EMS Subspecialty Certification
Review Course

Renal Failure & Dialysis

1.3.5.1.1 Use of dialysis access for resuscitation
1.3.5.1.2 Uncontrolled hemorrhage from shunt site
1.3.5.1.3 Special considerations for hyperkalemia

v. 2017

What is wrong and how do we treat it?

Learning Objectives

Upon the completion of this program participants will be able to:
• Recognize dialysis associated devices & access pearls
• Control bleeding from a dialysis shunt
• Diagnose and treat electrolyte complications
  – Hyperkalemia is the most life-threatening concern
Acute Kidney Injury

• AKI (formerly acute renal failure)
  – ↑ Cr ≥ 0.3 mg/dL within 48 hrs
  – ↑ Cr X 1.5 baseline within 7 days
  – Urine output < 0.5 mL/kg/hr for 6 hrs
• Etiologies
  – Pre-renal (shock, poor cardiac output eg. CHF)
  – Renal (acute tubular necrosis, rhabdo, meds eg. NSAIDs)
  – Post-renal (obstruction – mass or stones)

Chronic Kidney Disease

• CKD is typically due to intra-renal disease
• Usually CKD irreversible leading to ESRD
• Most typical co-morbidities are DM and HTN
• Hemodialysis is the most common form of dialysis
  – Typically 3 times/week for 3-4 hours
• Peritoneal dialysis is an option using abdominal wall catheter and home care (often at night)
• Renal transplant = think renal etiology if lower abd pain and recall immunosuppressant issues (lack of fever)

Hemodialysis Options

• Dialysis access can be temporary or permanent
• Flow rates need to be 350 mL/min or greater
• Temporary access in a central vascular access point
• Fistula can be placed (radial-cephalic, brachial-cephalic, or proximal thigh)
• An AV bridge graft can be used
Fluid Status

• In health, kidneys filter 180 liters of per day, excreting nearly 2 liters of fluid and waste.
• Renal disease may lead to fluid overload: respiratory distress is common presentation
• History: weight gain, missed dialysis, diet or fluid intake changes
• CHF due to cardiac disease may mimic or coexist
• O2 and nitrates with transport

Cardiovascular Disease

• High prevalence of CAD in CKD
• EKG ischemic changes may be hidden in LVH
• Pericarditis is common, EKG changes may not be apparent
• Stroke is more common than general population

Complications of Hemodialysis

• Common for EMS to be sent to dialysis for patient
  – Dialysis-associated hypotension
  – Air embolism
  – Bleeding
  – Infection
  – Dysequilibrium syndrome
  – Polypharmacy
Dialysis Site Access Considerations

- High potential for infection and rapid blood loss
- Only used if no other access is available
  - Venous side
- Dialysis catheters contain heparin
  - Aspirate 10 mL prior to use

Hemorrhage from Shunt

- Control hemorrhage like any other major bleed
- Direct pressure, elevation, **tourniquet**
- Hemostatic agents

Electrolyte Complications

**Hyperkalemia**

- Tolerated better in ESRD patients
- Less symptomatic at levels v norm
- Often fatal above 9 mEq/L
- ECG is a common indicator
  - Not as sens/spec as we think, though
- Calcium is the key
  - Chloride has 3 X Ca than gluconate
- Sodium bicarbonate to follow
  - Flush line to avoid calcium bicarb!
Electrolyte Complications

**HYPOmagnesemia**
- AKI or early CKD
- Impaired ability to conserve Mg
- ↑ reflexes
- Weakness

**HYPERmagnesemia**
- ESRD
- Loss of ability to excrete Mg
- ↓ reflexes
- AMS
- Respiratory depression

EMS Pearls

- Focused history
  - Dialysis schedule
  - Length of sessions
  - Weights
  - Vitals

Take-Home Points

- Dialysis devices can be accessed in emergent resuscitation IF no other access is available
  - Think IO before accessing
- Bleeding from a dialysis access site is managed like any other major hemorrhage
  - Think TQ early if high pressure bleeding
- Multiple electrolyte complications can occur
  - Think hyperkalemia: Check ECG. Treat in arrest.