUTAMINE HYDROCHLORIDE (Dobutrex)

Class: Adrenergic, inotropic agent

Mechanism of action

Synthetic catecholamine: Simulates beta-1 receptors with minor stimulation of beta-2 and alpha-1 receptors. Increases myocardial contractility and stroke volume. Increases renal blood flow secondary to increased cardiac output.

Indications

Heart failure with a SBP of 70 to 100 mm Hg and no signs of shock

Contraindications

Known hypersensitivity, suspected or known poison/drug-induced shock, SBP less than 10 mm Hg and signs of shock, idiopathic hypertrophic subaortic stenosis

Adverse reactions/side effects

Headache, dyspnea, tachycardia, hypertension, chest pain, dysrhythmias, nausea/vomiting,

Drug interactions

Incompatible with sodium bicarbonate and furosemide, beta blockers may blunt the inotropic effects.

Dosage and administration

Adult: IV infusion at 2 to 20 mcg/kg/min titrated to desired effect

Pediatric: IV infusion at 2 to 20 mcg/kg/min titrated to desired effect

Duration of action

Onset: 2 minutes.

Peak effect: 10 minutes

Duration: 1 to 2 minutes after infusion discontinued

Special considerations

Pregnancy safety: Category B. BP and hemodynamic monitoring recommended. Titrate dose to maintain a heart rate increase of no greater than 10% of baseline. May increase infarct size in patients with MI. May precipitate or exacerbate ventricular ectopy. Older patients may have a significantly decreased response. Patients may become hypotensive from the vasodilatory effect.

DOPAMINE (Inotropin)

Class: Sympathomimetic, inotropic agent.

Mechanism of Action

Immediate metabolic precursor to Norepinephrine. Increases systemic vascular resistance, dilate renal and splanchnic vasculature. Increases myocardial contractility and stroke volume.

Indications

Cardiogenic, septic or spinal shock, hypotension with low cardiac output states.
Distributive shock.

Contraindications

Hypovolemic shock, pheochromocytoma, tachydysrhythmias, VF.

Adverse Reactions

Cardiac dysrhythmias, hypertension, increased myocardial oxygen demand, extravagation may cause tissue necrosis.

Drug Interactions

Incompatible with alkaline solutions.
Beta blockers may antagonize effects of dopamine.

Dosage and Administration

Adult: 5-20 mcg / kg / min. (Rate determined by physician).
Pediatric: not for use in pediatric patients.

Duration of Action

Onset: 1-4 minutes.
Peak Effect: 5-10 minutes.
Duration: Effects cease almost immediately after infusion shut off.

Special Considerations

Pregnancy safety not established.
Effects are dose-dependent
Dopaminergic response: 2-4 mcg / kg / min.: dilates vessels in kidneys; inc. urine output.
Beta-adrenergic response: 4-10 mcg / kg / min.: Increased chronotropy and inotropy
Adrenergic response: 10-20 mcg / kg / min.: Primarily alpha stimulant / vasoconstriction.
Greater than 20 mcg / kg / min.: reversal of renal effects / override alpha effects.
Always monitor drip rate.
Avoid extravagation injury.

DROPERIDOL (Inapsine)

Class: Antiemetic, antipsychotic

Mechanism of action

Produces marked tranquilization and sedation; reduces motor activity and anxiety; possesses adrenergic blocking, antifibrillatory, antihistaminic, and anticonvulsive properties

Indications

Chemical restraint; acute delirium or psychosis

Contraindications

Known hypersensitivity; known or suspected prolonged QT interval; use with extreme caution in patients with bradycardia, cardiac disease, concurrent MAOI therapy, or use of Class I and Class III antidysrhythmic or other drugs.

Adverse reactions/side effects

QT interval prolongation, VT, TdP, cardiac arrest, mild to moderate hypotension, hypertension, tachycardia, dizziness, drowsiness, restlessness, anxiety, dysphoria, hyperactivity, hallucinations, extrapyramidal symptoms.

Drug interactions

Potentiates CNS depressants; reduces pressor effect of epinephrine.

Dosage and administration

Adult: 2.5 mg slow IV or 5 mg IM

Pediatric: Not routinely recommended

Duration of action

Onset: 3 to 10 minutes IV/IM.

Peak effect: 30 minutes IV/IM

Duration: 2 to 4 hours IV/IM

Special considerations

Pregnancy safety: Category C. Cases of QT prolongation and/or TdP. Closely monitor vital signs and ECG. Monitor the QT interval with a 12-lead ECG if feasible. Document the QT interval and relay findings to the receiving facility staff.

EPINEPHRINE

Class: Sympathomimetic.

Mechanism of Action

Direct acting alpha and beta agonist
Alpha: bronchial, cutaneous, renal and visceral arteriolar vasoconstriction.
Beta 1: positive inotropic and chronotropic actions, increases automaticity.
Beta 2: bronchial smooth muscle relaxation and dilation of skeletal vasculature
Blocks histamine release.

Indications

Cardiac arrest, asystole, PEA, VF unresponsive to initial defib.
Severe bronchospasm, asthma, bronchiolitis.
Anaphylaxis, acute allergic reactions.

Contraindications

Hypertension, hypothermia, pulmonary edema, coronary insufficiency, hypovolemic shock.

Adverse Reactions

Hypertension, dysrhythmias, pulmonary edema, anxiety, psychomotor agitation, nausea, angina, headache, restlessness.

Drug Interactions

Potentates other sympathomimetics.
Deactivated by alkaline solutions.
MAOIs may potentate effects of epinephrine.

Dosage and Administration

Adult:

Allergic reactions and asthma: 0.3 - 0.5 mg (0.3 - 0.5 ml 1:1000) IM
Anaphylaxis: 0.3 - 0.5 mg (3- 5 ml 1:10,000) IV
Cardiac: (asystole, PEA, VF) 1 mg IV push (1:10,000) every 3- 5 minutes

Pediatric:

Allergic reactions and asthma: 0.01 mg/kg (0.01 mL/kg 1:1000) IM to maximum of 0.5 mg.
Cardiac: (asystole, PEA, VF) IV, IO: Standard initial dose: 0.01 mg/kg (1:10,000, 0.1mL/kg)

Duration of Action

Onset: Immediate.
Peak Effects: Minutes.
Duration: Several minutes.

Special Considerations

Pregnancy safety: category C.

ETOMIDATE (Amidate)

Class: Nonbarbiturate hypnotic, anesthesia induction agent

Mechanism of Action:
Short acting hypnotic that acts at the level of the reticular activatingsystem.

Indications:
Premedication for RSI

Contraindications:
Hypersensitivity, labor/delivery, or septic shock.

Adverse Reactions:
Apnea of short duration, respiratory depression, hypoventilation,hypotension, dysrhythmias, nausea, vomiting, involuntary muscle movement.

Drug Interactions:
Effects may be enhanced when given with other CNS depressants.

Dosage and Administration:
Adult: 0.2–0.6 mg/kg IV (typical adult dose is 20mg)

Pediatric: 0.2-0.4mg/kg IV/IO to assist with RSI (over 10 years old), one time only, max 20mg.

Duration of action:
Onset: less than 1 minute
Peak Effect: 1 minute
Duration: 5-10 minutes

Special Considerations:
Pregnancy Safety: Category C
Use caution weighing fetal risk and maternal benefit in pregnant and breastfeeding women.

FAMOTIDINE (Pepcid)

Class: Antiulcer, H2 blocker

Mechanism of action:

Inhibits the volume and concentration of gastric secretions

Indications

GI ulcer; suspected upper GI bleeding; GERD; as an adjunct in the treatment of urticaria and/or pruritus

Contraindications

Known hypersensitivity to famotidine or other H_2 blockers

Adverse reactions/side effects

Constipation, diarrhea, rhabdomyolysis, seizures, pneumonia, agitation, vomiting, headache, dizziness, Vitamin B_{12} deficiency, prolonged QT interval. Confusion, hallucinations, disorientation, agitation, and seizures in older adults

Drug interactions

Decreased absorption of iron. Decreased effects of ketoconazole, naproxen, pseudoephedrine. Increased action of metformin

Dosage and administration

Adult: 20 mg IV, 20 mg orally twice daily
Pediatric: 0.25 mg/kg/dose every 12 hours IV (20 mg/dose maximum). 0.5 mg/kg orally (40 mg/dose maximum)

Duration of action

Onset: 60 minutes
Peak effect: 1 to 3 hours
Duration: 10 to 12 hours

Special considerations

Pregnancy safety: Category B. Fewer adverse effects and drug interactions and a longer duration of action than cimetidine. Can be given orally or IV

FENTANYL CITRATE (Sublimaze)

Class: Narcotic Analgesic

Mechanism of Action: Fentanyl citrate is a narcotic analgesic. A dose of 100 mcg (0.1 mg) (2 mL) is approximately equivalent in analgesic activity to 10 mg of morphine

Indications: IV:

Analgesic action of short duration during the anesthetic periods
RSI premedication, induction and maintenance
Narcotic analgesic supplement in general or regional anesthesia.

Contraindications: Fentanyl Citrate Injection is contraindicated in patients with known intolerance to the drug

Adverse Reactions:

As with other narcotic analgesics, the most common serious adverse reactions reported to occur with fentanyl are respiratory depression, apnea, rigidity and bradycardia; if these remain untreated, respiratory arrest, circulatory depression or cardiac arrest could occur.
Other adverse reactions that have been reported are hypertension, hypotension, dizziness, blurred vision, nausea, emesis, laryngospasm and diaphoresis.
It has been reported that secondary rebound respiratory depression may occasionally occur. Patients should be monitored for this possibility and appropriate countermeasures taken as necessary.

Dosage and Administration

Adult: 1 mcg/kg. to max. 150 mcg. slow IV push.

Pediatric: The safety and efficacy of fentanyl citrate in pediatric patients under two years of age has not been established.
Nasal administration may be permitted by the State Treatment Protocols in certain cases.

Duration of Action

Onset: The onset of action of fentanyl is almost immediate when the drug is given intravenously; however, the maximal analgesic and respiratory depressant effect may not be noted for several minutes.
Peak effect: The peak respiratory depressant effect of a single intravenous dose of fentanyl citrate is noted as 5 to 15 minutes following injection
Duration: The usual duration of action of the analgesic effect is 30 to 60 minutes after a single intravenous dose of up to 100 mcg.

Special Considerations

Pregnancy safety: Category C

FLUMAZENIL (Romazicon)

Class: Benzodiazepine receptor antagonist, antidote

Description:

Flumazenil antagonizes the actions of benzodiazepines in the central nervous system. It has been shown to reverse sedation, impairment of recall, and psychomotor impairment produced by benzodiazepines. Flumazenil is not, however, as effective in reversing hypoventilation. Flumazenil does not antagonize central nervous system effects of ethanol, barbiturates, or opioids.

Indications:

Reversal of respiratory depression and sedation from pure benzodiazepine overdose

Contraindications:

Hypersensitivity to flumazenil or to benzodiazepines, Tricyclic antidepressant overdose, Chronic benzodiazepine users or alcoholics, Cocaine or other stimulant intoxication. Known seizure disorder (relative)

Adverse Reactions:

Nausea and vomiting Dizziness, Headache, Agitation, Injection site pain, Cutaneous vasodilation Abnormal vision, Seizures

Drug Interactions:

Toxic effects of mixed drug overdose (especially tricyclic antidepressants) may emerge with the reversal of the benzodiazepine effects.

