DRUG MONOGRAPHS

Saskatchewan College of Paramedics

In spring 2019, the drug monographs previously contained within the Paramedic Clinical Practice Protocols were removed. The Paramedic Practice Committee encourages employers to develop their own monographs based on evidence and current best practice policies. Ambulance services should use the Saskatchewan Health Authority (SHA) drug monographs to ensure consistency across the province. For those paramedics who do not work for an ambulance service and who may not have access to the SHA monographs, appropriate sources to use would include the Canadian Pharmaceutical Compendium, Lexi-comp and other similar resources to develop their own reference material.

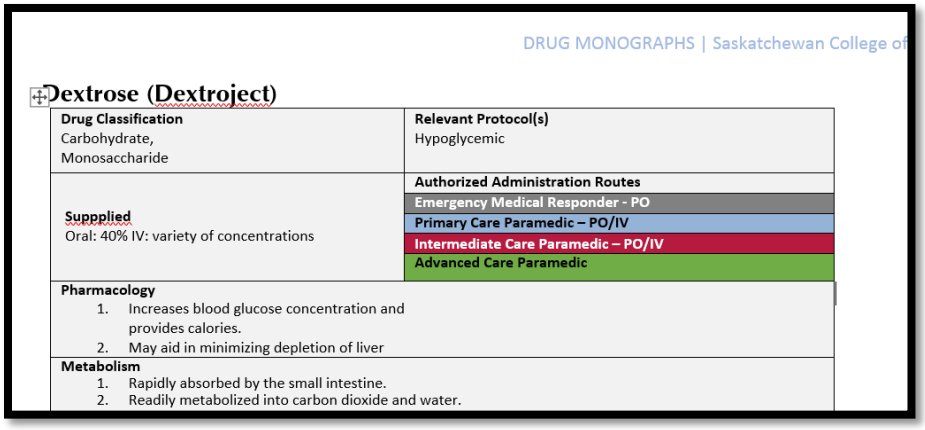
The monographs will remain on the SCoP website outside of the Clinical Practice Protocols as a reference to ensure no paramedic is left without a resource.

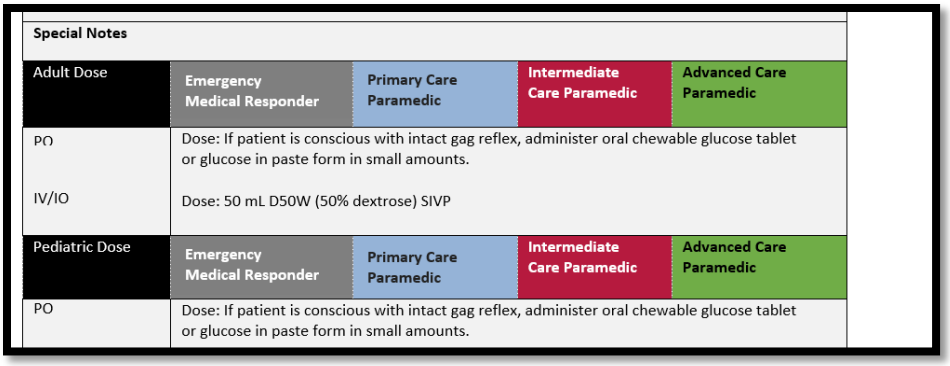
It is expected that paramedics will follow the direction of their employer and not develop references on their own without direction from their employer and the medical advisor.

The Drug Monographs were originally developed in order to make the Paramedic Clinical Practice Protocols less prescriptive. The specific drug names, doses and routes were removed from the patient care plans. The information contained within the Drug Monographs is not intended to be an exhaustive list, but includes some drugs commonly used within the approved classifications.

Employers should consult with their Medical Advisors to determine which drug names within each classification best suits the system in their area. Determining which medication to use must be evidence-based. In order to be authorized for administration, controlled substances such as narcotics and benzodiazepines must be named specifically under the class exception letter issued to the College by Health Canada.

The Drug Monographs are colour-coded to clearly outline which licence levels are permitted to administer or monitor a specific medication, and via which route. The specific routes for Advanced Care Paramedics (ACPs) were removed in 2018 as ACPs are permitted to administer any drug by any approved route and with approval of their medical advisor.





Special Notes				
Adult Dose	Emergency Medical Responder	Primary Care Paramedic	Intermediate Care Paramedic	Advanced Care Paramedic
PO IV/IO	Dose: If patient is conscious with intact gag reflex, administer oral chewable glucose tablet or glucose in paste form in small amounts. Dose: 50 mL D50W (50% dextrose) SIVP			
Pediatric Dose	Emergency Medical Responder	Primary Care Paramedic	Intermediate Care Paramedic	Advanced Care Paramedic
PO	Dose: If patient is conscious with intact gag reflex, administer oral chewable glucose tablet or glucose in paste form in small amounts.			

The example above illustrates that dextrose may be given orally by the EMR, and that PCP, ICP and ACP may administer IV dextrose.

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Acetaminophen (Tylenol)

Drug Classification Analgesic, antipyretic	**Relevant Protocol(s)** Pyrexic Patient Severe Sepsis/Septic Shock
Supplied Oral: immediate release tablet (325 mg, 500 mg), caplet 325 mg, 500 mg), extended release caplet (650 mg), gel cap (500 mg), chewable tablet (80 mg, 160 mg), rapidly dissolving tablet (80 mg/160 mg), liquid (80 mg/mL, 32 mg/mL) Rectal: suppository (160 mg, 325 mg, 650 mg)	**Authorized Administration Routes** **Emergency Medical Responder – PO (assist patient)** **Primary Care Paramedic – PO/PR** **Intermediate Care Paramedic – PO/PR** **Advanced Care Paramedic**

Pharmacology

1. Analgesic/antipyretic agent.
2. Does not share the anti-inflammatory or uricosuric effects of ASA.
3. Does not cause gastrointestinal ulceration or inhibit platelet aggregation.
4. Antipyretic action may involve direct action on the heat regulating centers in the hypothalamus leading to increased heat dissipation through vasodilation and sweating.
5. Analgesic action is proposed to inhibit prostaglandin synthesis in the CNS.
6. Has minimal effect on the peripheral prostaglandin synthesis, which may explain its relative lack of anti- inflammatory effect compared to ASA.

Metabolism

1. Absorbed rapidly and completely from the gastrointestinal tract.
2. 95% conjugated in the liver and excreted renally.

Onset	**Duration**	**Half Life**
- Peak plasma concentration (100umol/L) reached in approximately 48 minutes	- 4-6 hours	- 1-4 hours - May be prolonged in acute overdose

Indications

1. Reduction of fever.

Contraindications

1. Hypersensitivity
2. Acetaminophen-induced liver disease.

Precautions

1. Potentially fatal hepatotoxicity can result from overdose.
2. Patients that may be more susceptible to acetaminophen hepatotoxicity include chronic alcoholics, patients with liver disease, those who are malnourished, or those taking drugs that induce hepatic enzymes.
3. Inadvertent excessive administration can occur with concomitant use of multiple acetaminophen-containing products such as cough and cold remedies, analgesic or arthritis formulations, antipyretics, products for relief of menstrual symptoms or muscle spasm.
4. No more than 75mg/kg should be given to a child in a 24-hr period.

Side Effects

1. No notable adverse side effects that aren't related to chronic long-term use, overdose, hepatic insufficiency.

Special Notes

Adult Dose	Emergency Medical Responder	Primary Care Paramedic	Intermediate Care Paramedic	Advanced Care Paramedic
PO/PR	Dose: 325-650 mg q 4-6 hours, not to exceed 4000 mg/24-hours			
Pediatric Dose	**Emergency Medical Responder**	**Primary Care Paramedic**	**Intermediate Care Paramedic**	**Advanced Care Paramedic**
PO/PR	Dose: 10-15 mg/kg q 4-6 hours, not to exceed 75 mg/kg/24hrs			

Acetylsalicylic Acid (Aspirin)

Drug Classification
Analgesic, Antipyretic, Anti-inflammatory, Platelet Aggregation Inhibitor

Relevant Protocol(s)
Acute Coronary Syndromes

Supplied
Oral: immediate release tablet (80 mg, 325 mg, 500 mg), enteric coated tablet (80 mg, 81mg, 325 mg, 650 mg, 975 mg), chewable tablet (80 mg, 81 mg)
Rectal: suppository (150 mg, 650 mg)

Authorized Administration Routes
- Emergency Medical Responder – PO (assist patient)
- Primary Care Paramedic – PO
- Intermediate Care Paramedic - PO
- Advanced Care Paramedic

Pharmacology
1. Antiplatelet activity though the inhibition of the synthesis of thromboxane A2.
2. Analgesic/antipyretic agent.
3. Interferes with the production of prostaglandins in various organs and tissues with its main actions thought to be peripheral but may have similar activity in the CNS.
4. Reduction of tissue prostaglandin may be responsible for anti-inflammatory effects.
5. Lowers body temperature through inhibition of prostaglandin synthesis in the brain causing increased dissipation of heat via increased blood flow through the skin and sweating.

Metabolism
1. Rapidly absorbed from the stomach and proximal small intestine.
2. Rectal absorption is slow and variable and usually incomplete.
3. Rapidly and nearly completely excreted in the urine.

Onset	Duration	Half Life
– Peak blood levels 2 hours after ingestions of regular tablets, and 6-8 hours after enteric coated tablets		– 2-3 hours low doses – 15-30 hours for anti-inflammatory doses

Indications
1. As an anti-platelet agent to reduce risk of non-fatal MI and stroke.
2. Prevent death in the setting of STEMI and non-STEMI.

Contraindications
1. Hypersensitivity.
2. In patients where hypersensitivity that has led to a bronchospastic reaction.

Precautions
1. Asthma.
2. Should not be used in children, teenagers or young adults with chickenpox, influenza or flu-like illness due to the strong association of these illnesses and the ingestion of ASA and the development of Rye's syndrome.

Side Effects
1. May cause stomach upset.
2. Prolong bleeding times.

Special Notes

Adult Dose	Emergency Medical Responder	Primary Care Paramedic	Intermediate Care Paramedic	Advanced Care Paramedic
PO	Dose: Have the patient chew and swallow 160 to 325 mg of uncoated ASA			

Activated Charcoal (Charcadote, Charc, Charactol, Actidose)

Drug Classification Antidote	**Relevant Protocol(s)** Poisoning Cyclic Antidepressant Overdose
Supplied Various preparations	**Authorized Administration Routes** **Emergency Medical Responder – PO (assist patient)** **Primary Care Paramedic – PO** **Intermediate Care Paramedic - PO** **Advanced Care Paramedic**

Pharmacology
1. Binds to both organic and non-organic substances inside the GI tract, preventing absorption.
2. Must come into direct contact with substance to be absorbed to be effective at preventing absorption.

Metabolism
1. Not absorbed or metabolized.
2. Eliminated in the feces unchanged along with bound drug.

Onset	**Duration**	**Half Life**
– Charcoal binds to substances within one minute of coming into contact	– Remains bound to substance until bound substance passes through GI tract	

Indications
1. Used to prevent the absorption of poison and drugs in overdose and poisoning.
2. Greatest benefit is seen when administered within one hour of ingestion of substance.

Contraindications
1. Do not use in patients with decreased LOC and an unprotected airway.
2. Relatively contraindicated for use with ingestion of caustic substances as charcoal does not bind to these substances but can be administered with co-ingestion of non-caustic substances considered systemic toxins.

Precautions
1. May decrease the effectiveness of orally administered and therapeutically intended medications.
2. Preparations containing sorbitol should be used with caution when administered in children due to the potential to cause electrolyte disturbance.
3. If sorbitol containing preparations are used in adults or children, repeat doses should NOT contain sorbitol.

Side Effects
1. Nausea and vomiting.
2. Aspiration.
3. Constipation.

