

Sumner County Emergency Medical Services

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INTRODUCTION

The drug information section of this protocol manual is meant to cover the medications which are carried by our ALS units and the indications and dosages as used in our protocols. Many of these medications have indications beyond our protocols. The individual provider is encouraged to research these, however, these indications, the dosages for these indications, and the possible side effects when used for these indications are not covered here.

Non-Formulary Medications

To provide authorization for the use of medications not commonly used within the current guidelines. For EMERGENCY use only.

Assessment: The patient must exhibit the signs and symptoms for which the medication is prescribed.

1. Oxygen and airway maintenance appropriate to the patient's condition.
2. Other treatments will be in accordance with the BLS / ALS Standard Operating Procedures (SOP's).
3. Necessary medication(s) administration as requested by caregiver(s).
 - Caregiver must provide the medication to be administered.
 - **Caregiver must provide a written copy of the physician's order and care plan attached to the patient care report.**
 - This documentation by the patient's primary physician should list the following:
 - Name of the patient.
 - Name of the primary physician.
 - Document must be signed by the primary physician.
 - Contact phone number of the primary physician.
 - Name of the medication(s).
 - Signs and symptoms for which the medication(s) is prescribed.
 - Dosage of the medication(s).
 - Number of repeated doses of the medication(s).
 - Route(s) of administration(s).
 - Potential side effects of the medication(s).
4. Medication(s) will only be administered if the patient meets the signs and symptoms for that medication.
5. Copies of the care plan and physician order must be attached to the patient care report.
6. If the medication(s) is not administered documentation must include those reasons for withholding.
7. Whenever medication is administered under these circumstances, transport is mandatory.

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ADENOSINE (ADENOCARD)

CLASS: Endogenous nucleotide.

ACTION: Ultra-short acting A-V nodal blocker.

ONSET & DURATION: Onset: 30 seconds / Duration: 10 seconds.

INDICATIONS: Conversion of PSVT to sinus rhythm (tachycardia-narrow complex with a pulse).

CONTRAINDICATIONS:

- Second- or third-degree A-V block or sick sinus syndrome.
- Atrial flutter.
- Atrial fibrillation.
- Ventricular tachycardia.
- Hypersensitivity to Adenosine.

ADVERSE REACTIONS:

- Facial flushing.
- Lightheadedness.
- Diaphoresis.
- Palpitations.
- Chest Pain.
- Hypotension.
- Nausea.
- Shortness of Breath – may produce bronchospasms in patients with asthma.

DRUG INTERACTIONS:

- Methylxanthines (ex: caffeine and theophylline) antagonize the action of Adenosine.
- Dipyridamole & Carbamazepine potentiates the effect of Adenosine.

HOW SUPPLIED:

- 12 mg / 4 mL (3 mg/mL)

DOSAGE:

- Administer rapid IV push, flush with 10 mL's of Normal Saline, and elevate the extremity immediately after the injection.
- Adult: Initial dose 6 mg IV. If after 1-2 minutes and there is no response, then administer 12 mg IV (a total maximum of 18 mg).
- Pediatric: 0.1 mg/kg rapid IV (maximum single, first dose of 6 mg), and may repeat at 0.2 mg/kg if needed (maximum single, second dose of 12 mg) to a total of maximum dose of 18 mg.

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ALBUTEROL (VENTOLIN, PROVENTIL)

CLASS: Sympathomimetic & Bronchodilator.

ACTION: Sympathomimetic that is selective for beta₂ adrenergic receptors.

ONSET & DURATION: Onset: 5 to 15 minutes / Duration: 3 to 4 hours.

INDICATIONS: Relief of bronchospasms in patients with reversible obstructive airway disease.

CONTRAINDICATIONS:

- Prior hypersensitivity reaction to Albuterol.
- Cardiac arrhythmias.
- Heart Rate greater than 130 bpm.

ADVERSE EFFECTS:

- Usually dose related restlessness.
- Apprehension.
- Dizziness.
- Palpitations.
- Tachycardia.
- Increased Blood Pressure.
- Dysrhythmias.

HOW SUPPLIED:

- 2.5 mg in 3 mL of solution for aerosol administration.

DOSAGE:

- Adult:
 - 2.5 mg administered via nebulizer over 5 to 15 minutes.
 - Pediatric:
 - 2.5 mg administered via nebulizer over 5 to 15 minutes.
- Adult & pediatric doses can be repeated in 10 minutes, if IV access has been obtained.
- Albuterol may be given only once without IV access.

***** If Albuterol is unavailable due to shortage, it can be replaced with DuoNeb (Albuterol / Atrovent (Ipratropium Bromide)) *****

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AMIODARONE (CORDARONE)

CLASS: Antiarrhythmic.

ACTION: Converts atrial and ventricular arrhythmias.

INDICATIONS: Ventricular fibrillation and pulseless, ventricular tachycardia. (Amiodarone has multiple uses; however, this is our only indication at this time).

CONTRAINDICATIONS:

- Hypersensitivity.
- Cardiogenic shock.
- Sinus bradycardia.
- Second- and Third-degree A-V blocks.

ADVERSE EFFECTS:

- Hypotension.
- Bradycardia.

HOW SUPPLIED:

- 150 mg / 3 mL (50 mg/mL) vial or ampoule.

DOSAGE:

- Adult:
 - Cardiac Arrest: 300 mg IV/IO; May repeat once @ 150 mg IV/IO.
 - V-Tach with a pulse: 150 mg mixed in 100 mL bag of Normal Saline & infused over 10 minutes.
 - Maintenance infusion (drip): 150 mg mixed in 100 mL NS given over 10 minutes
- Pediatric:
 - Cardiac Arrest: 5 mg/kg IV/IO (max. 300 mg); May repeat once @ 2.5 mg/kg IV/IO (max. 150 mg).
 - V-Tach with a pulse: 5 mg/kg mixed in 100 mL bag of Normal Saline over 20 minutes.
 - Maintenance infusion (drip): 5 mg/kg mixed in 100 mL NS given over 20 minutes.