Dosage and Administration:

For Suspected Benzodiazepine Overdose

Adult: First dose: 0.2 mg IV over 15 sec
Second dose: 0.3 mg IV over 30 sec
Third dose: 0.5 mg over 30 sec at 1-min intervals until adequate response or max dose of 3 mg

Pediatric: Not recommended

Duration of Action:

Onset: 1-2 min
Duration: Related to plasma concentration of benzo- diazepine

Special Considerations:

Pregnancy safety: Category C
To minimize the likelihood of injection site pain, administer through an IV infusion established in a large vein. Be prepared to manage seizures in patients who are physically dependent on benzodiazepines to control seizures or who have ingested large doses of other drugs. Flumazenil may precipitate withdrawal syndromes in patients who are dependent on benzodiazepines. Patients should be monitored for possible re-sedation, respiratory depression, or other residual benzodiazepine effects.
Be prepared to establish and assist ventilation

FUROSEMIDE (Lasix)

Class: Loop diuretic.

Mechanism of Action

Inhibits electrolyte reabsorption and promotes excretion of sodium, potassium, chloride.

Indications

CHF; Pulmonary edema

Contraindications

Hypovolemia, anuria, hypotension (relative contraindication); hypersensitivity, hepatic coma.

Adverse Reactions

May exacerbate Hypovolemia, hypokalemia, ECG changes, dry mouth, hypochloremia, hyponatremia

Drug Interactions

Lithium toxicity may be potentiated by sodium depletion.
Digitalis toxicity may be potentiated by potassium depletion.

Dosage and Administration

Adult: 0.5-1.0 mg/kg injected slowly IV. (Medical Control Option)
Pediatric: 1 mg/kg / dose IV, IO. (Medical Control Option)

Duration of Action

Onset: 5 minutes.
Peak Effects: 20-60 minutes.
Duration: 4-6 hours.

Special Considerations

Pregnancy safety: Category C.
Ototoxicity and deafness can occur

GLUCAGON

Class:

Hyperglycemic agent, pancreatic hormone,

Mechanism of Action:

Increases blood glucose by stimulating glycolysis.
Unknown mechanism of stabilizing cardiac rhythm in beta-blocker overdose.
Minimal positive inotrope and chronotrope.

Indications

Altered level of consciousness when hypoglycemia is suspected.
May be used as inotropic agent in beta-blocker overdose.

Contraindications

Hyperglycemia, hypersensitivity.

Adverse Reactions

Nausea, vomiting.
Tachycardia, hypertension.

Drug Interactions

Incompatible in solution with most other substances.
No significant drug interactions with other emergency medications.

Dosage and Administration

Adult: 0.5 - 1 mg IM, SC, or slow IV; may repeat q 20 minutes PRN.

Pediatric: 0.1 mg/kg / dose (not to exceed 1 mg) q 20 min. IM, IO, SC, slow IV.
Nasal administration may be permitted by the State Treatment Protocols in certain cases.

Duration of Action

Onset: 1 minute.
Peak effect: 30 minutes.
Duration: Variable (generally 9-17 minutes).

Special Considerations

Pregnancy safety: Category C.
Ineffective if glycogen stores depleted.

GLUCOSE - ORAL

Class: Hyperglycemic.

Mechanism of Action

Provides quickly absorbed glucose to increase blood glucose levels.

Indications

Conscious patients with suspected hypoglycemia.

Contraindications

Decreased level of consciousness, nausea, vomiting.

Adverse Reactions

Nausea, vomiting.

Drug Interactions

None.

Dosage and Administration

Adult: 1 tube oral glucose 17-25g depending on brand
Pediatric: Same as adult.

Duration of Action

Onset: Immediate.
Peak Effect: Variable.
Duration: Variable.

Special Considerations

As noted in indications section.

HALOPERIDOL (Haldol)

Class: Tranquilizer, antipsychotic

Mechanism of Action: Inhibits CNS catecholamine receptors: strong antidopaminergic and weak anticholinergic. Acts on the CNS to depress subcortical areas, midbrain, and ascending reticular activating system in the brain.

Indications: Acute psychotic episodes.

Contraindications: Hypersensitivity to the drug, depressed mental status and agitation secondary to shock and hypoxia, Parkinson's Disease.

Adverse Reactions: Extrapyramidal reactions, seizures, sedation, confusion, insomnia, restlessness, dry mouth, hypotension, tachycardia, dystonia, respiratory depression, QT prolongation, cardiac arrest.

Drug Interactions: Enhanced CNS depression and hypotension in combination with alcohol. Other CNS depressants may potentiate effects.

Dosage and Administration:

Adult: 5mg IM

Pedi: not recommended

Duration of Action

Onset: 10 minutes
Peak effects: 30-45 minutes
Duration: Variable (generally 12-24 hours)

Special Considerations: Pregnancy: Category C. Use during pregnancy only if maternal benefit outweighs fetal risk, especially during the 3rd trimester.
Treat hypotension secondary to haloperidol with fluids and Norepinephrine, NOT Epinephrine.

HELIUM GAS MIXTURE (Heliox)

Class: Medical gas

Mechanism of action

Reduces airflow resistance within the bronchial tree in patients with obstructive lung disease. May reduce the work of breathing and improve pulmonary gas exchange efficiency

Indications

Persistent or severe bronchospasm

Contraindications

None

Adverse reactions/side effects

May reduce the effectiveness of coughing

Drug interactions

Unknown

Dosage and administration

Adult and pediatric: Normoxic patients: 80% helium and 20% oxygen. Hypoxemic patients: 70% helium and 30% oxygen or 60% helium and 40% oxygen. Helium/oxygen mixture fills a reservoir bag attached to a nonrebreathing mask.

Duration of action

Onset: Immediate

Peak effect: Minutes

Duration: Eliminated within a few breaths

Special considerations

Pregnancy safety: Not classified. The lower the helium percentage, the less effective. It should not be routinely administered to children with respiratory distress.

HEPARIN SODIUM

Class: Anticoagulant.

Mechanism of Action:

Prevents conversion of fibrinogen to fibrin and affect clotting factors: IX, XI, XII, plasmin. Does not lyse existing clots.

Indications:

Prophylaxis and treatment of venous thrombosis, pulmonary embolus, coronary **o**cclusion, disseminated intravascular coagulation (DIC), post-operative thrombosis. To maintain patency of IV injection devices and indwelling catheters.

Contraindication:

Hypersensitivity. Patients on antiplatelet drugs (relative contraindication).

Adverse Reactions:

Hemorrhage, thrombocytopenia, allergic reactions (chills, fever, back pain).

Drug Interactions:

Salicylates, some antibiotics and quinidine may increase risk of bleeding.

Dosage and Administration:

Adult: Loading dose: 80 units/kg IV; maintenance dose: 18 units/kg/hour IV.

Pediatric: Loading dose: 50 u/kg IV; maintenance dose: 7.5 units/kg/hour IV

Duration of Action:

Onset: Immediate.
Peak Effect: Variable.
Duration: 4 hours after **continuous** infusion discontinued.

HYDRALAZINE (Apresoline)

Class: Antihypertensive, vasodilator

Mechanism of action

Relaxes arteriolar, but not venous, smooth muscle. Lowers BP

Indications

Pregnancy-induced hypertension lasting more than 15 minutes with associated preeclampsia symptoms

Contraindications

Known hypersensitivity, CAB, mitral valve rheumatic heart disease. Use with caution in patients with stroke, known renal disease, or hypotension.

Adverse reactions/side effects

Headache, nausea, flushing, hypotension, palpitations, tachycardia, dizziness, and angina. Paresthesia, numbness, and tingling

Drug interactions

MAOIs. Synergistic effects if given simultaneously with other antihypertensives. NSAIDs may diminish the antihypertensive effects.

Dosage and administration

Adult: 5 mg IV; may repeat 10 mg after 20 minutes. Goal to reduce MAP by 20% to 25%
Pediatric: Not usually indicated in the prehospital setting

Duration of action

Onset: 5 to 20 minutes.
Peak effect: 10 to 80 minutes.
Duration: 2 to 12 hours

Special considerations

Pregnancy safety: Category C. Not recommended for long-term use during pregnancy. Usually lowers DBP more than SBP.

HYDROCORTISONE/METHYLPREDNISOLONE (Solu-Cortef, Solu-Medrol)

Class: Corticosteroid.

Mechanism of Action

Suppresses acute and chronic inflammation
Replaces absent glucocorticoids
Immunosuppressive effects.

Indications

Asthma, anaphylaxis, croup, Adrenal insufficiency

Contraindications

Hypersensitivity to product.

Adverse Reactions

Hypertension, sodium and water retention, GI bleeding, TB.
None from single dose.

Drug Interactions

Calcium

Dosage and Administration

Hydrocortisone: 2 mg./kg. IV bolus to maximum of 100 mg.; 100 mg. in adult.
Methylprednisolone: 2 mg./kg/ IV bolus to maximum of 125 mg.; 125 mg. in adult.

Duration of Action

Onset: Minutes to Hours (depending on indication).
Peak effects: 8-12 hours.

Special Consideration

Protect medication from heat.
Toxicity and side effects with long-term use.

HYDROXOCOBALAMIN (Vitamin B_{12})

Class: Water soluble Vitamin

Mechanism of Action:

Cyanide is an extremely toxic poison. In the absence of rapid and adequate treatment, exposure to a high dose of cyanide can result in death within minutes due to the inhibition of cytochrome oxidase resulting in arrest of cellular respiration. Specifically, cyanide binds rapidly with cytochrome a3, a component of the cytochrome c oxidase complex in mitochondria. Inhibition of cytochrome a3 prevents thecell from using oxygen and forces anaerobic metabolism, resulting in lactate production,cellular hypoxia and metabolic acidosis.

In massive acute cyanide poisoning, the mechanism of toxicity may involve other enzyme systems as well. Signs and symptoms of acute systemic cyanide poisoning may develop rapidly within minutes, depending on the route and extent of cyanide exposure. The action of hydroxocobalamin in the treatment of cyanide poisoning is based on its ability to bind cyanide ions. Each hydroxocobalamin molecule can bind one cyanide ion by substituting it for the hydroxylian linked to the trivalent cobalt ion, to form cyanocobalamin, which is then excreted in the urine.

Indications:

Hydroxocobalamin is indicated for the treatment of known or suspected cyanide poisoning.

Contraindications: None

Adverse Reactions:

Serious adverse reactions with hydroxocobalamin include allergic reactions and increases in blood pressure. Use caution in the management of patientswith known anaphylactic reactions to hydroxocobalamin or cyanocobalamin.

Consideration should be given to use of alternative therapies, if available.

Many patients with cyanide poisoning will be hypotensive; however, elevations in blood pressure have also been observed in known or suspected cyanide poisoning victims. Elevations in blood pressure (≥180 mmHg systolic or ≥110 mmHg diastolic) were observed in approximately 18% of healthy subjects (not exposed to cyanide) receiving hydroxocobalamin 5g and 28% of subjects receiving 10 g. Increases in blood pressure were noted shortly after the infusions were started; the maximal increase in blood pressure was observed toward the end of the infusion. These elevations were generally transient and returned to baseline levels within 4 hours of dosing.

Drug Interactions

No formal drug interaction studies have been conducted with hydroxocobalamin

HYDROXOCOBALAMIN (Vitamin B_{12}) continued

Dosage and Administration:

Adult: 5 g (i.e., both 2.5g vials) administered as an intravenous (IV) infusion over 15 minutes (approximately 15 mL/min), i.e., 7.5 minutes/vial.

Depending upon the severity of the poisoning and the clinical response, a second dose of 5 g may be administered by IV infusion for a total dose of 10 g. The rate of infusion for the second dose may range from 15 minutes (for patients in extremis) to two hours, as clinically indicated.

Pediatric: 70 mg/kg. This dose should be given over 15 minutes.

Special Considerations:

Emergency Patient Management:
In addition to Cyanokit, treatment of cyanide poisoning must include immediate attention to airway patency, adequacy of oxygenation and hydration, cardiovascular support, and management of any seizure activity. Consideration should be given to decontamination measures based on the route of exposure.