Special Notes
1. Saskatchewan Poison Control Centre (SPC) 1-866-454-1212

Adult Dose	Emergency Medical Responder	Primary Care Paramedic	Intermediate Care Paramedic	Advanced Care Paramedic
PO/NG/OG	Dose: 1 g/kg - In massive overdose, 2 g/kg may be indicated			
Pediatric Dose	**Emergency Medical Responder**	**Primary Care Paramedic**	**Intermediate Care Paramedic**	**Advanced Care Paramedic**
PO/NG/OG	Dose: 1 g/kg			

Adenosine (Adenocard, Adenoscan)

Drug Classification Antiarrhythmic	**Relevant Protocol(s)** Tachycardia
Supplied 2 mL or 4 mL vial or prefilled syringe (3 mg/mL)	**Authorized Administration Routes** **Advanced Care Paramedic**

Pharmacology

1. A naturally occurring nucleoside that is present in all cells of the body that when injected intravenously, interrupts AV nodal conduction.
2. By interrupting re-entry pathways through the AV node, normal sinus rhythm can be restored in patients with paroxysmal supraventricular tachycardia (PSVT), including PSVT associated with Wolff Parkinson's White (WPW) syndrome.
3. Antagonized competitively by methylxanthines such as caffeine and theophylline and potentiated by blockers of nucleoside transport such as dipridamole (Persantine).
4. Not blocked by atropine.
5. Potent peripheral vasodilator in larger infusion doses with vasoconstriction in the renal afferent arterioles and hepatic veins.
6. IV bolus doses of 6 or 12mg usually have systemic hemodynamic effects.

Metabolism

1. Rapidly cleared from the circulation via cellular uptake.
2. Metabolized intracellularly.
3. The activity is not affected by hepatic or renal insufficiency since neither the kidneys nor liver are required for metabolism or elimination of adenosine.

Onset	**Duration**	**Half Life** – Less than 10 seconds

Indications

1. To convert PSVT, including those associated with accessory bypass tracts (WPW), to normal sinus rhythm.
2. Does not convert atrial flutter, atrial fibrillation, or ventricular tachycardia to normal sinus rhythm.

Contraindications

1. Hypersensitivity.
2. Second- or third-degree heart blocks.
3. Sick sinus syndrome.
4. Symptomatic bradycardia.

1. Adenosine is naturally occurring in the body; therefore, no fetal effects would be anticipated, however it is not known if administration will cause fetal harm. In pregnant patients, use only when benefits outweigh the risks to the fetus.
2. Increased risk of ventricular fibrillation when given to patients taking digoxin and less frequently taking digoxin and verapamil. Use with caution in patients receiving digoxin or digoxin and verapamil in combination.
3. Antagonized by methylxanthines (caffeine or theophylline), therefore, larger doses may be indicated in patients taking these and may be ineffective.
4. Potentiated by dipyridamole (Persantine), thus smaller doses may be effective in patients taking this medication.
5. Higher degrees of heart block may be produced in patients taking carBAMazepine (TEGretol) as this medication is reported to increase the degree of heart block produced by other agents.

Side Effects

1. Usually brief (less than one minute) and may include one or more of the following: facial flushing, dyspnea, chest pain, and nausea.

Special Notes

Adult Dose	**Advanced Care Paramedic**
IV line close to the patient (as central as possible)	Dose: initial dose of 6 mg RIVP, if SVT is not terminated in 1-2 minutes, follow with 12 mg. A second dose of 12 mg may be repeated if required. Single doses greater than 12 mg are not recommended.
Pediatric Dose	**Advanced Care Paramedic**

IV line close to the patient (as central as possible)	Dose: initial dose of 0.05-0.1 mg/kg RIVP. If SVT is not terminated in 1-2 minutes, follow with additional bolus doses at incrementally higher doses, increasing the dose by 0.05-0.1 mg/kg to a maximum dose of 0.3 mg/kg. For patients greater than 50 kg, administer the adult dose.

Amiodarone Hydrochloride (Cordarone, Nexterone, Pacerone)

Drug Classification
Antiarrhythmic

Relevant Protocol(s)
V-fib/Pulseless V-tach Tachycardia

Supplied
50 mg/mL in 3 mL (5 mL vial), 6 mL (10 mL vial), 9 mL (10 mL vial), 18 mL (20 mL vial)

Authorized Administration Routes
Advanced Care Paramedic

Pharmacology

1. Generally considered a Class III antiarrhythmic but possesses characteristics from all four Vaughan Williams classes.
2. Blocks sodium channels (class I).
3. Exerts anti-sympathetic activity (class II).
4. With prolonged administration, lengthens cardiac action potential (class III).
5. Negative chronotropic effects (class IV).
6. Anti-sympathetic action and block of potassium and calcium channels are responsible for the negative dromotropic effects on the sinus node and for the slowing of conduction and prolongation of refractoriness in the AV node.

Metabolism

1. Primarily eliminated by hepatic metabolism and biliary excretion.
2. Oral absorption is slow and variable; 3-12 hours and may continue as long as 15 hours after administration.
3. First pass metabolism in the gut wall and liver appears to be an important factor in determining the systemic availability of the drug.
4. Very high volume of distribution with extensive accumulation in the tissues.

Onset	Duration	Half Life
– Onset of antiarrhythmic activity is highly variable following oral administration	– 10–150 days following withdrawal of long-term therapy	– 50 days (can range from 26-107 days)

Indications

1. Recurrent ventricular fibrillation or refractory ventricular tachycardia.

Contraindications

1. Hypersensitivity.
2. Cardiogenic shock.
3. Marked bradycardia or second- or third-degree heart block.

Precautions

1. To avoid QT prolongation and potential for torsades de pointes, patients with hypokalemia or hypomagnesia should have the condition corrected before receiving amiodarone.
2. Patients experiencing prolonged diarrhea or receiving concomitant diuretics that may have altered acid-base and electrolyte imbalance are also at increased risk of prolonged QT and torsades de pointes with amiodarone administration.
3. Safety and efficacy in children has not been established and administration is not recommended.
4. Should be used only when the benefit outweighs the risk to the fetus in pregnant patients.
5. Increased hypotension in patients receiving beta-blockers and calcium channel blockers.
6. Drug interactions: amiodarone affects the pharmacokinetics of multiple medications and due to the long half-life, these effects can occur long after the discontinuation.

Side Effects

Special Notes

Adult Dose	Advanced Care Paramedic
Perfusing v-tach	
IV/IO	Rapid Loading Infusion Dose: 150 mg over 10 minutes (15 mg/min) - add 3 mL (50 mg/mL) to 100mL D5W (concentration 1.5 mg/mL) - Infuse over 10 min Slow Loading Infusion Dose: 360 mg over 6 hours (1 mg/min) - add 18 mL (50 mg/mL) to 500 mL D5W (concentration 1.8 mg/mL) Maintenance Infusion: 540 mg over 18 hours (0.5 mg/min) decrease the rate of the slow loading dose to 0.5 mg/min - After the first 24 hours, the maintenance infusion rate of 0.5 mg/min (720 mg/24 hours) should be continued utilizing a concentration of 1 to 6 mg/mL (amiodarone hydrochloride for injection concentrations greater than 2 mg/mL should be administered via a central venous catheter). In the event of breakthrough episodes of VF or hemodynamically unstable VT, 150 mg supplemental infusions of amiodarone hydrochloride for injection mixed in 100 mL of dextrose 5% injection may be administered. Such infusions should be administered over 10 minutes to minimize the potential for hypotension. The rate of the maintenance infusion may be increased to achieve effective arrhythmia suppression.[2] During Cardiac Arrest: First dose 300 mg; 2nd dose 150 mg.

Amyl Nitrate

Drug Classification Vasodilator/Cyanide Antidote	**Relevant Protocol(s)** Cyanide Poisoning
Supplied 0.3 ml inhalants	**Authorized Administration Routes** **Primary Care Paramedic – Inhaled** **Intermediate Care Paramedic - Inhaled** **Advanced Care Paramedic**

Pharmacology

1. Chemically related to nitroglycerin.
2. Causes oxidation of hemoglobin to a compound called methemoglobin.
3. Methemoglobin reacts with the toxic cyanide ion to form cyanomethemoglobin, which can be enzymatically degraded. This serves to remove cyanide from the blood.

Metabolism

1. Therapeutic effects diminish after approximately 20 minutes.

Onset	**Duration**	**Half Life**
– Immediate	– Therapeutic effects diminish after approximately 20 mins	

Indications

1. Cyanide poisoning.

Contraindications

1. None.

Precautions

1. Headache.
2. Hypotension.

Side Effects

1. Severe headache.
2. Weakness.
3. Dizziness.
4. Flushing.
5. Cold sweats.
6. Tachycardia.
7. Syncope.
8. Orthostatic hypotension.
9. Nausea.
10. Vomiting.

Special Notes

Adult Dose	Primary Care Paramedic	Intermediate Care Paramedic	Advanced Care Paramedic
Inhaled	One to two inhalants of amyl nitrate should be crushed and inhaled. This should be maintained until the patient has reached an emergency department.		

Antimicrobials

Drug Classification Antimicrobials	**Relevant Protocol(s)** Inter-facility transfer of patients receiving medications Severe Sepsis / Septic Shock
Supplied Various preparations	**Authorized Administration Routes** **Primary Care Paramedic – monitor infusion** **Intermediate Care Paramedic – monitor infusion** **Advanced Care Paramedic**
Indications – Kill or prevent the replication of microbes in an infected host.	
Contraindications – Any specific to the antimicrobial being administered.	
Precautions – The majority of antimicrobial can be administered over 10-15 minutes, so will seldom need to be infused during inter-facility transfer – A dosage sticker **must** be affixed to the IV mini-bag – An infusion control device at a predetermined rate according to the local pharmacy protocol must be used	
Special Notes – The PCP, ICP and ACP may attend transporting patients receiving antimicrobial infusions during inter-facility transfer. – Bolus IV antimicrobial therapy is only permitted in the pre-hospital setting when treating severe sepsis/septic shock.	

Atropine Sulphate (AtroPen)

Drug Classification Anticholinergic	**Relevant Protocol(s)** Medicated Facilitated Intubation (MFI) Bradycardia Organophosphate/Carbamate Poisoning
Supplied 5 or 10mL pre-fill syringe (0.1mg/mL) 1mL ampule and 10 mL multi dose vial (0.4 mg/mL) 1mL ampule (0.6 mg/mL)	**Authorized Administration Routes** **Advanced Care Paramedic**

Pharmacology

1. Direct vagolytic action enhances sinus node automaticity and atrioventricular conduction.
2. Acts at the muscarinic receptors as a competitive antagonist of acetylcholine.
3. Acts on secretory glands and smooth muscle innervated by cholinergic nerves resulting in increased heart rate, decreased atrioventricular conduction time, decreased salivary, bronchial and gastric secretions, dilation of bronchioles, decreased gastrointestinal smooth muscle tone and peristalsis and relaxation of lower esophageal sphincter.
4. Relaxation of genitourinary, biliary, and GI tracts.
5. In large doses, can block nicotinic receptors at the autonomic ganglia and neuromuscular junction.

Metabolism

1. Metabolized in the liver.
2. 3-50% excreted unchanged in the urine.

Onset	**Duration**	**Half Life**
– 2-4 minutes following IV administration	– Heart rate increases 2-4 minutes after IV administration	- 2-12.5 hours

Indications

1. Symptomatic sinus bradycardia.
2. Organophosphate insecticide poisoning.

Contraindications

1. Patients with pyloric stenosis, thyrotoxicosis, obstructive GI diseases, paralytic ileus, or prostatic hypertrophy.
2. Severe ulcerative colitis.
3. Tachycardia.
4. Myasthenia gravis.
5. Narrow angle glaucoma.

Precautions

1. Due to the anticholinergic effects and antimuscarninic action of atropine, it has potential to negatively affect many conditions involving many body systems.

Side Effects

1. Headache.
2. Restlessness.
3. Tachycardia.
4. Dry mouth.
5. Hot skin.
6. Blurred vision.
7. Mydriasis.
8. Impaired GI motility.

Special Notes

Adult Dose	**Advanced Care Paramedic**
IV/IO	Bradycardia/Pre-medication MFI Dose: 0.5 mg q 3-5 min. max. of 3 mg Organophosphate/Carbamate Poisoning Dose: 2-5 mg q 10-15 min.
Pediatric Dose	**Advanced Care Paramedic**

IV/IO	Bradycardia/Pre-medication MFI Dose: 0.02 mg/kg, minimum dose of 0.1 mg and maximum dose of 0.5 mg in a child and 1.0 mg in an adolescent Dose may be repeated once q 5 min to a total maximum dose of 1.0 mg in a child and 2.0 mg in an adolescent Organophosphate/Carbamate Poisoning Dose: 0.05 mg/kg q 10-15 min.

