

## SHOCK CARE AND INTERVENTIONS

### DIAGNOSTIC STUDIES

- No single diagnostic study
- Medical and surgical history and history of recent events and injuries
- Laboratory changes that reflect anaerobic metabolism → lactate and base deficit elevation
- 12 lead EKG, continuous cardiac monitoring, chest x-ray, continuous pulse oximetry, hemodynamic monitoring (arterial pressure, CVP, PAP, SvO<sub>2</sub>/ScvO<sub>2</sub>)

### COLLABORATIVE CARE

- Early recognition and treatment is critical
- Successful management includes:
  - identification of patients at risk for developing shock
  - Integration of the patient's history, physical examination and clinical findings to establish a diagnosis
  - Interventions to control or eliminate the cause of the decreased perfusion
  - Protection of target and distal organs from dysfunction
  - Provision of multisystem supportive care
- Establish patent airway (natural or with ETT) → administer oxygen → maintain SaO<sub>2</sub> >90 and PaO<sub>2</sub> >60 → fluid replacement and drug therapy → optimize mean and circulating blood volume
- **Oxygen and ventilation**
  - Oxygen delivery is dependent on CO, available hemoglobin and arterial oxygen saturation
  - Need to increase supply and decrease demand
  - Supply is increased by
    - Optimizing the CO with fluid replacement and drug therapy
    - Increasing hemoglobin by the transfusion of whole blood or packed RBC
    - Increasing the arterial oxygen saturation with supplemental oxygen and mechanical ventilation
  - Monitor ScvO<sub>2</sub> by central venous catheter, SvO<sub>2</sub> via PA catheter, CO, hemoglobin, and oxygen consumption
  - Space care that will increase oxygen demand
- **Fluid resuscitation**
  - Based on patient's clinical status and type/volume of fluid loss
    - GOAL: restore tissue perfusion
  - Cardiogenic and neurogenic does not involve a decrease in circulating blood volume
  - Obstructive shock → repair the obstruction
  - Septic, hypovolemic and anaphylactic → volume expansion with administration of fluid
  - 2 large bore (14-16 gauge) IV into antecubital veins (ideal)
  - Monitoring
    - If cryst 2-3 L of crystalloids do not work → blood administration, CVP or PAP
    - Serial BPs or arterial catheter to monitor patient response
    - Indwelling bladder catheter will help monitor fluid status
  - Potential complications
    - Hypothermia and coagulopathy

- Warm fluids if massive fluid resuscitation is needed
    - Remember packed RBCs do not contain clotting factors
  - Hypotension despite normalized CVP (8-12)
    - Add vasopressor (norepinephrine [Levophed], dopamine [Intropin])
    - Add inotrope (dobutamine [Dobutrex])
- **Nutritional Therapy**
  - Protein calorie malnutrition due to hypermetabolism
  - Enteral nutrition should be started within 24 hours if not immediately
    - Eventually the GI system will not be working so you need to get as much nutrients into them as possible while you still can
    - Parenteral nutrition if not meeting 80% of caloric needs
  - Weigh daily on the same scale at the same time of day
    - Significant weight loss may be dehydration or deficient caloric intake
    - Weight gain is common due to third spacing
  - Assess nutritional status
    - Serum protein, albumin, BUN, Glucose and electrolytes

#### FLUID THERAPY IN SHOCK

- **Crystalloids**
  - Isotonic (0.9% NaCl or Lactated Ringers LR)
    - Fluid primarily remains in the intravascular space → increase intravascular volume
    - Used for initial volume replacement in most types of shock
    - Monitor patient closely for circulatory overload
    - Do not use LR in patients with liver failure
    - LR may be used if hyperchloremic acidosis develops from use of NaCl
      - Lactated ringers is rarely used because liver cannot convert lactate to bicarbonate → increase in serum lactate
  - Hypertonic (1.8%, 3%, 5% NaCl)
    - Fluid remains in the intravascular space, rapid volume expansion
    - May be used for initial volume expansion in hypovolemic shock
    - Monitor patient closely for signs of hypernatremia (disorientation, convulsions)
    - Central line is preferred for infusing 3 or greater percent NaCl (caustic)
- **Blood / blood products**
  - Packed RBC, Fresh frozen plasma, platelets
    - Replaces blood loss, increases oxygen carrying capacity
    - Replaces coagulation factors
    - Help control bleeding causes by thrombocytopenia
    - Used in all types of shock
    - Same precautions need to be used as during regular blood administration
- **Colloids**
  - Hetastarch (Hespan)
    - Made from starch and acts as volume expander, is as effective as albumin, can exert osmotic effect for up to 36 hours

- All types of shock expect cardiogenic and neurogenic
- May be 50% less costly than albumin
- Use cautiously in patients with heart failure, renal failure or bleeding disorders
  - Antiplatelet effects
- o Human serum albumin (5%), plasma protein fraction (5% albumin in 500 ml NaCl)
  - Can increase plasma colloid osmotic pressure, rapid volume expansion
  - All types of shock except cardiogenic and neurogenic shock
  - Monitor for circulatory overload
  - Mild side effects of chills, fever, and urticarial may develop
  - More expansive then other colloids
- o Dextran (40 or 70)
  - Hyperosmotic glucose polymer
    - Similar degrees of volume expansion with 40 and 70 but 70 has longer duration of action
  - Limited use because of side effects including reducing platelet adhesion, diluting clotting factors
  - Increased risk of bleeding
  - Important to monitor patient for allergic reaction and acute renal failure
- **Drug Therapy**
  - o IV or central line
  - o **Dobutamine (Dobutrex)**
    - Mechanism of action
      - ↑ Myocardial contractility
      - ↓ Ventricular fillinf pressures
      - ↓ SVR/PAWP
      - ↑ CO/stroke volume/CVP
      - ↑/↓ HR
    - Type of shock
      - Used in cardiogenic shock with severe systolic dysfunction
      - Used in septic shock to increase oxygen delivery and raise SvO<sub>2</sub>/ScvO<sub>2</sub> to 70% if Hb >7 or Hct >30
    - Nursing implications
      - Administer via central line (infiltration = sloughing)
      - Do not administer in same line as NaHCO<sub>3</sub>
      - Monitor HR, BP (hypotension may worse, need to increase med)
      - Stop if tacydysrhythmias develop
  - o **Dopamine (Inotropin)**
    - Mechanism of action
      - Positive inotropic effects
        - o ↑ Myocardial contractility
        - o ↑ Automaticity
        - o ↑ Atrioventricular conduction
      - ↑ HR
      - ↑ CO