Use with other cyanide antidotes:
Caution should be exercised when administering other cyanide antidotes simultaneously with Hydroxocobalamin, as the safety of co-administration has not been established. If a decision is made to administer another cyanide antidote with Hydroxocobalamin, these drugs should not be administered concurrently in the same IV line.

Preparation of Solution for Infusion
Each 2.5 g vial of hydroxocobalamin for injection is to be reconstituted with 100 mL of diluent (not provided with Cyanokit) using the supplied sterile transfer spike. The recommended diluent is 0.9% Sodium Chloride injection (0.9% NaCl). Lactated Ringers injection and 5% Dextrose injection (D5W) have also been found to be compatible with hydroxocobalamin and may be used if 0.9% NaCl is not readily available. The line on each vial label represents 100 mL volume of diluent. Following the addition of diluent to the lyophilized powder, each vial should be repeatedly inverted or rocked, not shaken, for at least 30 seconds prior to infusion.
Hydroxocobalamin solutions should be visually inspected for particulate matter and color prior to administration. If the reconstituted solution is not dark red or if particulate matter is seen after the solution has been appropriately mixed, the solution should be discarded.

Pregnancy Category: C

HYDROMORPHONE (Dilaudid)

CLASS: Analgesic; opiate agonist

DESCRIPTION:

Hydromorphone is a semisynthetic analog of morphine used to relieve moderate to severe pain in cancer, surgery, trauma, burn, and cardiac patients. The drug works at opioid receptors to produce analgesia and euphoria. It may also produce respiratory depression, miosis, decreased gastrointestinal motility, and physical dependence. Hydromorphone is a schedule II-controlled substance.

INDICATIONS:

Moderate to severe pain Analgesia, Preoperative medication

CONTRAINDICATIONS:

Asthma, GI obstruction, Hypersensitivity to narcotics, Respiratory depression, Status asthmaticus

ADVERSE REACTIONS:

Respiratory depression, Nausea and vomiting, Euphoria, Delirium, Agitation, Hallucination Seizures, Headache, Hypotension, Visual disturbances, Coma, Facial flushing, Circulatory collapse, Dysrhythmias, Allergic reaction, Drowsiness, Rash

DRUG INTERACTIONS:

Respiratory depression, hypotension, or sedation may be potentiated by central nervous system depressants. Therapeutic doses of hydromorphone have caused additive CNS or respiratory depression and hypotension in patients taking MAO inhibitors.

DOSAGE AND ADMINISTRATION:

Adult: 1-2 mg SC/IM or slow IV every 6 hr.; titrate to pain relief

Pediatric (>50 kg): 1 mg IV/SC every 4 hr.

(<50 kg or >6 months of age): 0.015-0.02 mg/kg IV/SC every 2-4 hr; titrate to pain relief.

ONSET AND DURATION:

Onset (IV/IM): Within 15min (dose related)

Duration: 4-5 hr in nondependent patients

SPECIAL CONSIDERATIONS:

Pregnancy safety: Category C

High potential for abuse, Use with extreme caution in patients with head trauma, increased intracranial pressure (ICP), or a preexisting seizure disorder. Use with caution in patients with cardiac dysrhythmias, hypotension, circulatory shock, or hypovolemia. Elderly patients may be more susceptible to adverse reactions.

Can induce vasovagal syncope or orthostatic hypotension. Naloxone should be readily available.

Ibuprofen (Advil, Motrin)

Class: NSAID, nonopioid analgesic

Mechanism of action

Inhibits prostaglandin synthesis; reduces swelling, pain, and fever

Indications

Acute pain management; Antipyretic

Contraindications

Known ASA/NSAID hypersensitivity. ASA-sensitive asthma. Significant renal function impairment. Pregnancy. Known peptic ulcer disease. Active intracranial hemorrhage or GI bleeding. Thrombocytopenia. Coagulation defects. Proven or suspected necrotizing enterocolitis. Perioperative pain in the setting of coronary artery bypass graft surgery

Adverse reactions/side effects

Headache, dizziness, drowsiness, fatigue, restless sleep, thirst/sweating, tingling or numbness in hands and feet, tinnitus, blurred vision and eye irritation, fluid retention, nausea/vomiting, frequent urination

Drug interactions

Additive risk for bleeding if given in combination with other agents that affect hemostasis. Alfalfa, anise, and bilberry may enhance adverse effects. May diminish the antihypertensive effect of Hydralazine. May diminish the diuretic effect of loop, thiazide, and thiazide-like diuretics. TCAs may enhance the NSAID antiplatelet effects. May increase bleeding time in patients taking anticoagulants.

Dosage and administration

Adult: Give 10 mg/kg orally for patients older than 6 months. Maximum dose: 800 mg

Pediatric: Febrile seizures: 10 mg/kg orally, if able to swallow. Maximum dose: 600 mg

Duration of action

Onset: 30 to 60 minutes

Peak effect: 1 to 2 hours

Duration: 6 to 8 hours

Special considerations

Increased risk of heart attack or stroke in patients with or without heart disease or risk factors for heart disease. Increased risk of heart failure

IPRATROPIUM BROMIDE (Atrovent)

Class: Bronchodilator

Mechanism of Action:

Blocks the action of acetylcholine at the parasympathetic sites inbronchial smooth muscle causing bronchodilation.

Indications:

Used in bronchospasm especially associated with COPD, and emphysema.

Contraindications:

Hypersensitivity to atropine or its derivatives**.**

Adverse Reactions:

Ipratropium is poorly absorbed from the lung, so systemic effects are rare.
>10% CNS: Dizziness, Headache, Nervousness
Respiratory: Cough
1-10% Cardiac: Hypotension, palpitations

Drug Interactions: Atropine, Anti-psychotics

Dosage and Administration:

Adult: 0.5mg **via Neb,** usually mixed neb solution with 2.5mg Albuterol

Pediatric: 250mcg via **NEB** may mix neb solution with Albuterol

Duration of Action

Onset: 1-3 minutes after administration
Peak effects: Within 1.5- 2 hours
Duration of Action: Up to 4-6 hours
T1/2: 2 hrs after inhalation

Special Considerations

Pregnancy Safety: Category B.

KETAMINE (Ketalar)

Class: Sedative, analgesic dissociative anesthetic

Mechanism of Action:
Blocks pain receptors and minimizes spinal cord activity, affecting theassociation pathways of the brain between the thalamus and the limbic system.

Indications:
Excited delirium, pain management, procedural sedation

Contraindications:
Hypersensitivity, conditions where hypertension could be dangerous to thepatient's care.

Adverse Reactions:
Hypertension, dysrhythmia, bronchodilation, respiratory depression.

Drug Interactions:
Ketamine increases the effects of opiates, barbiturates, and nondepolarizing neuromuscular blockers.

Dosage and Administration:
Adult: Excited Delirium 4mg/kg IM only

Pain: 0.3-0.5 mg/kg IV, may repeat IV dose once in 10 minutes
Or 1 mg/kg IM/IN, may repeat IM/IN dose once in 20 minutes.

RSI: 2mg/kg IV
Analgesia and sedation for intubated patient: 1-2mg/kg IV every 30-45min
(Not allowed in all systems – know your local protocols)

Pediatric: Not recommended

Duration of action:
Onset: 10 minutes
Peak Effect: 1-2- hours
Duration: 2-6 hours

Special Considerations:
Pregnancy Safety: Category C – Contraindicated for use during pregnancy. Use in caution in older patients due to a higher risk of renal and fatal GI adverse reactions.

KETOROLAC (Toradol)

Class: Nonsteroidal anti inflammatory

Description:

Ketorolac is an anti-inflammatory drug that also exhibits peripherally acting non-narcotic analgesic activity by inhibiting prostaglandin synthesis.

Indications:

Short-term management (less than 5 days) of moderate to severe pain

Contraindications:

Hypersensitivity to the drug, Patients with allergies to aspirin or other nonsteroidal Anti-inflammatory drugs, Bleeding disorders, Renal failure, Active peptic ulcer disease

Adverse reactions:

Anaphylaxis from hypersensitivity, Edema, Sedation, Bleeding disorders, Rash, Nausea, Headache

Drug interactions:

Ketorolac may increase bleeding time when administered to patients taking anticoagulants. Effects of lithium and methotrexate may be increased.

Dosage and administration:

Adult: **IM**: 1 dose of 60 mg (for patients <65 years of age); 1 dose of 30 mg for patients >65 years of age, have renal impairment, and/or weigh less than 50 kg
IV: 30 mg over 1 min (for patients <65 years of age or weigh less than 50 kg); one-half dose (15 mg) for patients >65 years of age, have renal impairment, and/or weigh less than 50 kg

Pediatric: Not recommended

Onset and duration:

Onset: Within 10 min
Duration: 6-8 hr.

Special considerations:

Pregnancy safety: Category C. Solution is clear and slightly yellow.
Use with caution and reduce dose when administering to elderly patients.

LABETALOL (Normodyne, Trandate)

Class: Beta Blocker

Mechanism of Action

Adrenergic receptor blocking agent that has both nonselective beta-adrenergic and selective alpha1 adrenergic receptor blocking actions

Indications

Acute hypertensive crisis and chronic stable hypertension

Contraindications

Greater than 1st degree AV block, cardiogenic shock, severe bradycardia, hypotension, CHF, COPD

Adverse Reactions

Blurred vision, sweats, dizziness, difficulty breathing, facial swelling, wheezing, chest tightness

Drug Interactions

Nitroglycerin, Digoxin, Clonidine, Amiodarone, Calcium Channel Blockers may cause profound hypotension

Dosage and Administration

Adult: 20 mg IV over 2 minutes
Pediatric: 0.4 – 1 mg/kg/hr by continuous IV infusion

Duration of Action

Onset: 2.5 minutes
Peak Effects: 15 minutes
Duration: 8 hours

Special Considerations

Pregnancy safety: Category C.

Levalbuterol (Xopenex)

Class: Sympathomimetic, bronchodilator, short-acting beta-2 adrenergic agonist

Mechanism of action

Stimulates beta-2 receptors

Indications

Treatment of acute bronchospasm in patients with reversible obstructive airway disease (COPD/asthma). Bronchospasm prophylaxis in patients with asthma

Contraindications

Known hypersensitivity to the drug, other sympathomimetics, or peanuts. MAOI use within 14 days. Angioedema, tachydysrhythmias, and severe cardiac disease. Avoid administration with other drugs that prolong the QT interval. Use with caution in patients with cardiac dysrhythmias and cardiovascular disorders.

Adverse reactions/side effects

Headache, anxiety, dizziness, restlessness. Hallucinations. Throat irritation. Tachycardia. Hypertension/hypotension. Dysrhythmias. Angina. Nausea/vomiting. Dyspepsia. Tremors. Hypokalemia. Hyperglycemia.

Drug interactions

Increased actions of bronchodilators, TCAs, MAOIs, and other adrenergic drugs. Increased risk of QT prolongation when administered with other QT-prolonging drugs.

Dosage and administration

Adult: 1.25 mg in 3 mL NS administered by nebulizer over 5 to 15 minutes and repeated as necessary

Pediatric: 0.63 to 1.25 mg in 3 mL NS administered by nebulizer over 5 to 15 and repeated as necessary

Duration of action

Onset: 5 to 15 minutes.

Peak effect: 60 to 90 minutes

Duration: 6 to 8 hours

Special considerations

Pregnancy safety: Category C

LIDOCAINE HCL (2%)

Class: Antidysrhythmic.

Mechanism of Action:

Decreases automaticity by slowing the rate of spontaneous Phase 4 depolarization.