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AMIODARONE DRIP PREPARATION AND INFUSION

Withdraw the desired amount of drug in milliliter (mL) volume from the vial... in adults, this will be 150 mg (3 ml)... the whole vial...

Inject the drug from the vial into a 100 mL bag of Normal Saline.

Spike the bag with 10 gtt/ml tubing (macro drip), then "prime" the line with fluid. Do not do this before mixing the drug into the bag, waiting till this step allows fluid in the line to have drug mixed in it.

Label the medication bag for proper identification and hang it approximately 12 inches higher than the primary line IV bag... This is best done by hanging the medication bag from the ceiling of the ambulance and the primary bag from the IV pole on the cot.

Using aseptic technique, attach the medication line into the port on the primary IV tubing, set the desired flow rate. If you are infusing 100 ml using 10 gtt/ml tubing, you want to see 1.5-2 drops per second falling into the drip chamber...this will safely give the drug.

Reality Check:

- The emphasis is **SAFE**, yet **effective** and **efficient** administration of the medication. If the drug goes in slightly less than or longer than the desired 10-minute infusion time, it is still safe.
- You can use 60 gtt/ml tubing, however using 10 gtt/ml makes it easier to see the drip rate due to the short infusion time of 10 minutes
- Once you calculate gtt/min, divide that by 60 to get actual drops per second you will see in the chamber.
- You can also consider using a dial-a-flow extension set, or use the formula below to calculate drip rates.

$$\frac{\text{Volume (mL)}}{\text{Minutes}} \times \text{Drop Factor (gtt/ml)} = \text{Flow Rate (gtt/min.)}$$

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ASPIRIN

CLASS: Antiplatelet.

ACTION: Prevents clot formation.

INDICATIONS: Chest pain suggestive of acute myocardial infarction or angina.

CONTRAINDICATIONS:

- Aspirin allergy.
- Recent GI bleeding.
- Already taking anticoagulants, such as Heparin or Warfarin (Coumadin).

ADVERSE EFFECTS:

- Bleeding.
- Anaphylaxis.

HOW SUPPLIED:

- 81 mg per chewable tablets.

DOSAGE:

- Adult:
 - Four (4) 81 mg tablets (324 mg) orally.
- Pediatric:
 - Not indicated in children.

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ATROPINE

CLASS: Parasympatholytic.

ACTION: Increases heart rate.

INDICATIONS:

- Symptomatic bradycardia.
- Heart blocks.
- Organophosphate poisoning.
- Pediatrics less than 8 years of age during RSI procedure.

CONTRAINDICATIONS:

- None.

ADVERSE EFFECTS:

- Palpitations.
- Tachycardia.
- Dizziness.
- Anxiety.
- Dry mouth.
- Pupillary dilation.
- Blurred vision.
- Headache.

HOW SUPPLIED:

- 1 mg / 10 mL (0.1 mg/mL) prefilled syringe.

DOSAGE:

- Adult:
 - Symptomatic Bradycardia: 1 mg IV/IO (maximum of 3 mg).
 - Organophosphate Poisoning: 2 mg IV/IO every 5 minutes until desired effect.
- Pediatric:
 - Symptomatic Bradycardia: 0.02 mg/kg IV/IO, maximum of 0.5 mg per dose.
 - RSI situations: 0.02 mg/kg IV/IO, maximum of 0.5 mg per dose.
 - Organophosphate Poisoning:
 - < 12 years old, administer 0.05 mg/kg IV/IO, may be repeated in 5 to 15 minutes.
 - 12 years and older, 1 mg IV/IO, may be repeated in 5 to 15 minutes.

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ATROVENT (IPRATROPIUM BROMIDE)

CLASS: Bronchodilator.

ACTION: Smooth muscle relaxant.

INDICATIONS: Dyspnea.

CONTRAINDICATIONS:

- Allergy to Atrovent.

ADVERSE EFFECTS:

- Dizziness.
- Nausea.
- Heartburn.
- Dry mouth.

HOW SUPPLIED:

- 0.5 mg in 2.5 mL of solution for aerosol administration.

DOSAGE:

- Adult:
 - 0.5 mg in 2.5 mL
- Pediatric:
 - Acceptable in DuoNeb administration due to shortages in Albuterol or Atrovent.

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CALCIUM CHLORIDE

CLASS: Electrolyte; Calcium Salt.

ACTION: Blocks harmful effects of elevated serum potassium on the cardiac cell membrane.

INDICATIONS:

- PEA and asystole in a renal patient with possible elevated serum potassium.
- Calcium channel blocker overdose.

CONTRAINDICATIONS:

- Any other rhythms or patients other than those described in the indications without contacting Medical Control.

ADVERSE EFFECTS:

- Bradycardia.
- Flushing.
- Hypotension.
- Nausea.
- Irritation and burning at IV site.
- Skin necrosis.

HOW SUPPLIED:

- 1 gram / 10 mL (100 mg/mL).

DOSAGE:

- Adult:
 - 1 gram IV/IO.
 - For Calcium Channel Blocker overdose, give 1 gram over 2-5 minutes IV/IO.
 - Cardizem induced hypotension, give 100 mg slow IV/IO, then followed by 500 mL of NS
- Pediatric:
 - 20 mg/kg IV/IO, maximum single dose of 1 gram.
 - For Calcium Channel Blocker overdose, give 20 mg/kg mixed in 100 mL bag of NS and give IV/IO over 10 minutes.

NOTE: Should only be given in larger bore IV or IO lines without possibility of extravasation.

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CARDIZEM (DILTIAZEM)

CLASS: Calcium Channel Blocker.

ACTION: Slows calcium channel antagonist, depression of cardiac contractility and conductivity.

