Drug Protocols

Revised 2013

Appendix

ADENOSINE (ADENOCARD)
(EMT P, EMT I direct verbal order**)**

PHARMACOLOGY AND ACTIONS:

1. It is naturally occurring nucleoside that causes slowing of A-V nodal conduction and heart rate. Its half-life is 10 seconds and it has duration of action of 40 seconds. It has little affect on intranodal conduction.

INDICATIONS:

1. Termination of regular narrow complex tachycardia's.
2. Diagnosis of atrial flutter and atrial fibrillation by increasing A-V nodal block thus allowing flutter or fibrillation waves to be seen.

CONTRAINDICATIONS:

1. SVT with known history of prolonged A-Fib. Consider Amiodarone
2. Known allergy or hypersensitivity to Adenosine.
3. Second or Third degree blocks and/or V-Tach
4. **WPW is not a contraindication to its use**

PRECAUTIONS:

1. Aminophylline and caffeine may antagonize the effects.
2. Digoxin, calcium channel blockers, B-blockers, Dipyridamole, may potentate its effects.
3. Recurrence of tachycardia may be seen in 10-58% of patients.
4. Effect may be potentiated with Tegratol and dose should be reduced to 3 mg IV

ADVERSE REACTIONS:

1. Flushing, dizziness, chest pressure, nausea, headache, and dyspnea with hypotension can be seen secondary to its vasodilatory properties.

ADMINISTRATION: IV

1. 6 mg IV rapidly (except if patient is on Tegratol, then use 3 mg IV) Inject close to catheter site. 10 ml NS following the injection may help deliver more concentrated dose to the heart.
2. If no response is seen after 90 seconds, 12 mg should be used. If no response is seen then 12 mg may be repeated after 90 seconds
3. Pediatric dose of 0.1 mg/kg rapid (max 6mg) 2^{nd} and 3^{rd} dose 0.2mg/kg (max 12mg)
4. Another agent should be used if adenosine fails to convert the arrhythmia.
5. If heart rate >150 and unstable, cardiovert .5j/kg - 1j/kg following sedation

HOW SUPPLIED:

1. 2 ml amps (3 mg/ml).

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AMIODARONE (CORDARONE)

(EMT P and EMT I direct verbal order)

Bolus Only

Special circumstance may arise when an EMTI is not able to make base physician contact for medication orders. During a cardiac arrest, EMTI will be allowed to administer this medications under standing orders. Documentation must be clear as to the reason for contact failure and the Medical Director should be notified that such a circumstance arouse.

PHARMACOLOGY AND ACTIONS:

1. Amiodarone (Cordarone) has a negative inotropic effect and will slow conduction through the AV node also. It will also slow ventricular response in atrial fibrillation and is well tolerated in most patients with left ventricular dysfunction. The half life of Cordarone is 40 days.

INDICATIONS:

1. Treatment and prophylaxis of VF or VT
2. Chemical cardioversion of Atrial fibrillation/flutter

CONTRAINDICATIONS:

1. Known hypersensitivity
2. Cardiogenic shock except when given for **unstable** recurrent VF or VT unresponsive to other agents
3. Marked sinus bradycardia and 2^{nd} or 3^{rd} degree heart block without functioning pacemaker.
4. Atrial fibrillation/flutter $\geq$ 48 hours

PRECAUTIONS:

1. It may cause hypotension which should be treated with standard therapy and slowing and/or discontinuing the infusion
2. Bradycardia and AV block should be treated by discontinuing the infusion and initiating Atropine therapy or external pacing.
3. Pro-arrhythmic effect may be seen including Torsade de Pointes. Standard therapy including discontinuation of the infusion should be utilized.
4. Will precipitate out when mixed with Sodium Bicarb.
5. Known atrial fibrillation/flutter $\geq$ 48 hours because of the risk of emboilization.
6. Should be used with caution in pregnancy since the half life is 40 days.

ADVERSE REACTIONS:

1. Hypotension
2. Can prolong the QT interval and therefore hypokalemia and Hypomagnesaemia should be corrected prior to its use if possible.
3. It will increase serum concentrations and therefore the pro-arrhythmic effects of Digoxin, Quinidine and Procainamide.

ADMINISTRATION:

Adult

Pulse less V-Tach / V-Fib Cardiac Arrest 300mg (6 cc) IV/IO bolus once, then consider an additional 150mg bolus once or move to Lidocaine.

Arial fibrillation - Consider 150mg (3ml) IV over 10 minutes

Stable V-Tach unresponsive to conventional pharmacological interventions: 150mg (3cc) diluted with 3 cc of NS and administered over 10 minutes. Repeat as needed max 24 hour dose 2.2g

Maintenance infusions are at 0.5 mg/mm IV (450 mg/250cc D_5W **glass only** @ 16.6 cc/hr)
Pediatric Dose: 5mg/kg rapid IV/IO, for V-Tach and V-Fib. Max dose 15mg/kg per day.

Pediatric

Pulse less V-Tach / V-Fib Cardiac Arrest - 5mg/kg bolus IV/IO repeat to single daily dose of 15/mg/kg (max single dose 300mg),

Stable V-Tach unresponsive to conventional pharmacological interventions: 5mg/kg IV/IO over 20 – 60 minutes (max single dose 300mg)

How Supplied:

150 mg (3cc) vials X 6

Interfacility transport drips may be maintained by EMT P and EMT I for anti-arrhythmic patients.

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ASPIRIN – CHEWABLE
(EMT-P, EMT-I, AEMT, EMT-B)
standing order for chest pain

PHARMACOLOGY AND ACTIONS

1. Aspirin has recently gained acceptance for use as an anticoagulant in the setting of myocardial infarctions. Aspirin inhibits platelet aggregation and vasoconstriction. Studies have shown to be beneficial in decreasing sudden death and MI's. Aspirin has been shown to be of additional benefit in maintaining vessel patency after thrombolytic therapy.

NOTE: The benefits of aspirin in MI or unstable angina outweigh the risk of GI effects at the dose given.

INDICATIONS

1. Unstable angina
2. Acute myocardial infarctions

CONTRAINDICATIONS

1. Contraindicated in patients allergic to aspirin products.
2. Aspirin is not to be given to patients with known bleeding disorders or taking anticoagulant medications such as Coumadin or Warfarin
3. Aspirin is not to be given to patients with suspected GI problems or possible aneurysms or aspirin induced asthma.

ADVERSE REACTIONS

1. It is not to be given for analgesic purposes such as headaches or orthopedic injuries.

ADMINISTRATION

1. 3-4 chewable 81 mg tablet(s)

HOW SUPPLIED

1. 81 mg chewable tablets (baby aspirin)

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ATROPINE SULFATE

(EMT-P & EMT-I with verbal order)

Special circumstance may arise when an EMTI is not able to make base physician contact for medication orders. During a cardiac arrest, EMTI will be allowed to administer this medications under standing orders. Documentation must be clear as to the reason for contact failure and the Medical Director should be notified that such a circumstance arouse.

PHARMACOLOGY AND ACTIONS:

Atropine is a muscarinic-cholinergic blocking agent. As such, it has the following effects:

1. Increases heart rate by blocking the vagal nerve influences.
2. Increases conduction through the AV node.
3. Reduces motility and tone of the GI tract.
4. Reduces action and tone of the urinary bladder.
5. Dilates pupils.

INDICATIONS:

1. To increase the heart rate in bradycardia or pacemaker failure.
2. To improve conduction in 2nd Mobitz I degree heart block.
3. As an antidote for some insecticide exposure and nerve gases.
4. To counteract excessive vagal influences responsible for some Brady systolic and asystolic arrests as in RSI. (Pre-treatment in peds of< 10 yrs and HR <180 when using succs.)
5. Per ACLS = used in Asystole and PEA

CONTRAINDICATIONS:

1. Atrial fibrillation and flutter.
2. Tachycardia.
3. Glaucoma.
4. Won't work in 3 degree heart blocks since the block is at the AV junction and atropine works at the SA node. Pacing is recommended for symptomatic 3 degree block patients.

PRECAUTIONS:

1. In acute MI, treat bradycardia only with signs of poor perfusion.
2. Use cautiously with hypertension.

ADVERSE REACTIONS:

1. Headache, blurred vision, increased intraocular pressure.
2. Tachycardia, palpitations, hypertension.
3. Urinary retention.
4. Restlessness, hallucinations, disorientation.

ADMINISTRATION:

1. Adult: 0.5 mg to 1.0mg IV, repeat if needed at 5-10 min intervals to a total dose of 3 mg. Usually titrated to a ventricular rate of about 60/mm.
2. Pediatrics: 0.02 mg/kg IV. Minimum dose 0.1 mg Max dose 0.5 mg for a child, 1.0 mg for adolescent. May be repeated once.
3. Neonatal - 0.03 mg/kg
4. May be given IV, IO, IM or via ET Tube

NOTE: DOSES LESS THAN .5 MG CAN CAUSE PARADOXICALLY SLOWING OF THE HEART RATE

5. For insecticide poisonings:
   Adult 2-5 mg IV every **15** min until clearing of bronchial secretions occurs.
   Peds: 0.05 mg/kg every 5-10 minutes until clearing of bronchial secretions occurs.
6. For insecticide poisonings, there in no max dose limit. The drug is generally used in 1 to 2 mg increments IV to alleviate life-threatening cholinergic symptoms such as Bronchorrhea, Bradycardia with hypotension.

