Chronic Kidney Disease & Cardiovascular Events: What to do, when, and why

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Outline

- Prevalence and risk factors for CV events for CKD patients
- Assessment
  - History
  - Physical Assessment
- Common Fluid & Electrolyte Imbalances in CKD Patients
- Treatment of CV events: Special considerations

Case Study

- 41 yo black male with hx of HD, EF 20%, a. fib, pacemaker, CKD (hemodialysis)
- Calls EMS with c/o palpitations. During the call, the patient goes into cardiac arrest. Family begins CPR.
- EMS on scene within 5 minutes of initial call. Pt found pulseless with agonal gasps.
- Airway partially obstructed with emesis
- Initial rhythm ventricular fibrillation

Prevalence of CKD

Source: National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), National Institutes of Health (NIH)

CKD Co-morbidities

Source: National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), National Institutes of Health (NIH)
Probability of sudden cardiac death in 2010 incident dialysis patients, by modality

**Figure 4.11 (Volume 2)**

United States Renal Data System. 2013 Annual Data Report

### History
- CV: HTN; Hyperlipidemia; MI; PAD; CHF; Stroke
- Diabetes

#### Type of Dialysis
- Hemodialysis: Last Treatment? Access?
- PD: Dwelling?

### History: CV Medications
- CHF
  - ACEI/ARB
  - Beta Blocker
  - Digoxin
  - Diuretic

- MI
  - ACEI/ARB
  - Beta Blocker
  - Statin
Case Study: Meds

- Coumadin
- Coreg 25 mg twice a day
- Hydralazine 40 mg q. 8 hours
- Imdur (nitrate)

5 Renal Functions

- Excretory Organ
- BP Regulation
- Fluid & Electrolyte Balance
- Acid-Base Regulation
- RBC Synthesis & Maturation

Assessment

- Lungs
- Heart
- Skin
- Access

Assessment

- Pulmonary
  - s/s of fluid overload
  - WOB
  - RR
  - SpO2
- Hematology
  - Anemia
- Renal
  - Voiding vs. anuric

CV Assessment

- HTN: RAAS
- Cardiac Monitor: Dysrhythmias
  - PVCs
  - Junctional rhythms
  - Ideoventricular rhythms
- Heart sounds: S3; pericardial friction rub
- Peripheral edema

ACE Inhibitors
Pericarditis?

Electrolyte Abnormalities

- Based on type of dialysis
- Hemodialysis
  - Hyperkalemia
  - Hypocalcemia
  - Hyperphosphatemia
- Peritoneal Dialysis
  - Hypokalemia
  - Hypoproteinemia

Hyperkalemia

- Serum $K^+ > 5.5$
- Causes:
  - ↓ urinary excretion
  - ↑ $K^+$ intake
  - Movement of $K^+$ into ECF
- If $K^+ \uparrow$, pH ↓
  - Metabolic Acidosis
  - Tachypnea

Hyperkalemia

- Signs/Symptoms:
  - Bradycardia; ECG Changes
  - Confusion
  - Abdominal cramping; diarrhea
  - Kussmaul respirations (2$^\circ$ acidosis)

What’s happening here?

http://www.theheart.org/ecg-of-the-month/1214789.do
Is this a problem?

Hyperkalemia
- Treatment if ECG changes or > 6.5mEq/L
  - D50 and 10-20 units regular insulin
  - Sodium Bicarbonate: 50-100 mEq IV
  - 10% calcium gluconate: 10-20 ml IV
  - Albuterol
  - Kayexalate
  - Diuretics
  - Dialysis

After treatment

Hypokalemia
- Causes:
  - Alkalosis
  - Inadequate PO intake
  - GI losses
  - Renal losses
  - Shifts into the cell
- S/S:
  - Dysrhythmias
  - Calf pain
  - Muscle weakness
  - Shallow respirations

Calcium and Phosphorous
- Chvostek's
- Trouseau's
Cardiac Arrest: PEA/Asystole

- **H’s**
  - Hyperkalemia
  - Hypokalemia
  - Hypoxia
  - Hyperglycemia

- **T’s**
  - Tamponade
  - Tension pneumo
  - MI
  - Pulmonary embolism
  - Tablet

NOTE: Succinylcholine can increase potassium levels

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VT/VF

- **Standard therapy**
- **Consider H’s & T’s**
  - $\text{HCO}_3^{-}$ 50mEq over 2 min
  - Calcium chloride 1 gr of 10% sol. over 5 min
  - Albuterol 5.0 mg
  - **Therapeutic Hypothermia**

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Case Study

- ROSC upon arrival to ED
- Therapeutic Hypothermia
- Fractured ribs
- Extubated, Day 3
- Subcutaneous ICD placed, Day 12
- Discharged neurologically intact, Day 14

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Questions

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