

# Hyperkalemia

## **Definition**

- Serum K<sup>+</sup> >5.3-5.5

## **Etiology:**

- **Pseudohyperkalemia**- K release from cells after blood draw, IVF with K
- **Impaired excretion**
- **Low GFR** (AKI or CKD)
- **Drugs** (spironolactone, ACEi, ARB, TMP-SMX, NSAIDs, digitalis overdose, heparin, chemo therapeutic agents)
- **Shift from intracellular to extracellular compartment**
- **Excessive K intake**
- Hemolysis
- Marked thrombocytosis or leukocytosis
- Ingestion (K Supplements, dietary salt substitutes)
- Iatrogenic
- Low mineralocorticoid state (adrenal insufficiency, type IV RTA)
- Acidosis
- Insulin deficiency or resistance including DKA
- Cell death (rhabdomyolysis, burns, tumor lysis)
- Retroperitoneal hemorrhage
- Old (hemolyzed) pRBC transfusion

## **Clinical manifestations:**

- Weakness, nausea, paresthesia, palpitations

## **Evaluation:**

- Repeat serum K<sup>+</sup> and assess renal function studies including serum Cr and BUN
- Order stat ECG to evaluate for hyperkalemia related changes (Tall peaked “tented” T waves, PR interval prolongation followed by loss of P waves, QRS widening, sinus wave pattern, VF/asystole/PEA)
- Review medications for offending drugs and stop as appropriate/indicated

## **Management:** PowerChart “Hyperkalemia (TH) Protocol”

### **Approach to Rx:**

- Order ECG for serum K >5.5 and treat emergently if ECG changes noted. Rx any K >6.5 emergently regardless of ECG changes
- Repeat ECG every 30-60 mins to ensure resolution of ECG abnormalities and consider telemetry for monitoring.
- Check and treat concurrent electrolyte abnormalities as they increase risk for arrhythmias
- Check if sample is hemolyzed and repeat serum K measurement to verify

### **Treatment aims:**

1. Stabilize the myocardial membrane
2. Temporarily shift K into cells
3. Eliminate K from body

#### Cardiac membrane stabilization:

- Calcium chloride 0.5-1g IV (more potent, but must be given via central line)
- Calcium gluconate 1-2g IV
- No effect on serum K level. Should normalize ECG. If not, re-dose.

#### Temporarily shift K into cells:

- Regular Insulin 10 units IV + D50 100ml IV. If high risk for hypoglycemia, monitor blood glucose closely. If hyperglycemic, insulin can be given alone.
- Beta2-agonists (albuterol 10-20mg in 4mL saline nebulized)
- NaHCO<sub>3</sub> 50-100 mEq

#### Eliminate K from body:

- Preferably renal elimination
- IVF with NS or NaHCO<sub>3</sub>- First line in hypovolemic patients
- Loop diuretic: Furosemide 40-160 mg IV- First line in hypervolemic patients and given with IVF if euvolemic
- Thiazide diuretic: Adjunct use with loop diuretic may be useful
- GI cation exchangers- Exchange Na<sup>+</sup> for K<sup>+</sup> in the GI tract

- Sodium zirconium cyclosilicate (Lokelma)- 10 g TiD for up to 48hr, then 5-15g q.other daily-daily as maintenance
- Kayexalate (sodium polystyrene sulfonate)- 15-30 g PO (slow onset and controversial use; associated with bowel necrosis and contraindicated in post-op patients and those with risk of/obstruction)
- Dialysis-can be used in patients with acute/chronic renal failure who fail medical management; improves serum K relatively quickly but lengthy process to initiate therapy (nephrology consult, machine and catheter placement)
- Continues renal replacement therapy-slow correction and requires ICU setting

### **Key Points:**

- Hyperkalemia protocol can be initiated/ordered from PowerChart
- Serum K level >6.5 or hyperkalemia with ECG changes warrant emergent treatment with calcium gluconate or CaCl
- Strategy to shift K into cells is useful acutely as it works fast but is only a temporary measure and it should be accompanied by therapies to eliminate K from the body
- K elimination renally is most efficient and takes into consideration patient's volume status

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