HOW SUPPLIED:

1 mg/ml (0.1 mg/ml) in a 10 ml prefilled syringe.

DRUG INTERACTIONS:

1. Possibility of additive anticholinergic effects with Procainamide and Quinidine.

ET TUBE DOSE IS 2 1/2 TIMES THE IV DOSE FOLLOWED BY 10CC NS

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ATROVENT (IPRATROPIUM BROMIDE)
(EMT-P, EMT-I & AEMT with verbal order)
EMT-B (if in MDI & pt. assisted)

PHARMACOLOGY AND ACTION:

Atrovent is an anticholinergic agent which inhibits vagal reflexes by antagonizing acetycholine thereby causing bronchodilation. It has a half-life of about 2 hours.

INDICATIONS:

Used in the treatment of bronchospasm associated with Asthma or COPD

CONTRAINDICATIONS:

In patients with a history of hypersensitivity or allergy to soy lecithin, soybeans, peanuts or Atropine

PRECAUTIONS:

It should be used with caution in patients with narrow angle glaucoma and bladder outlet obstruction

ADVERSE REACTIONS:

Tachycardia, blurred vision, urinary difficulty, cough and nervousness are the most common. The nebulizer should be stopped in cases where extreme tachycardias occur

ADMINISTRATION:

If< 2 yrs use 250 mcg. If> 2 yrs use 500 mcg. **It may be mixed with Albuterol** and given back to back 3 times. Or approximately 3 times over 1 hour in cases of severe respiratory distress. After the first hour it should then be administered every 4 hours

HOW SUPPLIED

500 mcg in 2.5 ml NS unit doses

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BENADRYL (DIPHENHYDRAMINE)
(EMT P, EMT I with verbal order)
(AEMT with verbal order for allergic reaction only)

PHARMACOLOGY AND ACTIONS:

1. An antihistamine which blocks action of histamines during an allergic reaction; also an anticholinergic, antiparkinsonism effect used to treat acute dystonic reactions to antipsychotic drugs. (Haldol, Thorazine, Compazine)

INDICATIONS:
1. The second line drug in all Anaphylaxis cases.
2. To counteract acute dystonic reactions to antipsychotic drugs.
3. Allergic reactions, including Vancomycin- induced red mans syndrome caused by rapid administration (1 gram over less than 1 hour)
4. For Paramedic's only to be used as a mild sedative or anti psychotic

PRECAUTIONS:
1. May have an additive effect with alcohol & other CNS depressants.
2. Benadryl has an Atropine-line effect and caution is needed for patients with Asthma, Glaucoma, Cardiovascular disease and Hypertension.
3. Not recommended for pregnant and nursing mothers.

ADVERSE REACTIONS:
1. May cause generalized weakness, dizziness, decreased LOC, hypotension, nausea and vomiting.

ADMINISTRATION:
1. 50 mg slow IV push or deep IM injection.
2. 1 mg/kg slow IV push or deep IM injection.
3. Pediatric: 1 to 2 mg/kg slow IV/IO or IM

HOW SUPPLIED:
1. 50 mg in 1 ml.

Note: Benadryl: Should be administered for all anaphylaxis cases

1. 50 mg. Slow IV push or deep IM
2. 1mg/kg in peds slow IV or deep IM

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10% CALCIUM CHLORIDE

(Paramedic Only)

ACTION:

Essential for regulating the excitation threshold of nerves, muscles and cardiac function (by increasing tone of muscle and force of contraction).

PHARMACOLOGY AND ACTIONS:

1. Increases cardiac contractility.
2. Increases excitability of the muscle fibers.
3. Increases amplitude of contractions in the feebly beating heart.
4. Decreases heart rate.

ADVERSE REACTIONS:

Hypercalcemia, bradycardia, cardiac arrest, nausea and vomiting, headache, decreased excitability of muscles and nerves, tissue irritation, and necrosis with IM or IV extravasation.

INDICATIONS:

1. Life threatening Hyperkalemia **except when associated with Digoxin toxicity**.
2. Pre arrest Hypocalcemia.
3. Calcium Channel Blocker toxicity.
4. Significant hypotension post Verapamil injection
5. Magnesium Sulfate toxicity; as indicated by:
    A. Absent knee jerks
    B. Respiratory difficulty
    C. Hypotension
    D. Cardiac arrest

PRECAUTIONS:

1. Rapid administration causes bradycardia or asystole.
2. Do not administer in suspected Digoxin toxicity, V-Fib Arrest, Asystole or PEA

ADMINISTRATION:

Adult Dose:

1. 3 mg/kg Slow IV push (not more than 0.5cc/min)

An easy way to remember is the **"Rule of 10"**

a. 10 cc of 10% solution slow IV push over 10 min.
b. Usual adult dose is 10-20 cc IV over *5* to 10 minutes.
c. May repeat every 10 minutes.

Verapamil induced hypotension

1. 3 cc rapid IV for and may be repeated x 3.

Pediatric Dose:

1. .05ml/kg Slow IV push.
3. 1 cc per minute - total dose over 3-5 minutes.

HOW SUPPLIED:

100 mg/cc (10% solution) in a prefilled syringe

SPECIAL NOTES:

1. High concentrations of calcium suddenly reaching the heart can cause fatal cardiac arrest.
2. Direct IV infusion may cause peripheral vasodilatation with a moderate fall in the blood pressure.
3. EKG monitor on the patient during and after administration to direct hypercalcemia associated with prolonged QT interval and with inverted T- wave
4. Be ready for seizures.

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DEXTROSE 25% - PEDIATRICS

(EMT-P, EMT-I, AEMT, EMT-B/IV)

PHARMACOLOGY AND ACTIONS:

1. Glucose is the body's primary fuel, it helps produce energy and is essential to brain function. By quick infusion into the blood stream, glucose can help reverse insulin shock and assist in regaining consciousness.

INDICATIONS:

1. Coma of unknown etiology.
2. Hypoglycemic state usually associated with insulin shock, comatose diabetic.

CONTRAINDICATIONS:

1. Questionable or unstable IV.

PRECAUTIONS:

1. Infiltration of dextrose will cause tissue necrosis. The IV should be double-checked for a good blood return before dextrose is injected.

ADVERSE REACTIONS:

1. D25% is remarkably free of side effects.

ADMINISTRATION:

1. 0.5 gm/kg (2 cc/kg) IV. HOW SUPPLIED:

HOW SUPPLIED:

1. 2.5gm (250 mg/cc) PFS.

DEXTROSE (D50%)

(EMT P, EMT I, AEMT, EMT BIV with verbal order after glucoscan conformation)

PHARMACOLOGY AND ACTIONS:

1. Glucose in the body's primary fuel, and helps to produce energy and is essential to brain function. By quick infusion into the blood stream, glucose can help reverse insulin shock and assist in regaining consciousness.

INDICATIONS:

1. Hypoglycemic states usually associated with insulin shock in Diabetes.
2. The unconscious patient, when a history is unattainable.
3. Patients with any focal or partial neurologic deficit or altered state of consciousness.
4. Hypothermia.
5. Alcohol induced hypoglycemia; consider the use in any intoxicated patient.

PRECAUTIONS:

1. Infiltration of Dextrose will cause tissue necrosis. IV should be double checked for good blood return before Dextrose is injected.

ADVERSE REACTIONS:

1. 50% Dextrose is remarkably free from side effects.
2. Glucose should be given whenever a question of hypoglycemia exists; even if diabetic coma is feared, regardless of the glucoscan check
3. Effect may be delayed in elderly with poor circulation.

ADMINISTRATION:

1. Draw blood prior to administration.
2. Check BGL if able. Administer 50 cc (1 Amp) D50% if BGL < 60. If between 60-80, use at crew discretion. Repeat if needed.
3. Consider a second dose in any patient with a slow response after base physician contact.

HOW SUPPLIED:

50 ml *(25* grams) prefilled syringe.

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DOPAMINE (INTROPIN)
(EMTP Only)

PHARMACOLOGY AND ACTIONS:

A vasopressor agent that increases cardiac output.

1.	1-2 mcg/kg/min	Dilates renal and mesenteric blood vessels (no effect on heart rate or blood pressure).
2.	2-10 mcg/kg/min	Beta effects on heart. Increasing cardiac output without significant effect on blood pressure.
3.	10-20 mcg/kg/min	Alpha peripheral effects causes peripheral vasoconstriction and increased blood pressure.
4.	20-40 mcg/kg/min	Alpha effects reverse dilation of renal and mesenteric vessels with resultant decreased flow.

INDICATIONS:

1. Cardiogenic shock not responding to fluid challenge.
2. Any hypotension after hypovolemia has been treated.

CONTRAINDICATIONS:

1. Hypovolemic shock (treat with fluids before administering dopamine).
2. Un-corrected tachyarrhythmias or ventricular fibrillation.