INDICATIONS: Symptomatic atrial fibrillation with a rate > 130 bpm.

CONTRAINDICATIONS:

- Heart rate less than 130.
- Hypotension.
- Congestive Heart failure (SpO2 less than 92% or rales noted on exam).
- Wide complex tachycardia.
- History of Wolfe-Parkinson White (WPW) syndrome.

ADVERSE EFFECTS:

- Bradycardia.
- Hypotension.
- Headache.
- Dizziness.
- Nausea.

HOW SUPPLIED:

- 100 mg powder to reconstitute in 100 mL of Normal Saline.

DOSAGE:

- Adult:
 - 10 mg slow IV push; May be repeated up to 3 times.
- Pediatric:
 - Not recommended.

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CARDIZEM PREPARATION AND INFUSION

Begin by gathering the 100 ml drug mixture bag with the screw in tab on top and the 100 mg powder vial of Cardizem

Remove the top tab from the 100 ml mixture bag by pulling upward on the tab. Then, remove the plastic ring around the top of the medication vial which will allow you to remove the plastic top also.

Screw the medication vial into place in the top of the 100 ml mixture bag... do not over tighten, but ensure it is secure.

The step is important... before the powder can mix into the bag, you must remove the inner plunger from the inside of the bag, at the top port where the vial is connected. There is instructions in the front of the medication bag also on how to do this.

Using aseptic technique, withdraw 10 ml of medication from the bag using a 10 ml syringe and needle... this gives you 10 mg of drug to administer per standing order... give this SLOW IV push, no slower than 1 ml / minute... (10 mg over 10 minutes)

Repeat the same 10 ml withdraw from the bag to give additional doses... you may repeat Cardizem 10 mg twice, for a total of 3 pushed, 10 mg each, total infusion per standing orders is 30 mg.

Do not infuse the entire 100 ml like other drips... when you mix Cardizem, you get 100 mg total, you only give 10 mg each time, with a max of 3 doses (30 mg)...

"Slow IV push" when giving Cardizem is necessary to prevent irritation to the vein...

REMEMBER to remove the inner plunger to actually mix the drug BEFORE drawing it up to administer. If you overlook this step, you will give normal saline only, and it will not contain Cardizem.

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DEXTROSE 50%, 25% and 10%

CLASS: Carbohydrate.

ACTION: Elevates blood glucose levels.

INDICATIONS: Hypoglycemia.

CONTRAINDICATIONS: Hyperglycemia.

ADVERSE EFFECTS: Local venous irritation.

HOW SUPPLIED:

- Adult: 25 grams / 50 mL prefilled syringe.
- Pediatric: 12.5 grams / 25 mL prefilled syringe.

DOSAGE:

- Adult:
 - 25 grams IV/IO.
- Pediatric:
 - 0-6 months of age (Draw 10 mL of D₅₀ and add to 40 mL of Normal Saline (D₁₀)), and administer D10% 2-4 mL/kg.
 - 6 months-8 years of age (Draw 25 mL of D₅₀ and add to 25 mL of Normal Saline (D₂₅)), and administer D25% 2-4 mL/kg.
 - > 8 years: D50% 1-2 mL/kg.

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DIPHENHYDRAMINE (BENADRYL)

CLASS: Antihistamine.

ACTION: Blocks histamine receptors.

INDICATIONS: Anaphylaxis.

CONTRAINDICATIONS: Use caution in asthmatic patients.

ADVERSE EFFECTS:

- Sedation.
- Blurred vision.
- Headache.
- Palpitations.
- Hypotension.

HOW SUPPLIED:

- 50 mg/mL

DOSAGE:

- Adult:
 - 25 mg IV/IO slow.
 - 50 mg IM.
- Pediatric:
 - 1 mg/kg IV/IO or deep IM (Maximum 25 mg).

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EPINEPHRINE 1:1,000

CLASS: Sympathomimetic.

ACTION: Bronchodilation, positive chronotrope and inotrope.

INDICATIONS:

- Anaphylactic reactions.
- Adult status asthmaticus.
- Croup or Epiglottitis with stridor.
- Symptomatic Bradycardia.

CONTRAINDICATIONS: None.

ADVERSE EFFECTS:

- Palpitations.
- Headaches.
- Anxiety.

HOW SUPPLIED:

- 1 mg/mL

DOSAGE:

- Adult:
 - 0.01 mg/kg IM (Maximum single dose of 0.5 mg).
 - Use caution with known cardiac history or > 60 years old. If so, consider a maximum single dose of 0.3 mg.
- Pediatric: (Any patient under 18 years of age)
 - 0.01 mg/kg IM (Maximum single dose of 0.3 mg).
 - 1 mg in 3 mL of Normal Saline nebulized with 6 to 8 LPM of O₂.
 - Symptomatic Bradycardia: 0.1 mg/kg via Endotracheal tube, if IV/IO is not available and patient is intubated.

NOTE: Use with caution in patients with cardiac history, hypertension, pregnancy and tachyarrhythmias.

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EPINEPHRINE 1:1,000 Drip

CLASS: Sympathomimetic.

ACTION: Bronchodilation, positive chronotrope and inotrope.

INDICATIONS:

- No relief from subcutaneous epinephrine in severe allergic reactions.
- Shock induced hypotension not involving hemorrhagic shock.
- Symptomatic Bradycardia.

CONTRAINDICATIONS: None.

ADVERSE EFFECTS:

- Palpitations.
- Headaches.
- Anxiety.