Indications:

Suppression of ventricular dysrhythmias (V-tach, VF, PVCs).
Prophylaxis against recurrence after conversion from V-tach, VF.

Contraindications:

Second degree and third degree blocks in absence of artificial pacemaker).

Adverse Reactions:

Slurred speech, seizures, altered mental status, confusion, lightheadedness, blurred vision, bradycardia.

Drug Interactions

Apnea induced with succinylcholine may be prolonged with high doses of Lidocaine.
Cardiac depression may occur in conjunction with IV Dilantin.
Metabolic clearance decreased in patients with liver disease or those patients taking beta-blockers.

Dosage and Administration – MEDICAL CONTROL OPTION

Adult:

Cardiac arrest VT/ VF: 1-1.5 mg/kg IV push; repeat dose 0.75 mg/kg to maximum dose of 3 mg/kg. After conversion to NSR, begin maintenance infusion at 2-4 mg/min.
VT with pulse: 1-1.5 mg/kg IV Push; then 0.50 - 0.75 mg/kg q 3-5 min. to max. of 3 mg/kg, Begin maintenance infusion at 2-4 mg/min. ASAP.

Pediatric:

VF or Pulseless V-tach: 1 mg/kg IV / IO per dose. Infusion: 20-50 mcg/kg/min.
PVCs with pulse: 1 mg/kg IV / IO per dose. Infusion: 20-50 mcg/kg/min.

Duration of Action

Onset: 1-5 minutes.
Peak Effect: 5-10 minutes.
Duration: Variable. (15 min. - 2 hours)

Special Considerations

Pregnancy safety: Category B.
Reduce maintenance infusions by 50% if patient is over 70 years of age, has liver disease, or is in CHF or shock.
A 75-100 mg bolus maintains levels for only 20 minutes.
If bradycardia occurs with PVCs, always treat the bradycardia with atropine,
Avoid Lidocaine for reperfusion dysrhythmias after thrombolytic therapy.

LORAZEPAM (Ativan)

Class: Benzodiazepine, sedative, anticonvulsant.

Mechanism of Action

Anxiolytic, anticonvulsant and sedative effects; suppresses propagation of seizure activity produced by foci in cortex, thalamus and limbic areas.

Indications

Initial control of status epilepticus or severe recurrent seizures.
Severe anxiety.
Sedation.

Contraindications

Coma, shock or suspected drug abuse.

Adverse Reactions

Respiratory depression, apnea, drowsiness, sedation, ataxia, psychomotor impairment, confusion. Restlessness, delirium. Hypotension, bradycardia.

Drug Interactions

May precipitate CNS depression if patient is already taking CNS depressant medications.

Dosage and Administration

Note: *When given IV or IO, must dilute with equal volume of sterile water or sterile saline; When given IM, Lorazepam is not to be diluted.*

Adult: 2-4 mg slow IV at 2 mg / min. or IM; may repeat in 15-20 minutes to maximum dose of 8 mg. For sedation: 0.05 mg/kg up to 4 mg IM.

Pediatric: 0.05 - 0.20 mg/kg slow IV, IO slowly over 2 minutes or IM; may repeat in 15-20 minutes to maximum dose of 0.2 mg/kg.

Duration

Onset of action: 1-5 minutes.
Peak effect: variable.
Duration of action: 6-8 hours.

Special Considerations

Pregnancy safety: Category D.
Inadvertent arterial injection may result in vasospasm and gangrene.
Lorazepam expires in 6 weeks if not refrigerated.

MAGNESIUM SULFATE

Class: Electrolyte.

Mechanism of Action

Reduces striated muscle contractions and blocks peripheral neuromuscular transmission by reducing acetylcholinesterase release at the myoneural junction; manages seizures in toxemia of pregnancy; induces uterine relaxation; can cause bronchodilation after beta agonists
and anticholinergics have been used.

Indications

Acute Asthma / Bronchospasm
Seizures of eclampsia (Toxemia of pregnancy).
Torsades de Pointes.
Hypomagnesemia.
TCA overdose-induced dysrhythmias.
Digitalis-induced dysrhythmias.
Class IIa agent for refractory VF and VT after administration of Amiodarone

Contraindications

Heart blocks.
Renal diseases.

Adverse Reactions

Respiratory and CNS depression.
Hypotension, cardiac arrest and asystole may occur.
Facial flushing, diaphoresis, depressed reflexes.
Circulatory collapse.

Drug Interactions

May enhance effects of other CNS depressants.
Serious changes in overall cardiac function may occur with cardiac glycosides.

Dosage and Administration

Adult: Seizure activity associated with pregnancy: 1-4 gm IV over 10 minutes.
Torsades de Pointes or Refractory VF/VT: 1-2 grams IV over 1-2 minutes.
For Bronchospasm: 2-4 gm IV in 100ml of NS over 5 minutes

Pediatric: Asthma/bronchospasm, severe: 25-50 mg/kg. over 10 minutes IV.
Usually mixed in 50-100ml of NS to be given IV.

Duration of Action

Onset: Immediate.
Peak effect: variable.
Duration: 3-4 hours.

MAGNESIUM SULFATE continued

Special Considerations

Pregnancy safety: Recommended that drug not be given in the 2 hours before delivery, if possible.

IV calcium gluconate or calcium chloride should be available as antagonist if needed.

Use with caution in patients with renal failure.

Magnesium sulfate is being used for acute MI patients in some systems under Medical Direction.

MANNITOL 20%

Class: Osmotic diuretic

Mechanism of Action:
Promotes the movement of fluid form the intracellular space to the extracellular space. Decreases cerebral edema and intracranial pressure. Promotes urinary excretion of toxins.

Indications:
Cerebral edema. Reduce intracranial pressure for certain cause (space occupying lesions). Rhabdomyolysis (myoglobinuria). Blood transfusion reactions.

Contraindications:
Hypotension, renal failure, electrolyte depletion, dehydration, intracranial bleeding. Severe CHF with pulmonary edema, hyponatremia.

Adverse Reactions:
CHF, pulmonary edema, hypertension, nausea, vomiting, headache, seizures, chest pain, tachycardia. Electrolyte depletion, dehydration, hypotension, sodium depletion.

Drug Interactions:
May precipitate digitalis toxicity in when given concurrently.

Dosage and Administration:
Adult: 0.50g - 2 g / kg IV infusion over 15-30 minutes; may repeat after 5 minutes if no effect.

Pediatric: 0.5 - 1g / kg / dose IV, IO infusion over 30-60 minutes; may repeat after 30 minutes if no effect.

Duration of Action:
Onset: 1-3 hours for diuretic effect; 15 minutes for reduction of intracranial pressure.
Peak effect: variable.
Duration: 4-6 hours for diuretic effect; 3-8 hours for reduction of ICP.

Special Considerations:
Pregnancy safety: Category C.
May crystallize at temperatures below 7.8 degrees Centigrade.
In-line filter should always be used.
Effectiveness depends upon large doses and an intact blood-brain barrier.
Usage and dosages in emergency care are controversial.

MEPERIDINE (Demerol)

Class: Opioid Analgesic

Mechanism of Action:

Synthetic opioid agonist that acts on opioid receptors to produce analgesia, euphoria, respiratory and physical depression; a schedule II drug with potential for physical dependency and abuse.

Indications:

Analgesia for moderate to severe pain.

Contraindications:

Hypersensitivity to narcotic agents. Diarrhea caused by poisoning. Patients taking MAOIs. During labor or delivery of a premature infant. Undiagnosed abdominal pain or head injury.

Adverse Reactions:

Respiratory depression, sedation, apnea, circulatory depression, dysrhythmias, shock, euphoria, delirium, agitation, hallucinations, visual disturbances, coma. Seizures, headache, facial flushing. Increased ICP, nausea, vomiting.

Drug Interactions:

Do not give concurrently with MAOIs (even with a dose in the last 14 days!). Exacerbates CNS depression when given with these medications.

Dosage and Administration:

Adult: 50-100 mg IM, SC or 25 - 50 mg slowly IV.

Pediatric: 1-2 mg/kg / dose IV, IO, IM, SC.

Duration of Action:

Onset: IM: 10-45 minutes; IV: immediate.
Peak effect: 30-60 minutes.
Duration: 2-4 hours.

METOCLOPRAMIDE (Reglan)

Class: Anti-emetic, prokinetic agent

Mechanism of Action:
Blocks dopamine and serotonin receptors in the chemoreceptor trigger zones of the CNS. Increases lower esophageal sphincter tone.

Indications:
Nausea / Vomiting

Contraindications:
Hypersensitivity to metoclopramide or procainamide; GI hemorrhage. Mechanical obstruction or perforation, history of seizures, tardive dyskinesia, or dystonic reaction, Parkinson's disease

Adverse Reactions:
Nausea/vomiting, Headache, fatigue, Rash, Dystonic reaction, Confusion, AV block, bradycardia, hallucinations, laryngospasm

Drug Interactions:
Increased sedation rate when used with CNS depressants, antihistamines, anticholinergics, MAOIs

Dosage and Administration:
Adults: 10 mg IV/IM

Pedi: Over age of 2 and weight greater than 12 kg: 0.1 mg/kg IM or 0.1mg/kg IV. Maximum dose 10mg IV

Duration of Action:
Onset: 1 to 3 minutes (IV), 30 to 60 minutes (IM)
Peak effect: Immediate
Duration: 1 to 2 hours

Special Considerations:
Pregnancy Safety: Category B
Geriatric patients should receive lowest dose that is effective. They are at greater risk for adverse effects.

METOPROLOL (Lopressor)

Class: Beta Blocker

Mechanism of Action: Selective inhibitor of beta1-adrenergic receptors; completely blocks beta1 receptors, with little or no effect on beta 2 receptors at doses <100 mg;

Indications: Atrial fibrillation, Atrial flutter

Contraindications: Hypersensitivity to metoprolol or any component of the formulation; sinus bradycardia; heart block greater than first degree (except in patients with a functioning artificial pacemaker); cardiogenic shock; uncompensated cardiac failure; pregnancy (2nd and 3rd trimesters)

Adverse Reactions:

Respiratory: Bronchospasm
Cardiovascular: Bradycardia, palpitations, edema, congestive heart failure, reduced peripheral circulation.
Central nervous system: Drowsiness, insomnia.

Drug Interactions:

Drugs which slow AV conduction (**digoxin**): effects may be additive with beta-blockers.
Glucagon: Metoprolol may blunt the hyperglycemic action of glucagon.
Verapamil or diltiazem may have synergistic or additive pharmacological effects when taken concurrently with beta-blockers; avoid concurrent I.V. use.

Dosage and Administration:

Adults: 5 mg over 1- 2 minutes slow IVP (Medical Control Option) May repeat every 5 minutes to a maximum of 15mg

Pedi: Not recommended

Special Considerations:

Pregnancy Safety: Category C (manufacturer); D (2nd and 3rd trimesters - expert analysis)
Not recommended in pediatric population. The safety and effectiveness of Metoprolol have not been established in children

MIDAZOLAM (Versed)

Class: Short-acting benzodiazepine CNS depressant.

Mechanism of Action

Anxiolytic and sedative properties similar to other benzodiazepines.
Memory impairment.

Indications

Status Seizure
Sedation, Anxiolytic prior to endotracheal or nasotracheal intubation.
Administer for conscious sedation.

Contraindications

Glaucoma, shock, coma, alcohol intoxication, overdose patient.
Depressed vital signs.
Concomitant use with other CNS depressants, barbiturates, alcohol, narcotics.

Adverse Reactions

Hiccough, cough, over-sedation, nausea, vomiting, injection site pain, headache, blurred vision.
Hypotension, respiratory depression and arrest.

Drug Interactions

Should not be used in patients who have taken CNS depressant.