PRECAUTIONS:

1. Inactivated when added to Bicarb or other alkaline solutions.
2. Infiltration may cause necrosis and sloughing of tissue.
3. Patients with occlusive vascular disease may receive peripheral skin color and temperature changes from compromised circulation
4. High doses may cause peripheral vasoconstriction.
5. **LOW DOSES MAY CAUSE DECREASED BLOOD PRESSURE FROM PERIPHERAL DILATION!!!**

ADVERSE REACTIONS:

1. Most frequent: Ectopic beats, angina, nausea/vomiting, and tachycardia.
2. May induce hypertensive crisis.

ADMINISTRATION:

1. Adult: Mix 400mg in 250 ml D5W = 1600 mcg/ml. Infuse at 10-50 cc/hr. Titrate for BP>90.
2. Peds: "RULE OF SIXES" Six (6) times the body wt in kg's is the mg dose added to make 100 ml's of D5W. One (1) ml per hour = 1 mcg/kg/min. **Infuse at 5-20 mcg/kg/min.**
3. 6 x wt. in kg = mg Dopamine added to D5W to make 100 cc. 1 ml/hr = **1** mcg/kg/min

Note: An easy way to calculate drip rates for a patient using the 400mg in 250ml that will result in a 5mcg/min dose is as follows

1. Take the patients weight in pounds (not KG) and round to nearest 10^{th}.
    a. i.e 179lbs = 180lbs or 173lbs = 170lbs
2. Delete or drop the last digit
    a. i.e. 180lbs = 18
3. Subtract one
    a. i.e. 18 - 1 = 17
4. Answer = 17 so 17drops/min = 5 mcg/min

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EPINEPHRINE

(EMT P, EMT I with verbal order)
(AEMT 1:1000 with verbal order for allergic reaction)

Special circumstance may arise when an EMTI is not able to make base physician contact for medication orders. During a cardiac arrest, EMTI will be allowed to administer this medication under standing orders. Documentation must be clear as to the reason for contact failure and the Medical Director should be notified that such a circumstance arouse.

PHARMACOLOGY AND ACTIONS:

1. Catecholamine with alpha and beta effects.
2. Cardiovascular responses:
    A. Increased heart rate.
    B. Increased myocardial contraction force.
    C. Increased systemic vascular resistance.
    D. Increased arterial blood pressure.
    E. Increased myocardial 02 consumption.
    F. Increased automatically.
3. Potent bronchodilator.

INDICATIONS:

1. Ventricular fibrillation (particularly fine fibrillation).
2. Asystole.
3. Pulse less Electrical Activity (PEA).
4. Systemic allergic reactions.
5. Bronchospasm in patients under 40.
6. Hypotension not responsive to dopamine. (cardiogenic shock)

CONTRAINDICATIONS:

In non-cardiac arrest situations contraindicated for:

1. Hypertension.
2. Hyperthyroidism.
3. Ischemic heart disease.
4. Cerebrovascular insufficiency.
5. Women in labor.

PRECAUTIONS:

1. Will precipitate if added to Sodium Bicarbonate.
2. When used for allergic reactions, increased cardiac work may precipitate angina and/or MI in susceptible individual.
3. Peripheral constriction and the rise of blood pressure may lead to pulmonary edema or CVA.

ADVERSE REACTIONS:

1. Anxiety, tremor, palpitations, tachycardia, headache, nausea and vomiting

ADMINISTRATION: IV, IO, ET, IM, SQ

1. ADULT:

A. Cardiac arrest (initial dose) 1:10,000 1mg in 10cc repeat every 3 – 5 minutes (may use Vasopressin instead)

May also be given via the ET tube at 2 1/2 times IV dose followed by 10/cc of NS.

100-200 mcg IV push in cardiogenic shock – not responding to Dopamine

B. Allergic or bronchospasm:
0.3 mg of 1:1000 SQ or IM

In severe Anaphylaxis, may give 3cc of 1:10,000 slow IV or at base of tongue.

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2. PEDIATRIC:

A. Cardiac arrest:
IV/IO: 0.01 mg/kg (0.1 ml mg/kg) of 1:10,000
Endotracheal (ET): 0.1 mg/kg of 1:1000
Repeat every 3-5 minutes at the same dose

B. Allergic or Bronchospasm:
0.01 mg/kg (0.01 ml/kg of 1:1000) SQ or IM

C. Epi Drip: 6 X wt in kg = mg dose added to make a total of 100 ml.
1 ml/hr = 0.1 mcg/kg/mm.

HOW SUPPLIED:

1. 1:10,000 = 1 mg/1ml (0.1 mg/cc) Prefilled syringe
2. 1:1000 = 1mg/ml 30 cc vial

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FENTANYL (SUBLIMAZE)

(EMTP, and EMT I with verbal order)

PHARMACOLOGY AND ACTIONS

Fentanyl (Sublimaze) is a synthetic opioid analgesic with the onset of 7 minutes and a short duration of action (1-2 hrs); it also has a low side effect profile. It causes little histamine release and therefore does not compromise hemodynamics.

INDICATIONS;

1. Severe pain associated with burns, trauma, etc. And those patients who are unable to tolerate Morphine due to allergy or compromised hemodynamics.
2. To blunt the rise in ICP during RSI in head injured patients.
3. May be used with chest pain associated with a MI, however, it should not be used instead of Morphine since MS causes coronary dilation and Fentanyl does not.
4. In conjunction with Benzodiazepines for conscience sedation (Conscience Sedation is not an EMS approved procedure)

CONTRAINDICATIONS:

1. Uncorrected respiratory insufficiency
2. Known hypersensitivity
3. Uncorrected hypotension
4. Pregnancy/Labor or children less then 2 years of age

PRECAUTIONS:

1. It may cause respiratory depression. Patients must be closely monitored. Resuscitative equipment and Narcan must be readily available.
2. Fentanyl should be avoided in severe trauma patients since it may alter clinical assessment. It may be used for isolated trauma to extremity when head, chest, and abdominal injuries are clinically non-suspected. It maybe used on trauma patients if respiratory status and hemodynamics are not compromised or uncorrected.
3. It may cause nausea and vomiting.
4. High doses and rapid infusions may cause truncal and jaw muscular rigidity with difficulty in ventilating the patient.
5. Class C medication in pregnancy

ADMINISTRATION:

1. 25 - 100 mcg IV/IO or IM **over 1 minute** titrated to the desired effect.
   a. Dose should be reduced in elderly or debilitated patients to reduce the risk of truncal and jaw rigidity.
   b. For elderly start at 25mcg over 1 minute
2. Pediatric: 2 to 3 mcg/kg IV/IO or IM **over 1 minute**

HOW SUPPLIED:

50 mcg/ml in 2 ml ampule

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GLUCAGON

(EMTP, EMT-I / AEMT with verbal order)

PHARMACOLOGY AND ACTIONS:

1. Glucagon is a hormone which causes glucose mobilization in the body. It works opposite to insulin, which causes glucose storage, and it is present normally in the body. It is released at times of insult or injury when glucose is needed and mobilizes glucose from body glycogen stores. Return to consciousness should be within 20 minutes of an IM injection if the patient is hypoglycemic.
2. Recent studies have shown that patients who demonstrate hemodynamic compromise due to overdose of Beta-Blocking agents do not respond to usual treatment with Beta-Agonist such as Epinephrine, Isuprel and Dopamine. In contrast, Glucagon was successful in 86% of cases in raising blood pressure and heart rate.

BETA BLOCKING AGENTS:

Inderal - Propranolol
Lopressor - Metaprolol
Corgard - Nadolol
Visken - Pindolol
Blocadren - Timolol
Tenormin - Atenolol
Normodyne - Labetalol
Trandate - Labetalol

INDICATIONS:

1. Insulin shock where the patient is unconscious and Dextrose solution is not available or a line cannot be established.
2. Paramedics only: Patients in cardiac arrest who are taking Beta-Blocking agents. Patients who intentionally or accidentally overdose on Beta-Blockers, who develop Bradycardia and hypotension.

ADMINISTRATION:

1. For hypoglycemia, 1 mg IM in adults.
2. For overdose of Beta-Blocking agents, 5-10 mg or 0.03 mg/kg IV push over 30 seconds.
3. Pediatric: 0.1mg/kg IV/IO or IM or SQ. Max dose 1mg

CONTRAINDICATIONS AND PRECAUTIONS:

1. IV glucose is the treatment of choice for insulin shock. Use of Glucagon is restricted to patients who are seizing, combative, or with collapsed veins and in whom an IV cannot be started.
2. Persons with no liver glycogen stores (malnutrition, alcoholism) may not be able to mobilize any glucose in response to Glucagon.
3. Nausea and vomiting may occur.

HOW SUPPLIED:

1 Unit (1 mg) vials.

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HEPARIN

(Direct order only EMT P)

PHARMACOLOGY AND ACTIONS:

1. Heparin is an anticoagulant that prevents blood coagulation but does not dissolve established clots.

INDICATIONS:

1. Prophylaxis and treatment of venous thrombosis.
2. Prophylaxis and treatment of pulmonary embolus.
3. Prophylaxis of patients with atrial fibrillation with embolization
4. Treatment of DIC.
5. Prophylaxis and treatment of peripheral arterial embolism.
6. Prevention of coronary artery thrombosis during angina, or following thrombolysis or angioplasty.

CONTRAINDICATIONS:

1. Uncontrollable active bleeding state (except DIC).
2. Severe thrombocytopenia.

PRECAUTIONS:

1. A higher incidence of bleeding complications has been reported in women over 60 years of age.

ADVERSE REACTIONS:

1. Hemorrhage: nose bleeds, blood in urine or tarry stools may be noted as the first sign of bleeding. Easy bruising or petechial formation may precede frank bleeding. If bleeding is not controlled with local pressure, consider stopping the heparin infusion.
2. Local irritation may occur, especially if injection is IM.
3. Hypersensitivity: Chills, fever and urticaria are most common Asthma, rhinitis, lacrimation, headache, nausea and vomiting, and anaphylactic reactions including shock occur rarely. Itching and burning of the soles of the feet may occur.