HOW SUPPLIED:

- **1 mcg / 1 ml**

Mix 0.5 mg (half of Epi 1:1,000 or 1:10,000) in a 500 mL bag of NS **OR** mix 1 mg (Epi 1:1,000 or 1:10,000) in a 1,000 mL bag of NS or LR, *then spike the bag (already has Epi in it now) with a 60 gtt/mL IV tubing*

Actual drops per second	Drug being delivered
1	1 mcg/min
2	2 mcg/min
4	4 mcg/min

DOSAGE:

- Epinephrine Drip – **Adults - Start at 1 mcg/min, titrate up to 4 mcg/min**, Adult Epi drip can go up to 10 mcg/min, however higher dosing beyond 4 mcg/min requires physician orders.
- Epinephrine Drip – **Peds - Start at 0.1 mcg/kg/min, CAREFULLY titrate up to 1 mcg/kg/min**

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EPINEPHRINE 1:10,000

CLASS: Sympathomimetic.

ACTION: Increases heart rate and cardiac contractility.

INDICATIONS:

- Cardiac arrest.
- Pediatric symptomatic bradycardia.

CONTRAINDICATIONS: None.

ADVERSE EFFECTS:

- Tachycardia.
- Palpitations.
- Hypertension.

HOW SUPPLIED

- 1 mg / 10 mL (0.1 mg/mL)

DOSAGE:

- Adult:
 - 1 mg IV or IO every 3-5 minutes.
- Pediatric:
 - 0.01 mg/kg IV or IO every 3-5 minutes (maximum per dose 1 mg).

NOTE: If giving via ET route, double the dose as listed above.

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ETOMIDATE (AMIDATE)

CLASS: Hypnotic.

ACTION: Hypnotic without analgesic activity.

INDICATIONS: Pre-medication for RSI or cardioversion.

CONTRAINDICATIONS: Hypersensitivity.

ADVERSE EFFECTS:

- Transient venous pain (immediately after administration).
- Transient skeletal muscle movement.

HOW SUPPLIED:

- 40 mg in 20 mL (2 mg/mL).

DOSAGE:

- Adult:
 - 20 mg IV/IO (0.25 mg/kg) - Initial induction for RSI or Facilitated Intubation
 - 10 mg IV/IO (0.1 mg/kg) – Pre-medication for cardioversion.
- Pediatric:
 - 0.25 mg/kg IV/IO, maximum single dose of 20 mg - For RSI.
 - 0.125 mg/kg IV/IO - Pre-medication for cardioversion (DO NOT EXCEED 10 mg).

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FENTANYL (SUBLIMAZE)

CLASS: Narcotic (Opioid) analgesic.

ACTION: Short acting analgesic.

INDICATIONS:

- Pain – traumatic injuries or second line in chest pain.
- RSI (Post Intubation).

CONTRAINDICATIONS:

- Respiratory depression.
- Altered Mental Status due to head injury.

CAUTIONS:

- If hypotensive, contact medical control prior to administration.

ADVERSE EFFECTS:

- Respiratory depression.
- Hypotension (rare).

HOW SUPPLIED:

- 100 mcg / 2 mL
- 250 mcg / 5 mL

DOSAGE:

- Adult:
 - 1 mcg/kg IV/IO, may repeat at 0.5 mcg/kg every 5 minutes as necessary and titrate to effect. If unable to gain IV/IO access, then can be given IM once.
 - Chest pain – 50 mcg IV, may repeat once.
 - RSI (Post intubation) – 100 mcg IV/IO every 5 minutes as necessary and titrate to effect.
- Geriatric (> 65 years of age)
 - 1 mcg/kg IV/IO with a maximum of 50 mcg per dose, may repeat at 25 mcg per dose every 5 minutes as necessary and titrate to effect. If unable to gain IV/IO access, then can be given IM once.
 - Chest pain – 50 mcg IV, may repeat once.
- Pediatric:
 - 1 mcg/kg IV/IO; May repeat at 0.5 mcg/kg every 5 minutes and titrate to effect.
 - 2 mcg/kg IN or IM; May repeat at 1 mcg/kg every 5 – 10 minutes and titrate to effect.
 - RSI (Post intubation) – 1 mcg/kg IV/IO, may repeat every 5 minutes as necessary and titrate to effect.

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GLUCAGON (GLUCAGEN)

CLASS: Pancreatic hormone.

ACTION: Elevates blood glucose by causing the breakdown of glycogen.

INDICATIONS:

- Symptomatic hypoglycemia less than 70 with altered mental status where IV access is unobtainable despite three attempts.
- Beta Blocker overdose.

CONTRAINDICATIONS: Hypersensitivity.

ADVERSE EFFECTS:

- Nausea.
- Vomiting.
- Hypertension.
- Tachycardia.

HOW SUPPLIED:

- 1 mg powder in a vial (Must mix with 1 mL solution of saline that is supplied).

DOSAGE:

- Adult:
 - 1 mg IM, may repeat once in 20 minutes with inadequate response.
 - Beta Blocker overdose – 1 mg IV.
- Pediatric:
 - 0.03 – 0.1 mg/kg IM; not to exceed 1 mg.
 - Beta Blocker overdose
 - < 25 kg – 0.5 mg IV.
 - > 25 kg – 1 mg IV.

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KETAMINE (KETALAR)

CLASS: Dissociative anesthetic.

ACTION: Sedates and causes anesthesia for endotracheal intubation.

INDICATIONS:

- Pain management
- Excited delirium.
- Facilitated and rapid sequence intubation.

CONTRAINDICATIONS:

- Hypertension.
- Tachy-arrhythmias.
- Acute coronary syndrome / MI.

ADVERSE EFFECTS:

- Abuse.
- Hallucinations.
- Emergent reaction.
- Hypertension.
- Tachycardia.
- Salivation.
- Laryngospasm.
- Tremors.
- Nystagmus.

HOW SUPPLIED:

- 250 mg / 5 ml vial
- 500 mg / 10 ml vial

DOSAGE:

- Adult:
 - 1-2 mg/kg IV/IO for RSI and Excited Delirium.
 - 2-4 mg/kg IM for Excited Delirium.
 - 20 mg IV/IO, if Morphine/Fentanyl does not work by itself.
- Pediatric:
 - 1-2 mg/kg IV/IO for RSI.
 - Call for medical direction in excited delirium or pain management.

