Medications

Acetaminophen – 20.010

CLASS: A

PROTOCOL(S) USED IN:
Seizure

PHARMACOLOGY AND ACTIONS:
Non-narcotic analgesic and antipyretic

INDICATIONS:
Reduction of fever associated with febrile seizures in the pediatric patient.

CONTRAINDICATIONS:
A. Hypersensitivity
B. DO NOT use with any other products that contain acetaminophen

SIDE EFFECTS AND NOTES:
May be administered via rectal suppository (same dose) if patient is vomiting, the patient's gag reflex is absent or in question or the patient is not alert. Can be given up to every 4 hours. Do not exceed five doses a day.

DOSING/DOSING CHART:
A. 15 mg/kg PO/PR suppository or
B. See chart below for other concentrations/forms

Weight	Age	80mg Tablets	160mg/tsp Elixir	80mg/0.8ml Drops	Mg
6-11 lbs	0-3 mos	---	¼ tsp	.4ml	40mg
12-17lbs	4-11mos	---	½ tsp	.8ml	80mg
18-23lbs	11-23mos	1 ½ tab	¾ tsp	1.2ml	120mg
24-35lbs	2-3yrs	2 tabs	1 tsp	1.6ml	160mg
36-47lbs	4-5yrs	3 tabs	1 ½ tsp	2.4ml	240mg
48-59lbs	6-8yrs	4 tabs	2 tsp	3.2ml	320mg
60-71lbs	9-10yrs	5 tabs	2 ½ tsp	4.0ml	400mg
72-95lbs	11-12yrs	6 tabs	3 tsp	4.8ml	480mg

Adenosine (Adenocard®) – 20.020

CLASS: A

PROTOCOLS USED IN: Cardiac Dysrhythmias - Tachycardia

PHARMACOLOGY AND ACTIONS:
Adenosine is a naturally occurring nucleoside that has the ability to slow conduction through the AV node. Since most cases of PSVT involve AV nodal re-entry, Adenosine is capable of interrupting the AV nodal circuit and stopping the tachycardia, restoring normal sinus rhythm. It is eliminated from the circulation rapidly and has a half-life in the blood of less than ten seconds.

INDICATIONS:
To convert PSVT to a normal sinus rhythm, including PSVT that is associated with accessory bypass tracts (e.g. Wolff-Parkinson-White Syndrome).

CONTRAINDICATIONS:
- **A. Second- or third-degree heart block.**
- **B. Sick Sinus Syndrome**
- **C. Known hypersensitivity**

PRECAUTIONS:
- A. When doses larger than 12 mg are given by injection there may be a decrease in blood pressure secondary to a decrease in vascular resistance.
- B. The effects of Adenosine are antagonized by methylxanthines such as Theophylline and caffeine. Larger doses of Adenosine may be required.
- C. Adenosine effects are potentiated by dipyridamole (Persantine) resulting in prolonged asystole.
- D. In the presence of carbamazepine (Tegretol), high degree heart block may occur.
- E. Adenosine is not effective in converting atrial fibrillation, atrial flutter or ventricular tachycardia. May attempt Adenosine administration in monomorphic, wide complex tachycardia where SVT with aberrancy is suspected.
- F. All doses of adenosine should be reduced to one-half (50%) in the following clinical settings:
  - a. History of cardiac transplantation.
  - b. Patients who are on carbamazepine (Tegretol) and dipyridamole (Persantine).
  - c. Administration through any central line.

SIDE EFFECTS AND NOTES:
May cause facial flushing, shortness of breath, chest pressure, nausea, headache and lightheadedness.

ADULT DOSING: 6 mg rapid IV. May repeat with 12 mg IV x 2 if patient fails to convert after initial dose. Use a large proximal IV site with fluid bolus flush.

PEDIATRIC DOSING:
PSVT - 0.1 **mg/kg rapid IV**. May repeat with 0.2 mg/kg once if patient fails to convert after first dose. Use a large proximal IV site with fluid bolus flush. Max single dose correlates with adult doses.

Albuterol (Ventolin®) – 20.030

CLASS A: Respiratory Distress **CLASS B: Hyper K & Crush injury**

PROTOCOLS USED IN: Respiratory Distress, Hyperkalemia and Crush Injury

PHARMACOLOGY AND ACTIONS:
Albuterol is a potent, relatively selective Beta-2 adrenergic bronchodilator and is associated with relaxation of bronchial smooth muscle and inhibition of release of mediators of immediate sensitivity from cells, especially MAST cells. The onset of improvement in pulmonary function is within 2 – 15 minutes after the initiation of treatment and the duration of action is from 4 – 6 hours. Albuterol has occasional Beta-1 overlap with clinically significant cardiac effects.

INDICATIONS:
A. To treat bronchial asthma and reversible bronchial spasm that occurs with chronic obstructive pulmonary disease.
B. To treat hyperkalemia.

CONTRAINDICATIONS:
None in the prehospital setting.

PRECAUTIONS:
A. The patient's rhythm should be observed for arrhythmias. Stop treatment if frequent PVC's develop or any tachyarrhythmias other than sinus tachycardia appear or if heart rate increases by more than 20 beats/minute.
B. Paradoxical bronchospasm may occur with excessive administration.

SIDE EFFECTS AND NOTES:
Clinically significant arrythmias may occur, especially in patients with underlying cardiovascular disorders such as coronary insufficiency and hypertension.

ADULT DOSING:
Respiratory distress -
2.5 mg via nebulizer. Repeat as needed.
Hyperkalemia -
10 mg via nebulizer.
Hyperkalemia secondary to crush injury -
OLMC contact required.

PEDIATRIC DOSING:
Same as adult

Albuterol & Atrovent (DuoNeb®) – 20.031

CLASS: A

PROTOCOLS USED IN: Respiratory Distress

PHARMACOLOGY AND ACTIONS:
Ipratropium is an atropine derivative used for inhalation therapy. For severe asthma, Ipratropium taken in addition to a short acting beta agonist (such as Albuterol) can provide greater bronchodilation and clinical benefit than the beta agonist alone. It has no anti-inflammatory effects and does not decrease bronchial hyper-responsiveness.

INDICATIONS:
Bronchial Asthma and reversible bronchial spasm that occur with chronic pulmonary disease.

CONTRAINDICATIONS:
Stop treatment if pulse increases by 20 bpm, frequent PVCs develop, any tachyarrhythmias other than sinus tachycardia appear, chest pain, apnea, nausea or vomiting or increased shortness of breath occur.

PRECAUTIONS:
Ipratropium in the meter dose inhaler and auto-inhaler formulations should not be administered to individuals allergic to soy lecithin or related food products (e.g. soy beans, peanuts). The nebulized formulation may be administered to these patients.

SIDE EFFECTS AND NOTES:

A. Patients with COPD should be monitored carefully for CO2 retention and decreased levels of consciousness.
B. Paradoxical bronchospasm may occur with excessive administration.
C. Skeletal muscle tremors.
D. Albuterol should be used with caution in pregnancy.
E. Continually assess patient's respiratory rate, effort and lung sounds.

ADULT DOSING:

Nebulizer:
2.5mg Albuterol/0.5mg Atrovent mixed in 3ml of normal saline for a concentration of 0.83mg/ml with at least 6 lpm of oxygen flow. Coach patient to inhale slowly and exhale passively through nose.

Metered Dose Inhaler (MDI)
90mcg per puff
Assemble one BVM, one AeroChamber, oxygen tubing and Albuterol inhaler.
Begin with two Albuterol puffs into chamber and assist patient's ventilations using the BVM and high flow oxygen.
After one minute, repeat with two puffs. Repeat every two minutes if improvement is not noted. **DO NOT EXCEED 20 PUFFS.**

PEDIATRIC DOSING:
≤ 1 year of age: Nebulized dosage of 0.03ml/kg with a max dose of 1ml.

Amiodarone (Cordarone®) – 20.040

CLASS: A

PROTOCOL(S) USED IN: Cardiac Arrest VT/VF, Cardiac Dysrhythmia Tachycardia

PHARMACOLOGY AND ACTIONS:

A. Antiarrhythmic
B. Prolongation of the myocardial cell-action potential duration & refractory period.
C. Noncompetitive alpha and beta-adrenergic inhibition.
D. Blocks sodium channels and, to some extent, the calcium channels.