ADMINISTRATION:

1. Add 25,000 units of heparin to 500 ml of D5/W.
2. Resulting concentration is 50 units/ml.
3. Rates and dose are as follows:

Microdrip set (Units/hr)	Using Volumetric Infusion pump gtts/min	Heparin dose/hr (ml/hr)
16	16	800
17	17	850
18	18	900
19	19	*950*
20	20	1000
21	21	1050
22	22	1100
23	23	1150
24	24	1200
25	25	1250
26	26	1300

HEPARIN BOLUS: (WILL BE DONE BY HOSPITAL STAFF PTA)

The loading of heparin will depend on the indication for which it is given. Typically all non-cardiac indications i.e. Pulmonary Emboli, DVT etc. require a bolus **60** units per kg bolus (max 10,000 units) then 12 units/kg/hr drip.

Cardiac conditions are now weight adjusted at **60** units per kg bolus (max 10,000 units) then 12 units/kg/hr drip. This bolus may be increased at the discretion of the cardiologist.

INR = Patient's PT divided by the mean PT of all of the patients that are tested by that technique. INR is a way to standardize coagulation studies irrespective of the testing technique.

INR target levels: 2-3 for cardiac, PE, and DVT patients

2.5-3.5 for mechanical heart valves

For patients that are previously anticoagulated:

If the INR is 2-3 only the Heparin bolus is indicated. (no drip)

If the INR is> 3 Heparin therapy is not indicated.

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INSULIN (Regular)
Humulin
LDT only

CLASS: Hypoglycemic hormone

ACTION:
Increase glucose transport across muscle and fat membranes to reduce blood glucose levels. Promotes conversion of glucose to its stored form, glycogen.

INDICATIONS:
To treat hyperglycemia, ketoacidosis and hyperkalemia in combination with D50

CONTRAINDICATIONS:
Allergies to this particular type of insulin or history of systemic allergic reaction to pork.

PRECAUTIONS:
Insulin potency can be reduced by 20% - 30% when added to plastic or glass containers or tubing. Use caution with patients taking Digitalis and patients susceptible to hypoglycemia.

ADVERSE EFFECTS:
Transient blurred vision, hypoglycemia, rebound hyperglycemia, coma, confusion and HA

ADMINISTRATION:
Administer drip settings by physician order only. Adult and children; 0.1 unit/kg/hour, continue until blood glucose levels drops to 250mg/dl. Mix 100 units of Regular Insulin in 100ml of NS (1unit/ml)

ONSET OF ACTION:
10 -30 minutes with a half life of ½ - 1 hour.

Reviewed 7/13

LIDOCAINE HYDROCHLORIDE

(EMT P, and EMT I with direct verbal order)

Special circumstance may arise when an EMTI is not able to make base physician contact for medication orders. During a cardiac arrest, EMTI will be allowed to administer this medication under standing orders. Documentation must be clear as to the reason for contact failure and the Medical Director should be notified that such a circumstance arouse.

PHARMACOLOGY AND ACTIONS:

1. Raises stimulation threshold in the ventricles by depressing the automaticity of the Purkinje fibers. Therefore decreasing the likelihood of fibrillation.
2. In usual doses there is no antiarrhythmic effect of the atrium or SA node.
3. In usual doses Lidocaine does not lower the blood pressure, decrease myocardial contractility or diminish cardiac output.

INDICATIONS:

Note: ACLS 2007 recommends the use of Amiodarone as first line anti-arrhythmic however Lidocaine is still acceptable

1. Significant PVC's in suspected myocardial infarction:
   A. PVC's greater than six (6) per minute.
   B. Close coupled PVC's (R on T).
   C. Multifocal PVC's**.**
   D. PVC runs of two or more.
2. Ventricular tachycardia or suspected V-tach when the clinical condition is not rapidly deteriorating
3. Recurrent ventricular fibrillation.
4. Following successful defibrillation and ROSC.
   a. Bolus followed by a drip
5. Prior to intubation for head injured patients
6. To blunt ICP response to RSI.

CONTRAINDICATIONS:

1. Presence of bundle branch blocks.
2. Presence of AV blocks.
3. Periods of sinus arrest.
4. Bradycardia (less than *50).*
5. Hypotension (less than 80).

PRECAUTIONS:

1. In atrial fibrillation or flutter, Quinidine like effect may cause alarming ventricular acceleration.
2. Lidocaine is metabolized in the liver. Therefore, patients with hepatic disease, shock or congestive heart failure will not break the drug down rapidly.
3. To maintain blood levels of Lidocaine, a Lidocaine drip must be started immediately.
4. Be aware of side effects and toxicity, especially in the elderly

ADVERSE REACTIONS AND TOXICITY:

1. CNS: drowsiness, confusion, dizziness, tremors, anxiety, euphoria, visual disturbances, convulsions.
2. Severe reactions are often preceded by somnolence and paresthesia.
3. Decreased myocardial contractility and increased AV block.
4. Rarely hypotension, shock, death and hypersensitivity.

ADMINISTRATION:

1. Lidocaine Bolus: (ADULT)
    A. 1.5 mg/kg IV push in arrest, slowly if awake.
    B. Max of 3 mg/kg.
    C. Should be followed by a Lidocaine drip.
2. Lidocaine Bolus: (PEDIATRIC)
    A. 1.5 to 2 mg/kg IV slowly up to six years old.
    B. Start Lidocaine drip immediately after the bolus at 40-60 mcg/kg/min.
3. Lidocaine Drip:
    A. Mix 1 gram in 250 cc D5W. Concentration = 4 mg/cc.
    B. Adult dose: 1-4 mg/min.
    C. Peds dose: 40-60 mcg/kg/min.
    D. "RULE OF SIXES" Six (6) times the body wt in kg's is the mg dose added to make 100 ml's of D5W. One (1) ml per hour = 1 mcg/kg/min.

4. Endotracheal tube: **May be given via ET at 2 1/2 times IV dose if unable to establish a line.**

HOW SUPPLIED:

1. 100 mg/S cc Prefilled syringe.
2. 1 gram/25 cc vials.
3. Premixed Lidocaine Drips (2 grams/500 cc).

Revised 7/2013

MAGNESIUM SULFATE

(EMTP only)
OB use by physician order only (see note below)

PHARMACOLOGY AND ACTIONS

Magnesium sulfate is a CNS depressant and peripheral neuromuscular blocker producing anticonvulsant effects.

1. Corrects repolarization in cardiac tissue
2. Blocks neuromuscular transmission in seizure patients, decreases cerebral vasospasm
3. Lowers blood pressure

INDICATIONS

1. Torsades de Pointes in cardiac arrest or patients with a pulse
2. Refractory V-fib after Lidocaine
3. Pre-Eclampsia and to stop seizures in Eclampsia
   a. Blood pressure greater than 180 systolic or 120 diastolic with altered mental status
4. Provides sedation to stop convulsions
5. Pre-term labor (Physician order only)
6. Promote diuresis
7. Hypermagnesemia

CONTRAINDICATIONS

1. AV Blocks
2. Hypomagnesemia
2. Watch for hypotension, respiratory depression, hyporeflexia

PRECAUTIONS

1. Watch for signs of toxic dosage levels
   a. Knee jerks disappear (can be gradual or abrupt)
   b. Visual changes
2. Treatment for Mag toxicity
   a. IV calcium chloride 1 gm/10 ml should be kept at the bedside (antidote for MgS04)
   b. Use with caution for renal failure – Foley catheter is advised for urine output monitoring every hour, decrease in urine output will lead to toxicity.
3. Respiratory difficulty or failure
4. Cardiac arrest may occur
5. Hypotension with rapid push
6. Watch for signs of fetal depression and labor inhibition
7. Patient may experience a feeling of warmth during IVP
   a. Pre-Eclamptic patients will be very uncomfortable while on Mag drips, monitor for toxicity constantly.

ADMINISTRATION

1, Torsades de Pointes
   a. 1 to 2 grams IVP for cardiac arrest over 1-2 minutes
2. Pre-Eclampsia, Eclampsia patients
   a. Loading dose 4gm IV push over 30 minutes.
3. Pre-term labor

Note: MCAS will not transport high risk OB patients unless escorted by a critical care RN and or physician familiar with high risk OB patients. High risk OB patients should be transported by a critical care team trained in high risk OB.

a. Loading dose of 4-6 gm IV over 20-30 minutes
b. Maintenance dose of 2-4 gm/hr
c. Monitor urine output and total fluid to avoid fluid overload, max recommended fluid is 3000 ml/24 hours
d. Serum magnesium levels to keep in therapeutic range (5.5 –7.5)
e. Maintain on IV magnesium for 24-48 hours before attempting to wean to oral agents

PEDS:

1. 25-50mg/kg IV or IO over 10-20 min
2. Max dose 2 gm

MAGNESIUM SULFATE ADMINISTRATION GUIDELINES

20 gm MgSO4 in 500 cc D5LR
(vial + 5 gms/10ml equals 4 gms/100cc))
1 gm/hr = 25 cc/hr
2 gm/hr = 50 cc/hr
3 gm/hr = 75 cc/hr
4 gm/hr = 100 cc/hr

IV PUSH BOLUS:

To dilute in 10% solution mix 8 cc sterile H20/1 gm MgS04

1 gm = 2 cc MgS04 plus 8 cc sterile H20
2 gm = 4 cc MgSo4 plus 16 cc sterile H20
4 gm – 8 cc MgSo4 plus sterile H20

Revised 7/2013

MORPHINE SULFATE

(EMT P, EMT I with direct verbal order)

PHARMACOLOGY/ACTION

Narcotic analgesic with a primary effect on the central nervous system therefore, causing respiratory depression, decreased rate and tidal volume, peripheral vasodilatation, mental and emotional changes, nausea and vomiting. Morphine also produces miosis (pupil constriction). It has little cardiovascular side effects when given in therapeutic doses, but may cause orthostatic hypotension or fainting in the sitting up patient due to vasodilatation. In the patient with an acute MI, Morphine is used to treat chest pain not as much as a pain medication but because it causes coronary arterial dilatation which increases blood flow and oxygenation.

