

electrolytes.md

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Hypokalemia

Hyperkalemia

Hypomagnesemia

Hypercalcemia

Hypocalcemia

Template

Abnormality

Resources

Signs/symptoms

Causes

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Hyponatremia

Resources

[EM Cases MD Calc](#)

Signs/symptoms

- muscular weakness
- headache
- lethargy
- confusion
- unsteady gait
- seizures, coma

Causes

- Spurious - (pseudohyponatremia) - lipemia (shouldn't happen with modern labs)
- Water shifts from cells to serum (osmotic pressure) - hyperglycemia
- Can't pee out water - heart/liver/renal failure, endocrine (SIADH, hypothyroid)
- Drinking too much water - exercise induced, psychogenic polydipsia
- Peeing out too much salt - adrenal insufficiency, diuretic use, cerebral salt wasting
- Drinking too much water and not enough salt/protein - beer potomania, "tea and toast"

Treatment

Mild/asymptomatic and onset greater than 48 hours

- if hypovolemic - give fluids - 3%, LR, NS, use MDCalc to calculate rate based on fluid choice
- if hypervolemic - take away fluids - furosemide
- if hyper or euvolemic - restrict free water, give salt, fix pathology
- if hypo-osmotic - give osmoles - food, salt
- if hyper-osmotic - move unwanted osmoles (hyperglycemia --> insulin)
- if endocrine problem - may need to add/remove/block hormones - corticosteroids, thyroid hormone, ddAVP
- if at risk of over-correction from spontaneous water diuresis - consider dDAVP (desmopressin)

Severe symptoms (seizing, coma) and onset of hyponatremia within 48 hrs

- raise by 1-5mmol/L/hr until symptoms resolve or Na⁺ 125-130mmol/L
- hypertonic saline (3%) 1-2ml/kg/hr
- use MDCalc to find correction rate for diff. fluids

Disposition

- Discharge: chronic AND sodium > 120 meq/l AND asymptomatic
 - this is from uptodate, I personally start to get nervous around 125 depending on chronicity
- Admit: acute OR sodium < 120 meq/l OR symptomatic

Hyperkalemia

Resources

[LITFL Review - ECG Examples](#)

Signs/symptoms

- muscle weakness, ascending
- palpitations
- fatigue
- weakness

Causes

- Spurious - long tourniquet time, hemolysis
- Moves out of cells - rhabdo, DKA (other acidosis), hyperkalemic periodic paralysis
- Taking too much - supplements
- Can't pee it out - renal failure, ace-inhibitor +/- [trimethoprim](#), K⁺ sparing diuretics, adrenal insufficiency

Treatments

- Mild - asymptomatic, no ECG changes, usually K⁺ < 6.0
 - treat underlying cause
 - e.g. - remove supplement/offending medication, hydration
- Severe - symptomatic, ECG changes, K⁺ > 6.0
 - Stabilize - Calcium Gluconate 1 gram IV
 - Dilute - IVF
 - Shift - insulin, D50, albuterol, bicarbonate
 - Remove - diuretics, dialysis, kayexelate (SPS - sodium polystyrene sulfonate), lokelma (sodium zirconium cyclosilicate)

Disposition

- Discharge: <6 AND asymptomatic AND no ECG changes AND underlying cause is known AND problem is fixed
- Admit: ≥ 6 or ECG changes or underlying cause not known/not fixed

ECG Findings

- Peaked T waves - symmetric, pointy, sometimes tall
- Prolonged intervals - everything gets spaced out, QRS is widened, QT prolonged, T wave broad based
- Junctional Bradycardia - no P waves, Rate 40-60. QRS and T look like mirror images
- Vfib/Vtach
- Sine Wave

Hypokalemia

Resources

[LITFL HypoK Stephen Smith ECG Blog](#)

Signs/symptoms

- myalgias
- cramping, spasms
- weakness
- paralysis

Causes

- Not taking enough - malnutrition
- Shifting - unusual (alkalosis, hyperinsulinemia, β -agonist), hypokalemic periodic paralysis
- Peeing out too much - diuretics (new thiazide), hypomagnesemia, hyperaldosteronism (cushing's)
- Pooping/Vomiting it out - diarrhea, vomiting

Treatments

- Repletion - oral solution, pills, IV
- 10 meq either oral or IV will increase serum concentration by 0.1 meq/l
 - i.e. if serum level is 3.0 meq/l, giving 10 meq will increase serum concentration to 3.1 meq/l
- Also check and replete magnesium if needed
- Stop potassium wasting drugs (diuretics)

Disposition

- Discharge: if asymptomatic AND $K^+ > 2.5$ AND no ECG changes AND able to replete at home
- Admit: if symptomatic OR $K^+ < 2.5$ OR ECG changes OR not able to replete at home

ECG Findings

- U waves

- T wave flattening
- Down-up T wave morphology
- ST depression
- Long QT
- Torsades