INDICATIONS:

A. Refractory sustained ventricular fibrillation/pulseless ventricular tachycardia.
B. Ventricular Tachycardia with a pulse.

CONTRAINDICATIONS:

A. None when given in the cardiac arrest setting.

SIDE EFFECTS AND NOTES:

A. Hypotension
B. Bradycardia
C. Congestive heart failure
D. AV Block
E. Shaking vials will cause foaming of the medication

ADULT DOSING:

Pulseless rhythms**: 300 mg rapid IV/IO push followed by a 10ml LR or NS flush.** May repeat at **150 mg rapid IV/IO push followed by a 10 ml LR or NS flush.**

Rhythm with a pulse**: 150 mg in 100ml of NS over 10-20 minutes IV/IO**

PEDIATRIC DOSING:

Vfib/Vtach with/without a pulse**: 5 mg/kg IV/IO.** May repeat twice up for a total of 15 mg/kg or the max adult dose.

Aspirin – 20.050

CLASS: A

PROTOCOL(S) USED IN: Chest Pain/Acute Coronary Syndrome

PHARMACOLOGY AND ACTIONS:
Blocks formation of thromboxane A2 which causes platelets to aggregate and arteries to constrict.

INDICATIONS:
Chest pain suspected of being in cardiac in origin.

CONTRAINDICATIONS:
- **A. Known hypersensitivity**
- **B. Relatively contraindicated in patients with history of active ulcer disease or asthma.**

SIDE EFFECTS AND NOTES:
- A. Higher doses can interfere with prostacyclin production and interfere with positive benefits.
- B. Aspirin alone, started within 24 hours of the onset of an acute MI, reduced overall mortality to almost the same degree as thrombolytic agents.

ADULT DOSING:
Chest pain (acute myocardial infarction)
4 chewable baby aspirin 324 mg PO.

PEDIATRIC DOSING:
Not indicated for pediatric patients

Atropine Sulfate – 20.060

CLASS: A

PROTOCOL(S) USED IN: Cardiac Dysrhythmia Bradycardia, Poisoning & Overdose, RSI (Pediatric), Organophospates

PHARMACOLOGY AND ACTIONS:

A. Muscarine-cholinergic blocking agent.
B. Increases heart rate by blocking vagal response.
C. Increases conduction through A-V node and increases ventricular sensitivity to atrial impulses.
D. Reduces motility and tone of GI tract.
E. Reduces action and tone of bladder which may cause urinary retention.
F. Dilates pupils.

INDICATIONS:

A. Symptomatic bradycardias, 2nd and 3rd degree heart blocks and pacemaker failure.
B. Sustained bradycardia induced during pediatric RSI
C. Organophosphate and nerve gas poisoning.

CONTRAINDICATIONS:

A. Atrial fibrillation and atrial flutter
B. Glaucoma

SIDE EFFECTS AND NOTES:

A. Bradycardia may be beneficial in the AMI setting. Administer only if there are signs of hypoperfusion (chest pain, low blood perfusion, altered mental status).
B. In organophosphate poisoning, massive doses of 10-20 mg or more may be needed.
C. Titrate dose by watching patient response.

ADULT DOSING:

Symptomatic Bradycardia:
1 mg IV/IO push, repeat prn in 3-5 minute intervals to a maximum dose of 3 mg.

Organophosphate Poisoning:
1-5 mg IV/IO push. Doses should be repeated every 5 minutes until excessive secretions and sweating have been controlled

PEDIATRIC DOSING:

Symptomatic Bradycardia:
0**.02 mg/kg IV/IO** Minimum single dose 0.1 mg, maximum single dose 1 mg. If no IV/IO may give 0.04 mg/kg ET. May repeat once.

Calcium Chloride 10% – 20.070

CLASS A: Premed and Hyper K **CLASS B: Calcium Channel OD**

PROTOCOL(S) USED IN: Cardiac Arrest, Cardiac Dysrhythmia Tachycardia, Hyperkalemia, Poisoning & Overdoses

PHARMACOLOGY AND ACTIONS:
Increases the force of myocardial contraction by initiation of myofibril shortening. The positive inotropic effects and vasoconstricting effects produce a rise in systemic arterial pressure.

INDICATIONS:
A. Premedication to Diltiazem if systolic BP <90 mmHg
B. Suspected Hyperkalemia not in cardiac arrest setting
C. In cardiac arrest setting:
    1. Hyperkalemia secondary to renal failure.
    2. Hypocalcemia due to multiple blood transfusions.
    3. Known or suspected calcium channel blocker overdoses.

CONTRAINDICATIONS:
A. CANNOT BE ADMINISTERED WITH SODIUM BICARBONATE>
B. In presence of sodium bicarbonate, calcium salts will precipitate as carbonates.

SIDE EFFECTS AND NOTES:
A. Extremely important to flush the IV line between administration of sodium bicarbonate and calcium chloride to avoid precipitation.
B. May produce coronary and cerebral artery spasms.
C. Should be used with caution in patients receiving digitalis; may precipitate toxicity.

ADULT DOSING:

Premedication: **500 mg** or **5 ml slow IV/IO push**

Hyperkalemia: 10 ml slow IV/IO over 5-10 minutes

Calcium Blocker OD: Contact OLMC for **10 ml slow IV/IO** over 5-10 minutes

PEDIATRIC DOSING:

Hyperkalemia: 20 mg/kg slow IV/IO push

Calcium Gluconate – 20.071

CLASS A: Hyper K **CLASS B: Calcium channel blocker OD except in cardiac arrest, Hydrogen Fluoride exposure**

PROTOCOLS USED IN: Cardiac Dysrhythmias (Tachycardia), Hyperkalemia, Poisoning/Overdose, Hydrogen Fluoride

PHARMACOLOGY AND ACTIONS:
Calcium is the most common cation in the human body. The majority of the body stores of calcium are located in bone. It plays an important role in many physiologic functions and is essential for proper nerve and muscle function.

INDICATIONS:
A. Hyperkalemia.
B. Suspected calcium channel Blocker overdose.
C. Hydrogen Fluoride over exposure

CONTRAINDICATIONS:
A. Hypercalcemia and hypercalciuria (hyperthyroidism, Vitamin D overdose, bone metastases).
B. Patients on Digoxin.

PRECAUTIONS:
A. Extravasation of Calcium salts will cause necrosis of tissue. The IV should be secured and free blood return into the syringe should be checked 2-3 times during administration. If extravasation does occur, immediately stop administration.
B. Administer slowly (no faster than 2ml/min) and stop if patient complains of distress. Inject using a small needle in a large vein.
C. Calcium Gluconate will precipitate if mixed with Sodium Bicarbonate. Flush catheter completely before administering one medication after another.

SIDE EFFECTS AND NOTES:
A. Rapid injection of Calcium Gluconate may cause vasodilatation, decreased blood pressure, bradycardia, cardiac arrythmias, syncope and cardiac arrest.
B. One vial of 10 ml Calcium Gluconate 10% contains 1 gram of calcium gluconate salt (= 93 mg elemental calcium or 4.6 mEq calcium or 2.3 mmol calcium)

ADULT DOSING:
Cardiac Dysrhythmias (Tachycardia,) Hyperkalemia, calcium channel blocker overdose -
1 gm or 10 ml slow IV/IO over 5 – 10 minutes. Use a proximal port.
Hydrogen Fluoride – see protocol. Contact OLMC

PEDIATRIC DOSING:
Hyperkalemia, calcium channel blocker overdose -
0.5 ml/kg slow IV/IO over 5 – 10 minutes. Use a proximal port. Max dose 10 ml.

Dexamethasone (Decadron ®) – 20.085

CLASS: A

PROTOCOL(S) USED IN: Anaphylaxis, Respiratory Distress

PHARMACOLOGY AND ACTIONS:

A. Dexamethasone is a synthetic steroid that suppresses acute and chronic inflammation. In addition, it potentiates smooth muscle relaxation by beta-adrenergic agonists.