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KETOROLAC (TORADOL)

CLASS: Non-Steroidal Anti-Inflammatory Analgesic (NSAID)

ACTION: Reduces inflammatory response by blocking the action of cyclooxygenase, the enzyme responsible for prostaglandin production (COX-inhibitor).

INDICATIONS: Pain management of

- Isolated musculoskeletal injuries
- Kidney stones
- Back pain

CONTRAINDICATIONS:

- Anticoagulant use
- Recent gastrointestinal bleeding or peptic ulcer disease
- Increased risk of bleeding caused by hemophilia or other clotting disorders
- Asthma
- Hypersensitivity to NSAIDs
- Less than 16 years of age
- Major trauma or head injuries
- Chronic kidney disease
- Pregnant patient in third trimester or later (>28 weeks gestation)

ADVERSE EFFECTS:

- Drowsiness
- Prolonged clotting time
- Anaphylaxis
- Asthma exacerbation

HOW SUPPLIED:

- 30 mg / 1 mL

DOSAGE:

- Adult:
 - 30 mg IV or 60 mg IM (Give only half of adult dose if > 65 years old)
- Pediatric:
 - Not currently being used for pediatric patients

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LABETALOL

CLASS: Beta-Blocker.

ACTION: Alpha- and Beta-Adrenergic blocker.

INDICATIONS: To decrease blood pressure in hypertensive crisis, pre-eclampsia and transfers carrying post or during tPA infusions from hospital to hospital.

CONTRAINDICATIONS:

- Asthma.
- COPD.
- Cardiogenic shock.
- Uncompensated CHF.
- 2nd and 3rd degree heart blocks.

ADVERSE EFFECTS:

- Hypotension.
- Bradycardia.
- Severe bronchospasms.
- May decrease the effects of Beta-Adrenergic bronchodilators.

HOW SUPPLIED:

- 100 mg / 20 mL.

DOSAGE:

- Adult:
 - Hypertensive Crisis -10 mg slow IV for systolic over 200 or diastolic over 110 and heart rate > 60 bpm, may repeat at 20 mg slow IV every 10 minutes as needed.
 - Pre-Eclampsia - 10 mg slow IV for systolic over 140 or diastolic over 90 and heart rate > 60 bpm, may repeat at 20 mg slow IV every 10 minutes as needed.
 - Acute Ischemic Stroke Interfacility Transfers During or After tPA Administration- 10 mg slow IV for systolic over 180 or diastolic over 100 and heart > 60 bpm, may repeat with another 10 mg slow IV if no response after 10 minutes.
- Pediatrics:
 - Not currently used for pediatric patients.

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LACTATED RINGER'S SOLUTION (LR)

CLASS: Isotonic Crystalloid Solution

ACTION: Replaces extracellular fluid by remaining in the vascular space

INDICATIONS:

- Fluid replacement in medical or trauma patients.

CONTRAINDICATIONS:

- Hypersensitivity to sodium lactate
- Known alkalosis or risk for development of alkalosis
- Severe renal impairment
- Hypervolemia / Hypertension
- Concurrent administration of blood products
- Fluid replacement for patients with a traumatic brain injury or increased ICP (Use Normal Saline)

ADVERSE EFFECTS:

- Fluid overload

HOW SUPPLIED:

- 1,000 mL fluid bag

DOSAGE:

- Adult:
 - 500 mL IV/IO bolus, repeated as needed until target blood pressure is achieved
 - Sepsis: 30 mL/kg IV/IO bolus
- Pediatric:
 - 20 mL/kg IV/IO bolus, may repeat as needed until target blood pressure is achieved (Minimum systolic blood pressure = $\geq 70 + 2 \times \text{age in years.}$)

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LIDOCAINE (XYLOCAINE)

CLASS: Antiarrhythmic.

ACTION: Suppresses ventricular ectopy and increases V-Fib threshold.

INDICATIONS:

- Symptomatic PVC's 12 or greater per minute.

CONTRAINDICATIONS:

- Heartblocks.
- PVC's in bradycardia.

ADVERSE EFFECTS:

- Dizziness.
- Confusion.
- Widening of the QRS.
- Anxiety.
- Seizures.

HOW SUPPLIED:

- 100 mg / 5 mL (20 mg/mL).

DOSAGE:

- Adult:
 - Cardiac Arrest: 1-1.5 mg/kg IV/IO bolus, may repeat at half the initial dose to a maximum of 3 mg/kg.
 - V-Tach/Wide Complex with a pulse: 100 mg IV, may repeat in 5-10 minutes at 50 mg IV.
 - Drip: 1-4 mg/min and titrate to effect.
 - PVC's:
 - 1 mg/kg IV/IO, may repeat at 0.5 mg/kg IV/IO to a maximum of 3 mg/kg.
 - Geriatric patients > 65 y/o, give 0.5 mg/kg IV/IO, may repeat at 0.25 mg/kg IV/IO to a maximum of 3 mg/kg.
 - Conscious IO: 40 mg IO push over 2 minutes, may repeat at 20 mg IO as needed over 2 minutes.
- Pediatric:
 - Cardiac Arrest: 1 mg/kg IV/IO bolus to a maximum of 3 mg/kg.
 - Wide Complex with a pulse: 1 mg/kg IV, may repeat in 5-10 minutes at 0.5 mg/kg IV.
 - Drip: 20-50 mcg/kg/min.
 - Conscious IO: 0.5 mg/kg to a maximum of 40 mg over 2 minutes, may repeat at 0.25 mg/kg as needed over 2 minutes.