Cefotaxime (Clarforan)

Drug Classification Antibiotic Class: Third generation Cephalosporins	**Relevant Protocol(s)** Severe Sepsis/Septic Shock
Supplied 500 mg (reconstituted with 10 mL sterile water) 1 g (reconstituted with 10 mL sterile water) 2 g (reconstituted with 10 mL sterile water)	**Authorized Administration Routes** **Advanced Care Paramedic**

Pharmacology

1. Spectrum of activity includes many gram-positive aerobic bacteria, some gram-negative aerobic bacteria, and some anaerobic bacteria; inactive against *Chlamydia*, fungi, andviruses·
2. Usually bactericidal.

Metabolism

1. Not appreciably absorbed from GI tract; must be administered parenterally. Following IM administration, peak serum concentrations attained within 30 minutes.
2. Widely distributed into body tissues and fluids, including aqueous humor, bronchial secretions, sputum, middle ear effusions, bone, bile, and ascitic, pleural, and prostatic fluids.
3. Metabolized in the liver and excreted principally in theurine.

Onset	**Duration**	**Half Life**
– Peak serum concentrations within 30 minutes (following IM injection)	– Varied	– 54-102 minutes

Indications

1. Severe septicemia with signs of septicshock.

Contraindications

1. Hypersensitivity to cephalosporin or penicillin groups ofantibiotics.

Precautions

1. Rapid IV administration potential to cause life-threateningarrhythmia.
2. Use with caution or consider alternative in patients with history ofcolitis.

Side Effects

1. Injection site pain andinflammation.
2. Diarrhea, nausea, vomiting.
3. Hypersensitivity-rash, pruritus,fever.

Special Notes

1. Reconstituted solution may be further diluted with 50-1000 mL of fluid recommended for administration.

Adult Dose	**Advanced Care Paramedic**
IV/IO	Dose: 2 g q 6-8 hours max. 12 g per day
Pediatric Dose	**Advanced Care Paramedic**
IV/IO	Dose: 50-100 mg/kg/day, divided into 4-6 equal doses

Clopidogrel (Plavix)

Drug Classification Platelet aggregation inhibitor	**Relevant Protocol(s)** STEMI
Supplied Oral: 75mg and 300mg tablet	**Authorized Administration Routes** **Advanced Care Paramedic – PO** **PENDING IMPLEMENTATION OF STEMI PROTOCOL**

Pharmacology

1. Prodrug whose metabolites are the inhibitors of platelet aggregation.
2. The active metabolite selectively inhibits the binding of adenosine diphosphate (ADP) to its platelet P2Y12 receptor and the subsequent ADP-mediated activation of the glycoprotein GPIIb/IIIa complex thereby inhibiting platelet aggregation.
3. In patients with STEMI, has been shown to reduce the rate of an endpoint of all-cause mortality and the rate of combined endpoint of death, re-infarction or stroke.

Metabolism

1. Actively metabolized by the liver.
2. Approximately 50% is excreted in the urine and approximately 46% is excreted in the feces 5 days after dosing.

Onset	**Duration**	**Half Life**
– 2 hours	– Platelet aggregation returns to normal approximately 5 days	– 6 hours

Indications

1. STEMI.
2. In combination with ASA for early and long-term prevention of atherothrombotic events in patients with acute coronary syndrome.

Contraindications

1. Hypersensitivity.
2. Active bleeding such as peptic ulcer.
3. Significant liver impairment.

Precautions

1. Concomitant use with proton-pump inhibitors may reduce the inhibitory effect on platelet aggregation.
2. Prolongs bleeding time.

Side Effects

1. Chest pain.
2. Accidental injury.
3. Influenza-like symptoms.
4. Pain.
5. Dizziness.
6. Nausea.
7. Rash.

Special Notes

Adult Dose	**Advanced Care Paramedic**
PO	Dose: 300 mg

Dextrose (Dextroject)

Drug Classification Carbohydrate, Monosaccharide	**Relevant Protocol(s)** Hypoglycemic
Suppplied Oral: 40% IV: variety of concentrations	**Authorized Administration Routes** Emergency Medical Responder - PO Primary Care Paramedic – PO/IV Intermediate Care Paramedic – PO/IV Advanced Care Paramedic

Pharmacology

1. Increases blood glucose concentration and provides calories.
2. May aid in minimizing depletion of liver

Metabolism

1. Rapidly absorbed by the small intestine.
2. Readily metabolized into carbon dioxide and water.

Onset	Duration	Half Life
Oral approximately 10-20 min. IV immediate	Following oral administration, concentrations peak at about 40 minutes	

Indications
Hypoglycemia

Contraindications

1. Simultaneous administration of dextrose solutions (without electrolytes) with blood through the same infusion set increases the risk of RBC cell pseudo agglutination.

Precautions

1. Hypertonic dextrose solutions may be administered slowly via a large peripheral vein, preferably through a small-bore needle to avoid extravasation.
2. Possible hypokalemia and hypophosphatemia after prolonged use of concentrated dextrose solutions.
3. Head injury.

Side Effects
Fever.
Injection site infection.
Extravasation.

Special Notes

Adult Dose	Emergency Medical Responder	Primary Care Paramedic	Intermediate Care Paramedic	Advanced Care Paramedic
PO	Dose: If patient is conscious with intact gag reflex, administer oral chewable glucose tablet or glucose in paste form in small amounts.			
IV/IO	Dose: 50 mL D50W (50% dextrose) SIVP			

Pediatric Dose	Emergency Medical Responder	Primary Care Paramedic	Intermediate Care Paramedic	Advanced Care Paramedic
PO	Dose: If patient is conscious with intact gag reflex, administer oral chewable glucose tablet or glucose in paste form in small amounts.			
IV/IO	Dose: 2-4 mL/kg D25W (25% dextrose) SIVP			

Diazepam (Valium, Diastat, Diazemuls)

Drug Classification Benzodiazepine	**Relevant Protocol(s)** Inter-facility transfer of patients receiving medications Seizures
Supplied Various preparations	**Authorized Administration Routes** **Intermediate Care Paramedic – monitor infusion** **Advanced Care Paramedic**
Indications 1. Seizure disorders. 2. Alcohol withdrawal. 3. Skeletal muscle spasticity.	
Contraindications 1. Hypersensitivity.	
Precautions 1. Record vital signs every 15 minutes 2. A dosage sticker must be affixed to the IV mini-bag 3. An infusion control device at a predetermined rate according to the local pharmacy protocol	
Special Notes	

dimenhyDRINATE (Gravol, Dinate, Naueatol, Dramamine)

Drug Classification Antiemetic/Anti-vertigo	**Relevant Protocol(s)** Nausea & Vomiting
Supplied 1mL and 5 mL ampules 50mg/mL	**Authorized Administration Routes** **Primary Care Paramedic – PO/IM/IV** **Intermediate Care Paramedic – PO/IM/IV** **Advanced Care Paramedic**

Pharmacology

1. Shown to inhibit vestibular stimulation, acting on the otolith system, and in larger doses on the semicircular canals.
2. Inhibits acetylcholine; this may be its primary mechanism of action, since cholinergic stimulation in the vestibular and reticular systems may be responsible for the nausea and vomiting of motion sickness.

Metabolism

1. Metabolized by the liver and excreted in the urine.

Onset	**Duration**	**Half Life**
– IV-almost immediately - IM-20-30min	– 3-6 hours	

Indications

1. Nausea and vomiting related to motion sickness, medication administration, and vertigo.

Contraindications

1. Hypersensitivity.
2. Glaucoma.
3. Chronic lung disease.
4. Prostatic hypertrophy

Precautions

1. Risk of drowsiness
2. Drowsiness and/or sedation are potentiated by other CNS depressants such as alcohol.

Side Effects

1. Drowsiness.
2. Headache.
3. Blurred vision.
4. Tinnitus.
5. Dry mouth.
6. Incoordination.
7. Palpitation.
8. Dizziness.
9. Hypotension
10. Excitation (especially in children).

Special Notes

Adult Dose	**Primary Care Paramedic**	**Intermediate Care Paramedic**	**Advanced Care Paramedic**
IM	Dose: 25-50 mg q 4 hrs.		
IV	Dose: 25-50 mg over 2 minutes (diluted 1:10)		
Pediatric Dose	**Primary Care Paramedic**	**Intermediate Care Paramedic**	**Advanced Care Paramedic**
IM	Dose: over 12 years old: 50 mg q 4 hrs. 8-12years: 25-50 mg q 8 hrs. 6-8 years: 12.5-25 mg q 8 hrs.		
IV	Dose: under 12 years: 1.0 mg/kg SIVP over 2 minutes, not to exceed 50 mg (diluted 1:10)		

diphenhydrAMINE (Benadryl, Allerdryl, Nytol, Sleep Aid, Sleep-Eze)

Drug Classification Antihistaminic	**Relevant Protocol(s)** Allergy/Anaphylaxis
Supplied 1 mL vial 50 mg/ mL	**Authorized Administration Routes** **Advanced Care Paramedic**

Pharmacology
1. Blocks H1 receptor sites preventing the reaction of histamine on the cell
2. Suppresses flare and pruritus that accompany the endogenous release ofhistamine.

Metabolism
1. Rapidly and almost completely metabolized
2. Excreted as metabolites in the urine.

Onset	**Duration**	**Half Life**
– Peak effects within 1-3 hours	– 7 hours	- 2.4-9.3 hours

Indications
1. Acute allergic reactions
2. Adjunct to EPINEPHrine and other standard measures for management of anaphylaxis

Contraindications
1. Hypersensitivity.

Precautions
1. Use with caution in patients with increased intraocular pressure, angle-closure glaucoma, stenosing peptic ulcer, pyloroduodenal obstruction, bladder-neck obstruction, symptomatic prostatic hypertrophy, active or a history of lower respiratory disease (e.g., bronchial asthma), hyperthyroidism, or cardiovascular disease (e.g., hypertension)

Side Effects
1. Sedation.
2. Sleepiness.
3. Dizziness.
4. Disturbed coordination.
5. Epigastric distress.
6. Thickening of bronchial secretions.
7. Excitation (especially in children).

Special Notes

Adult Dose	**Advanced Care Paramedic**
PO/IM	Dose: 1 mg/kg to a maximum dose of 50 mg
Infusion	Dose: 1 mg/kg to a maximum dose of 50 mg diluted in 50 or 100 mL NaCL infused over 10-15 minutes
Pediatric Dose	**Advanced Care Paramedic**
IV/IM	Dose: 1-2 mg/kg in children greater than 1 month of age

DOPamine (Intropin)

Drug Classification Sympathomimetic	**Relevant Protocol(s)** Severe Sepsis/ Septic Shock
Supplied 200 mg, 400 mg, and 800 mg preparations in 250 mLs D5W 800 mg preparations in 500 mLs D5W	**Authorized Administration Routes** **Advanced Care Paramedic**

Pharmacology

1. Endogenous catecholamine that is the immediate precursor of norepinephrine is a sympathomimetic agent with prominent dopaminergic and B1-adrenergic effects at low to moderate doses and a-adrenergic effects at high doses
   3
2. B1 effects lead to positive inotropic effect resulting in increased cardiac output due to the increased contractility and stoke volume.
3. Increases coronary blood flow 2.5 times that of EPINEPHrine.