INDICATIONS:

A. Severe allergic reaction or Anaphylaxis
B. Moderate/Severe Asthma or COPD
C. Croup

CONTRAINDICATIONS:
Known Hypersensitivity

SIDE EFFECTS AND NOTES:

A. May cause nausea, vomiting, headache and dizziness.
B. May cause hypertension and hyperglycemia

ADULT DOSING:

Anaphylaxis, severe allergic reaction, COPD, Asthma**--**
10 mg slow IV/IO/IM push or PO

PEDIATRIC DOSING:

Anaphylaxis, allergic reaction, Croup, Asthma-
0.6 mg/kg slow IV or IO push or IM to a maximum of 10 mg

Dextrose 10% and 50%– 20.090

CLASS: A

PROTOCOL(S) USED IN: Altered Mental Status

PHARMACOLOGY AND ACTIONS:
Glucose elevating agents nonpyrogenic hypertonic solution of dextrose in water as a fluid and nutrient replenisher.

INDICATIONS:
A. Coma, unconscious, unresponsive unknown etiology
B. Hypoglycemia, insulin shock

CONTRAINDICATIONS:
None in the emergent setting

SIDE EFFECTS AND NOTES:
Tissue necrosis and phlebitis at injection site

ADULT DOSING:
Dextrose 10% IV/IO titrate to effect, or **25 G Dextrose 50% IV. IO** if unable to obtain IV Access. May repeat D50 once.

PEDIATRIC DOSING:

A. Infants < 10 kg (birth to 1 year) with CBG < 45 mg%:
   - Give 2.5 - 5 ml/kg of **Dextrose 10%.**
B. Children 10 kg – 35kg with CBG < 60 mg%:
   - Give 2 - 4 ml/kg of **Dextrose 25%.**
C. Repeat dextrose as needed.

Diazepam (Valium)– 20.095

CLASS: A

PROTOCOL(S) USED IN: Altered Mental Status, Pain Management

PHARMACOLOGY AND ACTIONS:

A. Benzodiazepine with antianxiety and sedative effects.
B. Anticonvulsant

INDICATIONS:

A. Status Epilepticus
B. Chemical Sedation for transcutaneous pacing
C. Relief of anxiety

CONTRAINDICATIONS:
Known Sensitivity

SIDE EFFECTS AND NOTES:

A. Respiratory depression
B. Hypotension
C. Sedation
D. Paradoxical excitement or agitation

ADULT DOSING:

2-10 mg IV or IM

PEDIATRIC DOSING:

0.1-0.3 mg/kg IV/IO/IM Max dose 5 mg

Diltiazem (Cardizem®) - 20.100

CLASS: A

PROTOCOL(S) USED IN: Cardiac Dysrhythmia Tachycardia

PHARMACOLOGY AND ACTIONS:
A calcium channel blocker that inhibits calcium ion influx across cardiac and smooth muscle cells, decreasing myocardium contractility and oxygen demand.

INDICATIONS:
A. Rapid atrial fibrillation or atrial flutter.

CONTRAINDICATIONS:
A. Sick sinus syndrome or second or third degree AV block in the absence of an artificial pacemaker.
B. Systolic BP below 90 mmHg.
C. Wolff-Parkinson-White Syndrome or patients with ventricular tachycardia.

SIDE EFFECTS AND NOTES:
A. Headache, dizziness
B. Arrhythmias, bradycardia, heart failure, AV block-abnormal ECG.
C. Hypotension, flushing
D. Nausea, constipation, abdominal discomfort

ADULT DOSING:
A. **0.25mg/kg** slow IV/IO push. Max of 20 mg.
B. If no response, **0.35mg/kg** slow IV/IO push after 15 minutes. Max of 25 mg.

PEDIATRIC DOSING:
NONE

DILTIAZEM

1st Dose				2nd Dose			
Weight		0.25MG/KG	ML	Weight		0.35MG/KG	ML
100 lbs	45 kg	11.3 mg	2.3 ML	100 lbs	45 kg	15.8 mg	3.2 ML
110 lbs	50 kg	12.5 mg	2.5 ML	110 lbs	50 kg	17.5 mg	3.5 ML
120 lbs	54 kg	13.5 mg	2.7 ML	120 lbs	54 kg	18.9 mg	3.8 ML
130 lbs	59 kg	14.8 mg	3 ML	130 lbs	59 kg	20.7 mg	4.1 ML
140 lbs	63 kg	15.8 mg	3.2 ML	140 lbs	63 kg	22 mg	4.4 ML
150 lbs	68 kg	17 mg	3.4 ML	150 lbs	68 kg	23.8 mg	4.8 ML
160 lbs	73 kg	18.1 mg	3.6 ML	160 lbs	73 kg	25 mg	5 ML
170 lbs	77 kg	19.3 mg	3.9 ML	170 lbs	77 kg	25 mg	5 ML
180 lbs	82 kg	20.5 mg	4.1 ML	180 lbs	82 kg	25 mg	5 ML
190 lbs	86 kg	21.5 mg	4.3 ML	190 lbs	86 kg	25 mg	5 ML
200 lbs	91 kg	22.7 mg	4.5 ML	200 lbs	91 kg	25 mg	5 ML
210 lbs	95 kg	23.8 mg	4.8 ML	210 lbs	95 kg	25 mg	5 ML
220 lbs	100 kg	25 mg	5 ML	220 lbs	100 kg	25 mg	5 ML

MAX DOSE OF DILTIAZEM IS 25MG
DOSE CALCULATED FOR 25MG/5ML CONCENTRATION

Diphenhydramine (Benadryl ®) – 20.110

CLASS: A

PROTOCOL(S) USED IN: Altered Mental Status, Anaphylaxis, Nausea & Vomiting, Poisoning/Overdoses

PHARMACOLOGY AND ACTIONS:

A. Antihistamine which blocks action of histamines released from cells during an allergic reaction.
B. Direct CNS effects which include stimulant, or more commonly, depressant depending on individual variation.
C. Anticholinergic.

INDICATIONS:

A. Allergic reaction
B. Acute dystonic reactions to antipsychotic and antiemetic medications
C. Adjunctive therapy for anaphylaxis.
D. Chemical sedation adjunct for a combative patient.

CONTRAINDICATIONS:
Relative contraindication for pregnant or lactating females, neonates.

SIDE EFFECTS AND NOTES:

A. Sedation, blurred vision, anticholinergic effects.
B. May enhance effects of alcohol or other depressants.
C. Is NOT the first line drug for anaphylactic reactions.

ADULT DOSING:

Anaphylaxis, allergic reaction and sedation **--**
25-50 mg slow IV/IO push or Deep IM

Extrapyramidal symptoms **–**
12.5- 25 mg slow IV/IO or Deep IM

PEDIATRIC DOSING:

Anaphylaxis, allergic reaction, and extrapyramidal symptoms -
1-2 mg/kg slow IV or IO push or IM to a maximum of 50 mg

Epinephrine – 20.130

CLASS: A

CLASS B: Asthma
(> 3 doses, >40 y/o, and/or pmhx of CAD)

PROTOCOL(S) USED IN: Anaphylaxis, Cardiac Arrest protocols, Cardiac Dysrhythmias Bradycardia, Neonatal Resuscitation, Respiratory Distress

PHARMACOLOGY AND ACTIONS:

A. Catecholamine with alpha and beta effects.
B. Increased heart rate, arterial blood pressure, systemic vascular resistance, automaticity, myocardial O2 consumption and myocardial contractile force.
C. Potent bronchodilator.

INDICATIONS:

A. Ventricular fibrillation/Pulseless Ventricular Tachycardia
B. Asystole
C. Pulseless Electrical Activity
D. Symptomatic Bradycardia
E. Systemic allergic reactions, croup and epiglottitis
F. Severe Asthma (**> 3 doses, patients >40 years of age, and/or pmhx of CAD require OLMC**)

CONTRAINDICATIONS:
Use caution in patients with peripheral vascular insufficiency.

SIDE EFFECTS AND NOTES:

A. Anxiety, tremor, headache, tachycardia, palpitations, PVCs, angina and HTN
B. Should not be added directly bicarbonate infusion; catecholamine may be partially deactivated by alkaline solutions.
C. When used for allergic reactions, increased cardiac work may precipitate angina and/or MI in susceptible individuals.
D. Wheezing in an elderly patient is considered pulmonary edema or pulmonary embolus until proven otherwise.

ADULT DOSING:

Cardiac Arrest Dosing Options:

a. **1.0mg (1:10,000) IV/IO** every 3-5 minutes during arrest. Every 8-10 minutes after first 3 doses.