Morphine can also causes a decrease in systemic vascular resistance which may result in a transient fall in systemic arterial pressure and cause severe hypotension. In these patients, the minimum effective dose should be given, titrated very slowly. Maximal respiratory depression occurs within seven minutes following injection and lasting for two to three hours. Peak analgesic effect is 20 minutes after IV injection.

INDICATIONS

1. Severe chest pain associated with a suspected acute MI
2. Pulmonary edema
3. Severe pain associated with fractures when there is no head, chest, or abdominal involvement. May also use a benzodiazepine in small doses for analgesic effects.
4. Burns

CONTRAINDICATIONS

1. Shock, hypotension
2. Head injuries or altered mental states
3. Acute respiratory distress not associated with pulmonary edema
4. Decrease in respiratory drive
5. Poly-trauma
6. Acute abdomen and or the possibility of pregnancy

PRECAUTIONS

1. Administer slowly, titrated to patient's need
2. Morphine is not compatible with Aminophylline, Phenobarbital or Sodum Bicarbonate
3. Have Narcan available as an antidote, if needed

ADMINISTRATION

1. Give IV unless IM ordered by physician
2. Therapeutic IV dose: 2-10 mg
3. Must be titrated slowly: 2-5 mg every 5-10 minutes
4. Administer only the amount necessary to achieve patient comfort and lessen anxiety
5. Pediatric: 0.1 to 0.2 mg/kg IV/IO/IM or SQ

SUPPLY

Prefilled tubex 10mg/1c

Revised 7/2013

NARCAN (NALOXONE)

(EMT P, EMT-I, AEMT, EMT BIV with verbal order, EMT-B via MAD with verbal order)

PHARMACOLOGY AND ACTIONS:

1. Narcan is a pure narcotic antagonist. It has no pharmacological effects of its own when used without the presence of narcotics.

INDICATIONS:

1. To reverse the narcotic effects, primarily respiratory depression due to narcotic drugs either ingested, injected or administered in the course of treatment. Narcotics: Morphine, Demerol, Heroin, Dilaudid, Percodan, Codeine, Lomotil, Darvon and Talwin.
2. Diagnostically in coma of unknown etiology to rule out or reverse narcotic depression.
3. If risk of contracting communicable diseases is suspected, MAD is recommended

CONTRAINDICATIONS:

NONE

PRECAUTIONS:

1. In patients physically dependent on narcotics, frank and occasionally violent withdrawal symptoms may be precipitated.
2. Patients may become violent as the Narcan reverses the narcotic effect, so be prepared to restrain as needed. Titrate the dose so as to keep the patient awake, responsive and free from respiratory depression but somewhat groggy and docile may be warranted.
3. The duration of some narcotics is longer than Narcan and the patient must be monitored closely. Repeated doses may be necessary.
4. Darvon (propoxyphene) may require large doses of Narcan 4-6 mg to be effective.
5. **Use with discretion. Small incremental dosing to restore spontaneous respirations may be more advantageous than total withdrawal and the violent potential that follows.**
6. The half live is 40 minutes therefore deterioration may occur and repeat doses necessary at 30-60 minutes.

ADVERSE REACTIONS:

Essentially none.

ADMINISTRATION:

1. 0.1 mg/kg (1 ml) in children under 5 years. 2 mg (2 ml) over 5 years old IV, IM, SQ, or sublingual. If no response is observed, this dose may be repeated once for effect after 5 minutes.

2. May also be given IM, SQ, ET tube or sublingual.

Using Mucosal Atomizer Device (see MAD protocol)

1. Should use a concentration of 1mg/ml for best results

HOW SUPPLIED:

1. Prefilled syringe 2 mg/2 cc

Revised 7/2013

NITROGLYCERIN DRIP

(EMTP only)

PHARMACOLOGY AND ACTIONS:

Principal action is relaxation of vascular smooth muscle:

1. Dilation of blood vessels, including large veins, promotes peripheral pooling of blood and decreases venous return to the heart.
2. Myocardial oxygen need is decreased by both the arterial and venous effects.

INDICATIONS:

1. Congestive heart failure associated with the acute MI.
2. Angina Pectoris.

CONTRAINDICATIONS:

1. Known hypersensitivity to NTG or organic nitrates.
2. Hypotension or uncorrected hypovolemia.
3. Pericardial Tamponade
4. Patients taken medications for erectile dysfunction with 72 hours.

PRECAUTIONS:

1. Nitroglycerin readily migrates into many plastics and should be mixed only in glass bottles.
2. Should be used with caution in patients with severe liver or renal disease.

ADVERSE REACTIONS:

1. Headache, hypotension.
2. Tachycardia, nausea, vomiting, apprehension, restlessness, muscle twitching, retrosternal discomfort, palpitations, dizziness and abdominal pain.

ADMINISTRATION:

1. Premixed bottle with a concentration of 100 mcg/ml. **(25mg in 250cc D5W)**
2. Starting dose is 10 mcg/min or 6 ml/hr
3. Administer via pump.
4. If BP falls below 90 mmHg systolic, slow or stop the infusion.
5. Normal dosing ranges from 10 to 300 mcg/min, titrated for pain relief.
   a. As long as the patient continues to have chest pain and their blood pressure maintains stable, administer additional (SL NTG x 1) q 3 – 5 minutes. Be extra careful of the patient's blood pressure with SL NTG plus the drip. DO NOT titrate the drip upward.

NOTE: Make sure you check the mixture since some facilities do not use the 25mg premix bottles.

Revised 7/2013

NITROGLYCERIN (Sublingual)

(EMT P, EMT-I, AEMT, EMT B /IV direct verbal order if medication belongs to the patient)

PHARMACOLOGY AND ACTIONS:

1. The main action of Nitroglycerin is the relaxation of vascular smooth muscle resulting in vasodilatation. This causes decreased venous return to the heart indirectly resulting in decreased ventricular size and wall tension lowering the needs of myocardial oxygen demand. Additionally there is an increase in coronary blood flow due to vasodilatation of the coronary arteries.

INDICATIONS:

1. Angina.
2. Chest, arm or neck pain thought to be related to coronary ischemia. This may be therapeutic or diagnostic.
3. Control of hypertension in angina or MI.
4. Pulmonary edema, congestive heart failure.

CONTRAINDICATIONS:

1. Hypovolemic shock.
2. Cardiogenic shock.
3. Patients taking erectile stimulants within 72 hours (Viagra, Lavetra, Cealis)

PRECAUTIONS:

1. Generalized vasodilatation may cause profound hypotension and reflex tachycardia.
2. Use caution in hypotensive patients.
3. Must be stored in a dark glass container with a tight lid and not exposed to heat, as Nitroglycerin loses is potency easily.
4. Therapeutic effect is enhanced, but side effects are increased when the patient is upright.

ADVERSE REACTIONS:

1. Common: Throbbing headache, flushing, dizziness, and burning under the tongue, weakness, and postural hypotension.
2. Uncommon: Marked hypotension, sensitivity.

ADMINISTRATION:

1. 0.4mg tab (1/150gr) or 0.4 mg (400 mcq) spray given sublingual and repeated every five minutes for a total of three tablets or sprays for EMT B.
2. EMT P and EMT I, Give q 3 – 5 minutes or until relief of pain as long as B/P stable.
3. Discontinue when severe headache occurs.
4. DO NOT INHALE SPRAY!!

HOW SUPPLIED:

1. Bottles containing 0.4mg (1/150gr) strength.
2. Spray containing 0.4mg (1/150gr) (approx. 200 doses).

Revised 7/2013

OXYGEN

(EMT P, EMT I, AEMT, EMT B standing order)

PHARMACOLOGY AND ACTIONS:

Oxygen added to the inspired air raises the amount of oxygen in the blood, and therefore the amount delivered to the tissues. Tissue hypoxia causes cell damage and death. Breathing in most persons is regulated by small changes in acid/base balance and CO2 levels. It takes relatively large drops in blood oxygen concentration to stimulate respiration. Oxygen flow rate should be adjusted to titrate a pulse ox of 92%-99%

INDICATIONS:

1. Suspected hypoxemia or respiratory distress from any cause.
2. Acute chest pain in which a myocardial infarction is suspected.
3. Shock (decreased oxygenation of tissues) from any cause.
4. Major trauma.
5. Carbon Monoxide poisoning.