Metabolism

1. Metabolized via the liver, kidneys, and plasma
2. Approximately 25% of a dose is metabolized into norepinephrine within the adrenergic nerve terminals

Onset	**Duration**	**Half Life**
– 5 minutes	– Stops within 10 minutes of d/c infusion	– Approx. 2 minutes

Indications

1. Restoration and maintenance of blood pressure in patients with septicemia.

Contraindications

1. Pheochromocytoma or uncorrected tachyarrhythmias or VF
2. Hypotensive patients with uncorrected hypovolemia

Precautions

1. Must be administered via IV pump
2. Administer in a large vein.
3. Take care to avoid the risk of extravasation into surrounding tissues. Infusion site should be monitored for blanching, cold temperature, and firmness along the course of the vein or around infusion site
4. Ventricular arrhythmias may occur at high doses

Side Effects

1. Ectopic heart beats
2. Tachycardia
3. Angina
4. Palpitation
5. Vasoconstriction
6. Hypotension
7. Dyspnea
8. Nausea
9. Vomiting
10. Headache

Special Notes

Adult Dose	**Advanced Care Paramedic**
Infusion	Dose: 2–5 mcg/kg/minute, increased by 1-4 mcg/kg/min at 10-30-minute intervals titrated to effect. In severely ill patients, initiate at 5 mcg/kg/min and increase by 5-10 mcg/kg/min, up to 20-50 mcg/kg/min
Pediatric Dose	**Advanced Care Paramedic**
Infusion	Dose: maximum is 15-20 mcg/kg/min

Enoxaparin Sodium (Heparin: Low Molecular Weight, Lovenox)

Drug Classification Anticoagulant	**Relevant Protocol(s)** Saskatchewan STEMI Protocol
Supplied 100 mg/mL and 150 mg/mL	**Authorized Administration Routes** **Primary Care Paramedic – monitor infusion** **Intermediate Care Paramedic – monitor infusion** **Advanced Care Paramedic – monitor infusion** **IV/SC ADMINISTRATION PENDING IMPLEMENTATION OF STEMI PROTOCOL**

Pharmacology

1. Inhibits clotting processes by catalyzing the inhibition of factor Xa.
2. Fragments of unfractionated heparin through process of depolymerization.
3. Due to the smaller size of the low molecular weight heparin molecule it is unable to bind to thrombin and antithrombin simultaneously.

Metabolism

1. Not absorbed through the GI tract, so it must be administered IV or SC.
2. Unlike unfractionated heparin, low molecular weight heparin does not bind to plasma proteins.
3. Cleared primarily through the renal system.

Onset	**Duration**	**Half Life**
– IV: immediate – SC: 20-60 minutes		Approximately 2-4 hours

Indications

1. Prevention/treatment of DVT.
2. Unstable angina or non-Q wave MI.
3. Acute ST-elevation MI.

Contraindications

1. Hypersensitivity.
2. History of heparin induced thrombocytopenia.
3. Active uncontrolled bleeding.
4. Hemorrhagic stroke or other conditions involving high risk of bleeding.
5. Severe hypertension.

Precautions

1. Should not be injected IM due to risk of hematoma.
2. Use caution when administering to patients also on with oral anticoagulants, platelet inhibitors, and NSAIDS.
3. Recommended for prophylaxis of acute thrombosis.
4. Use in patients with prosthetic heart valves is controversial.

Side Effects

1. Increased risk for bleeding in patients who are alcoholics, are taking platelet drugs, are in renal failure, or are of an advanced age.

Special Notes

1. The PCP, ICP and ACP may attend transporting patients receiving heparin infusions during an inter-facility transfer.

Adult Dose	**Advanced Care Paramedic**
SC	Unstable Angina and Non-Q wave MI Dose: 1 mg/kg s.c. q 12 hrs. max of 100 mg in single dose for 2-8 days Acute ST elevation MI Dose: 30 mg IV bolus plus 1mg/kg s.c., then 1 mg/kg s.c. q 12 hrs max of 100 mg in single dose

EPINEPHrine (Adrenaline)

Drug Classification
Sympathomimetic

Relevant Protocol(s)
Allergy/Anaphylaxis, Asthma/COPD, Dyspnea, Cardiac Arrest, Asystole/PEA, Bradycardia

Supplied
1:1000; 1 mL ampules (1 mg/mL)
1:10000; 10 mL syringes (0.1 mg/mL)

Authorized Administration Routes
- Emergency Medical Responder – Epipen
- Primary Care Paramedic – IM/SC/Nebulized
- Intermediate Care Paramedic – IM/SC/Nebulized
- Advanced Care Paramedic

Pharmacology
1. Acts on alpha and beta receptor sites of sympathetic effector cells.
2. Most prominent actions are on the beta receptors of the heart, vascular and other smooth muscle.
3. Rapid IV administration: rapid rise in BP through direct stimulation of cardiac muscle which increases strength of ventricular contraction, increasing heart rate and constriction of the arterioles in the skin, mucosa and splenic areas of the circulation.
4. Relaxes smooth muscle of the bronchi.
5. Produces rise in blood sugar and glycogenolysis in the liver.

Metabolism
1. Disappears rapidly from the bloodstream.
2. Rapidly inactivated and degraded by liver enzymes and other tissues.
3. Large portions of injected dose is excreted unchanged in the urine.

Onset	Duration	Half Life
– IV-Immediate – Bronchodilation within 1-minute of oral inhalation	– Short duration when parenterally administered	

Indications
1. Anaphylaxis.
2. Severe bronchospasm.
3. Restore cardiac rhythm in cardiac arrest.
4. Improve BP to facilitate mechanical capture during transcutaneous pacing.

Contraindications
1. Hypersensitivity.
2. Shock (non-anaphylactic).

Precautions
1. May induce angina pectoris due to the increase in atrial pressure.
2. In patients who are taking beta-blocking medications, it may be difficult to treat anaphylaxis or severe bronchospasm. EPINEPHrine may not have its usual effect on a patient having anaphylaxis and/or severe bronchospasm. It may have little to no effect requiring larger doses which may cause excessive alpha-adrenergic stimulation leading to hypertension, reflex bradycardia, heart block and possibly worsen bronchospasm.

Side Effects
1. Anxiety.
2. Headache.
3. Palpitations.
4. Arrhythmia.
5. Excessive rise in blood pressure.

Special Notes
1. EPINEPHrine should be administered IM in the anterolateral thigh for patients experiencing anaphylaxis.

Adult Dose	Emergency Medical Responder	Primary Care Paramedic	Intermediate Care Paramedic	Advanced Care Paramedic
SC/IM IV/IO Infusion	Normotensive anaphylaxis Dose: 0.5 mg may repeat once after five minutes if necessary Normotensive status asthmaticus Dose: 0.3-0.5 mg SC into upper arm Hypotensive anaphylaxis Dose: 0.1 mg (1 mL) of 1:10000 slow IV push over several minutes Cardiac Arrest Dose: 1.0 mg of 1:10000 IVP q 3-5 min. To facilitate mechanical capture for TCP in hypotensive patient: Mix 1mg of 1:1000 in 500 mL bag NaCl or RL giving a concentration of 2 ug/mL Dose: 2 ug/min (60mL/hr.) titrate to a max of 10 ug/min (300 mL/hour)			
Pediatric Dose	**Emergency Medical Responder**	**Primary Care Paramedic**	**Intermediate Care Paramedic**	**Advanced Care Paramedic**
Nebulized	Croup			
SC/IM IV	Dose: Children < 5 kg – administer 0.5 mg/kg (0.5 mL/kg) of 1:1000 EPINEPHrine (max of 2.5 mg) diluted in 2.5-3 mLs of NaCl. Children > 5 Kg – administer 2.5 – 5 mg (max of 5 mg) of 1:1000 EPINEPHrine diluted in 2.5-3 mLs of NaCl Normotensive anaphylaxis Dose: 0.01 mg/kg max. of 0.5 mg may repeat once after five minutes if necessary Normotensive status asthmaticus Dose: 0.01 mg/kg max. of 0.5 mg Symptomatic bradycardia Dose: 0.01 mg/kg (0.1 mL/kg) 1:10000 q 3-5 min.			

Etomidate (Amidate)

Drug Classification Sedative and hypnotic agent	**Relevant Protocol(s)** Medicated Facilitated Intubation (MFI)
Supplied IV 20 mg and 40 mg vial (2 mg/mL)	**Authorized Administration Routes** **Advanced Care Paramedic**

Pharmacology

1. Enhances the activity of GABA (principal neurotransmitter in the CNS) and by interacting with the GABA receptor complex.
2. Capable of producing all levels of CNS depression—from light sleep to deep coma—depending on the dosage
3. No analgesic activity.
4. May decrease cerebral blood flow and intracranial pressure.
5. Slight decreases in heart rate, systemic vascular resistance, and arterial blood pressure.
6. Cause less respiratory depression than other induction agents (ex. propofol).

Metabolism

1. Principally metabolized in the liver.
2. Mainly excreted in urine, some excreted in feces and bile.

Onset	**Duration**	**Half Life**
– 1 minute	– Dose dependent 0.3 mg/kg-3-5 minutes	– 1.25-5 hours (doubles in patients with cirrhosis and esophageal varices)

Indications

1. Induction anesthesia.

Contraindications

1. Hypersensitivity.

Precautions

1. Associated with increased mortality and adrenal insufficiency in critically ill patients.
2. Suppresses adrenal function in patients when used in RSI (rapid sequence intubation).
3. Transient, involuntary skeletal muscle movements.
4. Geriatric patients may require smaller induction dose than that of younger patients.

Side Effects

1. Injection site pain.
2. Eye movement.
3. Skeletal muscle movements (e.g., myoclonic, averting, tonic, eye).

Special Notes

Adult Dose	**Advanced Care Paramedic**
IV	Dose: Induction 0.3 mg/kg, for maintenance use smaller increments than for induction
Pediatric Dose	**Advanced Care Paramedic**
IV	Dose: Induction > 10 years of age 0.3 mg/kg, for maintenance use smaller increments than for induction

Fentanyl (Abstral, Duragesic, Onsolis)

Drug Classification Opioid Analgesic	**Relevant Protocol(s)** Medicated Facilitated Intubation (MFI) Pain Management
Supplied Transdermal Patch: 12 ug, 25 ug, 50 ug, 75 ug, or 100 ug per hour Epidural: IM, IV-50 ug/mL	**Authorized Administration Routes** **Advanced Care Paramedic**

Pharmacology

1. Binds to opiate receptors in the central nervous system causing an altered response and emotional reaction to pain.
2. May cause suppression of the cough reflex and respiratory depression.

Metabolism

1. Metabolized extensively in the liver and the intestinal mucosa
2. Transdermally administered fentaNYL does not appear to be metabolized in the skin

Onset	**Duration**	**Half Life**
– IV: immediate – IM: 7-15 minutes – Transdermal: constant/continuous serum concentration	- IV: 30-60 min. - IM: 60-120 min.	– IV: 7.1 hours

Indications

1. Adjunct to medication facilitated intubation (MFI).
2. Acute and/or chronic pain.

Contraindications

1. Hypersensitivity.
2. Acute asthma attack or respiratory depression or upper airway obstruction.

Precautions

1. Use caution administering to elderly and debilitated.
2. Use caution in patients in shock.

Side Effects

1. Respiratory depression leading potentially leading to respiratory arrest.
2. Sedation.
3. Nausea and vomiting.
4. Constipation.
5. Sweating.

Special Notes

Adult Dose	**Advanced Care Paramedic**
IV/IO	Adjunct to MFI Dose: to be determined in consultation with medical advisor.
IM/IV/I	Analgesia Dose: 0.5–1 mcg/kg IM or IV, repeated every 30–60 minutes as needed

Pediatric Dose	**Advanced Care Paramedic**
IV/IO	Adjunct to MFI Dose: to be determined in consultation with medical advisor.
IM/IV/IO	Analgesia Dose: 0.5–1 mcg/kg IM or IV, repeated every 30–60 minutes as needed

Furosemide (Lasix)

Drug Classification Diuretic	**Relevant Protocol(s)** Pulmonary Edema
Supplied IV 10 mg/mL	**Authorized Administration Routes** **Advanced Care Paramedic**

Pharmacology

1. Inhibits the absorption of sodium and chloride in the proximal and distal renal tubules as well as the ascending loop of Henle.
2. Exact mechanism of hypotension sis not known but thought to be attributed to the decreased plasma volume.
3. Induces greater diuresis and electrolyte loss than many other diuretics.
4. Has some renal vasodilator effects.

Metabolism

1. Metabolized in the liver into active metabolites.
2. Rapidly excreted in the urine by glomerular filtration and small amounts in the feces.
3. Approximately 50% of an oral dose and 80% of an IV dose are excreted in the urine within 24 hours.

Onset	**Duration**	**Half Life**
– IV: diuresis can occur within 5 minutes, with peak diuresis effect within 20-60 minutes	– 2 hours	– 2 hours

Indications

1. Respiratory distress where diffuse crackles are appreciated on assessment associated with congestive heart failure.

Contraindications

1. Anuria.
2. Hypersensitivity.

Precautions

1. Patients with allergy to sulfonamides may show allergic response to furosemide.
2. Reversible or permanent hearing impairment increase following large IV doses, especially if administered too rapidly, in patients with renal impairment.
3. Risk of orthostatic hypotension.
4. Risk of hypokalemia.