Allergic reaction, anaphylaxis shock, laryngeal edema, severe asthma:

a. **0.5 mg (1:1,000) IM**
b. If diminished perfusion or shock symptoms present, gi**ve 0.5 mg (50 cc) of 1:100,000 IV/IO** over 60-120 seconds. Repeat prn every 5 minutes to maintain systolic BP of at least 100 mmHg. Make 1:100,000 by diluting 1 mg (1:1,000) in 100cc bag of NS or LR.

Croup/Epiglottitis:

3 ml (1:1,000) via nebulizer or Racemic Epinephrine 0.5 ml's in 2.25% solution diluted in 3 ml's of NS.

Symptomatic Bradycardia/Cardiogenic Shock

a. 2-10 mcg/min Drip Add 1 mg (1:1,000) in 250 NaCl or 2 mg (1:1,000) in 500 NaCl bag for a concentration of 4 mcg/ml
b. Push Dose Epi 0.1mg in 10ml. (1:100,000) 10mcg/ml Mix using 3 way stopcock Epi 1:10,000 syringe and 10cc NS. Push out 1ml from NS syringe and draw up 1ml of epi 1:10,000. Keep for additional doses if needed. May need to make on Epi 1:10,000 first.
    a. Administer 10-20mcg IV/IO (1-2ml) every 3-5 min titrate Systolic BP to >90 mm/Hg

PEDIATRIC DOSING:

Cardiac Arrest -

a. **0.01 mg/kg (1:10,000) IV/IO** every 3-5 minutes

Allergic reaction, anaphylaxis shock, severe asthma -

a. **0.01 mg/kg (1:1,000) IM** to max single dose of 0.5 mg

b. If diminished perfusion or shock symptoms present, give **0.01 mg/kg (1:100,000) IV/IO** over 60-120 seconds. Repeat every 5 minutes prn. Make 1:100,000 by diluting 1 mg (1:1,000) in 100cc bag of NS or LR.

Croup/Epiglottitis-

In patients 6 months to 6 years of age with audible stridor at rest, give **3 ml Epinephrine 1:1,000 via nebulizer**, **or Racemic Epinephrine 0.5 ml's in 2.25% solution diluted in 3 ml's of NS**.

Symptomatic Bradycardia/Cardiogenic Shock

a. 0.1-2 mcg/min Drip Add 1 mg (1:1,000) in 250 NaCl or 2 mg (1:1,000) in 500 NaCl bag for a concentration of 4 mcg/ml

Etomidate (Amidate®) – 20.140

CLASS: A

PROTOCOL(S) USED IN: Endotracheal Intubation RSI

PHARMACOLOGY AND ACTIONS:
Exact mechanism of action unknown; may have GABA-like effects, depresses brain stem reticular formation activity and produces hypnosis.

INDICATIONS:

Rapid Sequence Intubation

CONTRAINDICATIONS:
Known hypersensitivity to drug/class/components

SIDE EFFECTS AND NOTES:

A. The most frequent adverse reactions are transient venous pain on injection and transient skeletal muscle movements.
B. Etomidate may also cause nausea and/or vomiting.
C. Caution in elderly patients.

ADULT DOSING:

Induction agent for rapid sequence intubation -

0.3 mg / kg IV/IO slow push. Max single dose = 30 mg.

PEDIATRIC DOSING:

Same as adult

Fentanyl (Sublimaze®) – 20.150

CLASS: A

PROTOCOL(S) USED IN: Abdominal Pain, Chest Pain, Pain Management, Endotracheal Intubation RSI

PHARMACOLOGY AND ACTIONS:
Fentanyl is a pure opiod analgesic used to manage pain.

INDICATIONS:
A. Pain management
B. Extremity Fractures
C. Back and neck injuries when sedation/pain relief is necessary to prevent a patient from moving around and potentially injuring themselves.
D. Burns
E. Trauma

CONTRAINDICATIONS:
A. Patients with known intolerance to Fentanyl
B. Use caution if patient is pregnant, pregnancy risk category C

SIDE EFFECTS AND NOTES:
A. Respiratory depression
B. Decreased BP; monitor BP before and after administration. Systolic BP must be over 100mmHg
C. Decreased level of consciousness; watch for respiratory depression.
D. Decreased heart rate.
E. Have naloxone available to reverse over administration.
F. May follow administration with Zofran for nausea.
G. A dose of 100mcg is approximately equivalent to 10mg of morphine.

ADULT DOSING:
Pain management: 25-100 mcg given **slowly IV/IM/IO/IN** titrated to patient's condition and response to a max of 3mcg/kg.

Post RSI Pain Management: 50-100 mg/kg IV/IO repeat q 10-15 min not to exceed pain dose

PEDIATRIC DOSING:
1 microgram/kg IV/IO/IM/IN. May repeat with 0.5 -1 mcg/kg every 3-5 minutes as needed to a maximum of 3 mcg/kg. Do not exceed adult dosing

Glucagon – 20.160

CLASS A: Hypoglycemia **CLASS B: Calcium Channel Blocker OD**

PROTOCOL(S) USED IN: Altered Mental Status, Poisoning & Overdoses

PHARMACOLOGY AND ACTIONS:

A. Increases blood glucose concentration by converting liver glycogen to glucose.
B. Parenteral administration of glucagon produces relaxation of the smooth muscle of the stomach, duodenum, small bowel and colon.

INDICATIONS:

A. Hypoglycemia when IV access is unavailable or delayed.
B. Calcium Channel/Beta Blocker overdoses.

CONTRAINDICATIONS:
None

SIDE EFFECTS AND NOTES:

A. N/V and generalized allergic reactions have been reported.
B. Glucagon should not be used at concentrations greater than 1 unit (1mg).
C. Should not be used unless solution is clear and of water-like consistency.

ADULT DOSING:

Hypoglycemia-

1 unit (1 mg) IM. If no effect in 8-10 minutes, repeat 1 unit. IV glucose must be given if patient fails to respond to glucagon

Calcium Channel OD-

Contact OLMC

PEDIATRICS:

Hypoglycemia- 0.5 mg IM. (< 5 y/o or < 20 kg) to a maximum of 1 mg

Calcium Channel/Beta Blocker OD- contact OLMC

Glucose (Oral) – 20.170

CLASS: A

PROTOCOL(S) USED IN: Altered Mental Status

PHARMACOLOGY AND ACTIONS:
Provides a quickly absorbed form of glucose to increase blood glucose levels.

INDICATIONS:
Conscious patient with suspected hypoglycemia.

CONTRAINDICATIONS:
A. Decreased level of consciousness
B. Active vomiting

SIDE EFFECTS AND NOTES:
Duration of effect is limited; patient should consume foods high in carbohydrates as soon as possible.

ADULT DOSING:
15-30 gm PO. May be repeated until desired effects have been achieved.

PEDIATRIC DOSING:
Same as adult

Haloperidol (Haldol®) – 20.180

CLASS: A

PROTOCOL(S) USED IN: Patient Restraint Physical & Chemical

PHARMACOLOGY AND ACTIONS:

A. Haloperidol has similar pharmacologic properties to those in phenothiazines.
B. It is thought to block dopamine (type 2) receptors in the brain, altering mood and behavior.

INDICATIONS:

A. Acute psychotic episodes
B. Emergency sedation of severely agitated or delirious patients.

CONTRAINDICATIONS:

A. CNS depression
B. Coma
C. Known hypersensitivity
D. Pregnancy
E. Severe liver or cardiac disease.

SIDE EFFECTS AND NOTES:

A. Dose-related extrapyramidal reactions
B. Hypotension
C. Orthostatic hypotension
D. Nausea, vomiting
E. Allergic reactions
F. Blurred vision

ADULT DOSING:

A. Chemical restraint and emergency sedation: 5-10 mg IM may repeat for a max of 10 mg,

PEDIATRIC DOSING:

0.5mg IM not to exceed adult dose.

