EMS ECHO

ESSENTIAL DRUGS FOR EMMERGENCY DEPARTMENT

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OUTLINE OF THE PRESENTATION

- Introduction
- Emergence medications
- Main indications
- Main contraindications
- Dosages
- Major side effect and precautions

Introduction

The classes of drugs and agents presented are considered essential to the practice of Emergency Medicine.

However, the availability of the specific agents may be dependent on the functional level of the Emergency Department, which is determined by the nature hospital it belongs to…

- ✓Public Facilities: From Health Center II, III, IV, Gen. Hosp, RR,NRH
- ✓Private Facilities: Each Builds its own capacity in the domain of Emergency Medical Services

Accordingly, a system may be devised whereby each agent's availability is recommended based on the level of the Health Facility.

Analgesics Narcotics Codeine PO, Tramadol IV, IM, Morphine IV Fentanyl IV

Non-narcotics Paracetamol IV, PO, PR, Diclofenac IM, PR , Ibuprofen PO

Anaesthetics Topical (Lidocaine, Tetracaine) Topical, Lidocaine gel 2% Topical, Lidocaine spray 4%

Infiltrative Lidocaine 1%,2% Local, Single use vials Bupivicaine 0.5% Local, Single use vials Lidocaine with Epinephrine 2% Local

Anti-bleeding; Vitamin K IV, Prothrombin Complex Concentrate (Octaplex) IV , Tranexamic acid IV

Anti-coagulants; Unfractionated Heparin IV;LMWH SC

Anti-platelets; Aspirin PO, Clopedogril PO, Use should be guided by hospital or department protocol

Fibrinolytics rtPA (Alteplase) IV, For CVA and PE (must be used with a protocol) Reteplase IV , For ACS (must be used with a protocol

Antidotes (in the ED) Sodium bicarbonate 4.2% IV,N-Acetylcystine IV , Activated charcoal PO Calcium gluconate IV , Glucagon IV, Atropine IV , Flumazenil IV, Folic acid PO, Pyridoxine IV, Thiamine IM, IV, Hydroxy-cobalamin IV, Snake antivenom IV

Antidotes (in the ICU) Digi-Fab IV, Desferoxamine IV, 2-PAM(Pralidoxime) IV, Methylene Blue IV, Protamine sulphate IV

Anti-histamines Chlorphenaramine IV, IM, Prochlorperazine IV, IM

Anti-inflammatories Steroids Hydrocortisone IV, Methylprednisolone IV, Dexamethasone IV, Prednisone PO, Dexamethasone PO, Methylprednisolone Intraarticular, Triamcinolone actinide Intraarticular

Anti-convulsants Midazolam IV, Phenytoin IV , Lorazepam IV , Valporic acid IV , Phenobarbitol IV, Diazepam PR

Anti-diabetics Insulin (Soluble) IM

Burn preparations; Moist Exposure Burn Ointment (MEBO); Burncure(silver sulphadiazine) Topical

CVS Agents ACE inhibitors Captopril PO, Adrenergic stimulants Norepinephrine IV, Phenylephrine IV, Dobutamine IV, Dopamine IV, α/β Blockers Labetalol IV, Metoprolol IV, Propranolol IV, For Thyroid storm only Calcium Channel Blockers Diltiazem IV, Diuretics Furosemide IV; Mannitol IV, Vasodilators Nitroglycerine IV, Nitroglycerine SL, Nitroglycerine Patch, Na Nitroprusside IV

Electrolytes ORS PO , Potassium chloride IV

Fluid replacement solutions 0.45% NS IV , 0.9% NS IV , 3% NS IV , 5% Dextrose IV , 10% Dextrose IV , D5 NS IV , 0.45% NS D5 IV , Ringer Lactate IV

Anti-infectives Amoxi-clav IV, Ceftriaxone IV , Needs protocols for use; Clindamycin IV , Gentamicin IV, Metronidazole IV , Cefotaxime IV , Reserved for infants

GI Agents; Antacids Mag Hydroxide PO , Aluminum Hydroxide PO , Anti-emetics Metoclopramide IV, IM , Ondanesetron PO , Antispasmodics Hyoscine butylbromide IV, IM , Laxatives Fleet enema PR , H2 Antagonists Ranitidine IV, PO , Proton Pump Inhibitors Omeprazole IV , For Acute Upper GI Bleed only.