Side Effects

1. Orthostatic hypotension.
2. Dizziness.
3. Electrolyte imbalance.
4. Tinnitus.
5. Photosensitivity.

Special Notes

1. The ACP may transport patients receiving furosemide infusions during inter-facility transfer.

Adult Dose	**Advanced Care Paramedic**
IV	Dose: For patients not already taking prescribed dose, 40 mg SIVP not faster than 40 mg/min For patients taking prescribed furosemide, 2x daily dose to a maximum of 200 mg SIVP not faster than 40 mg/min

Glucagon (Glucagen)

Drug Classification Hyperglycemic agent	**Relevant Protocol(s)** Hypoglycemic
Supplied 1 mL vial of 1 mg powder for reconstitution	**Authorized Administration Routes** **Primary Care Paramedic – IM/SC** **Intermediate Care Paramedic – IM/SC** **Advanced Care Paramedic**

Pharmacology

1. Manufactured polypeptide hormone similar to endogenous human glucagon.
2. Causes increase in blood glucose levels by acting only on liver glycogen, converting it to glucose.
3. Also relaxes smooth muscle of the stomach, duodenum, small bowel and colon.

Metabolism

1. Extensively degraded in the liver, kidney and plasma
2. Urinary excretion of intact glucagon has not been measured

Onset	**Duration**	**Half Life**
– 13-20 minutes	– 60-90 minutes	– 8-18 minutes (following IV administration) – 45 minutes (following IM administration)

Indication

1. To treat hypoglycemia where a large vein cannot be established within 90 seconds or two attempts.

Contraindications

1. Hypersensitivity.
2. Pheochromacytoma.

Precautions

1. Supplementary carbohydrate should be given following glucagon administration, especially in adolescents and children.
2. Continued blood glucose monitoring is essential until patient is asymptomatic.

Side Effects

1. Nausea/vomiting.
2. Occasionally hypokalemia.

Special Notes

Adult Dose	Primary Care Paramedic	Intermediate Care Paramedic	Advanced Care Paramedic
SQ/IM	Dose: 1 mg repeat q 15 min. PRN		
Pediatric Dose	**Primary Care Paramedic**	**Intermediate Care Paramedic**	**Advanced Care Paramedic**
SQ/IM	Under 12 years of age Dose: 0.1 mg/kg repeat q 15 min. PRN		

Glycoprotein IIb/IIIa Inhibitor (ReoPro, Integrelin, Aggrastat)

Drug Classification	**Relevant Protocol(s)** Inter-facility transfer of patients receiving medications
Supplied Various preparations	**Authorized Administration Routes** **Intermediate Care Paramedic – monitor infusion** **Advanced Care Paramedic – monitor infusion**
Indications 1. Patients having acute coronary syndrome, MI or who may undergo percutaneoustransluminal coronary angioplasty (PCI).	
Contraindications 1. Patient must be stable. 2. Not compatible for infusion with other medications.	
Precautions 1. Record vital signs every 15 minutes. 2. A dosage sticker must be affixed to the IV mini-bag. 3. An infusion control device at a predetermined rate according to the local pharmacy protocol must be used.	
Special Notes 1. The ICP and ACP may attend transporting patients receiving glycoprotein IIB/IIIA inhibitor drug infusions during inter-facility transfer.	

Haloperidol Lactate (Haldol)

<table>
<tr><td>Drug Classification
Antipsychotic</td><td colspan="2">Relevant Protocol(s)
Agitated Patients</td></tr>
<tr><td>Supplied
1mL ampule, 5 mg/mL</td><td colspan="2">Authorized Administration Routes
Advanced Care Paramedic</td></tr>
<tr><td colspan="3">Pharmacology
1. Affinity for dopamine D2 receptors, which is the theory as to its antipsychotic action and extrapyramidal side effects.
2. Weak anticholinergic activity.
3. Antiemetic effect could be attributed to dopamine blockade in the chemoreceptor trigger zone.</td></tr>
<tr><td colspan="3">Metabolism
1. Mainly metabolized in the liver into inactive metabolites (DM).</td></tr>
<tr><td>Onset
– IM: 30-45 minutes</td><td>Duration
– Administration q 4-8 hours adequate to control symptoms in some patients.</td><td>Half Life
– 3 weeks (long acting decanoate preparation)</td></tr>
<tr><td colspan="3">Indications
1. Acute psychotic episodes in the absence of a history of seizures, head injury, the use of QT prolonging drugs (tricyclic anti-depressants, procainamide, stemetil etc.), drug toxicity (use of cocaine, etc)
2. Psychotic disorders including schizophrenia and manic states.</td></tr>
<tr><td colspan="3">Contraindications
1. Hypersensitivity.
2. Patients with severe CNS depression.</td></tr>
<tr><td colspan="3">Precautions
1. Not to be administered to children under the age of 12.
2. May lower seizure threshold, so use with caution in patients with seizure history.
3. Use with caution in patients with severe renal impairment.
4. Additive sedative effects in patients when used concurrently with other CNS depressants (e.g. alcohol, benzodiazepines, opioids).</td></tr>
<tr><td colspan="3">Side Effects
1. Prolonged QT interval.
2. Extrapyramidal effects such as restlessness, abnormal movements, or parkinsonism.
3. Severe extrapyramidal effects can be treated with an anticholinergic agent such as diphenhydramine.</td></tr>
<tr><td colspan="3">Special Notes
1. Long acting haloperidol deaconate (50 mg/mL and 100 mg/mL) is not to be administered IV.</td></tr>
<tr><td>Adult Dose</td><td colspan="2">Advanced Care Paramedic</td></tr>
<tr><td>IM</td><td colspan="2">Dose: 2-5 mg
Elderly or debilitated: 1.0-2.5 mg</td></tr>
</table>

Ipratropium Bromide (Atrovent)

Drug Classification Bronchodilator	**Relevant Protocol(s)** Asthma/COPD
Supplied Plastic single use 1 mL and 2 mL vial, 250 ug/mL	**Authorized Administration Routes** **Primary Care Paramedic – Nebulized** **Intermediate Care Paramedic – Nebulized** **Advanced Care Paramedic**

Pharmacology

1. Anticholinergic having bronchodilator properties.
2. Relaxes smooth muscles of bronchi and bronchioles.
3. Blocks acetylcholine-induced stimulation of guanyl cyclase and reduces formation of cyclic guanosine monophosphate (cGMP), a mediator of bronchoconstriction.
4. Greater antimuscarinic activity on bronchial smooth muscle than on secretory (e.g., salivary, gastric) glands.

Metabolism

1. Metabolized into at least 8 metabolites that bind poorly to muscanaric receptors.

Onset	Duration	Half Life
– Inhalation 5-15 minutes with peak response in 1-2	– Nebulized 15-30 minutes	– 1.6 hours

Indications

1. Patient with bronchospasm unresponsive to salbutamol.

Contraindications

1. Hypersensitivity.
2. Glaucoma.

Precautions

1. Caution against accidental release into the eyes.
2. In acute asthma, should be used in conjunction with another B2 adrenergic stimulant due to its slow onset.

Side Effects

1. Dry mouth.
2. Bad taste.
3. Tremors.
4. Exacerbation of symptoms.

Special Notes

Adult Dose	Primary Care Paramedic	Intermediate Care Paramedic	Advanced Care Paramedic
Nebulized	Dose: 12 years and older: 250-500 mcg, repeat as necessary		
Pediatric Dose	**Primary Care Paramedic**	**Intermediate Care Paramedic**	**Advanced Care Paramedic**
Nebulized	Dose: Up to 12 years: 125-250 mcg, repeat as necessary		

Ketamine

Drug Classification General anesthetic		**Relevant Protocol(s)** Medicated Facilitated Intubation (MFI) Pain Management
Supplied 2 mL vial, 10 mg/mL 2 mL vial, 50 mg/mL		**Authorized Administration Routes** **Advanced Care Paramedic**
Pharmacology 1. Produces a cataleptic-like state in which the patient is dissociated from the surrounding environment by direct action on the cortex and limbic system.		
Metabolism 1. Metabolized in the liver. 2. Excreted primarily in the urine.		
Onset – 30 seconds	**Duration** – 5-10 minutes	**Half Life** – 10-15 minutes
Indications 1. As an induction agent for medicated facilitated intubation (MFI).		
Contraindications 1. Hypersensitivity. 2. Cases where an increase in blood pressure would be hazardous.		
Precautions 1. CNS depression. 2. Respiratory depression with rapid administration. 3. Emergence reaction (less common in patients over 15 years old and less than 65 years of age).		
Side Effects 1. Arrhythmia. 2. Hyper/hypotension. 3. Increased ICP. 4. Increased salivation. 5. Pain at injection site.		
Special Notes		

Adult Dose	**Advanced Care Paramedic**
IV	Dissociative Dose: 1.0 mg/kg SIVP with half doses repeated as need.

Pediatric Dose	**Advanced Care Paramedic**
IV	Dissociative Dose: 1.5-2 mg/kg SIVP. Repeated incremental doses of 0.5-1 mg/kg may be administered to prolong sedation.

Lidocaine (Xylocaine, Xylocard Inj.)

Drug Classification Antiarrhythmic	**Relevant Protocol(s)** V-Fib/Pulseless V-Tach Tachycardia Vascular Access (Intraosseous) Procedure
Supplied IV infusion: 0.4% in 250 mL and 500 mL bag of D5W (4 mg/mL) IV: 2% in 5 mL prefilled syringe (20 mg/mL)	**Authorized Administration Routes** **Advanced Care Paramedic**

Pharmacology

1. Stabilizes cell membrane by combining with fast sodium channels in their inactive states and inhibiting recovery period after repolarization.
2. Suppresses automaticity in His-Purkinje fibers by suppressing spontaneous depolarization during diastole.
3. CNS depressant.
4. Usually has little effect on heart rate.

Metabolism

1. Widely distributed in body tissues and readily crosses blood-brain barrier.
2. Approximately 90% metabolized by the liver into active metabolites.
3. Rate of metabolism may be limited depending on hepatic blood flow.
4. Excreted in urine mainly as metabolites.

Onset	**Duration**	**Half Life**
– 45-90 seconds	– 10-20 minutes	– 7-30 minutes

Indications

1. Alternative to amiodarone to treat current ventricular fibrillation or refractory ventricular tachycardia.
2. EZ-IO pain management for conscious/awake patients.

Contraindications

1. Hypersensitivity.
2. SA or AV heart block.

Precautions

1. Some manufacturers state lidocaine is contraindicated in patients with Wolff-Parkinson's-White syndrome.

Side Effects

1. Drowsiness.
2. Dizziness.
3. Disorientation/confusion.
4. Psychosis.
5. Tinnitus.
6. Visual disturbances.
7. Paresthesia.
8. Dyspnea.
9. Slurred speech.
10. Sensations of heat, cold, or numbness.
11. Nausea/vomiting.

Special Notes

Adult Dose	**Advanced Care Paramedic**
IV/IO	Dose: 1-1.5 mg/kg (50-100 mg) RIVP, repeat q 5 min. at 0.5- 0.75 mg/kg up to a total of 3 doses or up to 3 mg/kg EZ-IO Pain Management Dose: 0.5 mg/kg 2% lidocaine, preservative free, slowly over 30-45 seconds through IO site. Do not exceed 50 mg
Infusion	Dose: 30-50 mcg/kg/minute (1-4 mg/minute in an average 70 kg adult)

Lorazepam (Ativan)

Drug Classification Benzodiazepine	**Relevant Protocol(s)** Seizures
Supplied Oral: 0.5 mg tablet, 1 mg tablet, 2 mg tablet Sublingual: 0.5 mg tablet, 1 mg tablet, 2 mg tablet IV-1 mL vial (4 mg/mL)	**Authorized Administration Routes** **Intermediate Care Paramedic – IV** **Advanced Care Paramedic**

Pharmacology

1. Affinity for benzodiazepine receptor sites which act as receptor sites for CNS neurotransmitter, GABA (amma ainobutyric acid).
2. Various types of benzodiazepines will produce different pharmacologic effects depending on the benzodiazepine receptor's location within the CNS.
3. As the dose increases, anxiolytic effects are first produced, followed by anticonvulsant effects, a reduction in muscle tonus, and finally sedation and hypnosis.

