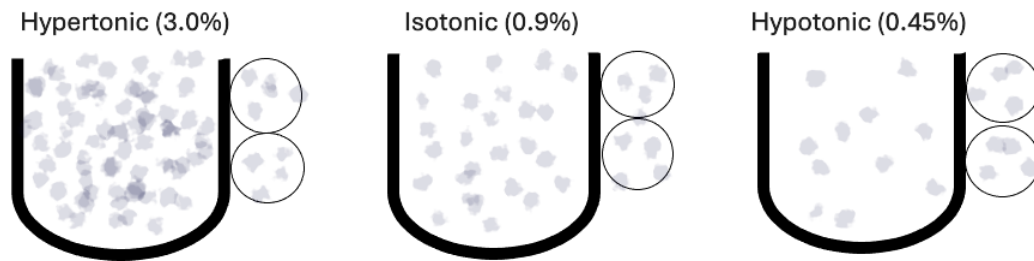


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Pharmacology - Fluids and electrolytes

Disclaimer: These notes are designed to provide the key points of each topic and may not contain all necessary information. Every effort is made to ensure this content is up to date and accurate at the time of writing. No liability is assumed for the content or its relation to current standards and practices. This should not replace comprehensive nursing educational resources.



Crystalloid solutions

- **Isotonic:**
 - Normal saline (NS, 0.9, sodium chloride, NaCl)
 - Has a sodium concentration of 154 mEq/L
 - Dextrose 5% in water (D5W)
 - Lactated ringers (LR)
 - Plasmalyte
- Indications: Volume replacement or maintenance fluid
- While considered isotonic, note that D5W becomes hypotonic after the dextrose is metabolized
- Potassium or other elements may be added as needed
- **Hypertonic:**
 - 3% sodium chloride
 - Dextrose 5% in sodium chloride (0.45% or 0.9%)
- Indications: To shift fluid into central circulation
- Always given through a pump
- **Hypotonic:**
 - 0.45% sodium chloride
 - 0.33% sodium chloride
- Indications:
 - To shift fluid into the cells
- Always given through a pump

Colloids

- Examples:
 - Albumin
 - Dextran 40% in D5W
 - Plasma protein fraction

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- Hetastarch 6% in NS
- Indications: To increase volume in central circulation
- Can be used to increase volume in central circulation with using less volume versus crystalloids
- Larger molecules that stay in the bloodstream longer
 - Also functions as hypertonic by pulling fluid towards it
- Most commonly used is albumin
 - Albumin is a blood product, and specific consent must be obtained for its administration

Drug name: Potassium

- Available PO, IV
- “MOA”: Required for nerve impulses and muscle contractions, and more
- Dietary sources: Bananas, spinach, oranges, avocados and more
- Indications: Hypokalemia
- S/S:
 - Hypokalemia- Muscle weakness, anorexia, nausea, vomiting
 - Hyperkalemia- Dysrhythmias, paresthesia, nausea
- May be painful when infusing
- Must be infused through a pump
- Never administered via IV push
- Must know serum potassium level prior to administration
- Cardiac rhythm should be monitored in patients receiving IV potassium
- Caution for extravasation
- PO should be taken with food
- Hyperkalemia is treated acutely with insulin and glucose
- Hyperkalemia can also be treated with polystyrene sulfonate or patiromer

Drug name: Sodium

- Available PO, IV
- “MOA”: Involved in fluid balance, acid-base balance, and neuromuscular functions
- Indications: Hyponatremia
- Key ingredient in many of the crystalloid fluids
- Hyponatremia:
 - Causes: excess fluids (relative hyponatremia), SIADH
 - S/S: Anorexia, n/v, abdominal cramping, progressive neuro symptoms leading to coma
 - Treated with hypertonic solution (Heavily dependent on severity, presentation and underlying cause)
- Hypernatremia:
 - Causes: Kidney issues leading to improper excretion of sodium
 - S/S: Thirst, weakness, musculoskeletal symptoms and neurological symptoms
 - Treated with D5W (Monitor glucose level closely)
- Sodium is often limited in those taking diuretics, and those with heart or kidney failure
- Sodium cannot be corrected faster than 0.5mg/dL per hour.

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- Requires close electrolyte monitoring to avoid osmotic demyelination syndrome (ODS)
- Low sodium diet is recommended in patients with hypertension

Drug name: Calcium

- Available PO, IV
- “MOA”: Required for nerve impulses, bone health, muscle contractions, and more
- Dietary sources: Dairy products, fortified foods and juices.
- Indications: Hypocalcemia
- S/S:
 - Hypocalcemia- spasms, increased DTRs, seizures, dysrhythmias, anxiety, tetany, Chvostek's sign, and Trousseau's sign
 - Hypercalcemia- Confusion, ECG changes, anorexia, nausea, vomiting, fatigue
- PO version is bound to various ingredients that do not have equivalent concentrations
 - Always consider vitamin D with anyone needing to supplement calcium
- Available IV in calcium gluconate and calcium chloride
 - Calcium chloride is three times more concentrated
- May be given to protect the heart in the presence of severe electrolyte imbalances
- Consideration necessary when administered with calcium channel blockers

Drug name: Magnesium

- Available PO, IV
- “MOA”: Required for many bodily functions, smooth muscle relaxant
- Indications: Laxative, hypomagnesemia
- Off-label use: Acute asthma exacerbation, pre-term labor (Tocolysis), certain arrhythmias
 - Administered via the IV route for the above indications
- Monitor for signs of magnesium toxicity
 - Requires frequent assessment of DTRs and respirations

Drug name: Sodium Bicarbonate

- Available PO, IV
- “MOA”: Buffers excess hydrogen ions, helping to maintain acid-base balance and correct metabolic acidosis. It also neutralizes gastric acid when used orally.
- Indications: Acidosis, antacid
 - Off label use for hyperkalemia and certain cardiac toxicities
- Treatment often monitored via electrolytes, cardiac ECG, and ABG

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