**Hyponatremia Algorithm**

**Measured Serum Osmolality**

- **Normal (~ 280 mOsm)** Isotonic
  - Pseudohyponatremia
    - Hypertriglyceridemia, hyperglobulinemia
    - Ion-specific electrodes has alleviated this lab error

- **Elevated (> 280 mOsm)** Hypertonic
  - Hyperglycemia
    - Unmeasured effective osmoles (glycine, mannitol, sorbitol, maltose, radiocontrast dyes)

- **Low (<280 mOsm)** Hypotonic Hyponatremia
  - Hypovolemic Hypotonic Hyponatremia
    - Total body water ↓
    - Total body sodium ↓↓
    - Effective arterial blood volume low
    - **Uosm > 450 mOsm/kg**
      - **Una < 20 meq/l**
        - Causes:
          - Extrarenal Losses
            - Vomiting, Diarrhea
          - Third Spacing (burns, pancreatitis), Bowel obstruction, Trauma, Sweating,
        - Treatment:
          - Onset Slow (>48 hours): 0.9% NaCl
            - Onset Rapid (<48 hours): May consider 3% NaCl
            - Stop offending medications; restore intravascular volume with 0.9% NaCl
      - **Una > 20 meq/l**
    - Treatment:
      - Onset Slow (> 48 hours): Fluid restriction
      - Onset Rapid (<48 hours): 3% NaCl and loop diuretic
      - Optimize treatment of underlying disease; restrict salt and water intake; give loop diuretics
  - Hypervolemic Hypotonic Hyponatremia
    - Total body water ↑↑
    - Total body sodium ↑
    - **Uosm > 100 mOsm/kg**
      - **UNa < 20 meq/l**
        - Maybe > 20 meq/l with diuretic
        - Causes:
          - CHF, cirrhosis, nephrotic syndrome
          - Low effective arterial blood volume (orthostatic changes in HR/BP, hemoconcentration)
          - Causes release of ADH and aldosterone
      - **UNa > 20 meq/l**
        - Causes:
          - Acute or chronic renal failure
  - Euvolemic Hypotonic Hyponatremia (no edema)
    - Total Body Water
    - **Uosm > 100 mOsm/kg**
      - **Inappropriately High**
        - **UNa < 20 meq/l**
        - Causes:
          - Hypothyroidism (TSH level), Glucocorticoid deficiency (adenocorticotrophin stimulation test); SIADH, Stress, Drugs,
        - Treatment:
          - Dialysis
        - Go to Severe Euvolemic Hypotonic Hyponatremia on Next page
    - **Maximally dilute Appropriately low**
      - **UNa > 20 meq/l**
      - Causes:
        - Primary polydipsia (psychogenic polydipsia), Low solute intake (beer solute intake synprome)
      - Treatment:
        - Fluid restrict
  - Euvolemic Hypotonic Hyponatremia (no edema)
    - Total Body Water
    - **Uosm < 100 mOsm/kg**
      - **Una < 20 meq/l**
      - Causes:
        - Primary polydipsia (psychogenic polydipsia), Low solute intake (beer solute intake synprome)
      - Treatment:
        - Fluid restrict
      - Go to Severe Euvolemic Hypotonic Hyponatremia on Next page

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**Unmeasured effective osmoles**
- Glycine
- Mannitol
- Sorbitol
- Maltose
- Radiocontrast dyes

**Hyponatremia Diagnosis**

- **Lesion**
  - No edema
    - **Total Body Water**
      - **↑**
      - **Total Body Sodium**
        - **↔**
  - Fluid restriction
  - Go to Severe Euvolemic Hypotonic Hyponatremia on Next page
There is no consensus about the optimal treatment of symptomatic hyponatremia. Correction should be of a sufficient pace and magnitude to reverse the manifestations of hypotonicity, but not so rapid and large as to pose a risk for developing osmotic demyelination.

For mild symptoms of hyponatremia, or asymptomatic patients with serum sodium above 125 meq/l, use a conservative approach. (Water restriction less than 1-1.25 l/day) If serum sodium continues to decline 0.9% NaCl may be given to clarify diagnosis. If the patient has SIADH, hyponatremia will worsen and if they are ECF volume contracted serum sodium will improve.