Sumner County Emergency Medical Services

LIDOCAINE DRIP PREPARATION AND INFUSION

Under normal operations, a pre-mixed Lidocaine drip will be on hand... any Lidocaine drip shall be in a 4mg/1ml concentration

If a pre-mixed Lidocaine drip is NOT available, you can mix one by adding 4 of the 100 mg pre-filled syringes to a 100 ml bag, this will create 400 mg of Lidocaine in 100 ml of NS...

Spike the bag with 60 gtt/ml tubing (microdrip), then "prime" the line with fluid. Do not do this before mixing the drug into the bag, waiting till this step allows fluid in the line to have drug mixed in it.

Label the medication bag for proper identification and hang it approximately 12 inches higher than the primary line IV bag... This is best done by handing the medication bag from the ceiling of the ambulance and the primary bag from the IV pole on the cot.

Using aseptic technique, attach the medication line into the port on the primary IV tubing, set the desired flow rate.

If Lidocaine bolus dose is successful in suppressing ventricular ectopy, begin Lidocaine drip at 1-4 mg/min

Infuse desired dose:

1mg/min = 15gtt/min (1 drop / 4 seconds)

2mg/min = 30gtt/min (1 drop / 2 seconds)

3mg/min = 45gtt/min (1 drop / approx. 1.5 seconds)

4mg/min = 60gtt/min (1 drop / 1 second)

Sumner County Emergency Medical Services

MAGNESIUM SULFATE

CLASS: Antiarrhythmic.

ACTION: Bronchodilator and anti-arrhythmic.

INDICATIONS:

- Respiratory distress (after Albuterol administration).
- Torsades.
- Eclampsia.

CONTRAINDICATIONS:

- Heartblocks.

ADVERSE EFFECTS:

- Respiratory depression.
- Hypotension.
- Sweating.

HOW SUPPLIED:

- 5 grams / 10 mL.

DOSAGE:

- Adult:
 - Respiratory: 2 grams (4 mL) mixed in a 100 mL bag of normal saline and infuse IV/IO over 10 minutes.
 - Pregnancy Seizure: If the patient is >20 weeks pregnant or 2 weeks post-delivery, 4 grams (8 mL) mixed in a 100 mL bag of normal saline and infuse IV/IO over 20 minutes (This can be used in conjunction with versed and Labetalol.)
 - Torsades: 2 grams IV/IO.
- Pediatric:
 - Respiratory: 20 mg/kg (maximum 2 grams) to be mixed in 100 mL bag of normal saline infuse IV/IO over 10 minutes.
 - Hypothermia V-Tach and V-Fib: 20 mg/kg IV/IO over 10 minutes, maximum single dose of 2 grams.

Sumner County Emergency Medical Services

MAGNESIUM SULFATE DRIP PREPARATION AND INFUSION

Withdraw the desired amount of drug in milliliter (mL) volume from the vial... (2 grams = 4 ml... 4 grams = 8 ml from vial)

Inject the drug from the vial into a 100 ml bag of Normal Saline...(this will actually give 102-104 ml of volume, which we will round to 100 ml...)

Spike the bag with 10 gtt/ml tubing (macro drip), then "prime" the line with fluid. Do not do this before mixing the drug into the bag, waiting till this step allows fluid in the line to have drug mixed in it.

Label the medication bag for proper identification and hang it approximately 12 inches higher than the primary line IV bag... This is best done by handing the medication bag from the ceiling of the ambulance and the primary bag from the IV pole on the cot.

Using aseptic technique, attach the medication line into the port on the primary IV tubing, set the desired flow rate. If you are infusing 100 ml using 10 gtt/ml tubing, you want to see 1.5-2 drops per second falling into the drip chamber...this will safely give the drug.

Reality Check:

- The emphasis is **SAFE**, yet **effective** and **efficient** administration of the medication. If the drug goes in slightly less than or longer than the desired 10-minute infusion time, it is still safe.
- You can use 60 gtt/ml tubing, however using 10 gtt/ml makes it easier to see the drip rate due to the short infusion time of 10 minutes
- Once you calculate gtt/min, divide that by 60 to get actual drops per second you will see in the chamber.
- You can also consider using a dial-a-flow extension set, or use the formula below to calculate drip rates.

$$\frac{\text{Volume (mL)}}{\text{Minutes}} \times \text{Drop Factor (gtt/ml)} = \text{Flow Rate (gtt/min.)}$$

Sumner County Emergency Medical Services

MORPHINE

CLASS: Narcotic (Opioid) analgesic.

ACTION: CNS depressant and decreases pain response.

INDICATIONS:

- Chest pain after NTG administration.
- Pulmonary edema.
- Pain from burns or fractures.

CONTRAINDICATIONS:

- Hypersensitivity.
- Head injury.
- Abdominal pain.

ADVERSE EFFECTS:

- Dizziness.
- Altered LOC.
- Hypotension.
- Respiratory depression.

HOW SUPPLIED:

- 10 mg/mL

DOSAGE:

- Adult:
 - Chest Pain: 2 mg IV and titrate to effect in 2 mg increments every 5 minutes.
 - CHF: 2 mg IV and titrate to effect in 2 mg increments every 5 minutes.
 - Burns & Fractures: 0.05-0.1 mg/kg IV/IO/IM; May repeat once if needed after 5 minutes.
- Pediatric:
 - 0.05-0.1 mg/kg IV/ IO, may repeat once after 5 minutes if needed, maximum initial dose of 5 mg.
 - If no IV/IO is established, administer 0.1 mg/kg IM, may repeat once after 5 minutes if needed, maximum initial dose of 5 mg.

Sumner County Emergency Medical Services

NALOXONE (NARCAN)

CLASS: Narcotic antagonist.

ACTION: Reverses the effects of opioid overdose.

INDICATIONS: Opioid overdose and coma of unknown origin.

CONTRAINDICATIONS: Hypersensitivity.

ADVERSE EFFECTS: Withdrawal effects (short acting).