Hydromorphone (Dilaudid®) – 20.190

CLASS: A

PROTOCOL(S) USED IN: Abd Pain, Pain Management,

PHARMACOLOGY AND ACTIONS:

A. Analgesic
B. Peripheral vasodilator
C. Pupil constriction
D. Respiratory depressant

INDICATIONS:

Analgesic for Severe Pain

CONTRAINDICATIONS:

A. Pediatric Patients, labor, respiratory depression or when ventilation function is depressed such as status asthmatics, or COPD
B. Hypersensitivity
C. Intercranial lesions
D. Suspected ICP
E. Acute exacerbation of chronic pain is not an indication for dilaudid
F. Hypotension

SIDE EFFECTS AND NOTES:

A. Use with caution in elderly patients and patients with chronic liver conditions
B. CNS: pupillary constriction, sedation, somnolence, clouded sensorium, dizziness
C. CV: Hypotension, bradycardia
D. Nausea, vomiting
E. Respiratory depression, bronchospasm.

ADULT DOSING:

1-4 mg IV/IO/IM titrated to effect

PEDIATRIC DOSING: Not Indicated

IV Solutions – 20.200

CLASS: A

PHARMACOLOGY AND ACTIONS:

Includes:

A. Lactated Ringers
   1. Source of electrolytes, calories and water for hydration.
   2. Isotonic Solution

B. 0.9% Sodium Chloride
   1. Nonpyrogenic solution for fluid and electrolyte replenishment.
   2. Isotonic Solution

C. Dextrose 5% in Water
   1. Hypertonic dextrose containing solution.

INDICATIONS:

A. Used for Maintenance of venous access
B. Hypotension
C. Hydration

Lactated Ringers Choice for

A. Trauma
B. Burns

0.9% Sodium Chloride

A. Choice for normal maintenance
B. Hypotension not due to trauma

Dextrose 5% in water

A. Choice for dilution with certain drugs

CONTRAINDICATIONS:

Lactated Ringers

A. Known Hypersensativity

Dextrose 5% in Water

A. Should not be used for fluid replacement in Hypovolemic Shock

SIDE EFFECTS AND NOTES:

A. Pulmonary Edema
B. Fluid Overload

ADULT DOSING:

LR/NS 250-500cc may repeat as needed caution for anything over 1000cc.
D5W Varies

PEDIATRIC DOSING:

LR/NS 20 cc/kg may repeat once
D5W Varies

Ketamine - 20.210

CLASS: A

PROTOCOL(S) USED IN: Altered Mental Status, Endotracheal Intubation RSI, Patient Restraint Physical & Chemical

PHARMACOLOGY AND ACTIONS:

A. Sedative/dissociative analgesia
B. Generalized CNS depression
C. The exact mechanism of action is unknown; it acts on the cortex and limbic receptors producing dissociative analgesia and sedation.

INDICATIONS:

A. Probable excited delirium.
B. RSI induction.
C. Procedural Sedation
D. Pain Management

CONTRAINDICATIONS:

A. Known hypersensitivity.

PRECAUTIONS:

A. Ketamine should be used with caution for intoxicated patients or if illicit drug use is suspected.

SIDE EFFECTS AND NOTES:

A. Respiratory depression
B. Laryngospasm Increased
C. Emergence Delirium
D. All patients receiving Ketamine should have cardiac, capnography and spO2 monitoring when available.

ADULT DOSING:

Probable excited delirium/Patient Chemical Restraint:
2-4 mg/kg IM or 1-2 mg/kg IV

RSI Induction dose:
1-2 mg/kg IV/IO push. Single max dose of 200 mg.
Repeat once prn for continued sedation**.**

Procedural Sedation:
15-30mg IV/IO/IM and may increase to total dose of 1-2 mg/kg IV/IO/IM if needed

Pain Management:
15-30 mg IV/IO/IM for muscle spasm in conjunction with other agents. If hypotension is present. Mix in 50-100cc of NS or LR. Give slowly over 10 minutes.

PEDIATRIC DOSING: Same as adult for RSI Induction dose.

Ketorolac Tromethamine (Toradol®) 20.215

CLASS: A

PROTOCOL(S) USED IN:
Abdominal Pain, Pain Managment

PHARMACOLOGY AND ACTIONS:
Nonsteroidal anti-inflammatory drug (NSAIDs)

INDICATIONS:
A. Age 2-64 years old
B. Musculoskeletal pain
C. Flank pain from suspected kidney stone(s)
D. Back pain

CONTRAINDICATIONS:
A. History of renal failure, renal insufficiency or kidney transplant
B. History of liver disease.
C. Allergies to aspirin or other NSAIDs.
D. Known pregnancy or lactating females.
E. Patient currently taking anticoagulants.
F. Bleeding or clotting disorder
G. History of ulcer or GI bleed
H. Suspected cardiac chest pain.

SIDE EFFECTS AND NOTES:
A. Burning or pain at injection site.
B. Nausea, vomiting, dizziness, headache.
C. Itching, flushing.
D. May prolong bleeding time; use caution in patients with coagulation disorders.
E. Use caution in known or suspected fractures due to risk of bleeding.

DOSING/DOSING CHART:
30mg IV or 60mg IM

PEDIATRIC DOSING:

IV	0.5 mg/kg to max of 30
IM	1 mg/kg to max of 60

Lidocaine – 20.220

CLASS: A

PROTOCOL(S) USED IN: Cardiac Arrest V-tach/V-fib, Tachydysrhythmia-Vtach, Intraosseous Access & Infusion

PHARMACOLOGY AND ACTIONS:

A. Depresses automaticity of Purkinjie fibers thus increasing ventricular fibrillation threshold.
B. Decreases conduction rate and force of contraction mainly at toxic levels.
C. Single bolus effect disappears in 10-20 minutes due to redistribution in the body.
D. Metabolic half-life is about 2 hours; toxicity develops with repeated doses.

INDICATIONS:

A. Local anesthetic for IO placement.
B. V-tach with a pulse
C. Pulseless V-tach/V-fib arrest

CONTRAINDICATIONS:

A. Supraventricular dysrhythmias
B. Atrial fibrillation or flutter
C. 2nd or 3rd degree heart blocks
D. Hypotension

SIDE EFFECTS AND NOTES:

A. Seizures, slurred speech, AMS

ADULT DOSING:

A. IO insertion

0.5 mg/kg IO not to exceed 50 mg

B. V-tach with/without pulse or V-fib

1-1.5 mg/kg IV/IO. If with a pulse, given over 2-3 minutes. Repeat dose of 0.5-0.75 mg/kg every 5-10 minutes up to 3 mg/kg. May consider post ROSC prophylactic infusion at 1 – 4 mg/min within the first hour of ROSC during EMS transport

PEDIATRIC DOSING:

A. IO Insertion

Same as adult

B. V-tach with/without pulse or V-fib

1 mg/kg IV/IO. May repeat after 15 minutes. May consider post ROSC prophylactic infusion at 20-50 mcg/kg/min within the first hour of ROSC during EMS transport

Lorazepam (Ativan®) – 20.230

CLASS: A

PROTOCOL(S) USED IN: Altered Mental Status, Seizures, Patient Restraint Physical & Chemical

PHARMACOLOGY AND ACTIONS:

A. Benzodiazepine with antianxiety and sedative effects.
B. Anticonvulsant

INDICATIONS:

A. Status Epilepticus
B. Chemical Sedation for transcutaneous pacing
C. Relief of anxiety

CONTRAINDICATIONS:

A. Hypersensitivity
B. Acute narrow-angle glaucoma

SIDE EFFECTS AND NOTES:

A. Apnea, N/V, drowsiness, restlessness, confusion, delirium, HTN, hypotension
B. **Class D pregnancy category**; may cause fetal damage
C. When administering, dilute medication 1:1 with NS prior to administration.
D. Use with extreme caution with opiods due to synergistic effect and risk of respiratory depression/arrest.

ADULT DOSING:

Status epilepticus

2-4 mg IM/IN/IV/IO. May repeat once if still seizing after 5-10 minutes. Max of 8 mg. Contact OLMC for further doses PRN.