Metabolism

1. Pharmacokinetic properties differ amongst the various types ofbenzodiazepines.
2. Widely distributed throughout the body and accumulate in lipid rich areas in the body such as the CNS and adipose tissue.
3. Highly bound to plasma proteins.
4. Eliminated along with its metabolites almost entirely in the urine.

Onset	**Duration**	**Half Life**
– IV: 1-5 minutes – IM: 15-30 minutes	- 12-24 hours	- 10-20 hours

Indications

1. Status epilepticus-grand mal seizure lasting longer than 15 minutes or where repeated seizures have occurred over a 30-minute period without return of consciousness in between seizures.

Contraindications

1. Hypersensitivity.
2. Patients with sleep apnea.
3. Patients with severe respiratory insufficiency.

Precautions

1. The elderly, children, patients who are debilitated, and patients with liver disease are likely to experience adverse CNS effects. To minimize these effects, low doses titrated to lowest effective dose is recommended.
2. Careful monitoring of respiratory rate and maintenance of an adequate, patent airway is required; ventilatory support may be necessary.
3. Possible apnea, hypotension, bradycardia, or cardiac arrest with parenteral administration, particularly in geriatric or severely ill patients, in patients with limited pulmonary reserve or unstable cardiovascular status, or if the drug is administered by IV too rapidly.
4. May cause paradoxical excitation in children.

Side Effects

1. Ante grade amnesia.
2. Ataxia.
3. Dizziness.
4. Lightheadedness.

Special Notes

1. Intramuscular midazolam 10 mg (5 mg if 13-40 kg) may be more effective than IV LORazepam for pre-hospital seizure cessation.
2. Intranasal benzodiazepines (LORazepam or midazolam) and rectal benzodiazepines (diazepam or LORazepam) appear effective for acute repetitive seizures.
3. The ICP and ACP may attend patients receiving LORazepam infusions during an inter-facility transfer.

Adult Dose	Intermediate Care Paramedic	Advanced Care Paramedic
IV/IO	Dose: 4 mg SIVP, may be repeated once after 10-15 minutes	

Pediatric Dose	Intermediate Care Paramedic	Advanced Care Paramedic
IV/IO	Dose: 0.1 mg/kg may be repeated once after 5-10 minutes	

Magnesium Sulfate

Drug Classification Electrolyte	**Relevant Protocol(s)** Asthma/COPD Seizures Tachycardia Ventricular fibrillation/Pulseless Ventricular Tachycardia
Supplied 2 grams in 10 mL.	**Authorized Administration Routes** **Advanced Care Paramedic**

Pharmacology
1. General CNS depressant.
2. Blocks peripheral neuromuscular transmission.
3. Slows rate of SA node impulse formation in myocardium and prolongs conduction time.
4. Decreases amount of acetylcholine released at endplate by motor nerve impulse.
5. Promotes movement of calcium, potassium, and sodium in and out of cells and stabilizes excitable membranes.

Metabolism
1. Magnesium is excreted solely by the kidney.

Onset	**Duration**	**Half Life**
– Immediate	– 30 minutes	

Indication
1. Severe asthma/ status asthmaticus **(NOT indicated in COPD)**
2. Eclampsia
3. Torsades de pointes
4. Refractory ventricular fibrillation

Contraindications
1. Hypersensitivity.
2. Heart block.
3. Myocardial damage.

Precautions
1. Use extreme caution in those with myasthenia gravis or other neuromuscular disease.
2. Elderly and those with renal impairment.

Side Effects
1. Hypotension.
2. Flushing of skin and sweating.
3. Loss of deep tendon reflexes.
4. ECG changes (increased P-R interval, QRS widening, increased height of Twaves).
5. CNS depression.
6. Nausea, vomiting.
7. Respiratory depression and/or arrest

Special Notes
1. Cardiovascular monitoring post administration.
2. Dilute prior to administration.
3. Transport must not be delayed administering Magnesium Sulfate.

Adult Dose	**Advanced Care Paramedic**
Intravenous	Dose: Eclampsia: 4 grams infusion Severe Asthma/status asthmaticus: 1 – 2 grams over 15 minutes. Torsades de pointes: (with pulse): 2 grams over 5 minutes. Ventricular fibrillation/pulseless ventricular tachycardia (due to Torsades do pointes): 2 grams.

Pediatric Dose	**Advanced Care Paramedic**
Intravenous	Dose: Severe asthma/status asthmaticus: 25-50 mg/kg infusion. Torsades de pointes & Ventricular fibrillation 50 mg/kg to a max dose of 2 grams - slow IV over 5-10 mins with a pulse or IV push for pulseless.

methylPREDNISolone (Depo-Medrol, Medrol, Solu-MEDROL)

Drug Classification Glucocorticoid	**Relevant Protocol(s)** Allergy/Anaphylaxis Asthma/COPD
Supplied Oral: 2 mg, 4 mg, 8 mg, 16 mg, 32 mg tablets IV: 40 mg, 125 mg, 500 mg, 1 g vial of powder for reconstitution Reconstitute with 1 mL, 2 mL, 8 mL, and 16 mL respectively with bacteriostatic water	**Authorized Administration Route** **Advanced Care Paramedic**

Pharmacology

1. Potent anti-inflammatory steroid.
2. Less likely to cause sodium and water retention when compared to prednisolone.
3. Decreases inflammation by stabilizing leukocyte lysosomal membranes, preventing release of destructive acid hydrolases from leukocytes; or reducing leukocyte adhesion to capillary endothelium.
4. Inhibits macrophage accumulation in inflamed areas.
5. Reduces capillary wall permeability and edema formation.

Metabolism

1. Metabolized in most tissues, but mainly in the liver, to inactive compounds.
2. Most glucocorticoids are removed rapidly from the blood and distributed to muscles, liver, skin, intestines, and kidneys.

Onset	**Duration**	**Half Life**
– IM: 8-12 hours	– 1.25-1.5 days (single 40 mg oral dose)	– 188 minutes

Indications

1. Status asthmaticus.
2. Anaphylaxis.

Contraindications

1. Hypersensitivity.

Precautions

1. Can cause adrenal insufficiency when administered over long periods.
2. Increased susceptibility to infections.
3. Prolonged therapy can cause muscle wasting, delayed wound healing, and osteoporosis.
4. Use with caution in patients with CHF and hypertension.

Side Effects

Associated with long term use:

1. Bone loss.
2. Cataracts.
3. Indigestion.
4. Muscle weakness.
5. Back pain.
6. Bruising.
7. Oral candidiasis.

Special Notes

Adult Dose	**Advanced Care Paramedic**
Infusion	Dose: 1 mg/kg IV, to a maximum of 125 mg, in a 50 to 100 mL minibag of normal saline over 15-20 minutes.
Pediatric Dose	**Advanced Care Paramedic**
Infusion	Dose: 1 mg/kg IV, to a maximum of 125 mg, in a 50 to 100 mL minibag of normal saline over 15-20 minutes.

Midazolam (Versed)

Drug Classification
Benzodiazepine

Relevant Protocol(s)
Seizures
Psychiatric Emergencies
Medicated Facilitated Intubation (MFI)

Supplied
1 mg/mL; 2, 5, 20 mL vial
5 mg/mL

Authorized Administration Routes
Intermediate Care Paramedic – IV
Advanced Care Paramedic

Pharmacology

1. Affinity for benzodiazepine receptor sites which act as receptor sites for CNS neurotransmitter, GABA (amma ainobutyric acid).
2. Various types of benzodiazepines will produce different pharmacologic effects depending on the benzodiazepine receptor's location within the CNS.
3. As the dose increases, anxiolytic effects are first produced, followed by anticonvulsant effects, a reduction in muscle tonus, and finally sedation and hypnosis.

Metabolism

1. Pharmacokinetic properties differ amongst the various types ofbenzodiazepines.
2. Widely distributed throughout the body and accumulate in lipid rich areas in the body such as the CNS and adipose tissue.
3. Highly bound to plasma proteins.
4. Eliminated along with its metabolites almost entirely in the urine.

Onset	**Duration**	**Half Life**
IV: 1.5-5 min IM: 5-15 min	IM: 2 hours IV: <2 hours, may persist up to 6 hours in some	1.5-5 hours

Indications

1. Status epilepticus-grand mal seizure lasting longer than 15 minutes or where repeated seizures have occurred over a 30-minute period without return of consciousness in between seizures.
2. The markedly agitated patient who poses a threat to himself or others.
3. As an adjunct to medication facilitated intubation (MFI) where there is a need to immediately correct a severely compromised airway.

Contraindications

1. Hypersensitivity.

Precautions

1. The elderly, children, patients who are debilitated, and patients with liver disease are likely to experience adverse CNS effects. To minimize these effects, low doses titrated to lowest effective dose is recommended.
2. Careful monitoring of respiratory rate and maintenance of an adequate, patent airway is required; ventilatory support may be necessary.
3. Possible apnea, hypotension, bradycardia, or cardiac arrest with parenteral administration, particularly in geriatric or severely ill patients, in patients with limited pulmonary reserve or unstable cardiovascular status, or if the drug is administered via IV too rapidly.
4. Possible serious and occasionally fatal adverse effects, including respiratory depression, airway obstruction, oxygen desaturation, apnea, respiratory arrest, and/or cardiac arrest, in patients receiving midazolam concomitantly with other CNS depressants and in those undergoing procedures involving the airway without the protective effect of an endotracheal tube, in geriatric or severely ill patients, or in patients with limited pulmonary reserve or unstable cardiovascular status, or if the drug is administered via IV too rapidly·
5. Do not administer parenterally to patients with shock, those who are comatose, or those with acute alcohol intoxication and accompanying depression of vital signs. Exercise caution if administered via IV to patients with uncompensated acute illnesses, including severe fluid or electrolyte imbalances.
6. For deeply sedated pediatric patients, an individual other than the clinician performing the procedure should be dedicated to monitoring the patient throughout the procedure.
7. Slow administration and individualized titration of dosage is required.

Side Effects

1. Ante grade amnesia.
2. Changes in respiratory rate, BP and pulse rate.

Special Notes

1. Following IM administration, retrograde amnesia persists for approximately 1 hour.
2. Following IV administration, retrograde amnesia persists for approximately 20-40minutes.
3. The ICP and ACP may attend patients receiving midazolam infusions during an inter-facility transfer.

Adult Dose	Intermediate Care Paramedic	Advanced Care Paramedic
IM/IV/IO	Markedly agitated patient (threat to himself or others) Dose: 2-10 mg IM q 10 min prn if systolic BP>100 mmHg to a max of 20 mg	
	Status Epilepticus Dose: 10 mg IM or; 2.5 mg IV q 2 minutes titrated to effect to a max of 10 mg. Medication Facilitated Intubation Dose: Individual response is variable, especially when opiate agonist premedication is not used; therefore, titrate dosage carefully to the desired clinical effect, taking into consideration the patient's age and clinical status.. When used prior to other anesthetic agents for the induction of general anesthesia, the initial dose of each of these agents may be substantially reduced, in some instances to as low as 25% of the usual initial dose of the individual agents.	
Pediatric Dose	**Intermediate Care Paramedic**	**Advanced Care Paramedic**
IV/IO/IN	Status Epilepticus Dose: 0.2 mg/kg IM to a max of 7 mg or; 0.1-0.2 mg/kg intra-nasal to a max of 7 mg or; 0.1 mg/kg IV to a max of 7 mg repeated x 1 in 10 minutes	

Morphine Sulphate (Doloral, Kadian, M-Eslon, M.O.S., Statex)

Drug Classification Narcotic Analgesic	**Relevant Protocol(s)** Acute Coronary Syndromes Abdominal Pain (nontraumatic) Musculoskeletal Trauma Burns Amputation Trauma Pain Management
Supplied **IV injection:** 10 mL vial (1 mg/mL) 1 mL ampule (2 mg/mL) 30 mL vial (5 mg/mL) 50 mL vial (2 mg/mL) 1 mL ampules (10 mg/mL)	**Authorized Administration Routes** **Advanced Care Paramedic**

Pharmacology

1. Binds to opiate receptors in the central nervous system causing an altered response and emotional reaction to pain.
2. Precise mechanism of action has not been fully elucidated; opiate agonists act at several CNS sites, involving several neurotransmitter systems to produce analgesia.