HOW SUPPLIED:

- Adult:
 - 2 mg / 2 mL (1 mg/mL).
- Pediatric:
 - 0.4 mg/mL (0.4 mg/mL).

DOSAGE:

- Adult:
 - 0.4-2 mg IV or IM, maximum dose of 8 mg.
 - 2-4 mg IN, maximum dose of 8 mg.
- Pediatric:
 - 0.1 mg/kg IV/IO, maximum 2 mg per dose.
 - 0.2 mg/kg IN/IM, maximum 4 mg per dose.

Sumner County Emergency Medical Services

NITROGLYCERIN (NITROSTAT)

CLASS: Antianginal.

ACTION: Dilates the coronary arteries and systemic arteries.

INDICATIONS: Chest pain.

CONTRAINDICATIONS:

- Children <12 years old.
- Hypotension.
- Viagra use within 12 hours.
- Levitra use within 24 hours.
- Cialis use within 48 hours.

ADVERSE EFFECTS:

- Headache.
- Dizziness.
- Hypotension.

DOSAGE:

- Adult:
 - 0.4 mg sublingual; May repeat 3 times if needed every 5 minutes to a maximum of 3 doses.
- Pediatrics:
 - Not indicated.

NOTE: May be given 1 time without an IV established.

Sumner County Emergency Medical Services

ROCURONIUM (ZEMURON)

CLASS: Paralytic

ACTION: Non-depolarizing muscle relaxant.

INDICATIONS: To facilitate ventilations in a patient with a secured airway with an endotracheal tube and position is confirmed.

CONTRAINDICATIONS:

- Airway which is not absolutely secured.
- Malignant hyperthermia.

ADVERSE EFFECTS:

- Hypotension.
- Tachycardia.

HOW SUPPLIED:

- 100 mg/10 mL's (10 mg/mL).

DOSAGE:

- Adult:
 - 50 mg IV/IO.
- Pediatric:
 - 1 mg/kg IV/IO (max 50 mg).

Sumner County Emergency Medical Services

SODIUM BICARBONATE

CLASS: Alkalinizing agent.

ACTION: Combines with acids to form a weaker acid to lower pH.

INDICATIONS:

- Tricyclic overdose.
- Known metabolic acidosis.
 - Sepsis.
 - Coded dialysis patients.
 - Unwitnessed arrest or witnessed arrest > 15 minutes.

CONTRAINDICATIONS: Alkalotic state.

ADVERSE EFFECTS:

- Alkalosis.
- Deactivates catecholamines.

HOW SUPPLIED:

- Adult:
 - 50 mEq / 50 mL (1 mEq/mL) of an 8.4% solution.
- Pediatric:
 - 5 mEq / 10 mL (0.5 mEq/mL) of a 4.2% solution.

DOSAGE:

- Adult:
 - 1 mEq/kg IV/IO of an 8.4% solution.
- Pediatric:
 - 1 mEq/kg IV/IO of a 4.2% solution.

Sumner County Emergency Medical Services

SODIUM CHLORIDE 0.9% SOLUTION (NORMAL SALINE)

CLASS: Isotonic Crystalloid Solution

ACTION: Replaces extracellular fluid by remaining in vascular space

INDICATIONS:

- Fluid replacement in medical or trauma patients.

CONTRAINDICATIONS:

- Severe renal impairment
- Hypervolemia / Severe hypertension
- Acute presentation of congestive heart failure

ADVERSE EFFECTS:

- Fluid overload
- Dilutional coagulopathy

HOW SUPPLIED:

- 500 mL fluid bag

DOSAGE:

- Adult:
 - 500 mL IV/IO bolus, repeated as needed until target blood pressure is achieved.
 - Fluid Replacement: 20 mL/kg IV/IO (Standard).
 - Sepsis: 30 mg/kg IV/IO bolus
- Pediatric:
 - < 60 days old, 10 mL/kg IV/IO bolus, may repeat as needed until target blood pressure is achieved (Minimum systolic blood pressure = $\geq 70 + 2 \times \text{age in years.}$)
 - > 60 days old, 20 mL/kg IV/IO bolus, may repeat as needed until target blood pressure is achieved (Minimum systolic blood pressure = $\geq 70 + 2 \times \text{age in years.}$)

Sumner County Emergency Medical Services

SOLU-MEDROL (METHYLPREDNISOLONE)

CLASS: Corticosteroid.

ACTION: Anti-inflammatory.

INDICATIONS: Allergic reactions and Asthma.

CONTRAINDICATIONS: Hypersensitivity.

ADVERSE EFFECTS:

- Hypertension.
- Nausea.

HOW SUPPLIED:

- 125 mg / 2 mL (62.5 mg/mL).

DOSAGE:

- Adult:
 - 125 mg IV or IM.
- Pediatric:
 - 1 mg/kg IV or IM with a maximum of 125 mg.

Sumner County Emergency Medical Services

SUCCINYLCHOLINE (ANECTINE)

CLASS: Paralytic.

ACTION: Depolarizing muscle relaxant.

INDICATIONS: To facilitate endotracheal intubation.

CONTRAINDICATIONS:

- Hyperkalemia.
- Renal failure.
- Penetrating eye injuries.
- Massive crush injuries.
- Burns greater than 8 hours old.
- Spinal cord injury greater than 24 hours old.
- Neuromuscular disease.
- Organophosphate poisoning.
- Malignant hyperthermia.

ADVERSE EFFECTS:

- Hyperkalemia.
- Cardiac arrhythmias.
- Increased intraocular pressure.

HOW SUPPLIED:

- 200 mg / 10 mL (20 mg/mL).

DOSAGE:

- Adult:
 - 1 mg/kg IV/IO.
- Pediatric:
 - 1.5 mg/kg IV/IO.

Sumner County Emergency Medical Services

THIAMINE (VITAMIN B₁)

CLASS: Vitamin.