Chemical Sedation

2 mg IM/IN or 1 mg IV/IO

Severe Anxiety

1 mg IM/IN/IV/IO

PEDIATRIC DOSING:

Status epilepticus

Consider (age >28 days to 12 years) dose: **0.05-0.1mg/kg IV/IO/IM/IN.**
IV diluted 1:1 with Normal Saline

i. If still seizing after 5-10mins you can repeat dose once

Magnesium Sulfate – 20.240

CLASS A: ACLS **CLASS B: Eclampsia and Asthma**

PROTOCOL(S) USED IN: Cardiac Arrest (V-fib/tach), Cardiac Dysrhythmia Tachycardia, Seizure, Respiratory Distress

PHARMACOLOGY AND ACTIONS:

A. CNS Depressant
B. Stabilizes muscle cell membranes by interacting with the sodium/potassium exchange system.
C. Smooth muscle relaxant
D. Vasodilator
E. Bronchodilator

INDICATIONS:

A. Severe refractory VF
B. Torsades
C. Eclampsia
D. Asthma

CONTRAINDICATIONS:

A. Renal Disease
B. Heart Block

SIDE EFFECTS & SPECIAL NOTES

A. Hypotension
B. Asystole
C. Respiratory & CNS Depressant

ADULT DOSING:

Refractory V Fib / Torsades -
1.0-2.0 grams diluted in 10ml fluid IV/IO over 1-2 minutes.

Tachycardia with a pulse: Wide QRS Irregular Rhythm
1.0-2.0 grams diluted in 10ml fluid IV/IO over 5 minutes.

Eclampsia -
4.0-6.0 grams diluted in 10ml fluid IV/IO over 1-2 minutes. **OLMC required**.

Asthma
1-2 grams diluted to 10cc in fluid IV/IO. Administer slowly. **OLMC required**. (Contraindicated in the hypotensive pt.).

PEDIATRIC DOSING:

Tachycardia with a pulse
25 mg/kg IV over 1-2 min. Max dose 2g. OLMC required.

Metoprolol (Lopressor) – 20.245

CLASS A: ACLS

PROTOCOL(S) USED IN: Cardiac Dysrhythmia Tachycardia **(only if Diltiazem is unavailable)**

PHARMACOLOGY AND ACTIONS:

A. Beta 1 selective adrenergic receptor blocker.
B. Reduction in heart rate, blood pressure
C. Inhibition of isoproterenol-induced tachycardia
D. Reduction of reflex orthostatic tachycardia.

INDICATIONS:

A. Rapid A-fib/flutter or SVT refractory to adenosine
B. Only to be used if Diltiazem is unavailable

CONTRAINDICATIONS:

A. Hypersensitivity
B. Heart Block

SIDE EFFECTS & SPECIAL NOTES

A. Hypotension
B. Headache
C. Dizziness
D. Bradycardia and Heart Failure

ADULT DOSING:

2.5-5mg IV slow, every 5 min up to max of 15mg.

PEDIATRIC DOSING: **Not indicated**

Midazolam (Versed®) – 20.250

CLASS A: Seizure and Sedation **CLASS B: Sympathomimetic OD**

PROTOCOL(S) USED IN: Endotracheal Intubation RSI, Seizure, Cardiac Dysrhythmias Brady, Cardiac Dysrhythmias Tachy, Poisoning and Overdoses, Patient Restraint Physical & Chemical

PHARMACOLOGY AND ACTIONS:

A. Sedative/hypnotic benzodiazepine
B. Generalized CNS depression
C. Therapeutic effects include short term sedation and postoperative amnesia

INDICATIONS:

A. Status seizure (any seizure that has lasted longer than 2 minutes or two consecutive seizures without regaining consciousness)
B. Sedation and amnesia during RSI, cardioversion and transcutaneous pacing.
C. Sympathomimetic Overdoses such as cocaine and methamphetamine.

CONTRAINDICATIONS:

A. Hypersensitivity or cross sensitivity with other benzodiazepines
B. Acute narrow angle glaucoma
C. Shock
D. Comatose patients or those with pre-existing CNS depression
E. Severe, uncontrolled pain
F. Pregnancy or lactation

SIDE EFFECTS AND NOTES:

A. Respiratory depression
B. HA, excess sedation, drowsiness, agitation
C. Blurred vision
D. Cardiac arrhythmias
E. N/V, rashes
F. Increased risk of hypotension with antihypertensives, acute ingestion of alcohol or nitrates
G. Use with extreme caution with opioids due to synergistic effect and risk of respiratory depression/arrest.

ADULT DOSING:

Seizures
10 mg IM/IN or 5 mg IV/IO. May repeat PRN. Max dose of 10 mg for seizures lasting longer than 5 minutes.

Pacing/Cardioversion -
5 mg IM or 2.5 IV/IO/IN

Chemical restraint -
2-5 mg IV/IM/IN.

Pre-medication for RSI -
0.1-.02 mg/kg IV/IO if BP is >100mmHg. Single max dosage of 10 mg.

Sedation after intubation.
0.05-0.1 mg/kg IV/IO if BP is >100mmHG. Single max dosage of 5 mg.

Max dose of Midazolam is 20 mg

PEDIATRIC DOSING:

Seizures -

0.1 mg/kg IV/IO. If no IV access, administer **0.2 mg/kg IM/IN** to a maximum initial adult dose. May repeat to a maximum dose of 10 mg for seizures lasting longer than five minutes.

Pacing -

0.1 mg/kg IV/IO/IN to max of 2.5 mg or 0.2 mg/kg IM to max of 5mg**.**

Pre-medication for RSI -

0.1 mg/kg IV/IO not to exceed 5mg.

Sedation after intubation with or without paralytics **-**

0.1 mg/kg IV/IO not to exceed 5mg.

Morphine Sulfate – 20.260

CLASS: A

PROTOCOL(S) USED IN: Abd Pain, Chest pain, Pain Management, Respiratory Distress

PHARMACOLOGY AND ACTIONS:

A. Analgesic
B. Peripheral vasodilator
C. Pupil constriction
D. Respiratory depressant
E. Cardiac effect of vasodilation: decreases myocardial oxygen consumption, decreases left ventricular end-diastolic pressure, decreases cardiac workload, may decrease incidence of dysrhythmias.

INDICATIONS:

A. Chest pain not relieved by NTG
B. Pulmonary edema
C. Extremity fractures in absence of any head, chest, or abdominal injuries.
D. Back and neck injuries when sedation/pain relief are necessary to prevent a patient from moving around and potentially injuring themselves.

CONTRAINDICATIONS:

A. Known allergy to morphine or sulfates (Sulfa drugs are not sulfates)
B. Hypotension
C. Head injuries
D. Patients with respiratory difficulties except for pulmonary edema
E. Major blood loss
F. Decreased level of consciousness

SIDE EFFECTS AND NOTES:

A. Respiratory depression
B. Decreased BP
C. Decreased level of consciousness
D. Decreased heart rate
E. N/V
F. Have naloxone available to reverse over administration
G. Allergic reactions
H. May follow administration with Zofran for nausea

ADULT DOSING:

Pain - Musculoskeletal injuries, burns, chest pain -
2-5 mg IV/IO/IM. Repeat every 3-5 minutes to max of 20 mg.

PEDIATRIC DOSING (< 20kg):

Pain - Musculoskeletal injuries, burns, chest pain -
0.1-0.2 mg/kg IV/IO/IM. Repeat every 3-5 minutes. Do not exceed adult dosing.

Naloxone (Narcan®) – 20.270

CLASS: A

PROTOCOL(S) USED IN: Altered mental status, Poisoning & Overdoses

PHARMACOLOGY AND ACTIONS:

A. Narcotic antagonist
B. Competitively binds to narcotic sites, but exhibits almost no pharmacologic activity of its own.
C. Duration of action is 30-80 minutes.

INDICATIONS:

A. Reversal of narcotic overdose
B. Coma of unknown etiology

CONTRAINDICATIONS:
None noted

SIDE EFFECTS AND NOTES:

A. Acute withdrawal symptoms in addicted patients
B. Be prepared to restrain patient
C. Titrate dosing to keep patient awake, responsive and free from respiratory depression, but somewhat groggy.
D. Patients who have received Narcan must be transported to the hospital because coma may recur when Narcan wears off.

ADULT DOSING:

Reversal of opioid effects, coma of unknown etiology –
0.4 - 2mg IV/IO/IM/IN. Repeat dose if no response to max of 8mg.

PEDIATRIC DOSING:

If suspected opiate overdose
0.1 mg/kg IV/IO/IM/IN. Repeat prn.