Metabolism

1. Rapid systemic absorption

Onset	**Duration**	**Half Life**
– Peak analgesia within 20 min (maximal respiratory depression 7 min)	– Analgesia can be maintained for up to 7 hours post admin (respiratory center sensitivity returns to normal with 2-3 hours)	- 1.5-4.5 hours

Indications

1. Relief of severe, acute pain or moderate to severe, chronic pain.

Contraindications

1. Hypersensitivity.
2. Respiratory depression.
3. Acute or severe bronchial asthma or hypercardia

Precautions

1. Respiratory depression occurs most commonly in the elderly, the debilitated, and those patients whose conditions are associated hypoxia and hypercapnia, even with moderate therapeutic doses
2. Uses extreme caution in COPD patients or cor pulmonale, due to these patients having a substantially decreased respiratory reserve

Side Effects

1. Dizziness.
2. Visual disturbance.
3. Mental clouding.
4. Depression.
5. Sedation.
6. Coma.
7. Euphoria.
8. Dysphoria.
9. Weakness.
10. Agitation.
11. Delirium.
12. Nausea/vomiting.
13. Constipation.

Special Notes

1. Morphine is supplied in a variety of preparations (for example - oral, IV and rectal) in a variety of dosage ranges. The above noted IV preparations are examples of the more commonly used IV preparations.

Adult Dose	**Advanced Care Paramedic**

IV	Dose: Chest pain persisting after nitroglycerin 2-5 mg SIVP q 10 min with one repeat Musculoskeletal trauma/Burns/Amputation trauma 2-5 mg SIVP, titrate to effect, keeping mindful of the patient's vital signs.
Pediatric Dose	**Advanced Care Paramedic**
IV	Musculoskeletal trauma/Burns Dose: 0.1 mg/kg max of 2.5 mg q 15 min.

Naloxone (Narcan)

Drug Classification Opioid Antagonist	**Relevant Protocol(s)** Unconsciousness of Unknown Etiology
Supplied 1 mL ampules, 0.4 mg/mL 2 mL vials, 1 mg/mL	**Authorized Administration Routes** **Emergency Medical Responder - auto-injector/IN-prefilled syringe** **Primary Care Paramedic - IM/IN/IV** **Intermediate Care Paramedic - IM/IN/IV** **Advanced Care Paramedic**

Pharmacology

1. A pure opiate antagonist.
2. Antagonizes opiate-induced sleep or sedation.
3. Increase in respiratory rate and minute volume, decrease toward normal in arterial PCO2, and return to normal in blood pressure if depressed due to opioid administration.

Metabolism

1. Rapidly metabolized in the liver.
2. Excreted in the urine over 72 hours following an oral or IV dose.

Onset	Duration	Half Life
– IV: 1-2minutes – IM: 2-5 minutes	– Dose and route dependent and is more prolonged post IM than IV administration	– 30-81 minutes

Indications

1. Opiate induced depression and acute opiate overdose.

Contraindications

1. Hypersensitivity.

Precautions

1. In opiate dependency, administration can cause severe withdrawal symptoms.
2. Carefully monitor patients who have responded to naloxone since the duration of action of some opiates may exceed that of naloxone. Monitor pediatric patients for at least 24 hours. Give repeated doses of naloxone to these patients when necessary.

Side Effects

1. Nausea/vomiting.
2. Analgesia reversal.
3. Excitement.
4. Agitation.
5. Increased BP.
6. Tremor and hyperventilation with abrupt return to consciousness.

Special Notes

Adult Dose	Emergency Medical Responder	Primary Care Paramedic	Intermediate Care Paramedic	Advanced Care Paramedic
IV IM	Dose: 0.4-2 mg SIVP q 2-3 minutes. Dose: 0.4-0.8 mg, repeat as necessary If no response is observed after a total of 10 mg of the drug has been administered, the depressive condition may be caused by a drug or disease process not responsive to naloxone 3			
Pediatric Dose	**Emergency Medical Responder**	**Primary Care Paramedic**	**Intermediate Care Paramedic**	**Advanced Care Paramedic**
IV	Dose: 0.01 mg/kg repeat once at 0.1 mg/kg if initial dose does not produce expected response			

Nitroglycerine (Nitrol, Nitrostat)

Drug Classification
Antianginal

Relevant Protocol(s)
Acute Coronary Syndromes
Pulmonary Edema

Supplied
Sublingual: 0.4 mg pump-spray and 0.3 mg or 0.6 mg tablet

IV: 1 mg/mL and 5 mg/mL ampule/vial
100 ug/mL, 200 ug/mL, and 400 ug/mL solution

Authorized Administration Routes

Emergency Medical Responder – Assist with patient's own prescription

Primary Care Paramedic – SL

Intermediate Care Paramedic – SL

Advanced Care Paramedic

Pharmacology

1. Vascular smooth muscle relaxant resulting in generalized vasodilation.
2. Some effect on the relaxation of bronchial, biliary, gastrointestinal, uretal, and uterine smooth muscle.
3. Peripheral venous resistance is decreased via a selective action on venous capacitance vessels and results in venous pooling of blood and decreased venous return to the heart.
4. Vasodilatory effect on arteriolar resistance is not as great as the action on the venous side. As a result of this combined action, both venous filling pressure (preload) and, to a lesser extent, arterial impedance (afterload) are reduced.
5. By decreasing myocardial oxygen consumption, nitrates and nitrites alter the imbalance of myocardial oxygen supply and consumption that is thought to cause angina pectoris.
6. Because of hemodynamic profile, nitrates and nitrites are particularly beneficial in patients with left ventricular systolic dysfunction or CHF.

Metabolism

1. Undergo first pass denitration in the liver.
2. Well absorbed from the gastrointestinal tract and the intact skin as well.
3. Metabolites are further metabolized into glycerol and carbon dioxide.
4. Small amount excreted in urine.

Onset	Duration	Half Life
– Sublingual tablet: 1-3 min. – Sublingual spray: 2-4 min. – IV infusion: 1-2 minutes	– Sublingual tablet: 3-5 min. – Sublingual spray: 10-30 min. – IV infusion: 3-5 minutes	– 1-4 minutes

Indications

1. Chest pain of cardiac origin.
2. Chest pain of cardiac origin with associated pulmonary edema.
3. Patients who present with diffuse crackles attributed to pulmonary edema and respiratory distress.

Contraindications

1. Hypersensitivity.
2. Systolic blood pressure below 100 mmHg.
3. Heart rate below 50 beats per minute.
4. Male or female patients who have taken Viagra, Levitra, Cialis or similar drugs within 24 hours.

Precautions

1. Severe hypotension, particularly in upright position, particularly in the elderly.
2. Use with caution in patients who are volume depleted.
3. Paradoxical bradycardia and angina exacerbation may accompany hypotension.

Side Effects

1. Headache.
2. Hypotension.
3. Cutaneous vasodilation with cutaneous flushing.

Special Notes

Adult Dose	Emergency Medical Responder	Primary Care Paramedic	Intermediate Care Paramedic	Advanced Care Paramedic
SL Infusion	Dose: nitro tablet or pump spray q 3-5 minutes to maximum of 3 doses An infusion pump must be used when administering nitroglycerine infusion 5 mcg/minute initially, with increases of 5 mcg/minute every 3–5 minutes until a blood pressure response is obtained or until the infusion rate is 20 mcg/minute. If no effect is obtained with 20 mcg/minute, dosage may be increased by increments of 10 mcg/minute and, if necessary, by increments of 20 mcg/minute.			

Nitrous Oxide (Nitronox/Entonox)

Drug Classification
Gaseous analgesic

Relevant Protocol(s)
Childbirth
Musculoskeletal Trauma
Burns
Amputation Trauma
Pain Management

Supplied
Concentrations of 25% to 50% nitrous oxide with oxygen

Authorized Administration Routes
Primary Care Paramedic – Inhaled
Intermediate Care Paramedic – Inhaled
Advanced Care Paramedic

Pharmacology
1. General CNS depressant.
2. Possibly stabilizes axonal membranes to partially inhibit action potentials leading to sedation.
3. May partially act on opiate receptor systems to cause mild analgesia similar to morphine.
4. Does not negatively affect blood pressure, systemic vascular resistance, or cardiac output.
5. Does not depress carbon dioxide drive to breath.
6. Increases cerebral blood flow and intracranial pressure while decreasing hepatic and renal blood flow.

Metabolism
1. Absorbed rapidly through lungs and excreted rapidly and almost entirely through exhalation.

Onset	Duration	Half Life
– 2-5 minutes	– Analgesic effects cease shortly after inhalation is stopped	

Indication
1. Cardiac chest pain.
2. Active labour.
3. Pain due to musculoskeletal trauma or amputation.
4. Burns.

Contraindications
1. Should not be administered without oxygen.
2. Head injury with impaired consciousness.
3. Inebriation.
4. Heavily sedated (overdose, street drugs).
5. Severe facial injuries.
6. Inability to follow the instructions (too young, mentally challenged, senile, injury to both hands).
7. Pneumothorax.
8. Decompression sickness.

Precautions
1. It should be remembered you are not providing 100% oxygen and so you may wish to supplement with a nasal cannula.
2. May be associated with abuse and/or addiction.

Side Effects
1. Hypotension (frequency not defined).
2. Headache (frequency not defined).
3. Dizziness (frequency not defined).
4. Confusion (frequency not defined).
5. CNS excitation (frequency not defined).
6. Nausea, vomiting (frequency not defined).
7. Apnea (frequency not defined).

Special Notes

Adult Dose	Primary Care Paramedic	Intermediate Care Paramedic	Advanced Care Paramedic
Inhalation	Dose: 25% to 50% nitrous oxide with oxygen self- administered prn		

Pediatric Dose	Primary Care Paramedic	Intermediate Care Paramedic	Advanced Care Paramedic
Inhalation	Dose: 25% to 50% nitrous oxide with oxygen self- administered prn		

Norepinephrine (Levophed)

Drug Classification Sympathomimetic	**Relevant Protocol(s)** Severe Sepsis / Septic Shock
Supplied 4 mL vials (1 mg/mL)	**Authorized Administration Routes** **Advanced Care Paramedic**

Pharmacology

1. Powerful peripheral vasoconstrictor via alpha-adrenergic action and potent inotropic stimulator and dilator of coronary arteries via beta-adrenergic action.
2. Increases systemic blood pressure and coronary artery blood flow.
3. Increases coronary blood flow 2.5 times that of EPINEPHrine.

Metabolism

1. Metabolized via the liver and other tissues by a combination of reactions.
2. Metabolites are excreted in the urine with only a very small amount of norepinephrine excreted unchanged.

Onset	**Duration**	**Half Life**
– Immediate	– Stops within 1-2 minutes upon d/c of infusion	

Indications

1. Restoration and maintenance of blood pressure in patients with septicemia.

Contraindications

1. Hypotensive patients with uncorrected hypovolemia.
2. Patients with mesenteric or peripheral vascular thrombus.
3. Use with extreme caution in patients taking MAO inhibitors or antidepressants (imipramine or triptyline types).

Precautions

1. Must be administered via IV pump
2. Administer in a large vein.
3. Take care to avoid the risk of extravasation into surrounding tissues. Infusion site should be monitored for blanching, cold temperature, and firmness along the course of the vein or around infusion site.

Side Effects

1. Systemic ischemic injury due to potent vasoconstrictor action and tissue hypoxia.
2. Anxiety.
3. Headache.
4. Respiratory difficulty.

Special Notes

1. Remedy for extravasation of norepinephrine is phentolamine infiltrated liberally throughout affected area. Important to seek treatment as soon as possible as treatment may be ineffective when given >12 hours after extravasation.

