Hyperkalemia: Management of a Critical Electrolyte Disturbance

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Balancing Fluid

- Intracellular fluid (ICF)
- Extracellular fluid (ECF)
  - Intravascular
  - Interstitial
- Hormonal Influence
  - Antidiuretic hormone (ADH)
  - Renin-angiotensin-aldosterone feedback system
  - Atrial natriuretic peptide (ANP)

Electrolyte Overview

- What are they:
  - Salts & minerals
  - Electrically charged
- Responsible for:
  - Fluid balance, Muscle contraction, Energy generation, Biochemical reactions
- Na, K, Cl, Ca, Mg, etc.
**K+ Fun Facts**

- Discovered by: Sir Humphrey Davy on October 6, 1807
- Named for “Potash” (POH)
- Denoted on periodic table: K+ for Latin word *kalium*

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**Potassium K+**

- Most abundant intracellular cation
  - 98% intracellular
  - 2% extracellular
- Normal serum level: 3.5 – 5 mEq/L
- ICF/ECF K+ control:
  - Na-K pump; Insulin; catecholamine; acid-base balance

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**Potassium Excretion**

- Renal System
  - Aldosterone
  - Rate and flow of Na/K through nephron
- GI tract
  - In feces
- Sweat
Hyperkalemia

• Definition – serum level >5.0
• Potentially life-threatening
  – Degree of elevation
    • Mild: 5.5 – 6.5 mEq/L
    • Moderate: 6.5 – 7.5 mEq/L
    • Severe: >7.5 mEq/L
  – Rapidity of onset

Cause: High Intake/Absorption

• Rare if have good kidney function
• Dietary (salt substitutes)
• Potassium supplements (oral & parental)
• Stored blood
• Potassium-containing medications

Cause: Impaired Elimination

• Renal Failure (acute; chronic)
• Tubular defect in K+ excretion
• Hypoaldosteronism
  – Addison’s
  – Congenital adrenal hyperplasia
  – Drug-induced
• Constipation
Cause: Transcellular Shifts

- Acidosis
- Hypertonicity
- Insulin deficiency
- Drug related: digitalis toxicity; beta-blockers; succinylcholine
- Exercise
- Hyperkalemic periodic paralysis

Cause: Cellular Injury

- Rhabdomyolysis
- Severe intravascular hemolysis
- Acute tumor lysis syndrome
- Burns
- Crush injury

Diagnosis

- Elevated serum K+ level
- Assessment findings
- Labs: CBC, ABG, serum osmolality, electrolytes, BUN/Cr, liver enzymes, UA
- EKG
- Pseudohyperkalemia – false elevation
Cardiac Manifestations

- ECG changes:
  - peaked T
  - Loss of P wave
  - Widened QRS
- Dysrhythmias
  - AV blocks
  - V-fib
  - Asystole
  - PEA

Other Manifestations

- Neurological
  - fatigue, irritability, and mental confusion
- Neuromuscular
  - muscle cramps, weakness, paresthesias, paralysis
- GI hyperactivity
  - Nausea, diarrhea, abdominal cramping

Treatment: K+ Source Removal

- Low-potassium diet
- Stop IV and oral potassium Supplements
- D/C meds causing or aggravating hyperkalemia
Treatment: Shifting K+ to ICF

- Calcium Salts
  - calcium gluconate, calcium carbonate
- Sodium Bicarbonate (NaHCO₃)
- Insulin
  - with glucose
- Beta 2 Agonists
  - albuterol, ventolin

Treatment: K+ Excretion

- Exchange resin
  - sodium polystyrene sulphonate (Kayexalate)
- Diuretics (loop or thiazides)
  - furosemide (Lasix)
  - hydrochlorothiazide (HCTZ)
- Dialysis
  - hemodialysis; peritoneal

Nursing Interventions

- Good history
- Thorough head-to-toe assessment
- Assess VS, I&O, card monitor
- Monitor lab values
- Watch: s/s hyperkalemia & hypokalemia (p tx)
- Patient education
Thank you

QUESTIONS

References


References (cont)

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