Hypertonic hyponatremia also been termed translocational hyponatremia because the presence of osmotically active particles in the plasma induces an osmotic movement of water from the ECF to the ICF, decreasing serum sodium even though serum osmolality remains elevated. Solutes such as glucose, mannitol, sorbitol, or radiocontrast agents at extremis this effect.

**Corrected Na+ for glucose = [glucose + 3] + apparent sodium**

Hyponatremia is a common electrolyte abnormality that varies greatly in its clinical presentation. It has been shown to be an independent predictor of mortality in the intensive care unit. In critically ill patients with hyponatremia approaches 40%, and long-term outcomes have been shown to be a predictor of mortality in the intensive care unit.

Hyponatremia is generally categorized based on serum tonicity as isotonic, hypotonic, or hypertonic. Although most instances of hyponatremia in critical illness are associated with hypotonic, isotonic and hypertonic hyponatremia are also well documented.

**General**
- The symptom severity of hyponatremia depends in large part upon the rapidity of the decrease in serum sodium. Most patients are not symptomatic until the serum sodium decreases to less than 125 mmol/L.
- Symptoms are predominantly neurologic, including nausea, vomiting, headache, fatigue, incontinence, and disorientation. Severe hyponatremia can progress to seizures, brainstem herniation, and death.
- The initial evaluation of patients in the critical care setting with hyponatremia includes a thorough history and physical examination with particular care in evaluating the ECF volume status.
- Initial laboratory evaluation should include serum electrolytes, glucose, an evaluation of renal function with urea, creatinine, serum osmolality, and urine osmolality and sodium.
- Treatment of hyponatremia must strike a balance between the risks of the hyponatremia and the risks of correction.
- The magnitude of these risks depends on the degree of brain volume regulation that has transpired as a result of intracranial fluid and solute shifts.
- The treatment of some hyponatremia-associated disease states involves treating the underlying etiology, such as steroids for adrenal insufficiency and thyroid hormone for hypothyroidism.
- In most cases, the appropriate treatment of hyponatremia relies on the identification of the underlying ECF volume status, the aetiology with which the hyponatremia developed, and the severity of neurologic symptoms present. Severe acute symptomatic hyponatremia:
  - Acute hyponatremia (defined as <48 hours duration) with very low sodium values (<100-115 mmol/L) with seizures or coma is a medical emergency.
  - The risk for neurologic complications is high, because cerebral edema can evolve quickly as a result of osmotic movement of water into the brain.
  - In patients with severe acute hyponatremia, NaCl should be infused at a rate to increase serum [Na] approximately 1 to 2 mmol/L/h until a less hyponatremic serum [Na] (ie, 125-130 mmol/L) has been achieved.
  - In coma or seizures, patients a faster rate of sodium correction of 3.5 to 5 mmol/L/h for a short period of time (ie, 1-2 hours) may be warranted to avoid imminent brainstem herniation.
- In hypovolemic states, including the majority of patients with a UNa less than 30 mmol/L, fluid resuscitation with isotonic NaCl is appropriate with a goal serum sodium increase of 0.5 mmol/L/h. Accumulated evidence in experimental animals and humans confirms that a slower rate of serum sodium correction minimizes the risk for central pontine myelinolysis.

**General**
- Hypotonic hyponatremia can occur as a result of solute depletion, a primary decrease in total body solute (often with secondary water retention), or solute dilution, a primary increase in total body water (often with secondary solute depletion).
- Hypotonic or hyposmolar hyponatremia is generally subdivided according to the clinical ECF volume status. A recent retrospective analysis found the relative distributions of the types of hypertonic hyponatremia in the intensive care setting to be 24% hypertonic, 26% hypotonic, and 50% euvolemic.

**Symptomatic and asymptomatic hyponatremia:**
- Symptomatic hyponatremia is associated with hypovolemia and hypovolemic hyponatremia.
- Asymptomatic hyponatremia is associated with hypervolemia and hypervolemic hyponatremia.
- Euvolemic hyponatremia is associated with hypoosmolality and hypervolemic hyponatremia.

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