CONTRAINDICATIONS:

1. If the patient is not breathing adequately on his/her own, the treatment of choice is ventilation, not just 02.
2. A small percentage of patients with chronic lung disease breathe because they are hypoxic. Administration of 02 will shut off their respiratory drive.

DO NOT WITHHOLD OXYGEN BECAUSE OF THIS POSSIBILITY. BE PREPARED TO ASSIST VENTILATION IF NEEDED.

ADMINISTRATION:

DOSAGE	**INDICATIONS**
Low flow 1-2 L/min	Patients with chronic lung disease
Moderate flow 4-6 L/min	Precautionary use for trauma, chest pain
High flow 10-15 L/min	Severe resp distress, medical or trauma

SIDE EFFECTS AND SPECIAL NOTES:

1. Non-humidified 02 is drying and irritating to mucous membranes.
2. **Restlessness** may be an important sign of hypoxia.
3. Oxygen supports combustion.
4. Oxygen toxicity (overdose) is not a hazard from acute administration.
5. Nasal prongs work equally well on nose and mouth breathers.

METHOD	FLOW RATE	02 INSPIRED AIR (APPROX)
Room air		21%
Nasal Cannula	1 L/min	24%
	2 L/min	28%
	8 L/min	40%
Face Mask	6 L/min	0-60%
Non rebreather	10-12 L/min	90%
Bag Valve Mask	Room Air	21%
	12 L/min	40%
100% value	High flow regulated to inflate bag at proper rate	90%+

NOTE: Most hypoxic patients will feel quite comfortable with an increase of inspired 02 from 21% to 24%.

Revised 7/2013

PACKED BLOOD CELLS
(EMT P LDT's only)

PURPOSE

To allow EMTP with MCAS to monitor and maintain medical facility-initiated packed red blood as well as to initiate hospital supplied blood during an inter-facility transport for patients who are otherwise hemodynamically stable.

POLICY

Blood will be supplied by the transferring facility ensuring all cross-matching and patient matching has been confirmed prior to transport. Additional units should be transported in coolers with ice packs supplied by the facilities blood bank. The facility should also send one tubing filter for each unit of blood as well as a thermometer to check patient temperatures. **Medics should verify with an RN present and reading aloud the following before transport.**

- Verify MD order
- Verify signed blood consent
- Verify patients complete name (spelling the last name)
- Verify Patients account number and arm band match the assigned blood unit
- Verify Blood Unit Number or Pool number from the tag attached to the blood unit
- Verify Unit number from the blood bag itself
- Verify expiration and unit type

A blood release form should then be signed by the transporting Medic. Unused units and coolers should be returned to the blood bank.

PROCEDURE

Always use universal precautions when there is a potential exposure to blood or blood products. All equipment should be disposed in biohazard waste.

1. Blood products should be mixed thoroughly and gently before infusion
2. Blood should be hung with normal saline
3. Blood should be infused independent from other lines
4. DO NOT add medications to blood bag or piggy bag into an IV line
5. Never vent blood product containers.
6. ONLY use pressure bags during transport to ensure flow when necessary
    a. Pumps should be used to control flow
7. Blood infusion should be completed within the time expiration noted on the bags or before midnight if no other time of day is noted.
8. Obtain base set of vital signs before transport including a temp using the thermometer that will be set with you. Reassess v/s and temp q 15 min
9. Observe patient for reaction (usually occurs within the first 15 minutes)
    a. If reaction occurs (see blood transfusion reaction guidelines)
10. When transfusion is complete, flush tubing with NS, record vital signs and volume infused.

Note: When infusing multiple units, the ending vital signs are the baseline for the next unit. Transfusion reactions are independent and should be monitored with each unit infused.

EFFECTIVE 2/2010

TRANSFUSION REACTIONS AND TREATMENT PROTOCOL

PURPOSE
To detail the interventions necessary to effectively manage a transfusion reaction.

DEFINITION
Fever – an increase in fever of 2°F or greater above baseline. Baselines for each unit are independent of each other.

POLICY
Any adverse symptom or physical signs during or after the transfusion of blood should be considered part of a potentially life-threatening reaction.

Reaction	**Timing**	**Signs & Symptoms**	**Treatment**	**Prevention**
Acute Hemolytic	Usually within the first 5-15 minutes, but can happen anytime during the transfusion	Fever, chills, hypotension, dyspnea, nausea, vomiting, dark urine, DIC, pain – IV site, back, flank, chest, abdomen, head, feeling of impending doom	Maintain renal output with fluid replacement and diuretics Vasopressor Treat for DIC as needed	Proper identification of patient/ sample/unit
Febrile nonhemo-lytic	During transfusion; usually toward the end of transfusion	Fever, chills	Antipyretics Meds per MD for shaking and chills	Leukocyte-reduced blood components
Mild allergic (urticarial)	During transfusion; up to 2-3 hours after the start of the unit	Hives, itching	Antihistamines Steroids	Premedication with anti-histamines

Reaction	Timing	Signs & Symptoms	Treatment	Prevention
Bacterial contamin-ation	Usually during transfusion; can be immediate or up to 3 hours after the start of the unit; less severe reactions may manifest up to 15 days after transfusion	Severe chilling, high fever, dry flushing, nausea, vomiting, hemoglobinemia, bleeding, sudden, severe hypotension	Supportive treatment Broad spectrum antibiotics	Careful inspection of the unit for abnormalities before transfusion Proper storage and handling of unit Infuse for $\leq$ 4 hours
Anaphylactic	During transfusion; within 1-45 minutes of start of the unit	Fever absent, stridor, bronchospasm, dyspnea, hypotension, abdominal cramps, flushing, hives, “lump in my throat”, chest tightness	Epinephrine (0.4 ml of 1:1000 solution) Steroids Oxygen	Washed Red Blood Cells for subsequent transfusion Medic alert bracelet Platelets, Fresh Frozen, Cryo products from known IgA deficient donors (rare donor registry)
Transfusion-Related Acute Lung Injury	Usually within 1-2 hours of transfusion; occasionally up to 6 hours after transfusion	Acute respiratory distress, dyspnea, cyanosis, hypotension, tachycardia, fever, ABG’s- decreased PO_2 , X-ray-pulmonary infiltrates	Oxygen Intubation Mechanical ventilation Vasopressors	Prompt intervention at first sign of respiratory distress will mitigate reaction

Reaction	**Timing**	**Signs & Symptoms**	**Treatment**	**Prevention**
Transfusion Associated Circulatory Overload	Within several hours of transfusion	Headache, elevated blood pressure, nonproductive cough, neck vein distension, cyanosis, restless dyspnea, rales	Diuretics Oxygen Meds per MD Therapeutic phlebotomy if severe	Lung assessment pretransfusion and during transfusion in high-risk patients Careful assessment of flow rate – 1mL/kg/hour for at-risk patients

EFFECTIVE 2/2010

Reviewed 7/13

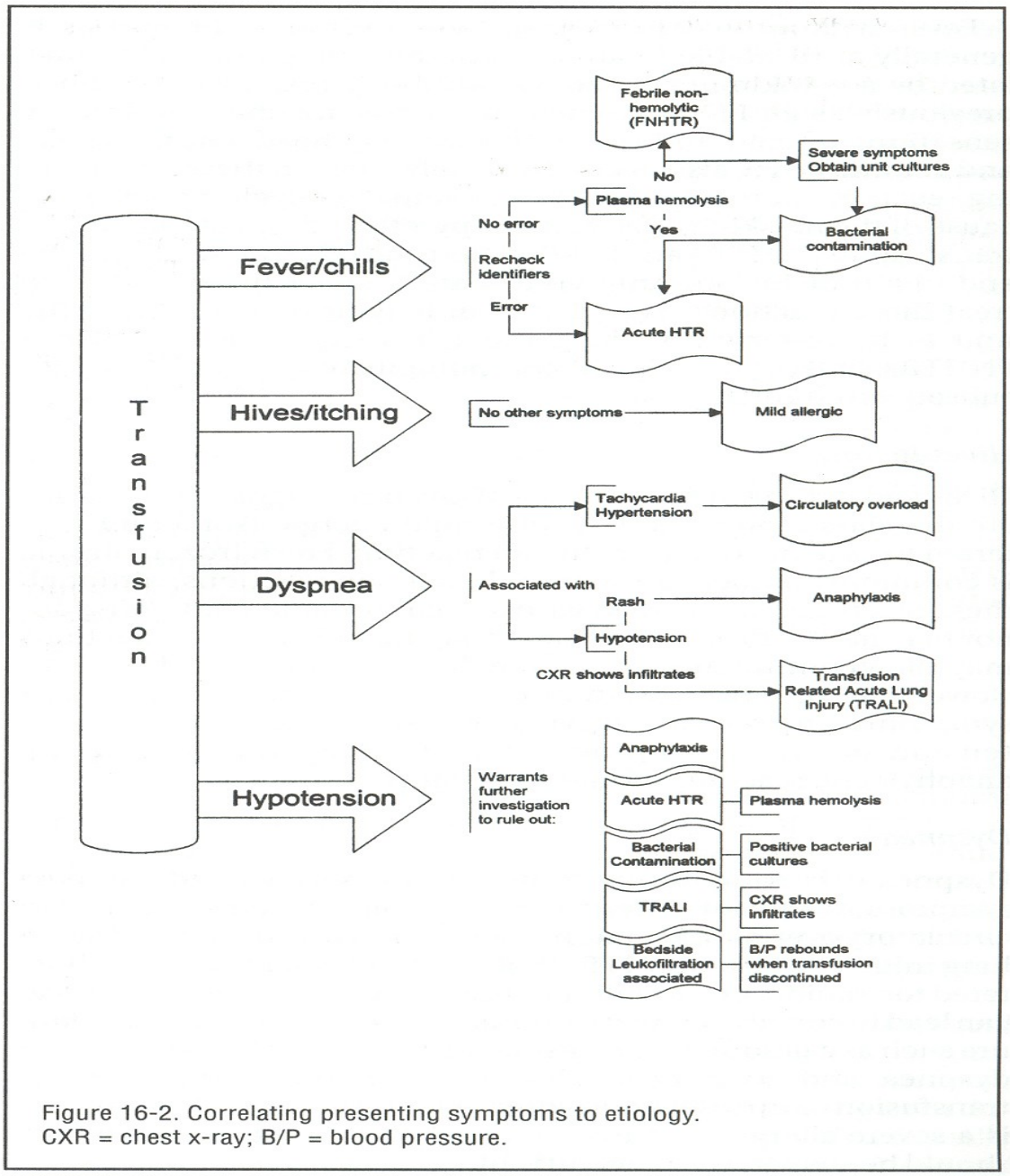

Figure 16-2. Correlating presenting symptoms to etiology.
CXR = chest x-ray; B/P = blood pressure.