Dosage and Administration

Adult: 2-6 mg slow IV push; (may be repeated to total maximum: 0.1 mg/kg).

Pediatric: To facilitate intubation: Medical control may order:
(6 months- 5 years) Use of Midazolam 0.05-0.1 mg/kg IV maximum dose of 5 mg.
(6-12 years old) Use of Midazolam 0.1 mg/kg IV maximum dose of 8 mg.

WMD: (See APPENDIX Dosing Table)
Nasal administration may be permitted by the State Treatment Protocols in certain cases.

Duration of Action

Onset: 1-3 minutes IV and dose dependent.
Peak effect: variable.
Duration: 2-6 hours and dose dependent.

Special Considerations

Pregnancy safety: category D.
Administer immediately prior to intubation procedure.
Requires continuous monitoring of respiratory and cardiac function.

MILRINONE (Primacor)

Class: Inotrope

Mechanism of Action:
Increases myocardial contractility and has a direct dilating effect on vascular smooth muscle. Does not possess beta adrenergic properties.

Indications:
Heart failure in post-op cardiovascular surgical patients.

Contraindications:
Known hypersensitivity. Patients with renal dysfunction should receive a lower dose.

Adverse Reactions:
Nausea/vomiting, Headache, Hypotension, Hypokalemia, Bronchospasm, SVT, Ventricular dysrhythmias

Drug Interactions:
Synergistic with catecholamines

Dosage and Administration:
Adults: Consult medical direction or follow the dosing ordered by sending physician.

Pedi: Consult medical direction or follow the dosing ordered by sending physician.

Duration of Action:
Onset: 5 to 15 minutes
Peak effect: Unknown
Duration: 3 to 6 hours

Special Considerations:
Pregnancy Safety: Category C
Hemodynamic monitoring required.

MORPHINE SULFATE

Class: Opioid analgesic. (Schedule II drug).

Mechanism of Action

Alleviates pain through CNS actions
Suppresses fear and anxiety centers in brain.
Depresses brain stem respiratory centers.
Decreases preload and afterload, decreasing myocardial oxygen demand.

Indications

Analgesia for moderate to severe acute and chronic pain (use with caution).
Severe CHF, pulmonary edema.
Chest pain associated with acute MI.

Contraindications

Head injury, exacerbated COPD, depressed respiratory drive, hypotension undiagnosed abdominal pain, decreased level of consciousness.
Suspected hypovolemia.

Adverse Reactions

Respiratory depression, hypotension, decreased level of consciousness, nausea, vomiting.
Bradycardia, tachycardia, syncope, facial flushing, euphoria, bronchospasm, dry mouth.

Drug Interactions

CNS depressant may potentate effects of morphine.

Dosage and Administration

Adult: 0.1 mg/kg to a maximum of 10 mg IV/IM/SC

Pediatric: 0.1 - 0.2 mg/kg / dose IV, IO, IM, SC every 5 minutes titrated to max. of 5 mg.

Duration of Action

Onset: Immediate.
Peak effect: 20 minutes.
Duration: 2 - 7 hours.

Special Considerations

Pregnancy safety: Category C.
Morphine rapidly crosses the placenta.
Safety in neonate not established.
Use with caution in geriatric population and those with COPD, asthma.
Naloxone should be readily available as antidote.

NALOXONE (Narcan)

Class: Narcotic antagonist.

Mechanism of Action

Competitive inhibition at narcotic receptor sites.
Reverse respiratory depression secondary to depressant drugs.
Completely inhibits the effect of morphine.

Indications

Respiratory Depression Secondary to Opiate overdose
Complete or partial reversal of CNS and respiratory depression induced by opioids
- Narcotic agonist
  - Morphine, heroin, hydromorphone (Dilaudid), methadone.
  - Meperidine (Demerol), Paregoric, Fentanyl (Sublimase).
  - Oxycodone (Percodan), codeine, propoxyphene (Darvon).
- Narcotic agonist and antagonist
  - Butorphanol (Stadol).
  - Pentazocine (Talwin).
  - Nalbuphine (Nubain).

Contraindications

Use with caution in narcotic-dependent patients.
Use with caution in neonates of narcotic-addicted mothers.

Adverse Reactions

Withdrawal symptoms in the addicted patient.
Tachycardia, hypertension, dysrhythmias, nausea, vomiting, diaphoresis.

Dosage and Administration

Adult: 0.4 - 2.0 mg IV, IM, SC, Nasal via atomizer); min. recommended = 2.0 mg repeat at 5 minute intervals to 10 mg maximum dose. (Medical Control may request higher amounts). Infusion: 2 mg in 500 ml of D5W (4 mcg/ml), infuse at 0.4 mg / hr. (100 ml/hour).

Pediatric: 0.1 mg/kg / dose IV, IM, SC, ET (diluted); maximum of 0.8 mg; if no response in 10 minutes, administer an additional 0.1 mg/kg /dose.

Duration of Action

Onset: within 2 minutes.
Peak effect: variable.
Duration: 30-60 minutes.

Special Considerations

Pregnancy safety: category B.
Seizures without causal relationship have been reported.
May not reverse hypotension.
Use caution when administering to narcotic addicts (violent behavior, etc.).

NIFEDIPINE (Procardia, Adalat, Nifedical)

Class: Calcium Channel Blocker

Mechanism of Action

Inhibits movement of calcium ions across cell membranes. Inhibits cardiac and vascular smooth muscle contraction. Does not prolong AV nodal conduction.

Indications

HAPE prevention and treatment. Pregnancy-induced hypertension lasting more than 15 minutes with associated preeclampsia symptoms

Contraindications

Known hypersensitivity to calcium channel blockers, cardiogenic shock

Adverse Reactions

Headache, nervousness, weakness, mood changes, dyspnea, cough, heart failure, MI, hypotension, syncope, nausea

Drug Interactions

Beta blockers may potentiate effects.

Dosage and Administration

Adult: HAPE prevention and treatment: 30 mg extended-release PO

Pediatric: Not recommended

Duration of Action

Onset: 15-30 minutes
Peak effect: 1 to 3 hours
Duration: 6 to 8 hours

Special Considerations

Pregnancy safety: Category C.

NITROGLYCERIN

Class

Vasodilators.

Mechanism of Action

Smooth muscle relaxant acting on vascular, bronchial, uterine and intestinal smooth muscle.
Dilation of arterioles and veins in the periphery, reduces preload and afterload, decreases the workload of the heart and, thereby, myocardial oxygen demand.

Indications

Acute angina pectoris.
Ischemic chest pain.
CHF, pulmonary edema.

Contraindications

Hypotension, hypovolemia.
Intracranial bleeding or head injury.

Adverse Reactions

Headache, hypotension, syncope, reflex tachycardia, flushing.
Nausea, vomiting, diaphoresis, muscle twitching.

Drug Interactions

Additive effects with other vasodilators.

Dosage and Administration

Adult:

Tablets: 0.3 mg SL; may repeat in 3-5 minutes to maximum of 3 doses.
NTG spray: 0.4 mg on or under the tongue; 1-2 sprays, may repeat in 3-5 minutes

Pediatric: not recommended.

Duration of Action

Onset: 1-3 minutes.
Peak effect: 5-10 minutes.
Duration: 20-30 minutes or if IV, 1-10 minutes after discontinuation of infusion.

Special Considerations

Pregnancy safety: category C.
Hypotension more common in geriatric population.
NTG decomposes if exposed to light or heat.
Must be kept in airtight containers.
Active ingredient may have a stinging effect when administered SL.

NITROPRUSSIDE (Nitropress)

Class: Antihypertensive, vasodilator

Mechanism of Action

Arterial and venous vasodilator that reduces afterload. Decreased BP and increases cardiac output

Indications

Heart failure, Acute and symptomatic hypertension

Contraindications

Hypersensitivity, hypotension, decreases CPP

Adverse Reactions

Confusion, restlessness, flushing, dizziness, headache, palpitations, hypotension, increased ICP

Drug Interactions

Hypertensives, sympathomimetics, general anesthetics

Dosage and Administration

Adult: Consult sending physician

Pediatric: Not recommended

Duration of Action

Onset: Immediate.
Peak effect: Rapid.
Duration: 1 to 10 minutes

Special Considerations

Pregnancy safety: Category C.
Light sensitive.

Nitrous Oxide 50:50 (Nitronox)

Class: Gaseous analgesic and anesthetic

Mechanism of Action

Exact mechanism is unknown.

Indications

Analgesia in the patient who can self-administer this medication.

Contraindications

Hypersensitivity. Impaired level of consciousness. Head injury, decompression sickness, respiratory compromise, facial trauma, hypotension

Adverse Reactions

Light-headedness, headache, dizziness, confusion, nausea, hallucinations

Drug Interactions

Can potentiate the effects of CNS depressants

Dosage and Administration

Adult: Self-administered

Pediatric: Self-administered

Duration of Action

Onset: 2 to 5 minutes
Peak effect: 2 to 5 minutes
Duration: 2 to 5 minutes

Special Considerations

Pregnancy safety: Category C.
Some agencies prohibit use inside ambulances because of risk to rescuer exposure.
Nonflammable and nonexplosive.
It is ineffective in 20% of the population.

NITROPASTE

Class: Vasodilator

Mechanism of Action:

Smooth muscle relaxant acting on vascular, bronchial, uterine and intestinal smooth muscle. Dilation of arterioles and veins in the periphery reduces preload and afterload, decreases the workload of the heart and, thereby, myocardialoxygen demand.

Indications:

Angina pectoris and chest pain associated with acute MI, CHF/PE; Hypertension(HTN).

Contraindications:

Hypotension, hypovolemia, Intracranial bleeding or head injury.

Adverse Reactions:

Headache, hypotension, syncope, reflex tachycardia, flushing.
Nausea, vomiting, diaphoresis, muscle twitching.

How Supplied: Topical Ointment: (Nitrol®) 2% [20 mg/g] (30g, 60g)

Dosage and Administration

Adult: For CHF/PE; HTN
Paste: Apply 1 inch, cover with plastic wrap and secure with tape.

Pediatric: not recommended.

Duration of Action

Onset: 30 minutes.
Peak effect: Variable.
Duration: 18-24 hours.

Special Considerations

Pregnancy safety: Category C.
Apply in thin uniform layer on non-hairy area.
1-inch equals approximately 15 mg nitroglycerin.
Avoid using fingers to spread paste.
Store past in cool place with tube tightly capped.
Erratic absorption rates quite common.

NOREPINEPHRINE (Levophed)

Class: Vasopressor

Mechanism of Action:

Potent alpha-agonist resulting in intense peripheral vasoconstriction, positive chronotropic and increased inotropic effect with increased cardiac output. Aplha adrenergic activity resulting in peripheral vasoconstriction and beta-adrenergic activity leading to inotropic stimulation of the heart and coronary artery vasodilation.

Indications:

Cardiogenic shock unresponsive to fluid resuscitation, significant hypotension (<70 mm/Hg) states, first line vasopressor in septic shock.

Contraindications:

Hypotensive patients with hypovolemia, preg022219nancy (relative).
Adverse Reactions: Headache, anxiety, dizziness, restlessness, dyspnea, bradycardia, hypertension, dysrhythmias, chest pain, peripheral cyanosis, cardiac arrest, nausea, vomiting, urinary retention, renal failure, decreased blood flow to the GI tract, kidneys and skeletal muscle and skin, tissue necrosis from extravasation.

Drug Interactions:

Can be deactivated by alkaline solutions. Sympathomimetic and phosphodiesterase inhibitors may exacerbate dysrhythmias.

Dosage and Administration:

Adult: 0.1-0.5 mcg/kg/min titrating to a BP of 90 systolic.

Pediatric: 0.1-2 mcg/kg/min, titrate rate to achieve desired change in BP and systemic perfusion.

