SHOCK / HYPOTENSION

(Last updated 08/12/2019; Reviewed by: Ognjen Gajic MD; S Chandralekha Kruthiventi MD)

PRESENTING COMPLAINT: Hypotension, tachycardia, dizziness

FINDINGS

- **A** Check airway
- **B** ↑ RR, increased work of breathing
- **C** ↓ BP, ↑ HR, rapid and thready pulse, mottling
- **D** Variable altered (V,P,U,D)*
- **E** Cold, pale or cyanotic, clammy and mottled extremities (cutis marmorata), warm extremities (septic shock); bleeding, acute abdomen
- **L<sub>PC</sub>** ↓ Hb (trauma), ↑ WCC (septic shock), ↓ platelets, ABG- ↓ pH metabolic acidosis, ↑ lactate, serum electrolytes, urea and creatinine, PT/APTT, blood cultures, blood type and crossmatch, urine analysis
- **U<sub>PC</sub>** Lungs: exclude B lines (risk of fluid bolus, pneumonia, edema, ARDS) & effusions, Heart (effusion, RV/LV function, IVC size & collapsibility); Abdomen: (fluid, source of infection, urine in the bladder; Focused assessment with sonography for trauma (FAST)

*V (verbal), P (pain), U (unconsciousness), D (delirious)

U<sub>PC</sub> (point of care ultrasound)  L<sub>PC</sub> (point of care labs)

OTHER HISTORY

- **Predisposing factors:** Trauma, bleeding, recent infection, immunosuppression
- **Signs & Symptoms:** Low blood pressure, altered mental status, decreased urinary output, +/- cold extremities, tachycardia

DIFFERENTIAL DIAGNOSIS

- Differentiate cardiogenic shock, hypovolemic shock, distributive shock (septic)

OTHER INVESTIGATIONS

- **Labs:** CBC, lactate, electrolyte panel, pan-cultures, blood type and screen, urine drug screen, urine pregnancy test, troponin
- **Monitoring:** Vital signs, urine output, mental status, lactate
  - Consider: arterial line, central venous pressure, ScVO2
- **Imaging:** CXR, US/Echo, CT scan
THERAPEUTIC INTERVENTIONS

- **General**
  - Large bore venous access for fluid resuscitation; consider intraosseous access
  - Central line should be placed for vasopressors

- **Optimize O2 supply**
  - Oxygen: goal O2sat ≥ 90-95%
  - Consider RBC transfusion: goal Hb > 7-9 mg/dL if ScVO2 < 70%

- **Cardiac output**
  - Preload fluid bolus 30 mL/kg
  - Contractility: inotrope, mechanical devices
  - Heart rate: pacemaker, cardioversion, antiarrhythmic
  - Perfusion pressure, particularly coronary (vasopressor)

- **Limit O2 consumption**: Consider intubation, analgesia-sedation, NMB, correction of hyperthermia

- **Specific to underlying etiology**
  - **Cardiogenic/obstructive**: High venous pressures, US evidence of impaired LV/RV function or severe tachy/brady-arrhythmia, cold extremities, narrow pulse pressure
  - **Arrhythmia**: Cardioversion, external pacemaker, inotrope +/-, anticoagulation
  - **ACS/PE/tamponade/aortic, dissection/septum, or valve chordal rupture**: PCI, thrombolysis, pericardial tap, surgery
  - Inotrope (dobutamine/milrinone) +/- vasopressor (nor/epinephrine/dopamine)
  - **Norepinephrine is initial choice** in hypotension unless bradycardia
  - Consider mechanical circulatory support (IABP, ECMO)
  - As-needed pacemaker

- **Hypovolemia: low venous pressures, normal LV/RV function**
  - Fluid resuscitation: early and rapid volume repletion
    - **Crystalloids only**: albumin may be considered, but not as a first choice
    - Caution in bleeding until hemostasis
      - If bleeding, control source: surgery, endoscopy, angioembolization
        - Serial Hb, correct hemostasis (coagulation, thrombocytopenia), early use of warmed RBC, FFP, and platelets; correct metabolic acidosis; hypothermia; hypocalcemia; hyperkalemia

- **Distributive**: Variable venous pressures, hyperdynamic myocardium, low diastolic BP, persistent hypotension after fluid bolus, warm extremities

- **Sepsis**: Cultures, antibiotics, fluids +/- vasopressors (for details, see sepsis card)
- **Adrenal insufficiency:** Steroids
- **Anaphylaxis:** Stop allergen exposure, fluid resuscitation, epinephrine (bolus followed by infusion, if needed), corticosteroids, antihistamines (H1 and H2 blockers), consider airway edema and bronchospasm

**ONGOING TREATMENT**

- **Further Treatment**
  - Antimicrobial therapy, if administered empirically: deescalate according to culture results
  - Glucose control: keep blood glucose level < 180mg/dl
- **Prophylaxis:** VAP bundle, if intubated; HOB elevation; DVT prophylaxis; ulcer prophylaxis; daily sedation break and assessment of extubation; daily oral care with chlorhexidine
- **Goals of care:** Discuss with the patient/family

**REFERENCES & ACKNOWLEDGMENTS**

Acknowledgement: *Benjamin Bonneton, MD; Raj Dhokarh, MD; Maja Surbatovic, MD*

- ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure - 2012