PATIENTS WITH INCREASED RISK OF TRANSFUSION REACTION

Reaction	Patients with potentially greater risk
Immediate hemolytic	• Patients receiving emergency un-crossmatched transfusion • Multiparous women • Patients previously transfused
Delayed hemolytic	• Multiparous women • Patients previously transfused
Allergic and anaphylactic	• Multiparous women • Patients previously transfused • Patients with IgA deficiency and anti-IgA
Febrile nonhemolytic	• Multiparous women • Patients previously transfused • Patients receiving platelet and granulocyte transfusion
Bacterial contamination	• Equal risk for all patients
Transfusion-related acute lung injury	• Equal risk for all patients
Transfusion-associated graft-vs-host disease	• Marrow transplant recipients • Patients with Congenital cellular immune deficiency • Patients with Hodgkin's disease • Patients with Non-Hodgkin's lymphoma • Intrauterine transfusion or neonatal exchange transfusion • Recipients of blood relative directed donation • Recipients of HLA-matched platelets
Posttransfusion purpura	• Multiparous women • Patients previously transfused
Transfusion Associated Circulatory overload	• Pediatric • Geriatric • Preexisting cardiopulmonary disease

PROCEDURE:

If any symptoms of transfusion reaction are noted:

1. All recipients with symptoms or signs of a transfusion reaction as defined above will have a transfusion reaction workup.
2. Immediately stop the transfusion. An allergic transfusion reaction (itching and hives) is routinely managed by administration of an antihistamine, and is the only transfusion reaction that permits administration of the remainder of the unit of blood or blood component that may have evoked the reaction.
3. Monitor vital signs, continue to monitor every 15 minutes until the patient is stable.
4. Maintain IV with new bag and tubing of normal saline. (Do not discard blood or blood tubing). Entire system is returned to lab.
5. Contact base physician for orders and treatment of reactions.

PROVENTIL (ALBUTEROL)

(EMT P Standing Order, EMT I, AEMT, EMT IV, EMT B with direct verbal order)

PHARMACOLOGY AND ACTIONS:

1. Proventil is a beta-adrenergic agent similar to Terbultiline that is used as an aerosolized medication to relieve bronchospasm.

INDICATIONS:

Acute bronchospasm in:

1. Acute asthma.
2. Acute allergic reactions.
3. COPD.

CONTRAINDICATIONS:

1. History of sensitivity to Proventil.

PRECAUTIONS:

1. Use with caution in patients with hypertension, coronary insufficiency, seizure disorders, diabetes and recent use.
2. COPD patients who breathe on hypoxic drive.

ADVERSE REACTIONS:

1. Seizures.
2. Nausea and vomiting.
3. Bronchospasm.
4. Tachycardia and arrhythmias - elevation in heart rate of 30 bpm or heart rate of 140 (adult) or 160 (children).

ADMINISTRATION:

1. Aerosol:
   - A. >1 yr age = 0.5ml/3cc NS
     <1 yr age = 0.25ml/3cc NS
     In severe resp distress: >1 yr age = 1ml/3ccNS
     <1 yr age = O.5m1/3ccNS
   - B. Dilute with 3 ml of saline mixed in nebulizer.
   - C. Drive with *5-6* L/min 02 for a fine mist and delivered over 5-10 minutes.
   - D. Can also be delivered via the ET tube.
   - E. Can be delivered continuously in severe respiratory distress

HOW SUPPLIED:

1. 20 ml bottle with marked *(0.25 & 0.5* ml) dropper.

Revised 7/2013

RACEMIC EPINEPHRINE

(VAPONEPHRINE OR ASTHMAEPHRINE)
(EMT-P, EMT-I VERBAL ORDER)

PHARMACOLOGY / ACTIONS

- Vasoconstriction to reduce swelling in upper airway
- Relief of bronchospasm

INDICATIONS

- Croup with life threatening airway obstruction
- Severe stridor and/or accessory muscle use

CONTRAINDICATIONS

- Allergic reaction / hypersensitivity

SUPPLIED AS

- .5cc pre-filled bullet

PRECAUTIONS

- Store in cool, dark space. Light Sensitive
- May cause tachycardia or arrhythmias
- Symptoms of overdose include
    - Nausea
    - Palpitations
    - Headache
    - Arrhythmias

ADULT AND PEDIATRIC PROCEDURE

- .01 cc/kg mixed with 2cc respiratory saline in nebulizer
- Oxygen flow at 6 lpm – 8 lpm
- Maximum dose for adults: 0.50 cc
- Maximum dose for pediatrics: 0.25 cc

Revised 7/2013

SODIUM BICARB

(EMT P, and EMT I for cardiac arrest only with direct verbal orders)

PHARMACOLOGY AND ACTIONS:

1. Acids are increased when body tissue become hypoxic due to cardiac arrest or respiratory arrest. Acidosis depresses cardiac contractility, depresses the cardiac response to catecholemines and makes the heart more likely to fibrillate and less likely to be defibrillated. Sodium Bicarbonate is an alkalotic solution which neutralizes acids found in the blood.

INDICATIONS:

1. Acidosis found during prolonged cardiac arrest and to make the heart more receptive to conversion from ventricular fibrillation, asystole or electromechanical dissociation by normalizing the pH.

Paramedic use only:

2. TCA O.D. accompanied by widening of QRS of 0.12 and/or shock.

PRECAUTIONS:

1. Addition of too much NaHCO3 may result in alkalosis (pH of blood is higher than normal) which is difficult to reverse and can cause as many problems in resuscitation as acidosis.
2. Should not be given in a mixture with catecholamines or calcium.
3. May increase cerebral acidosis, especially in diabetics who are in DKA.

ADMINISTRATION:

1. For cardiac arrest: (Adult and Peds).
    A. 1 meq/kg initially after 10 minutes of adequate BLS, then *0.5* mEq/kg, or 1/2 of initial dose, until the pulse is restored.
    B. Neonates: 2 mEq/kg IV slowly over 2 minutes if newborn ventilated (use the 4.2% solution *0.5* mEq/ml.)
2. Medical Conditions: (Adult and Peds).
    A. pH < 7.20 due to a metabolic acidosis except in Diabetic Ketoacidosis where you only treat if pH is < *7.05.* Dose is *0.5* - 2.0 meq/kg and is dependent on the degree of acidosis. Avoid subsequent doses until acid base balance is reevaluated.

SIDE EFFECTS AND SPECIAL NOTES:

1. Each amp of Bicarb contains 44 o r 50 mEq of Na++. In persons with cardiac disease, this will increase intravascular volume and further stress the heart.
2. In the presence of a respiratory arrest, without cardiac arrest, the treatment of choice is ventilation to correct the respiratory acidosis. No NaHCO3 should be given unless cardiac arrest has also occurred.

HOW SUPPLIED

1. 8.4% solution 1 mEq/cc 50 cc PFS.
2. 4.2% solution *0.5* mEq/cc 10 cc PFS.

Revised 7/2013

TERBUTALINE SULFATE

(EMTP respiratory emergencies with standing order, OB use verbal order)

PHARMACOLOGY AND ACTIONS:

1. Terbutaline is a beta adrenergic receptor agonist which has an effect on bronchial smooth muscle. Relieves acute bronchospasm in both acute and chronic COPD. Maximal effect usually occurs within 30 to 60 minutes and may persist for 90 minutes to 4 hours. Stops uterine contractions in pre-term labor.

INDICATIONS:

1. As a bronchodilator for asthma and reversible bronchospasm which may occur with bronchitis and emphysema.
2. For use with those patients over 40 when Epi is not advisable.
3. To stop pre-term labor for 27 to 36 weeks gestational patients (Direct order Only)
4. To delay delivery at term until the patient can be transported to an obstetrical facility. (Direct Order Only)

CONTRAINDICATIONS:

1. Known allergic or hypersensitivity to sympathomimetic agents.
2. Existing tachycardia in elderly with known cardiac conditions.