Duration of action:

Onset: 1-3 minutes
Peak Effect: Variable
Duration: 5-10 minutes. Effects last only 1 minute after infusion discontinued.

Special Considerations:

Pregnancy Safety: Category C. Use cautiously during pregnancy andwhile breastfeeding.
May cause fetal anoxia when used in pregnancy.
Infuse norepinephrine through a large, stable vein to avoid extravasation and tissue necrosis.
Drug or poison induced hypotension may require higher doses to achieve adequate perfusion.

OCTREOTIDE (Sandostatin)

Class: Synthetic hormone, antidiarreal

Mechanism of Action

Decreases visceral blood flow. Inhibits the release of serotonin, vasoactive intestinal peptide, secretin, motilin, and pancreatic peptide.

Indications

Treatment of active GI bleeding during transport

Contraindications

Hypersensitivity

Adverse Reactions

Nausea/vomiting, bloating, dizziness, headache, dysrhythmias, pain at injection site.

Drug Interactions

Decreases cyclosporine levels.

Dosage and Administration

Adult: Consult medical direction or follow the dosing ordered by the sending physician.

Pediatric: Consult medical direction or follow the dosing ordered by the sending physician.

Duration of Action

Onset: 30 minutes
Peak effect: 30 minutes
Duration: Up to 12 hours

Special Considerations

Pregnancy safety: Category B.

OLANZAPINE (Zyprexa)

Class: Second generation antipsychotic, antimanic agent

Mechanism of Action

Acts as a combination of dopamine and serotonin type 2 receptor site antagonist

Indications

Agitated or violent patients experiencing a behavioral emergency

Contraindications

Hypersensitivity, heat exhaustion, anticholinergics, seizures

Adverse Reactions

Dry mouth, drowsiness, slurred speech, unsteady gait, headache, insomnia, depression

Drug Interactions

Addictive effects with alcohol or CNS depressants.

Dosage and Administration

Adult: Chemical restraint: 10 mg IM

Pediatric: Chemical restraint: 6-11 years old: 5mg IM, 12-18 years old 10 mg IM

Duration of Action

Onset: 15 to 30 minutes IM
Peak effect: 15 to 45 minutes IM
Duration: Variable

Special Considerations

Pregnancy safety: Category C
Use caution with benzodiazepines used concurrently.

OXYMETAZOLINE (Afrin, Dristan, Vick's Sinus)

Class: Intranasal decongestant, vasoconstrictor, topical sympathomimetic

Mechanism of Action

Stimulates alpha adrenergic receptors in the arterioles of the nasal mucosa to produce vasoconstriction

Indications

Epistaxis in a patient experiencing facial trauma

Contraindications

Severe hypertension, hypersensitivity

Adverse Reactions

Rebound nasal congestion, nasal mucosa irritation

Drug Interactions

May diminish the vasoconstricting effects of alpa1 agonists

Dosage and Administration

Adult: 2 to 3 sprays in each nare

Pediatric: 1 to 2 sprays in each nare

Duration of Action

Onset: Immediate
Peak effect: 5 minutes
Duration: Up to 5 hours

Special Considerations

Pregnancy safety: Category B

OLANZAPINE (Zyprexa)

Class: Second generation antipsychotic, antimanic agent

Mechanism of Action
Acts as a combination of dopamine and serotonin type 2 receptor site antagonist

Indications
Agitated or violent patients experiencing a behavioral emergency

Contraindications
Hypersensitivity, heat exhaustion, anticholinergics, seizures

Adverse Reactions
Dry mouth, drowsiness, slurred speech, unsteady gait, headache, insomnia, depression

Drug Interactions
Addictive effects with alcohol or CNS depressants.

Dosage and Administration

Adult: Chemical restraint: 10 mg IM

Pediatric: Chemical restraint: 6-11 years old: 5mg IM, 12-18 years old 10 mg IM

Duration of Action
Onset: 15 to 30 minutes IM
Peak effect: 15 to 45 minutes IM
Duration: Variable

Special Considerations
Pregnancy safety: Category C
Use caution with benzodiazepines used concurrently.

ONDANSETRON (Zofran)

Class: Antiemetic

Mechanism of Action:
Selective 5-HT receptor antagonist, blocking serotonin, both peripherally on vagal nerve terminals and centrally in the CNS chemoreceptor trigger zone

Indications:
Treatment and prevention of nausea and vomiting

Contraindications:
Hypersensitivity to ondansetron, other selective 5-HT3 antagonists, or any component of the formulation

Adverse Reactions:
Headache, drowsiness, pruritus, prolonged QT

Dosage and Administration
Adults: 4-8 mg IV or PO

Children: ≤30 kg: 1 mg IV;
≤30 kg: 2 mg IV.

Duration of Action
Onset of action: ~30 minutes
Half-life elimination: Children <5 years: 2-3 hours; Adults: 3-6 hours

Special Considerations
Pregnancy safety: Category B

OXYGEN

Class: Naturally occurring atmospheric gas.

Mechanism of Action

Reverses hypoxemia.

Indications

Confirmed or expected hypoxemia.
Ischemic chest pain.
Respiratory insufficiency.
Prophylactically during air transport.
Confirmed or suspected carbon monoxide poisoning.
All other causes of decreased tissue oxygenation.
Decreased level of consciousness.

Contraindications

Certain patients with COPD, emphysema who will not tolerate Oxygen concentrations over 35%.
Hyperventilation.

Adverse Reactions

Decreased level of consciousness and respiratory depression in patients with chronic CO2 retention. Retrolental fibroplasia if given in high concentrations to premature infants. (maintain 30-40% 02)

Drug Interactions

None.

How Supplied

Oxygen cylinders (usually green and white) of 100% compressed oxygen gas).

Dosage and Administration

Adult:
Cardiac arrest and Carbon Monoxide poisoning: 100%.
Hypoxemia: 10-15 L/ min. via non-rebreather.
COPD: 0-2 L/ min. via nasal cannula or 28-35% venturi mask. Be prepared to provide ventilatory support if higher concentrations of oxygen needed.

Pediatric: Same as for adult with exception of premature infant.

Duration of Action

Onset: Immediate.
Peak effect: not applicable.
Duration: Less than 2 minutes.

Special Considerations

Be familiar with liter flow and each type of delivery device used.
Supports possibility of combustion.

OXYTOCIN (Pitocin)

Class: Pituitary hormone and uterine vasoconstrictor

Mechanism of Action

Binds to oxytocin receptor sites on the surface of uterine smooth muscle and increases the force and frequency of uterine contractions

Indications

Postpartum hemorrhage due to uterine atony after infant and placental delivery

Contraindications

Hypersensitivity, presence of a remaining fetus, unfavorable fetal position, anticipated non-vaginal delivery, fetal distress

Adverse Reactions

Coma, seizures, anxiety, hypotension, nausea, anaphylaxis, pain, maternal intracranial hemorrhage

Drug Interactions

Can cause severe, persistent hypertension if administered with vasopressors

Dosage and Administration

Adult: IM: 10 units IM after delivery of placenta
IV: 10 to 40 units in 1000 mL LR at 10 to 15 gtts

Pediatric: Not applicable

Duration of Action

Onset: 1 to 5 minutes
Peak effect: 40 minutes
Duration: Variable

Special Considerations

Pregnancy safety: Category C
Closely monitor vital signs, including fetal heart rate and uterine tone.

PANCURONIUM (Pavulon)

Class: Neuromuscular blocker (non-depolarizing)

Mechanism of action:

Pancuronium produces complete muscular relaxation by binding to the receptor for acetylcholine at the neuromuscular junction, without initiating depolarization of the muscle membrane. As the concentration of acetylcholine rises in the neuromuscular junction, Pancuronium is displaced and muscle tone is regained.

Indications:

In emergency care, Pancuronium is used to optimize conditions for endotracheal intubation and assisted ventilations. Induction or maintenance of paralysis after intubation to assist ventilations.

Contraindications:

Known hypersensitivity to the drug. Inability to control airway and/or support ventilations with oxygen and positive pressure Neuromuscular disease (e.g., myasthenia gravis)

Adverse reactions:

Transient hypotension Tachycardia, Dysrhythmias, Hypertension, Excessive salivation, Pain, burning at IV injection site

Drug interactions:

Positive chronotropic drugs may potentiate tachycardia.

Dosage and administration:

Adult: 0.04-0.1 mg/kg slow IV; repeat q 30-60 min prn

Pediatric: 0.04-0.1 mg/kg slow IV

Newborn: 0.02 mg/kg dose Onset: Paralysis in 3-5 min Duration: 45-60 min

Special considerations:

Pregnancy safety: Category C, Patients must be sedated completely and have an artificial airway during paralysis. Carefully monitor the patient and be prepared to resuscitate.

Pancuronium has no effect on consciousness or pain. Pancuronium will not stop neuronal seizure activity or decrease central nervous system damage caused by seizures. Heart rate and cardiac output will be increased. Pancuronium is excreted in the urine; doses should be decreased for patients with renal disease.

Neuromuscular blocking agents result in respiratory paralysis. Therefore, intubation and ventilatory support must be readily available.

PHENYLEPHRINE (Neo-Synephrine)

Class: Adrenergic, alpha agonist, nasal vasoconstrictor

Mechanism of Action

Stimulates alpha adrenergic receptors in the arterioles of the nasal mucosa to produce vasoconstriction

Indications

Epistaxis, to reduce bleeding during nasotracheal intubation

Contraindications

Hypersensitivity

Adverse Reactions

Tremors, palpitations, hypertension

Drug Interactions

MAOIs, TCAs, and atropine

Dosage and Administration

Adult: Two sprays in the selected nare before nasotracheal intubation

Pediatric: Not recommended

Duration of Action

Onset: 10 seconds
Peak effect: 30 minutes
Duration: 30 minutes to 4 hours

Special Considerations

Pregnancy safety: Category C
Each bottle is SINGLE PATIENT USE.

POTASSIUM IODIDE (Pima Syrup, SSKI, ThyroSafe, ThyroShield)

Class: Antidote

Mechanism of Action

Potassium iodide (KI) can help block radioactive iodine from being absorbed by the thyroid gland

Indications

Environmental radiation emergency to block uptake of radioactive iodine isotopes in the thyroid and reduce thyroid cancer risk

Contraindications

Hypersensitivity, hyperthyroidism, respiratory failure

Adverse Reactions

Skin rash, salivary gland swelling, iodism

Drug Interactions

NSAIDs may cause potassium retention. Use caution with ACE inhibitors

Dosage and Administration

Adult: Consult medical direction

Pediatric: Consult medical direction

Duration of Action

Onset: Varies
Peak effect: Varies
Duration: 24 hours

Special Considerations

Pregnancy safety: Category D

PRALIDOXIME CHLORIDE (2-PAM, Protopam)

Class: Cholinesterase reactivator.

Mechanism of Action

Reactivation of cholinesterase to effectively act as an antidote to organophosphate pesticide poisoning. This action allows for destruction of accumulated acetylcholine at the neuromuscular junction.

Indications

As an antidote in the treatment of poisoning by organophosphate pesticides and chemicals. In the pre-hospital arena, is used when atropine is or has become ineffective in management of organophosphate poisoning.

Contraindications

Use with caution in patients with reduced renal function.
Patients with myasthenia gravis and organophosphate poisoning.

Adverse Reactions

Dizziness, blurred vision, diplopia, headache, drowsiness, nausea, tachycardia, hyperventilation, muscular weakness, excitement and manic behavior

Drug Interactions

No direct drug interactions, however, patients with organophosphate poisoning should not be given barbiturates, morphine, theophylline, aminophylline, succinylcholine, reserpine and phenothiazines.