Obstetric agents Oxytocin IV, IM

Ophthalmic agents Acetazolamide IV , Acetazolamide PO, Oxybuprocaine 0.4% Eye drops, Tropicamide 0.5% Eye drops , Timolol 0.5% Eye drops , Pilocarpine 2% Eye drops

Psych agents Haloperidol IV, IM, Olanzapine PO, Orally disintegrating tablets

Respiratory agents Salbutamol Nebulised, Ipratropium bromide Nebulised

Procedural Sedation drugs Etomidate IV, Thiopental IV, Propofol IV, Midazolam IV, IM, PO, Succinylcholine IV ,Rocuronium IV, Ketamine IV, IM

Vaccines & Immunoglobulin Td(Tetanus Diptheria) vaccine IM, Rabies vaccine IM, Rabies immunoglobulin IM, Tetanus immunoglobulin IM

Epinephrine

The single most useful drug currently available for the treatment of **cardiac arrest.**

- It also works in cases of
  - ✓ **Anaphylactic shock**
  - ✓ **Sever asthmatic attack**

It raises both aortic systolic and aortic diastolic pressures, resulting in higher coronary and cerebral perfusion pressures.

- Dose 1.0 mg IV(0.014 mg/kg) in a 70-kg person.
- The endotracheal dosage is 2 to 3 mg.
- Subsequent doses are administered every 3 to 5 minutes.

- Clinical trials show no difference in survival to hospital discharge with high-dosage epinephrine.
- Precautions
  - ✓ May cause myocardial ischemia, angina, increased myocardial oxygen demand
  - ✓ Do not mix or give with alkaline solutions

Vasopressin

has been shown to be an effective alternative to epinephrine in both animal and human studies.

- a peptide hormone normally released from the posterior pituitary gland in response to
- Hypovolemia
- Hypotension
- increased plasma osmolarity.
- potent vasoconstrictor

Dosing

- One time dose of 40 units only
- May be substituted for epinephrine
- Not repeated at any time
- May be given down the endotracheal tube
- DO NOT double the dose
- Dilute in 10 mL of NS

Anti-arhythmics

- Amiodarone

  Amiodarone is considered a class III antidysrhythmic

- In a recent trial, amiodarone administered to patients with persistent V Fib improved survival to hospital admission.
- The 300-mg bolus in cardiac arrest
  - (1 mg/min) over 6 hours followed by 540 mg (0.5 mg/min) over the next 18 hours.
- If breakthrough VT(Ventricular Tachycardia) or VF(Ventricular Fibrillation) occurs, give another bolus of 150 mg over 15 to 30 minutes.

- Main Side effects: bradycardia and hypotension.

Atropine

Atropine acts as a competitive antagonist of acetylcholine (ACh) at the muscarinic receptor.

Indications: Bradycardia; hypersalivation; broncho secretions; organophosphate poisoning.

The maximum vagolytic dosage in healthy human volunteers is 0.04 mg/kg (3 mg in a 70-kg
person).

- Based on the available data, a dose of 0.04 mg/kg iv q5min should be used.
- No more than 3mg.

Dopamine

- Indications
- Second drug for symptomatic bradycardia (after atropine)
- Use for hypotension (systolic BP 70 to 100 mm Hg) with S/S of shock
- 5 to 20 µg/kg per minute

DO NOT mix with sodium bicarbonate

Magnesium Sulfate

- Indications
  - Cardiac arrest associated with torsades depointes/VT or suspected hypomagnesemic state
  - Refractory VF
  - VF with history of ETOH abuse
  - ventricular arrhythmias due to digitalis toxicity, tricyclic overdose
- Dosing
  - 1 to 2 g (2 to 4 mL of a 50 solution) diluted in 10 mL of D5 IV
- Precautions
  - Occasional fall in blood pressure with rapid administration
- Use with caution if renal failure is present

Calcium Chloride

- Calcium administration is likely to be beneficial in cases of
  - Hyperkalemia
  - Hypocalcemia
  - Calcium channel blocker toxicity.
- Infusion dosage

If required, 4 mg/kg of calcium chloride (0.04 ml/kg of 10 solution) may be administered every 10 minutes.

Beta Blockers

Labetalol

For Hypertensive emergencies and pheochromocytoma

- 10 mg labetalol IV push over 1 to 2 minutes
- May repeat or double labetalol every 10 minutes to a maximum dose of 150 mg
  - Give initial dose as a bolus, then start labetalol infusion 2 to 8 µg/min
- Precautions
  - Concurrent IV administration with IV calcium channel blockers
  - bronchospastic diseases,
  - cardiac failure
  - cardiac conduction
  - Monitor cardiac and pulmonary status during administration
  - May cause myocardial depression

- Esmolol
- 0.5 mg/kg over 1 minute, followed by continuous infusion at 0.05 mg/kg/min
- Titrate to effect
- Esmolol has a short half-life (lt10 minutes)