PRECAUTIONS:

1. Solution is sensitive to light and heat. Discard if discolored.
2. Use with caution in patients with diabetes, hypertension, and hyperthyroidism.
3. Use with caution in cardiac patients especially those with known arrhythmias.
4. The use of Terbutaline with other sympathomimetic agents is not recommended.
5. Use of Terbutaline combined with Mag Sulfate and fluids can result in pulmonary edema in the pregnant patient.

ADVERSE REACTIONS:

1. Increased heart rate, nervousness, tremor, palpitations, dizziness muscle cramps.
2. Other side effects include head ache, nausea vomiting and anxiety. These are usually transient in nature & do not require treatment.

ADMINISTRATION:

1. 0.25 MG SQ. If significant clinical improvement does not occur within 15-30 minutes, a second dose may be administered.
2. A total dose of 0.5 mg should not be exceeded within a 4 hour period.
3. 0.1 mg/kg in 2 cc NS (max 2.5 mg) nebulized if Albuterol is not effective.
4. IV (after consultation with pediatric intensivist) @ 10 mcg/kg load over 20 minutes then 0.5 mcg/kg/min titrated to HR _ 180 and bronchodilation.
5. To stop uterine contractions, 0.25 mg SQ - Q 15 minutes until contractions cease. (Direct Order Only)
    A. See preterm labor protocol

HOW SUPPLIED:

1. 2 ml ampules containing 1 mg of solution.

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VALIUM (DIAZEPAM)

(EMTP, EMT I with direct verbal order)

Special circumstance may arise when an EMTI is not able to make base physician contact for medication orders. Valium may be used for chemical restraint when a patient poses a threat to themselves or others. EMTI will be allowed to administer this medication under standing orders. Documentation must be clear as to the reason for contact failure and the Medical Director should be notified that such a circumstance arouse.

PHARMACOLOGY AND ACTIONS:

1. Diazepam acts as a tranquilizer, an anticonvulsant and a skeletal muscle relaxant.

INDICATIONS:

1. Status Epilepticus - Any seizure lasting longer than *5* minutes or two consecutive seizures without regaining consciousness.
2. Uncontrollable or hysterical patients with possible spinal damage.
3. Uncontrollable patients that need to be intubated.
4. Acute alcohol withdrawal **Not allowed for EMTI**
5. May be used in 2mg increments in conjunction with narcotics for analgesic effects but not for conscience sedation. Pt must be on capnography, o2, pulse ox, EKG, BP, and have IV/IO access. (EMTI with VO)

CONTRAINDICATIONS:

1. Patients with history of alcohol intake.
2. Patients already respiratory depressed or hypotensive.
3. Patients with glaucoma.
4. Children under 6 months.

PRECAUTIONS:

1. Diazepam can cause respiratory depression and/or hypotension.
2. Airway care equipment should be close and ready upon administration.

ADVERSE REACTIONS**:**

1. Common side effects include drowsiness, dizziness, fatigue, ataxia. Paradoxical stimulation sometimes occurs.
2. Avoid mixing with other agents or dilution. By giving through distal end of IV slowly, venous thrombosis and phlebitis will be less likely.
3. Most likely to produce respiratory depression in patients who have already taken other depressant drugs, especially alcohol and barbiturates.

ADMINISTRATION:

1. Adult: 5-10mg slow IV push (each 5 mg over at least 1 minute)
   0.5mg/kg may be given rectally for Sz
2. Peds: *.25* mg/kg slow IV push (0.2 mg/kg) over at least 1 minute).
   0.5mg/kg may be given rectally
   Max dose is 10 mg

HOW SUPPLIED:

1. 2 ml preloaded syringes *(5* mg/ml).

NOTE: Use great caution when administering Valium or other benzodiazepines since the administer of the antidote (Romazacon), is not allowed

Revised 7/2013

VASOPRESSIN

Antidiuretic Hormone (ADH), Desmopressin Acetate (DDAVP)

(EMT P, and EMT I with direct verbal order)

Special circumstance may arise when an EMTI is not able to make base physician contact for medication orders. During a cardiac arrest, EMTI will be allowed to administer this medication under standing orders. Documentation must be clear as to the reason for contact failure and the Medical Director should be notified that such a circumstance arouse.

PHARMACOLOGY AND ACTIONS:

1. Vasopressin acts directly on vascular smooth muscle to cause vasoconstriction. It increases coronary artery perfusion pressure above the threshold needed for successful defibrillation. It does not have the adverse B-adrenergic effects that epinephrine does. Portal and GI blood flow are reduced making it useful for treating GI bleeds (esophageal varicies). Desmopres sin Acetate is a synthetic analogue of Vasopressin and is used in Diabetes Insipidus and bleeding disorders.

INDICATIONS:

1. Shock resistant V-fib / pulseless VT
2. Cardiac Arrest alternative to 1st or 2nd dose of EPI

CONTRAINDICATIONS:

1. Known hypersensitivity.

PRECAUTIONS:

1. There have been rare reports of anaphylaxis following Vasopressin use. Thrombotic events have also been rarely observed. Transient changes in BP (up and down) have also been described. Prolonged or repeated use may be associated with free water retention and hyponatremia.

ADVERSE REACTIONS:

1. Transient headache, nausea, abdominal cramps, local irritation at the injection site, facial flushing, and either transient rise or fall in the BP. Myocardial ischemia, arrhythmias, mesenteric ischemia, and gangrene from local IV infiltration have been described when using as a continuous IV infusion for GI bleeding.

ADMINISTRATION:

1. 1 40 units IV push for pulseless **VT / VF**
2. 0.1-0.9 units/minute IV for GI bleeding

HOW SUPPLIED:

1. Vasopressin — 20 units / ml in 1cc and 10cc multi-dose vials
2. DDAVP —4 units/ml in 1cc and 10cc multi-dose vials.

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VERSED

(EMTP, EMTI with verbal order)

**Special circumstance may arise when an EMTI is not able to make base physician contact for medication orders. Versed may be used as a chemical restraint when a patient poses a threat to themselves or others, EMTI will be allowed to administer this medication under standing orders. Documentation must be clear as to the reason for contact failure and the Medical Director should be notified that such a circumstance arouse.

PHARMACOLOGY AND ACTIONS:

1. Versed is a sedative/hypnotic agent related to Valium. Following injection its onset of action is *1-5* minutes, this is affected by the dose, the age of the patient, and presence of other drugs. Duration of action is usually less than 2 hours. It is *2.5* times more potent than Valium.

INDICATIONS:

1. Sedation pre- cardioversion in order to produce amnesia. (EMTP only)
2. Management of acute agitation
3. **Chemical Restraints
4. Seizures
5. Status Epilepticus. (**EMTI may use with verbal order after Valium)
6. May be used in 2mg increments in conjunction with narcotics for analgesic effects but not for conscience sedation. Pt must be on capnography, o2, pulse ox, BP, EKG, and have IV/IO access. (EMT I with VO)
7. Therapeutic Induced Hypothermia (EMTI verbal order)

CONTRAINDICATIONS:

1. Known hypersensitivity.
2. Its use without complete monitoring (EKG, Pulse Ox) and resuscitative equipment.
3. Hypotension associated with mental status changes.

PRECAUTIONS:

1. Must be used with extreme caution in elderly patients, those with known COPD, and those patients with other sedative drugs on board. Remember that an individual's response may not be predicted prior to giving the drug.

ADVERSE REACTIONS:

1. Respiratory depression with cerebral hypoxia if untreated.
2. Transient hypotension usually responsive to fluids.

ADMINISTRATION:

1. Initial dose of 2-4 mg IV over 30 seconds. This dose may be titrated to the desired effect at 2 minute intervals. The dose should be reduced in the elderly. Rarely is a dose of greater than *5* mg required.
2. The initial dose in pediatric patients is 0.1 mg/kg 2 minutes. Max dose is 2.5mg
3. If unable to start an IV use 0.2mg/kg IM

MAD – Mucosal Atomizer Device (see MAD protocol)

1. Draw up 2 – 1cc syringes of 5mg/ml
2. Apply atomizer to one of the syringes
3. Rapidly inject the entire 1cc into one nares
4. Reapply atomizer to the other syringe and repeat in the opposite nares

HOW SUPPLIED:

1 mg per ml in *5* ml vials. 5mg/ml in

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ZOFRAN
(Odansetron)
(EMTP, EMT I, AEMT)

PHARMACOLOGIC ACTIONS:

Zofran is a unique antiemetic that acts centrally as a serotonin receptor antagonist. Its major advantage is that it's a non-sedative, and is better tolerated by the pediatric population than other antiemetics. It may also be used safely in pregnant patients.

INDICATIONS:

- Nausea and vomiting in adults and adolescents associated with a variety of medical conditions as well as that induced during flight and should therefore be used prior to patients being transported by air who display signs and symptoms.
- To control nausea and vomiting in pediatric patients ages 6 months to 2 years

CONTRAINDICATIONS:

- Known hypersensitivity or allergies to Zofran
- Emesis/nausea secondary to closed head injury
- Less than 6 months of age

PRECAUTIONS:

- It's generally well tolerated. Most common side effects are headache and dizziness

ADMINISTRATION:

- Adult – IV only 4mg. May repeat once q 4 hours
- Pediatrics – 0.15mg/kg IV q 4 hours up to 4mg max

Note: Don't expect immediate results as the onset of action is 15 – 20 minutes.

HOW SUPPLIED:

2mg/ml 2mg/vial
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