MEDS IN MAYHEM

ANTICIPATING THE PHARMACOLOGICAL NEEDS OF TRAUMA PATIENTS

DISCLOSURES

My name is Jon Head, and I'm speaking on Anticipating Pharmacological Needs of the Trauma Patient. I work for St. Vincent's Health System/Ascension. *I have no relevant financial or nonfinancial relationships to disclose.*


C-MAC

ROLES

- Collaborative, interdisciplinary approach, safety-centered approach
  - Optimizes outcomes, provides/receives feedback, trust & respect
  - Pharmacy- Reference source on dosing, pharmacokinetics, therapeutics
  - Imaging- emergent diagnostics
  - Laboratory- diagnostic labs and blood product prep
- Nursing is the hub
  - Nursing staff often use tools like the Trauma Nursing Process to prioritize and optimize patient care and outcomes

TIPS OF THE TRADE

- Weight-based dosing
- Administration routes
- Resuscitation strategies

TRAUMATIC INJURIES & ISSUES IN TRAUMA

- Airway and Ventilation
  - Them vs. Us
    - Rapid Sequence Induction/Intubation or Drug Assisted Intubation
    - 7 P's or RSI or DAI
      - Preparation
      - Pre-oxygenate
      - Pre-treatment
      - Paralysis with sedation/induction
      - Protection with Positioning
      - Placement with Proof
      - Post-intubation management

TRAUMATIC INJURIES AND ISSUES AIRWAY AND VENTILATION

- Preparation
  - Prepare equipment, vascular access, draw up and label RSI meds
- Pre-oxygenate- HOB up 20-30 degrees, passive high flow Oxygen
- Pre-treatment
  - Lidocaine 1.5 mg/kg
  - Fentanyl 3 mcg/kg
  - LOAD
    - Older technique: Lidocaine, Opiates, Atropine, Defasciculating agent

TRAUMATIC INJURIES AND ISSUES AIRWAY AND VENTILATION

- Paralysis
  - Succinylcholine 1.5 mg/kg
  - Rocuronium 1 mg/kg
  - Vecuronium 0.15 mg/kg
- Sedation/Induction
  - Etomidate 0.3 mg/kg
  - Ketamine 1-2 mg/kg
  - Midazolam 0.2 mg/kg
  - Propofol 1.5-3 mg/kg

TRAUMATIC INJURIES AND ISSUES AIRWAY AND VENTILATION

- Protection and positioning
  - HOB up
  - Head midline
- Placement with proof
  - CO2- colormetric device, waveform capnography
- Post-intubation management
  - Maintenance of sedatives and paralytics

TRAUMATIC INJURIES AND ISSUES SHOCK

- Circulatory support
  - Permissive hypotension
- Hemorrhagic shock
  - Extremity wounds may have tourniquets applied
    - Complications- nerve palsies, vascular thrombosis, ARI, compartment syndrome
      - Tx modalities- Calcium, Sodium Bicarbonate, anticoagulants
  - Damage Control Resuscitation
    - REBOA, AAJT
    - TBI

TRAUMATIC INJURIES AND ISSUES SHOCK

- Hemorrhagic Shock
  - Hemostatic resuscitation
    - Avoid hemodilution
    - Balanced blood product administration
    - Whole blood
      - Citrate issues
  - TXA
    - Previous: 1 gm over 10 minutes IV, followed by 1 gm over 8 hours
    - Current: 2gm over 20 minutes

TRAUMATIC INJURIES AND ISSUES SHOCK

- Hemorrhagic Shock
  - Hemostatic Agents
    - Junctional wounds
    - Must be held with pressure for minimum of 2-3 minutes
    - Types: Factor concentrator, mucoadhesives, procoagulant supplementors
    - Common materials found in Emergency Medicine
      - Zeolite
      - Kaiolin
      - Chitosan
      - Smectite

TRAUMATIC INJURIES AND ISSUES SHOCK

- Volume Expanders
  - Hypertonic saline 7.5% or Hypertonic Saline Dextran 7.5/70%
    - No improved outcomes
  - Colloid Solutions
    - Hextend, Hetastarch, Dextran
      - Good for volume expansion, non-hemorrhagic shock
    - Albumin
      - Takes time to produce oncotic pressure
  - Standard options
    - NS
    - LR

TRAUMATIC INJURIES AND ISSUES SHOCK

- Neurogenic shock

  Dopamine (400mg/250ml D5W) 2.5 mcg/kg/min- 20 mcg/kg/min

  - Titrate time 10 minutes
  - SBP >80mmHg
  - MAP >60mmHg

  Dobutamine (500mg/250ml D5W) 2.5mcg/kg/min-20mcg/kg/min

  - Titrate time 5 minutes
  - SBP >80mmHg
  - MAP >60

TRAUMATIC INJURIES AND ISSUES SHOCK

- Neurogenic shock

  Milrinone (20mg/100ml D5W) 50 mcg/kg IVPB x , over 10 min

  - Titrate up to 0.75 mg/kg/min
  - SBP >80mmHg, MAP > 60mmHg
  - Epinephrine (low- 5mg/250ml; high- 10mg/250ml) 0.03mcg/kg/min-0.3mcg/kg/min
    - Titrate time 3 minutes
    - Septic shock 0.05 mcg/kg/min-2 mcg/kg/min
  - Norepinephrine (4mg/250ml D5W, 8mg/250ml D5W, Quad Strength- 16mg/250ml D5W)
    - Titrate time 3 min
    - 0.03mcg/kg/min-1mcg/kg/min
    - Titrate SBP >90mmHg, MAP >65