Nitroglycerin – 20.280

CLASS A: Chest Pain & Respiratory Distress **CLASS B: Hypertensive Crisis**

PROTOCOL(S) USED IN: Chest Pain, Hypertension, Respiratory Distress

PHARMACOLOGY AND ACTIONS:

A. Vasodilator
B. Decreases peripheral resistance
C. Generalized smooth muscle relaxation
D. Reduces venous tone

INDICATIONS:

A. Chest, arm, neck pain thought to be related to coronary ischemia.
B. Angina
C. Control of hypertension during hypertensive crisis
D. Pulmonary edema

CONTRAINDICATIONS:

A. Hypotension
B. Hypovolemia
C. ICP
D. Aortic Stenosis
E. Severe bradycardia or tachycardia
F. Patients who have taken Viagra® (sildenafil citrate) or Levitra® (vardenafil HCl) within 24 hours, or who have taken Cialis® (tadalafil) within 48 hours. Contact OLMC for direction.

SIDE EFFECTS AND NOTES:

A. Common side effects are headache, flushing, dizziness or burning under the tongue.
B. Hypotension; IV line should be established prior to administration
C. Reflex tachycardia
D. Syncope
E. May be effective in relieving chest pain due to esophageal spasm
F. Therapeutic effect is enhanced but adverse effects are increased when patient is upright.
G. NTG loses potency easily; should be stored in a dark glass container with tight lid and not exposed to heat.

ADULT DOSING:

0.4 mg SL every 3-5 minutes or IV/IO infusion starting at **5 mcg/min** and titrating to effect as long as **systolic BP ≥ 100 mmHg**

PEDIATRIC DOSING: Not recommended in pediatric patients.

Norepinephrine (Levophed®)– 20.285

CLASS A:

PROTOCOL(S) USED IN: Cardiac Arrest, Cardiac Dysrhythmias, Respiratory Distress, Sepsis, Shock

PHARMACOLOGY AND ACTIONS:

A. Adrenergic vasopressor
B. Primary alpha adrenergic vasoconstrictor.

INDICATIONS:

A. Primary indication is septic, cardiogenic, neurogenic, and obstructive shock.
B. Not useful for primary treatment of hypovolemic shock.

SIDE EFFECTS AND NOTES:

A. Extravasation may occur with tissue necrosis
B. May induce tachyarrhythmias, in which case infusion should be decreased or stopped
C. Moderate doses may cause extreme peripheral vasoconstriction.
D. Certain antidepressants potentiate the effects of this drug. Norepinephrine can precipitate hypertensive crisis in patients on MAO inhibitors (Parnate®, Nardi®, Marplan®).
E. Should not be added to sodium bicarbonate or other alkaline solutions since norepinephrine will be inactivated in alkaline solutions.
F. The most common side effects include ectopic beats, nausea, and vomiting.
G. Consider hypovolemia and treat with appropriate fluids before administration of norepinephrine.
H. Norepinephrine should be administered with a pump if possible. Monitor rate closely

ADULT DOSING:

Mix 4mg in 500cc or 2mg in 250cc. This gives a concentration of 8mcg/ml

Initial Dose 2-4mcg/min

Dose Range 1-30mcg/min If no response in 5 min increase to maximum of 30mcg/min

PEDIATRIC DOSING:

Begin at 0.1mcg/kg/min. If no response in 5 min increase to 0.2mcg/kg/min. If still no response after 5 min, may increase to 0.4mcg/kg/min. All subsequent doses 0.2 mcg/kg/min increase to max 1.2 mcg/kg/min. Goal is age-appropriate systolic blood pressure.

Ondansetron (Zofran®) – 20.290

CLASS: A **CLASS B: pts < 2 y/o**

PROTOCOL(S) USED IN: Nausea & Vomiting

PHARMACOLOGY AND ACTIONS:
Selective antagonist of a specific type of serotonin receptor located in the CNS at the chemoreceptor trigger zone and in the peripheral nervous system on nerve terminals of the vagus nerve. Drugs blocking action may occur at both sides.

INDICATIONS:
Prevention and control of uncomplicated nausea and vomiting.

CONTRAINDICATIONS:
Known hypersensitivity to Zofran or similar medications.
Caution in patients with hepatic impairment.

SIDE EFFECTS AND NOTES:
A. Headache, malaise, fatigue, dizziness, fever, sedation
B. Extrapyramidal symptoms; have Benadryl available

ADULT DOSING:
Nausea & vomiting -
4 mg IM/IN/PO or slow IV/IO over 2-5 minutes. If nausea and/or vomiting are inadequately controlled after 10 minutes, may repeat **4 mg** once for max dosage of 8 mg.

PEDIATRIC DOSING:
A. Ondansetron use in patients under 2 years of age requires OLMC consultation.
B. For children < 40 kg administer **Ondansetron 0.1mg/kg** via slow IV/IO push over 2 minutes up to a total maximum IV dose of 4mg.

Oxygen – 20.300

CLASS: A

PROTOCOL(S) USED IN: All when indicated

PHARMACOLOGY AND ACTIONS:
Raises the amount of oxygen in the blood and the amount delivered to the tissues.

INDICATIONS:
A. Suspected hypoxia or respiratory distress from any cause.
B. Acute chest pain where MI is suspected.
C. Shock from any cause
D. Major trauma
E. Carbon monoxide poisoning

CONTRAINDICATIONS: None

SIDE EFFECTS AND NOTES:
A. DO NOT WITHHOLD OXYGEN from patients with COPD. Be prepared to assist ventilations if needed. Initial flow should be no greater than 2lpm to start.
B. Patient should be breathing adequately on their own, if not, assist with BVM.
C. Oxygen supports combustion, use caution.
D. Oxygen toxicity is not a hazard from acute administration.
E. Non-humidified O2 is drying and irritating to mucous membranes.

DOSAGE	INDICATIONS
Low Flow (1-2lpm)	Patients with chronic lung disease
Moderate Flow (4-6lpm)	Precautionary use for trauma, chest pain
High Flow (10-15lpm)	Severe respiratory distress

OXYGEN THERAPY			
Method	Device	Flow Rate	O2 % Inspired Air
Low Flow	Nasal Cannula	1-2 lpm	25-28%
Moderate Flow	Nasal Cannula	6 lpm	50-60%
High Flow	Non-rebreather mask	10-25 lpm	90+%

Promethazine (Phenergan®) – 20.290

CLASS: A **CLASS B: pts < 2 y/o**

PROTOCOL(S) USED IN: Nausea & Vomiting

PHARMACOLOGY AND ACTIONS:
Is in a group of drugs called phenothiazines. It works by changing the actions of the chemicals in your brain. Acts as an antihistamine.

INDICATIONS:
Prevention and control of uncomplicated nausea and vomiting not taken care of with Zofran

CONTRAINDICATIONS:
A. Known hypersensitivity
B. Narrow angle glaucoma

SIDE EFFECTS AND NOTES:
A. Hypotension
B. Anxiety
C. Dystonic Reactions
D. Drowsiness

ADULT DOSING:
Nausea & vomiting -
12.5-25 mg IV/IM

PEDIATRIC DOSING: Not indicated.

Rocuronium (Zemuron®) – 20.330

CLASS: A

PROTOCOL(S) USED IN: Endotracheal Intubation RSI, Induced Hypothermia

PHARMACOLOGY AND ACTIONS:
Non-depolarizing neuromuscular blocking agent

INDICATIONS:
Paralysis to facilitate rapid sequence intubation

CONTRAINDICATIONS:
Known hypersensitivity

SIDE EFFECTS AND NOTES:

A. Use caution in patients with impaired hepatic or respiratory function or severe obesity.
B. Arrhythmia, tachycardia, N/V, bronchospasm, hypotension, HTN, rash or edema.
C. Must be able to ventilate patient
D. Must be accompanied by sedation
E. Pregnancy Category B; only use if potential benefits justify the potential risk to the fetus.

ADULT DOSING:

Paralytic agent – 1 mg/kg IV/IO
Maintenance - 0.3-0.5 mg/kg IV
Continuous – 0.01-0.012 mg/kg/min IV

PEDIATRIC DOSING:
Same as adult

Sodium Bicarbonate – 20.340

CLASS A: Cardiac Arrest/Poisoning/Hydrogen Cyanide **CLASS B-Hyper K, Crush injury**

PROTOCOL(S) USED IN: Cardiac Arrest protocols, Crush Injury/Entrapment, Hyperkalemia, Poisoning & Overdose, Hydrogen Cyanide Exposure

PHARMACOLOGY AND ACTIONS:

A. An alkalotic solution which neutralizes acids found in the blood.
B. Acidosis depresses cardiac contractility, and the cardiac response to catecholamine and makes the heart more likely to fibrillate.