How Supplied: Emergency Single Dose Kit containing:

One 20 ml vial of 1gram sterile Protopam Chloride.
One 20 ml ampule of sterile diluent.Sterile, disposable 20 ml syringe.Needle and alcohol swab.

Dosage and Administration

NOTE: If Protopam is to be used, administer almost simultaneously with atropine.
Adult: Initial dose of 1-2 grams as an IV infusion with 100 ml saline over 15-30 minutes.

Pediatric: 20-40 mg/kg as IV infusion over 15-30 minutes.
Doses may be repeated every 1 (one) hour if muscle weakness persists.
If IV administration is not feasible, IM or SC injection may be utilized.

Duration of Action

Onset: Minutes
Peak effects: Variable.
Duration: Variable

Special Considerations

Pregnancy safety: unknown.

PROCAINAMIDE (Pronestyl)

Class: Antidysrhythmic Class Ia

Mechanism of Action:

Suppresses phase IV depolarization in normal ventricular muscle and Purkinje fibers, reducing automaticity of ectopic pacemakers; suppresses reentry dysrhythmias by slowing intraventricular conduction.

Indications:

Suppress PVCs refractory to Lidocaine. Suppress VT with a pulse refractory to Lidocaine. PSVTs with wide-complex tachycardia of unknown origin (drug of choice when associated with WP).

Contraindications:

Second- and Third-Degree block, Torsades de Pointes, Lupus, Digitalis toxicity, Myasthenia gravis.

Adverse Reactions:

PR, QRS, and QT widening, AV Block, cardiac arrest, hypotension, seizures. Nausea, vomiting, reflex tachycardia, PVCs, VT, VF. CNS depression, confusion.

Dosage and Administration:

Adult: 20-30 mg/min; maximum total dose is 17 mg/kg.
Maintenance infusion: 1-4 mg/min.

Pediatric: 2-6 mg/kg IV at less than 20 mg/min; maximum dose is 17mg/kg.
Maintenance infusion: 20-80 micrograms/kg/min.

Duration of Action:

Onset: 10-30 minutes.
Peak effect: Variable.
Duration: 3-6 hours.

PROCHLORPERAZINE (Compazine)

Class: Antiemetic, first-generation anti-psychotic, phenothiazine

Mechanism of Action

Depresses the brain's chemoreceptor trigger zone. Alpha-1 adrenergic receptor blockade produces sedation, muscle relaxation, and cardiovascular effects.

Indications

Nausea and vomiting

Contraindications

Hypersensitivity, CNS depressant usage, anticholinergic medications, glaucoma, children under 2

Adverse Reactions

Drowsiness, slurred speech, unsteady gait, headache, prolonged QT, tachycardia

Drug Interactions

Increased risk of respiratory depression when used with other medications that cause respiratory depression.

Dosage and Administration

Adult: 5 to 10 mg IM/IV

Pediatric: Over age of 2: 0.1 mg/kg slow IV or deep IM. Max dose of 10 mg

Duration of Action

Onset: 10 – 20 minutes IM. Rapid IV
Peak effect: 30 to 60 minutes IV
Duration: 3 to 4 hours IM/IV

Special Considerations

Pregnancy safety: Category C
Contraindicated for breastfeeding women

PROMETHAZINE (Phenergan)

Class: Phenothiazine, antihistamine

Mechanism of Action:

H receptor antagonist that blocks the actions of histamines by competitive antagonism at the H receptor. In addition to antihistamine effects, promethazine also possesses sedative, antimotion, antiemetic, and considerable anticholinergic activity.

Indications:

Nausea and vomiting, Motion sickness, Preoperative and postoperative, obstetrical (during labor) sedation

Contraindications:

Hypersensitivity, Comatose states, central nervous system depression from alcohol, barbiturates, or narcotics.

Adverse reactions:

Sedation, Dizziness, may impair mental and physical ability. Allergic reactions, Dysrhythmias, Nausea and vomiting. Hyperexcitability, and dystonias. Use in children may cause hallucinations, convulsions, and sudden death

Drug interactions:

Concomitant use of central nervous system depressants may have an additive sedative effect. Increased incidence of extrapyramidal effects occurs when given with some MAO inhibitors.

Concomitant use of epinephrine may decrease blood pressure further.

Dosage and administration:

Adult: **IM:** 12.5-25mg (undiluted) deep IM injection

IV: 6.25-25 mg slow IV (dilute in 9 mL of NaCl and give 25 mg or less over 10-15 min)

Pediatric **Age ≥2 years of age only**:

IM: 0.25-0.5 mg/kg (up to a maximum of 25 mg) or

IV: 0.2-0.5 mg IV (up to a maximum of 25 mg) slow IV (dilute in 9 mL of NaCl and give 25 mg or less over 10-15 min)

Duration of Action:

Onset: IV (rapid)

Duration: 4-6 hr.

Special considerations:

Pregnancy safety: Category C (generally considered safe for use during labor).

Use caution in patients with asthma, peptic ulcer, and bone marrow depression. Take care to avoid accidental intraarterial injection. IM injections are the preferred route of administration.

PROPARACAINE OPTHALMIC (Alcaine, Ophthaine)

Class: Topical ophthalmic anesthetic

Mechanism of Action:
Produces local anesthesia by blocking sodium ion channels

Indications:
Induction of topical anesthesia before eye irrigation in the management of a chemical injury to the eye

Contraindications:
Hypersensitivity, intraocular trauma, hyperthyroidism

Adverse reactions:
Temporary stinging, burning, and conjunctival redness

Drug interactions:
Unknown

Dosage and administration:
Adult and Pediatric: 1 to 2 drops in affected eye(s)

Duration of Action:
Onset: 15 to 60 seconds
Peak effect: 30 to 120 seconds
Duration: 10 to 20 minutes

Special considerations:
Pregnancy safety: Category C

Propofol (Diprivan)

Class: Short-acting general anesthetic, sedative-hypnotic

Mechanism of Action:
Produces a rapid and brief state of general anesthesia

Indications:
Maintenance of sedation in mechanically ventilated patients

Contraindications:
Hypovolemia, known sensitives including soybean oil, peanuts, and eggs

Adverse reactions:
Seizure, Apnea, Dysrhythmias, Hypotension, Rash, Involuntary muscle movement

Drug interactions:
Increased effects when combined with alcohol, opioids, and sedatives

Dosage and administration:
Adult and Pediatric: Consult medical control or the sending physician

Duration of Action:
Onset: Less than 1 minute
Peak effect: 1 minute
Duration: As long as infusion is running

Special considerations:
Pregnancy safety: Category b
No analgesic properties

RACEMIC EPINEPHRINE

Class: Sympathomimetic

Mechanism of Action:
Stimulates beta-2 receptors in the lungs: bronchodilation with relaxation of bronchial smooth muscles. Reduces airway resistance. Useful in treating laryngeal edema; inhibits histamine release.

Indications:
Croup, laryngeal edema, bronchial asthma

Contraindications:
Hypertension, underlying cardiovascular disease, epiglottitis.

Adverse Reactions: Headache, anxiety, fear, nervousness, respiratory weakness, palpitations, tachycardia, dysrhythmias, nausea, vomiting.

Drug Interactions:
Beta blockers may blunt the effect. MAOIs may potentiate the effect.

Dosage and Administration:
Adult: 11.25 mg (0.5 ml) Dilute 0.5 ml solution for inhalation with 2.5 ml normal saline in nebulizer

Pediatric: Same as adult dosing

Duration of action:
Onset: within 5 minutes
Peak Effect: 5-15 minutes
Duration: 1-3 hours

Special Considerations:
Pregnancy Safety: Category C
Excessive use may cause bronchospasm.
May have a strong rebound effect after drug wears off.

ROCURONIUM (Zemuron)

Class: Neuromuscular blocker (non-depolarizing)

Mechanism of action:

Rocuronium produces complete muscular relaxation by binding to the receptor for acetylcholine at the neuromuscular junction, without initiating depolarization of the muscle membrane. As the concentration of acetylcholine rises in the neuromuscular junction, Pancuronium is displaced and muscle tone is regained.

Indications:

In emergency care, Rocuronium is used to optimize conditions for endotracheal intubation and assisted ventilations. Induction or maintenance of paralysis after intubation to assist ventilations.

Contraindications:

Known hypersensitivity to bromides. Use with caution in pts with heart and liver disease. Inability to control airway and/or support ventilations with oxygen and positive pressure.

Adverse reactions:

Muscle paralysis apnea, dyspnea, respiratory depression, tachycardia, uritcaria

Drug interactions:

Positive chronotropic drugs may potentiate tachycardia.

Dosage and administration:

Adult: 0.6-1.2 mg/kg IV

Pediatric: 0.9-1.2 mg/kg IV

Duration of Action:

Onset: 30 seconds to 1 minute
Peak effect: 1 minute
Duration: 25-75 minutes

Special considerations:

Pregnancy safety: Category C
Patients must be sedated completely and have an artificial airway during paralysis.
Carefully monitor the patient and be prepared to resuscitate.
Rocuronium has no effect on consciousness or pain. Rocuronium will not stop neuronal seizure activity or decrease central nervous system damage caused by seizures.
Heart rate and cardiac output will be increased. Rocuronium is excreted in the urine; doses should be decreased for patients with renal disease.
Neuromuscular blocking agents result in respiratory paralysis. Therefore, intubation and ventilatory support must be readily available.

SILDENAFIL (Revatio, Viagra)

Class: Phosphodiesterase-5 enzyme inhibitor

Mechanism of Action:
Inhibits PE5 in lung tissue

Indications:
HAPE prevention

Contraindications:
Hypersensitivity, coadministration with nitrates, significant cardiovascular disease

Adverse reactions:
Headache, nasal congestion, flushing, epistaxis, erythema, diarrhea, skin rash, tinnitus

Drug interactions:
Nitrates, alpha blockers, antihypertensives, alcohol

Dosage and administration:
Adult: HAPE Prevention – 50 mg PO every 8 hours
Pediatric: Not recommended.

Duration of Action:
Onset: 20 minutes
Peak effect: 30 to 120 minutes
Duration: 4 hours

Special considerations:
Pregnancy safety: Category B

SODIUM BICARBONATE 8.4%

Class: Buffer, alkalinizer.

Mechanism of Action

Reacts with hydrogen ions to form water and carbon dioxide thereby acting as a buffer for metabolic acidosis.

Indications

Hyperkalemia
TCA overdose
Phenobarbital overdose
Known pre-existing bicarbonate-responsive acidosis.
Upon return of spontaneous circulation after long arrest interval.
Alkalinization for treatment of specific intoxications.

Contraindications

Metabolic and respiratory alkalosis.
Hypocalcemia and hypokalemia.
Hypochloremia secondary to GI loss and vomiting.

Adverse Reactions

Metabolic alkalosis, hypokalemia, hyperosmolarity, fluid overload.
Increase in tissue acidosis.
Electrolyte imbalance and tetany, seizures.
Tissue sloughing at injection site.

Drug Interactions

May precipitate in calcium solutions.
Vasopressors may be deactivated.

Dosage and Administration

Adult: 1 mEq / kg IV; may repeat with 0.5 mEq / kg every 10 minutes**.**

Pediatric: same as for adult.

Duration of Action

Onset: 2-10 minutes.
Peak effect: 15-20 minutes.
Duration: 30-60 minutes.

Special Considerations

Pregnancy safety: Category C.
Must ventilate patient after administration.
Intracellular acidosis may be worsened by production of carbon dioxide.
May worsen CHF.

SUCCINYLCHOLINE (Anectine)

Class: Neuromuscular blocker, skeletal muscle relaxant.

Mechanism of Action: Ultra short acting depolarizing skeletal relaxant that mimics acetylcholine as it binds with the cholinergic receptors on the motor end plate, producing a phase I block as manifested by fasciculations.