Nitroglycerine

- Indications
  - Chest pain of suspected cardiac origin
  - Unstable angina
  - CHF(Chronic Heart Failure)
  - Hypertensive Emergencies
- Dosing
  - Sublingual Route
  - 0.3 to 0.4 mg repeat every 5 minutes
- Aerosol Spray
  - Spray for 0.5 to 1.0 second at 5 minute intervals
- IV Infusion
  - Infuse at 10 to 20 µg/min and titrate
- CIs
  - BP <90 mm Hg
  - RV infarction
  - Limit BP drop to 10 if patient is normotensive
  - Severe tachycardia

- **Diltiazem**
- A cardio selective Calcium channel blocker
Indications
- To control ventricular rate in atrial fibrillation and atrial flutter
- Use after adenosine to treat refractory PSVT(Proximal supra ventricular Tachy cardia) in patients with narrow QRS complex and adequate blood pressure
- Dosing
- Acute Rate Control
  - 15 to 20 mg (0.25 mg/kg) IV over 2 minutes
- Maintenance Infusion
  - 5 to 15 mg/hour, titrated to heart rate

- **Adenosine**
Indications
  - First drug for narrow-complex PSVT
- Dose
  - IV Rapid Push
  - Initial bolus of 6 mg given rapidly over 1 to 3 seconds followed by normal saline bolus of 20 mL then elevate the extremity
  - Repeat dose of 12 mg in 1 to 2 minutes if needed
- Less effective in patients taking theophyllines

Blood Thinners

- Aspirin
  Blocks formation of thromboxane A2, which causes platelets to aggregate
- Indications
  - Administer to all patients with ACS (Acute Coronary Syndrome)-Heart Attack!! Myocardial Infarction
  - Give as soon as possible

- Dosing
  - 160 to 325 mg tablets
  - Preferably chewed
  - May use suppository
- Precautions
  - Higher doses may be harmful
  - Relatively contraindicated in patients with active ulcer disease or asthma

- Heparin
  Inhibits thrombin generation by factor Xa inhibition and also inhibit thrombin indirectly by formation of a complex with antithrombin III

- Indications
  - For use in ACS (acute coery syndrme), PE (pulmonery embolism), DVT(deep vein thrombosis)
- Dosing
  - By protocol

- CIs
  - active bleeding
  - recent intracranial surgery
  - intraspinal or eye surgery
  - severe hypertension
  - bleeding disorders(heaophilia, vit-k deficiency)
  - gastrointestinal bleeding
- DO NOT use if platelet count is below 100 000

Fibrinolytics

Alteplase, recombinant (tPA)

Indications

- For Acute Ischemic Stroke
- Hemodynamiclly unstable PE(Pulmonery Embolism)
- For AMI in adults
- ST elevation or new or presumably new LBBB
- Time of onset of symptoms in 12 hours

Dosing

- For fibrinolytic use, all patients should have 2 peripheral IV lines-1 line exclusively for fibrinolytic administration

- Dosing for AMI Patients
- Accelerated Infusion
  - 15 mg IV bolus
  - Then 0.75 mg/kg over the next 30 minutes
  - Not to exceed 50 mg
  - Then 0.5 mg/kg over the next 60 minutes
  - Not to exceed 35 mg
- 3 hour Infusion
  - Give 60 mg in the first hour (initial 6 to 10 mg is given as a bolus)
  - Then 20 mg/hour for 2 additional hours

Fibrinolytics…

- Dosing for AMI Patients
- Streptokinase
  - 1.5 million IU in a 1 hour infusion

- Reteplase, recombinant
  - Give first 10 unit IV bolus over 2 minutes
  - 30 minutes later give second 10 unit IV bolus over 2 minutes

- Anistreplase (APSAC)
  - Reconstitute 30 units in 50 mL of sterile water
  - 30 units IV over 2 to 5 minutes

- Tenecteplase (TNKase)
  - Bolus 30 to 50 mg

Pain Management: Morphine Sulfate

Dosing

- 1 to 3 mg IV (over 1 to 5 minutes) every 5 to 10 minutes as needed
- Precautions
  - Administer slowly and titrate to effect
  - May compromise respiration (Must have Naloxone ready as a reversing antidote!!)
  - Causes hypotension in volume-depleted patients

Oxygen

- Indications
  - Any suspected cardiopulmonary emergency
- Note; Pulse oximetry should be monitored
- Dosing
  - Device Flow Rate; Oxygen Nasal Prongs 1 to 6 lpm 24 to 44 Venturi Mask 4 to 8 lpm 24 to 40 Partial Rebreather Mask 6 to 10 lpm 35 to 60 Bag Mask 15 lpm up to 100 lpm
- Precautions: Pulse oximetry inaccurate in
  - Low cardiac output
  - Vasoconstriction
  - Hypothermia
- NEVER rely on pulse oximetry Alone!

THANK YOU ALL…