HYPOKALEMIA

DEFINITION: Serum potassium level less than 3.6 mEq/L.

INCIDENCE IN CRITICAL ILLNESS: Common.

ETIOLOGY:

- **Inadequate potassium intake.**
- **Increased potassium excretion:**
  - **Gastrointestinal losses:** Diarrhea; laxative and enema overuse.
  - **Renal losses:** Diuretics (loop and thiazides); metabolic alkalosis; osmotic diuresis (hyperglycemia); mineralocorticoid excess (primary hyperaldosteronism, congenital adrenal hyperplasia, glucocorticoid-responsive aldosteronism); penicillin and its synthetic derivatives; hypomagnesemia (caused by aminoglycosides, amphotericin B, cisplatin, foscarnet); high-dose glucocorticoids; renal tubular acidosis (type 1 and some type 2); Liddle disease; Bartter syndrome; congenital enzyme deficiencies.
- **Shift of potassium into cells:** Medications (beta-adrenergic agonists [bronchodilators, decongestants, tocolytics], insulin, theophylline, caffeine, barium); delirium tremens (increased endogenous beta-adrenergic stimulation); hyperthyroidism; familial hypokalemic periodic paralysis.
- **Dilution.**

CLINICAL MANIFESTATIONS:

- **Most hypokalemic patients are asymptomatic.**
- **Cardiovascular:** Patients with underlying cardiac disease or those taking digitalis are at increased risk of abnormal cardiac electrical activity progressing to cardiac arrest; characteristic deterioration of ECG changes (flat T waves, ST depression, U waves, QT interval prolongation); ventricular arrhythmias.
- **Neuromuscular:** Generalized weakness; muscle necrosis; rhabdomyolysis; ascending muscle paralysis (respiratory failure and arrest).

TREATMENT:

- **Potassium repletion:** Potassium chloride or potassium phosphate; intravenous or enteric.
- **Serum potassium level < 3.0 mEq/L:** IV repletion in a monitored setting.
- **Magnesium repletion:** 8-10 gm of magnesium is often required to correct a serum potassium level of < 3.0 mg/dL.
- **Serum potassium decreases by 0.3 mEq/L for each 100 mEq decrease in total body potassium.**

KEY REFERENCES:

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- Buckley MS, LeBlanc JM, Crawley MJ. Electrolyte disturbances associated with commonly prescribed medications in the intensive care unit. *Crit Care Med* 2010;38(Suppl):S253-264.