INDICATIONS:

A. To reverse acidosis found during cardiac arrest and near-drowning victims.
B. Make the heart more receptive to conversion from VF, asystole, or PEA by normalizing the pH.
C. For alkalization of urine in certain poisoning & overdoses.
D. For treatment in suspected hyperkalemic patients

CONTRAINDICATIONS: None

SIDE EFFECTS AND NOTES:

A. Should not be given in with catecholamine or calcium.
B. May increase cerebral acidosis, especially in diabetics who are ketotic.
C. Metabolic alkalosis which is impossible to reverse.
D. In respiratory arrest without cardiac arrest, the treatment of choice is ventilation, no sodium bicarbonate unless cardiac arrest has occurred and the patient does not respond to adequate ventilation or other standard ACLS treatment modalities.

ADULT DOSING:

Cardiac arrest- 1 mEq/kg IV/IO initially followed by 0.5mEq/kg every 10 minutes

Tricyclic Overdose- 1 mEq/kg IV/IO
(If patient exhibits arrhythmias or a widening QRS complex)

Hyper K/Crush Injury- 50 mEq IV/IO. Contact OLMC

PEDIATRIC DOSING:

All Indications: **1 mEq/kg IV/IO**

Succinylcholine – 20.350

CLASS: A

PROTOCOL(S) USED IN: Endotracheal Intubation RSI

PHARMACOLOGY AND ACTIONS:

A. Short acting depolarizing skeletal muscle relaxant.
B. Binds to cholinergic receptors in the motor neuron endplate to cause muscle depolarization (fasciculations) followed by paralysis.
C. Complete paralysis occurs with 1 minute; recovery usually seen within 4-6 minutes.
D. Has no effect of consciousness or pain threshold.

INDICATIONS:

Paralysis to facilitate rapid sequence intubation

CONTRAINDICATIONS:

A. Acute narrow angle glaucoma
B. Penetrating eye injuries
C. Burns or crush injuries > 12-24 hours
D. Use caution in patients with kidney failure or undiagnosed neuromuscular disease or skeletal muscle myopathy such as Duchenne's Muscular Dystrophy.

SIDE EFFECTS AND NOTES:

A. May cause malignant hyperthermia, ventricular dysrhythmias, bradycardia in pediatrics, hyperkalemia, hypotension, increased intraocular pressure and ICP.
B. Histamine release may occur.
C. Bradycardia is usually seen in patients under 5 years old and will generally respond to oxygenation and atropine.
D. Ventricular dysrhythmias may be treated with oxygenation.

ADULT DOSING:

1.5mg/kg IV/IO; a second equal dose may be given if paralysis is not achieved within 60-120 seconds of initial administration.

PEDIATRIC DOSING:

1.5-2mg/kg IV/IO depending on age.

Thiamine – 20.360

CLASS: A

PROTOCOL(S) USED IN: Altered Mental Status

PHARMACOLOGY AND ACTIONS:

A. Vitamin commonly referred to as vitamin B1.
B. B1 is required for the conversion of pyruvic acid to acetyl-coenzyme A.
C. If thiamine deficiency occurs, the brain cannot obtain glucose to use as energy.
D. Chronic alcoholism or starvation interferes with the absorption, intake, and utilization of thiamine.

INDICATIONS:

A. Administered with D50 in patients suspected of malnutrition of chronic alcoholism or chemotherapy.
B. Coma of unknown origin, especially if alcohol may be involved.
C. Delirium tremens

CONTRAINDICATIONS:
Known hypersensitivity

SIDE EFFECTS AND NOTES:

A. There may be a few cases of hypersensitivity to thiamine

ADULT DOSING:

100mg Slow IV/IO or IM if IV access cannot be obtained.

PEDIATRIC DOSING: NOT INDICATED IN PEDIATRIC PATIENTS

Tranexamic Acid (TXA)– 20.365

CLASS: A

PROTOCOL(S) USED IN: Shock

PHARMACOLOGY AND ACTIONS:
Inhibits plasminogen activation and plasmin activity, preventing clot breakdown. It is a lysine analog and binds to plasminogen preventing the binding of plasminogen to fibrin.

INDICATIONS:

A. Adult trauma patient (16 years or older) with a time of injury to administration of less than 3 hours.
B. Concern for active hemorrhage.
C. Systolic BP < 100 mmHg and considered to be at risk of traumatic hemorrhage.
D. May require a blood transfusion.
E. Gastrointestinal Bleed
F. Obstetrics

CONTRAINDICATIONS:

A. Trauma greater than 3 hours old
B. Clinical evidence of DIC
C. Non-hemorrhagic shock
D. Non-traumatic shock
E. Known allergy to the medication

SIDE EFFECTS AND NOTES:

A. Caution in patients with a history of DVT, PE or severe renal impairment
B. Subarachnoid Hemorrhage. Some indication that TXA may improve outcomes in SAH. Patients with traumatic SAH may be considered for this medication only after a discussion with online medical control.
C. Should not be given in the same IV/IO line as blood or infusions containing penicillin.
D. If a blood transfusion is being initiated in the field for traumatic hemorrhagic shock, TXA should also be administered.
E. **Administering TXA in less than 10 minutes can cause hypotension.**

ADULT DOSING:

Administer **1 gram in 100 ml Normal Saline or Lactated Ringers solution IV/IO over 10 minutes**. Document timing of administration. It is imperative to report TXA administration to the receiving hospital so that treatment can be continued.

Vecuronium (Norcuron®) – 20.380

CLASS: A

PROTOCOLS USED IN: Endotracheal Intubation RSI, Induced Hypothermia

PHARMACOLOGY AND ACTIONS:

Vecuronium is a non-depolarizing neuromuscular blocking agent causing skeletal muscle relaxation. It reversibly binds the acetylcholine receptor, blocking the action of acetylcholine. Neuromuscular blockade occurs within 2-3 minutes. Time to recovery is 30-45 minutes. Vecuronium metabolism is 5-35% renal with the remainder done in the liver.

INDICATIONS:

A. For sustained neuromuscular blockade in the intubated patient.
B. As the first line agent for Rapid Sequence Induction in the patient where Succinylcholine is contraindicated.

CONTRAINDICATIONS:
None

PRECAUTIONS:

A. Patients with renal or hepatic failure may experience prolonged paralysis.
B. Vecuronium has no effect on consciousness and must be used with a sedative or induction agent.

SIDE EFFECTS AND NOTES:

A. Vecuronium exhibits minimal side effects and does not substantially affect heart rate or rhythm, systolic or diastolic blood pressure, mean arterial pressure, cardiac output, or systemic vascular resistance.
B. Vecuronium can be used to maintain paralysis even if intubation was performed without Succinylcholine.

ADULT DOSING:

RSI-
0.1mg/kg IV/IO.

Maintenance Dose-
0.01 mg/kg IV/IO

Infusion Dose-
1 mcg/kg/min IV/IO

PEDIATRIC DOSING:
Same as adults.

Verapamil – 20.390

CLASS: A

PROTOCOLS USED IN: Cardiac Dysrhythmia Tachycardia **(only if Diltiazem and metoprolol is unavailable)**

PHARMACOLOGY AND ACTIONS:
Calcium channel blocker

INDICATIONS:
A. Rapid A-fib/flutter or SVT refractory to adenosine
B. Only to be used if Diltiazem is unavailable

CONTRAINDICATIONS:
A. BP <100 or Shock
B. Wide complex tachycardia
C. 2° or 3° AV Block w/o a functioning pacemaker
D. Wolf Parkinson's white, Short PR or sick sinus syndromes
E. Hypersensitivity

PRECAUTIONS:
A. May cause hypotension if used IV or with patients on Oral beta blockers, nitrates or quinidine

SIDE EFFECTS AND NOTES:
A. Dizziness
B. Hypotension decrease myocardial contractility
C. Sinus arrest, heart blocks, nodal escape rhythms
D. Bradycardia, asystole
E. Nausea, vomiting
F. Injection site reaction, flushing

ADULT DOSING:

5 mg slow IV over 2 min (3min I patient over 65) may repeat every 15 min up to max of 20 mg.

PEDIATRIC DOSING: Not Indicated