ACTION: Allows the breakdown of glucose.

INDICATIONS:

- Coma of unknown origin.
- Alcoholism.
- Delirium tremens.

CONTRAINDICATIONS: None.

ADVERSE EFFECTS: Anaphylaxis when given IV (Rare).

HOW SUPPLIED:

- 200 mg / 2 mL (100 mg/mL).

DOSAGE:

- Adult:
 - 100 mg IV/IM.
- Pediatric:
 - Not indicated.

Sumner County Emergency Medical Services

TRANEXAMIC ACID (TXA)

CLASS:

- Antifibrinolytic Agent

ACTION:

- Tranexamic acid inhibits plasmin and reduces clot breakdown.

INDICATIONS:

- To be administered in PATIENTS 16 YEARS OLD AND OLDER, who have signs of shock from suspected blood loss in severe / multisystem trauma.

CONTRAINDICATIONS:

- Isolated head injuries
- Not given if it has been longer than 3 hours since time of injury (onset)

ADVERSE EFFECTS:

- This drug may increase the potential for blood clots, however in situations of injury threatening death due to blood loss, that risk is outweighed by benefits of reducing clot breakdown.

HOW SUPPLIED:

- 1 gram of drug suspended in a 10 ml vial (100 mg / 1 ml)

DOSAGE:

- Loading dose: 2 grams (all 10 ml from the vial mixed in 100 ml bag) given over 10 minutes slow IV/IO infusion

Sumner County Emergency Medical Services

VECURONIUM (NORCURON)

CLASS: Paralytic

ACTION: Non-depolarizing muscle relaxant.

INDICATIONS: To facilitate ventilations in a patient with a secured airway with an endotracheal tube and position is confirmed.

CONTRAINDICATIONS:

- Airway which is not absolutely secured.
- Malignant hyperthermia.

ADVERSE EFFECTS:

- Hypotension
- Tachycardia

HOW SUPPLIED:

- 20 mg/10 mL's (2 mg/mL) vial.

DOSAGE:

- Adult:
 - 0.1 mg/kg, maximum dose of 10 mg IV/IO.
- Pediatric:
 - 0.1 mg/kg IV/IO, maximum single dose of 10 mg.

Sumner County Emergency Medical Services

VERSED (MIDAZOLAM)

CLASS: Sedative.

ACTION: Short acting parenteral benzodiazepine, CNS depressant and muscle relaxant.

INDICATIONS:

- Seizures.
- Pre and Post RSI sedation.
- Agitated psychiatric patient.

CONTRAINDICATIONS:

- Hypersensitivity to benzodiazepines.
- Hypotension.

ADVERSE EFFECTS:

- Hypotension.
- Confusion.
- Respiratory depression.
- Bradycardia.

HOW SUPPLIED:

- 10 mg / 2 ml (5 mg/ml)
- **5 mg / 5 ml (1 mg/ml)** - Most common as of 1-1-19 due to logistics.

SPECIAL NOTE - Pay special attention and be sure the concentration of drug coordinates with the concentrations listed on pediatric charts, etc.

DOSAGE:

- Adult:
 - Seizures:
 - 5 mg IM, may be able to repeat once at 5 mg IM in 5 minutes after initial dose, if IV access is unavailable.
 - 2 mg IV/IO, may repeat twice at 2 mg IV/IO in 2-3 minutes after initial dose.
 - Excited Delirium: 2 mg IV or 5 mg IM, may repeat once at 2 mg IV or 5 mg IM in 5-10 minutes.
 - RSI:
 - Initial Sedation – 5 mg IV/IO.
 - Post-Intubation Sedation – 2-5 mg IV/IO, every 5 minutes and titrate to effect.
 - Cardioversion: 5 mg IV/IO/IM.

Sumner County Emergency Medical Services

VERSED (MIDAZOLAM) Continued

- Pediatric:
 - Seizures:
 - 0.2 mg/kg IM, may be able to repeat once at 0.2 mg/kg IM in 5 minutes after initial dose, if IV access is unavailable. DO NOT exceed 5 mg IM as a maximum dose.
 - 0.1 mg/kg IV/IO, may repeat twice at 0.1 mg/kg IV/IO in 2-3 minutes after initial dose. DO NOT exceed 2 mg IV/IO as a maximum dose.
 - RSI:
 - Initial Sedation – 0.2 mg/kg IV/IO, maximum 5 mg.
 - Post-Intubation Sedation – 0.1 mg/kg IV/IO, maximum 5 mg per dose every 5 minutes and titrate to effect.
 - Cardioversion:
 - 0.1-0.2 mg/kg IV/IO, maximum 2 mg.
 - 0.2 mg/kg IM, maximum 5 mg, if IV/IO access cannot be obtained.
 - Stimulant Overdose:
 - 0.05 mg/kg IV/IO, maximum 2mg, repeat every 10 minutes as needed and titrate to effect.
 - 0.2 mg/kg IM, maximum 5 mg, repeat every 10 minutes as needed and titrate to effect if no IV/IO access can be obtained.

NOTE: Be cautious in patients with COPD, CHF, chronic renal failure and elderly.

Sumner County Emergency Medical Services

ZOFRAN (ONDANSETRON)

CLASS: Antiemetic.

ACTION: Selective antagonist of the serotonin receptors in the CNS.

INDICATIONS: Severe nausea and vomiting.

CONTRAINDICATIONS: Hypersensitivity.

ADVERSE EFFECTS:

- Headache.
- Dizziness.

HOW SUPPLIED:

- 4 mg / 2 mL (2 mg/mL).

DOSAGE:

- Adult (>40 kg):
 - 4 mg IV/IM/PO; May repeat once, if necessary.
- Pediatric (<40 kg):
 - 0.1 mg/kg IV.

NOTE: May be given to patients after administration of Fentanyl, if the patient becomes nauseated.