Adult Dose	**Advanced Care Paramedic**
Infusion	Average adult maintenance dosage: 2–4 mcg/minute
Pediatric Dose	**Advanced Care Paramedic**
Infusion	Usually administered at a rate of 2 mcg/minute

Oxytocin (Pitocin, Syntocinon)

Drug Classification Oxytocic	**Relevant Protocol(s)** Childbirth
Supplied 10 units/mL	**Authorized Administration Routes** **Primary Care Paramedic – monitor infusion** **Intermediate Care Paramedic –monitor infusion** **Advanced Care Paramedic**

Pharmacology

1. Acts on the smooth muscle of the uterus to stimulatecontraction.
2. Increases contraction amplitude and frequency that tends to decrease cervical activity, produce dilation and effacement of the cervix, and transiently impede uterine blood flow. Contractions produced by oxytocin at term are similar to those occurring during spontaneous labour

Metabolism

1. Rapidly metabolized by the liver and kidneys.
2. Small amounts excreted in urine unchanged.

Onset	**Duration**	**Half Life**
– IM: 3-5 minutes	– 2-3 hours	– 3-5 minutes

Indications

1. Postpartum hemorrhage ensuring the patient is not a candidate for multiple births.

Contraindications

1. None when given to treat postpartum bleeding.

Precautions

1. Water intoxication with headache and nausea has been reported after prolonged or too rapid IV infusion.

Side Effects

1. Nausea.
2. Vomiting.
3. Sinus bradycardia.
4. Premature ventricular complexes (probably related to labour and not the drug).

Special Notes

Adult Dose	**Advanced Care Paramedic**
IM	Dose: 5-10 units IM

Pantoprazole (Pantoloc, Tecta)

Drug Classification Proton-pump inhibitor Gastric anti-secretory	**Relevant Protocol(s)** Inter-facility transfer of patients receiving medications
Supplied Various preparations	**Authorized Administration Routes** **Intermediate Care Paramedic – monitor infusion** **Advanced Care Paramedic – monitor infusion**
Indications 1. Gastroesphageal reflux. 2. Duodenal ulcer. 3. Gastric ulcer. 4. Crohns disease.	
Contraindications 1. Hypersensitivity.	
Precautions 1. A dosage sticker must be affixed to the IV mini-bag. 2. An infusion control device at a predetermined rate according to the local pharmacy protocol must be used	
Special Notes 1. The ICP and ACP may attend patients receiving pantoprazole infusions during inter-facility transfer.	

Penthrox (Methoxyflurane)

Drug Classification Gaseous analgesic	**Relevant Protocol(s)** Musculoskeletal Trauma Burns Amputation Trauma
Supplied 3 mL of 99.9% methoxyflurane	**Authorized Administration Routes** **Primary Care Paramedic - Inhaled** **Intermediate Care Paramedic – Inhaled** **Advanced Care Paramedic**

Pharmacology

1. Methoxyflurane belongs to the halogenated hydrocarbon group of volatile anesthetic agents. The mechanism of action is not clearly understood.

Metabolism

1. Metabolized by the liver and excreted by the lungs.

Onset	**Duration**	**Half Life**
– 1-3 minutes	– 1 hour	- Not available

Indications

1. Moderate to severe pain associated with trauma

Contraindications

1. Inadequate understanding/lack of patient cooperation
2. Decreased level of consciousness
3. Psychosis
4. Pre-eclampsia
5. Known moderate to severe renal and/or liver impairment.
6. Hypersensitivity to methoxyflurane or other halogenated anesthetics.
7. Malignant hyperpyrexia / family history of malignant hyperpyrexia without negative personal test
8. Significant cardiovascular compromise

Precautions

1. Raised intracranial pressure
2. Supratherapeutic doses have been shown to lead to serious, irreversible nephrotoxicity.

Side Effects

1. Altered level of consciousness
2. Cough

Special Notes

1. Store between 5 - 30°C.
2. After loading the inhaler, replace cap onto Penthrox bottle. After use, place used Penthrox inhaler and used bottles in plastic bags provided, seal and dispose.

Adult Dose	**Primary Care Paramedic**	**Intermediate Care Paramedic**	**Advanced Care Paramedic**
Inhalation	One 3mL bottle to be vaporized in a Penthrox inhaler. One additional bottle of 3 mL may be used if needed. Self-administered prn. Patients should use the lowest amount needed for pain control. No more than 6 mL is to be used in a single 48-hour period.		

Pediatric Dose	**Primary Care Paramedic**	**Intermediate Care Paramedic**	**Advanced Care Paramedic**
Inhalation	Not to be used in patients under 18 years old.		

Potassium Chloride (KCl)

Drug Classification Electrolyte	**Relevant Protocol(s)** Inter-facility transfer of patients receiving medications
Supplied Various preparations	**Authorized Administration Routes** **Primary Care Paramedic – monitor infusion** **Intermediate Care Paramedic – monitor infusion** **Advanced Care Paramedic – monitor infusion**
Indications 1. Hypokalemia.	
Contraindications 1. Sudden boluses of potassium may cause lethal arrhythmias. Therefore, the rate of infusion of a potassium drip cannot be increased rapidly if the patient develops hypotension	
Precautions 1. The potassium containing solution must be administered via an IV pump 2. If potassium is infusing, ensure that a medication sticker that identifies potassium as the medication being infused as well as the dose of potassium is affixed to the IV bag 3. The rate of administration must be in writing and is not to be exceeded under any circumstances	
Special Notes 1. The PCP, ICP and ACP may attend patients receiving potassium chloride infusions during inter-facility transfer.	

Salbutamol (Airomir, Apo-Salvent, Ventolin)

Drug Classification Bronchodilator	**Relevant Protocol(s)** Asthma/COPD
Supplied Inhalation 2.5 mg or 5.0 mg nebules	**Authorized Administration Routes** **Primary Care Paramedic – Nebulized** **Intermediate Care Paramedic – Nebulized** **Advanced Care Paramedic**

Pharmacology

1. Stimulates B-adrenergic receptors with little or no effect on A-adrenergic receptors, relaxing smooth muscles from the trachea to the terminal bronchial tree.

Metabolism

1. Efficacy of orally inhaled drug appears to result from local action rather than systemic absorption.
2. Extensively metabolized in the intestinal wall and the liver into inactive metabolites.
3. Largely excreted in urine with small amounts excreted in feces.

Onset	**Duration**	**Half Life**
- 5-15 minutes	- 2-4 hours	- 3.8-6 hours

Indications

1. Exacerbation of asthma or chronic bronchitis.

Contraindications

1. Hypersensitivity.
2. Tachyarrhythmias.

Precautions

1. Failure to respond to a previously effective dosage of salbutamol may indicate seriously worsening asthma.
2. Possible fatalities associated with excessive use of inhaled sympathomimetic drugs.
3. Possible clinically important cardiovascular effects including cardiac arrhythmias (e.g., atrial fibrillation, supraventricular tachycardia, extrasystoles), increased or decreased BP, and related symptoms.
4. Possible CNS stimulation and adverse nervous system effects.

Side Effects

1. Tremors.
2. Otitis media.
3. Nausea.
4. Cough.
5. Headache.
6. Palpations.

Special Notes

Adult Dose	**Primary Care Paramedic**	**Intermediate Care Paramedic**	**Advanced Care Paramedic**
Nebulized	Dose: 2.5 mg-5 mg nebulized with oxygen or air at 6-8 lpm		
Pediatric Dose	**Primary Care Paramedic**	**Intermediate Care Paramedic**	**Advanced Care Paramedic**
Nebulized	Dose: 1.25 mg (0.25 mL) of salbutamol and add 2 - 4 mL of NaCL. In severe cases of bronchospasm, administer 2.5 mg of salbutamol and add 2 - 4 mL of NaCL.		

Sodium Bicarbonate (BiBag, Bicart PWR, HeamCart)

Drug Classification Alkalinizer		**Relevant Protocol(s)** Cyclic Antidepressant Overdose V-fib/Pulseless V-tach
Supplied [3] IV 8.4% (1 mEq/mL) 10 or 50 mEq 4.2% (0.5 mEq/mL) 2 or 5 mEq		**Authorized Administration Routes** **Advanced Care Paramedic**
Pharmacology 1. Dissociates to provide bicarbonate ion; bicarbonate is the conjugate base component of the principal extracellular buffer in the body 2. Administration of sodium bicarbonate, by decreasing pH, can cause a redistribution of potassium ions into cells in patients with acidosis		
Metabolism 1. Bicarbonate readily excreted in urine; administration of the drug will increase urinary pH in patients with normal renal function, alkalinizing the urine can increase the solubility of certain weak acids.		
Onset	**Duration**	**Half Life**
Indications 1. Known cyclic antidepressant overdose with QRS widening (greater than 0.10 sec.) 2. Prolonged v-fib/pulseless v-tach cardiac arrest		
Contraindications 1. Metabolic or respiratory alkalosis. 2. Hypocalcemia in which alkalosis may induce tetany.		
Precautions 1. Extreme caution in patients with CHF. 2. Possible fluid overload following IV administration.		
Side Effects 1. Gastric distention and flatulence with oral administration.		
Special Notes 1. If patient presents with hypotension, administer sodium bicarbonate while rapidly infusing normal saline.		

Adult Dose	**Advanced Care Paramedic**
IV	Dose: 1 mEq/kg IV
Pediatric Dose	**Advanced Care Paramedic**
IV/IO	Dose: 1 mEq/kg (1 mL/kg of an 8.4% sodium bicarbonate solution)

Thiamine (Betaxin, Thiamiject)

Drug Classification Vitamin	**Relevant Protocol(s)** Hypoglycemic
Supplied 1 mL ampule, 100 mg/mL	**Authorized Administration Routes** **Advanced Care Paramedic**

Pharmacology

1. An exogenous source of thiamine is required for carbohydrate metabolism.
2. Functions as a coenzyme in the metabolism of carbohydrates and branched-chain amino acids.

Metabolism

1. Metabolized by the liver and excreted renally.

Onset	**Duration**	**Half Life**

Indications

1. Hypoglycemic patients who have received D50W and appear malnourished.

Contraindications

1. Hypersensitivity.

Precautions

1. Sensitivity reactions

Side Effects

1. Associated with hypersensitive response e.g. pruritus, urticaria, weakness, sweating, nausea, restlessness, angioedema, tightness in the throat.

Special Notes

Adult Dose	**Advanced Care Paramedic**
IV	Dose: 100 mg SIVP

Vancomycin (Vancocin)

Drug Classification Antibiotic	**Relevant Protocol(s)** Severe Sepsis/Septic Shock
Supplied IV: 500 mg sterile powder in 10 mL vial (reconstituted with 10-20 mL sterile water) -1 g sterile powder in 30 mL vial (reconstituted with 10-20 mL sterile water)	**Authorized Administration Route** **Advanced Care Paramedic**

Pharmacology
1. Inhibits cell wall synthesis in gram positive bacteria.
2. Usually bactericidal
3. There is evidence that suggests that vancomycin alters the permeability cell membrane and selectively inhibits RNA synthesis.
4. Not effective in vitro against gram-negative bacilli, myobacteria or fungi.

Metabolism
1. Widely distributed into body tissues and diffuses following IV administration, including pericardial, pleural, ascetic and synovial fluids.
2. Does not appear to be metabolized and eliminated unchanged primarily in the urine.
3. Not appreciably absorbed from GI tract; must be administered parenterally for treatment of systemic infections.

Onset	**Duration**	**Half Life**
– Peak serum concentrations within 30 minutes (following IM injection)	– Varied	– 4-7 hours

Indications
1. Severe septicemia with signs of septic shock.

Contraindications
1. Hypersensitivity.

Precautions
1. Rapid infusion may result in serious hypotension.
2. To prevent hypotensive infusion reaction, administer over one hour or longer.
3. Ototoxicity, d/c if tinnitus occurs.
4. Should be used with care on patients with renal insufficiency.
5. Can cause nephrotoxicity in those with renal impairment or on prolonged high dose IV therapy.

Side Effects
1. Injection site pain and inflammation.
2. Diarrhea, nausea, vomiting.
3. Hypersensitivity-rash, pruritus, fever.

Special Notes
1. Further dilute reconstituted solutions containing 500 mg or 1 g with at least 100 mL or at least 200 mL, respectively, of a compatible IV solution.

Adult Dose	**Advanced Care Paramedic**
IV/IO	Dose: IV: 500 mg every 6 hours or 1 g every 12 hours max 2 g in a 24-hour period Infuse at not faster than 10 mg/min
Pediatric Dose	**Advanced Care Paramedic**
IV/IO	Dose: 10 mg/kg q 6 hours max 2 g in a 24-hour period