Indications: RSI

Contraindications: penetrating eye injuries; malignant hyperthermia; hyperkalemic states; acute injury after multi-system trauma, major burns, or extensive muscle injury that may result in hyperkalemia.

Adverse Reactions: Apnea, respiratory depression, bradydysrhythmia, tachydysrhythmias, cardiac arrest, prolonged muscle rigidity, rhabdomyolysis, malignant hyperthermia, hyperkalemia

Drug Interactions: Oxytocin, beta-blockers, and organophosphates may potentiate effects. Diazepam may reduce the duration of action.

Dosage and Administration:

Adult: 1-2 mg/kg rapid IV. Repeat once if needed.

Pediatric: 2 mg/kg rapid IV. Repeat once if needed.

Duration of action:

Onset: 1 minute
Peak Effect: 1-3 minutes
Duration: 5-10 minutes

Special Considerations: Pregnancy Safety: Category C

Appropriate sedation and analgesia should be used in any patient before undergoing neuromuscular blockade. Time management is crucial. Postintubation sedation and analgesia should be readily available.

Tadalafil (Cialis, Adcirca)

Class: Phosphodiesterase-5 enzyme inhibitor

Mechanism of Action:
Inhibits PE-5 in lung tissue and relaxes pulmonary vascular smooth muscle cells

Indications:
HAPE prevention

Contraindications:
Hypersensitivity, coadministration with nitrates, Stevens-Johnson syndrome, Exfoliative dermatitis

Adverse reactions:
Headache, nasal congestion, back pain, flushing, epistaxis, erythema, diarrhea, skin rash, tinnitus

Drug interactions:
Nitrates, alpha blockers, antihypertensives, alcohol

Dosage and administration:
Adult: For HAPE prevention, 10 mg PO twice daily
Pediatrics: Not recommended

Duration of Action:
Onset: 30 to 45 minutes
Peak effect: 2 hours
Duration: 36 hours

Special considerations:
Pregnancy safety: Category B

TETRACAINE

Class: Local Anesthetic

Mechanism of Action:
Blocks the initiation and conduction of nerve impulses

Indications:
Topically applied local anesthetic for eye examination

Contraindications:
Hypersensitivity to ester anesthetics; Not to be applied in large amounts orto Infants of less than 1 year old.

Adverse Reactions:
1-10% Dermal: Angioedema, burning, contact dermatitis, stinging.
< 1%: Methemoglobinemia in infants

How Supplied: Ophthalmic: 0.5% [5mg/ml] (1ml, 2ml, 15ml)

Dosage and Administration:
Adult: Ophthalmic Solution: Instill 1-2 drops

Pediatric: Safety and efficacy have not been established.

Duration of action:
Onset: Within 60 seconds.

Special Considerations
Pregnancy category C
Caution in Child < 6 years old
Storage Store in a light resistant container
Stability: Lasts 6 months refrigerated; Lasts 4 weeks at room temperature: Discard if solution discolors (should be clear)

THIAMINE (Vitamin B1)

Class: Vitamin (B1)

Mechanism of Action

Combines with ATP to form thiamine pyrophosphate coenzyme, a necessary component for carbohydrate metabolism. The brain is extremely sensitive to thiamine deficiency.

Indications

Delirium tremens.
Wernicke's encephalopathy.

Contraindications

None

Adverse Reactions

Hypotension from too rapid injection or too high a dose.
Anxiety, diaphoresis, nausea, vomiting.
Rare allergic reaction.

Dosage and Administration

Adult: 100 mg slow IV or IM.

Pediatric: 10-25 mg slow IV or IM.

Duration of Action

Onset: Rapid.
Peak effects: variable.
Duration: Dependent upon degree of deficiency.

Special Considerations

Pregnancy safety: Category A.
Large IV doses may cause respiratory difficulties.
Anaphylaxis reactions reported.

TRANEXAMIC ACID (TXA, Cyklokapron)

Class: Hemostatic agent, antifibrinolytic, plasminogen inactivator

Mechanism of Action:
Reduces plasminogen activation, mitigating conversion to plasmin.

Indications:
Blunt or penetrating trauma less than 3 hours from MOI, with hemodynamic compromise, bleeding.

Contraindications:
Hypersensitivity; subarachnoid hemorrhage; history of PE, DVT, or other thromboembolic event; mechanism of injury greater than 3 hours.

Adverse Reactions:
Fatigue, headache, abdominal pain, anemia, DVT, PE, other thromboembolic disorder. Rapid infusion may cause hypotension**.**

Drug Interactions:
Hormonal contraceptives

Dosage and Administration:
Adult: 1000 mg in 100mL of NS infused over 10 minutes

Pediatric: Not recommended.

Duration of action:
Onset: Unknown
Peak Effect: Unknown
Duration: 7-8 hours

Special Considerations:
Pregnancy Safety: Category C
Use in pregnant and breastfeeding women should be clearly indicated.
Must be mixed into an infusion bag, typically 100 mL of NS.

VASOPRESSIN (Pitressin)

Class: Naturally occurring antidiuretic hormone

Mechanism of Action:

Vasopressin acts by direct stimulation of smooth muscle receptors. When given in extremely high doses, it acts as a noradrenergic peripheral vasoconstrictor.

Indications:

As an alternative pressor to epinephrine in adult cardiac arrest. Vasodilatory shock

Contraindications:

Responsive patients with coronary artery disease

Adverse reactions:

Ischemic chest pain, Abdominal distress, Sweating, Nausea and vomiting, Tremors Bronchial constriction, Uterine contraction

Drug interactions:

No significant drug reactions have been reported.

Dosage and administration:

Adult:

Ventricular fibrillation/cardiac arrest: 40 units IV/IO push; may replace either first or second dose of epinephrine

Vasodilatory shock: Continuous infusion of 0.02-0.04 unit/min

Child and infant:

Cardiac arrest: 0.4-1 unit/kg IV/IO bolus (max 40 units)

Hypotension (continuous infusion): 0.0002-0.002 unit/ kg/min (0.2-2 milliunits/kg/min)

Onset and duration:

Onset: Immediate

Duration: Variable

Special considerations:

Pregnancy safety: Category C.

Vasopressin may increase peripheral vascular resistance and provoke cardiac ischemia and angina. Not recommended for responsive patients with coronary artery disease.

VECURONIUM (Norcuron)

Class: Nondepolarizing neuromuscular blocker

Mechanism of action:

Vecuronium is an intermediate-acting, non-depolarizing, neuromuscular blocking agent. Non-depolarizing agents produce skeletal muscle paralysis by blockade at the myoneural junction. Unlike depolarizing agents, vecuronium has little agonist activity, with no depolarizing effect at the motor endplate.

Indications:

To facilitate intubation Muscle relaxation

Contraindications:

Bromide hypersensitivity. Inability to control airway and/or support ventilations with oxygen and positive pressure. Bradycardias, dysrhythmias, hypotension, respiratory depression, muscular disease, malignant hyperthermia.

Adverse reactions:

Rare hypersensitivity reactions (e.g., bronchospasm, flushing, erythema, urticaria, hypotension, sinus tachycardia), excessive doses of vecuronium can cause prolonged apnea, dyspnea, respiratory depression, and/or profound muscular weakness (muscle paralysis).

Drug interactions:

Can interact with opiate agonists by increasing the incidence and severity of bradycardia and hypotension. Administration of IV phenytoin to patients currently receiving vecuronium has been noted to augment the neuromuscular activity of vecuronium.

Dosage and administration:

Neuromuscular Blockade

Adults, adolescents, and children >10 years: 80-100 mcg/kg IV; reconstitute by adding 10 or 20 mL of bacteriostatic water for injection to 10 or 20 mg, respectively, to give a parenteral solution containing 1 mg/ml

Rapid Sequence Intubation

Adults - 0.1-02 mg/kg IV/IO
Children 0.1-0.3 mg/kg IV/IO

Onset and duration:

Onset: Within 1 min
Duration: 25-40 min (dose related)

Special considerations:

Pregnancy safety: Category C. Reconstituted vecuronium, do not mix with alkaline solutions (e.g., barbiturate solutions such as thiopental) in the same syringe or administer simultaneously during intravenous infusion through the same needle or through the same intra- venous line.

VERAPAMIL (Isoptin)

CLASS: Calcium channel blocker (Class IV antidysrhythmic)

Mechanism of Action:

Verapamil inhibits the movement of calcium ions across cell membranes. The slow calcium ion current blocked by verapamil is more important for the activity of the sinoatrial node and atrioventricular node than for many other tissues in the heart. Verapamil decreases atrial automaticity, reduces atrioventricular conduction velocity, and prolongs the atrioventricular nodal refractory period. In addition, verapamil depresses myocardial contractility, reduces vascular smooth muscle tone, and dilates coronary arteries and arterioles in normal and ischemic tissues.

INDICATIONS:

Give only to narrow-complex reentry supraventricular tachycardias or known supraventricular dysrhythmias. Atrial flutter with a rapid ventricular response, atrial fibrillation with a rapid ventricular response, Multifocal atrial tachycardia, Vasospastic and unstable angina

CONTRAINDICATIONS:

Hypersensitivity, Sick sinus syndrome (unless the patient has a functioning pacemaker), Second- or third-degree heart block. Sinus bradycardia, Hypotension, Cardiogenic shock, Severe congestive heart failure, Wolff-Parkinson-White syndrome with atrial fibrillation or flutter. Patients receiving IV beta blockers. Give with extreme caution to patients receiving oral beta blockers. Wide-complex tachycardias of uncertain origin (ventricular tachycardia can deteriorate into ventricular fibrillation when calcium channel blockers are given.)

ADVERSE REACTIONS:

Dizziness, Headache, Nausea and vomiting, Hypotension, Bradycardia, Complete atrioventricular block, Peripheral edema

DRUG INTERACTIONS:

Verapamil increases serum concentration of digoxin. Beta-adrenergic blockers may have additive negative inotropic and chronotropic effects. Antihypertensives may potentiate hypotensive effects.

DOSAGE AND ADMINISTRATION:

Adult: Initial dose: 2.5-5 mg slow IV bolus over 2 min (over 3 min in older patients).
Repeat dose: 5-10mg bolus in 15-30 min after initial dose if needed; or 5 mg bolus every 15 min until a desired response is achieved (max dose 30 mg)

Pediatric:

Not recommended in the prehospital setting

ONSET AND DURATION:

Onset: 1-5 min
Duration: 30-60 min (may persist longer)

VERAPAMIL (Isoptin) continued

SPECIAL CONSIDERATIONS:

Pregnancy safety: Category C, closely monitor patient's vital signs.

Be prepared to resuscitate. Atrioventricular block or asystole may occur because of slowed atrioventricular conduction.

ZIPRASIDONE (Geodon)

Class: Second-generation antipsychotic

Mechanism of Action:
Blocks synaptic reabsorption of serotonin and norepinephrine. Binds to alpha adrenergic receptors, dopamine receptors, and serotonin receptors.

Indications:
For the management of agitated or violent patients experience a behavioral emergency

Contraindications:
Hypersensitivity, Prolonged QT Syndrome, AMI, heart failure, impaired renal function

Adverse reactions:
Dizziness, headache, orthostatic hypotension, suicide attempt, bradycardia, prolonged QT interval

Drug interactions:
CNS depressants

Dosage and administration:
Adult:
Chemical restraint: 10 mg IM
Anxiety: 20 mg IM

Pediatric:
Chemical restraint: Ages 6-11: 5 mg IM, ages 12-18 years old 10 mg IM

Duration of Action:
Onset: 10 minutes IM
Peak effect: 60 minutes
Duration: Variable

Special considerations:
Pregnancy safety: Category C.
Monitor QT interval