TRAUMATIC INJURIES AND ISSUES SHOCK

- Vasopressin- 20 units/100 ml, Initiate at 0.04u/min
- Phenylephrine- 0.5 mcg/kg/min
  - SBP> 90 mmHg, MAP >65
- Peds- Push Dose Epi

TRAUMATIC INJURIES AND ISSUES SHOCK

- Rhogam
  - Consideration in female trauma patients of childbearing years

BURNS

- Substantial fluid resuscitation
  - Parkland formula
  - Electrical burns
  - Fluid selection
- Hydrofluoric Acid
- Pain management

BURNS

- Unique presentations
  - Tar or asphalt
  - Phenols
- Ointments
  - Polysporin, Silvadene, Aquaphor

BURNS

- Inhalation injuries
  - Cyanide exposure
  - Thermal injuries
  - Treatment
    - Hydroxocobolamine- binds to cyanide
      - Forms cyanocobolamine (B12)
      - 5 gm over 15 minutes
      - Cyanokit- 2 vials at 2.5 gm each
- Tetanus Toxoid
  - TIG, IGIV

CLOSED HEAD TRAUMA / AMS

- Reversals
  - Anticoagulant or Antiplatelet meds,
  - Opiates
  - Benzodiazepines
  - CNS depressants
- IDDM
- Drug Assisted Intubation and sedation

CLOSED HEAD TRAUMA

- Treatment foci- 3H
- Increased intracranial pressure
  - Mannitol 20% solution- 1gm/ kg
    - Not for use with active bleeding or hypotensive patients
  - Hypertonic saline
  - Anticonvulsants and sedatives
  - Sodium Nitroprusside (50mg/ 250ml D5W)- 0.5 mcg/kg/min
    - Max 3 mcg/kg/min,
    - Titrate time 10 minutes, 90<SBP<160

CLOSED HEAD TRAUMA

- Treatment options
  - Steroids
    - Controversial
    - Dexamethasone, Methylprednisolone
  - Blood Products
    - Clotting factors combined with vasopressors
    - Tx to maintain CPP

INFECTION

- Antibiotics
  - Ancef 1 gm
  - Zosyn: 3.375gm IV Q6 hours for abdominal infections, 4.5 gm IV Q6 hours- pneumonia
  - Vancomycin
  - Flagyl
  - Cefepime 1 gm x 1
- Steroids- controversial

WMD/ MCI

- Nerve agents- Sarin, Tabun, Soman, Cyclosarin, VX, Organophospates
  - Tx: Atropine, Pralidoxime
    - Mark I kit
    - CDC Chem-pack/Push-pack
      - 24 hour sustainability, 1960 units in 1340 locations
      - Benzodiazepines
- First Receivers

WMD/ MCI

- Biological agents
  - Anthrax- Doxycycline, Cipro, fluoroquinolones
  - Botulism- Antitoxin
  - Plague- Streptomycin, Doxycycline, Gentamycin
  - Smallpox- treat secondary infections with appropriate Abx
  - Tularemia- streptomycin, gentamicin

PAIN MANAGEMENT

- Opioids
  - Morphine, hydromorphone, fentanyl, tramadol
- Other agents
  - Ketamine
    - Dose for effect
  - Nitrous oxide (PTA EMS)
  - Non-narcotic- ketorolac, NSAIDS, gabapentin

POST-RESUSCITATION CARE

- Coagulopathies
  - Increased risk
    - Stasis, endothelial damage, hypercoagulability
  - Low molecular weight heparin
- Acidosis
- Hypothermia- will impact acidosis and coagulopathy, drug metabolism
- Arrhythmias- cardiac injuries or electrolyte imbalance

POST-RESUSCITATION CARE

- Infection
  - Wounds, VAP, CAUTI
  - Antipyretics
- Septic shock
  - Often delayed onset after resuscitation
  - May appear as hypovolemic shock initially
- Pulmonary contusions
  - 24-48 hours

POST-RESUSCITATION CARE

- Rhabdomyolysis
  - Burns or crush injuries leading to renal injury, hyperkalemia, and acidosis
    - Fluid resuscitation, sodium bicarbonate, diuretics, calcium gluconate, glucose and insulin, albuterol, sodium polystyrene sulfonate
- Alcohol withdrawal
  - Clinical Institute Withdrawal Assessment for Alcohol Screening tool
  - Tx: Benzodiazepines, fluids, electrolytes, thiamin, glucose, vitamins

CASE SCENARIO- FIRST RECEIVERS

- October 1, 2017
- Las Vegas, Nevada
- Sunrise Hospital and Medical Center
- More than 200 patients received
- Choke points

CONCLUSION

- Trauma patients present with unique, complex, multifactorial, and multisystem issues and insults
- Nursing and ancillary services each play an integral role in patient management and outcomes in trauma
- Utilization of the Trauma Nursing Process may serve as guide for anticipating pharmacological therapeutics as well as other interventional adjuncts in the management of acute and post-resuscitation trauma patients.
    - Have a plan and execute the plan