Week 5 Concepts: Managing Fluid and Electrolyte Alterations

Fluid and Electrolytes

Prepare: Fluid and Electrolytes

Osmolality

Which of the following describes osmolality?

The weight of the fluid.
Amount of particles removed from the fluid as part of evaporation.
Amount of particles within a fluid contributing to the fluid concentration.
Color of the fluid.

Important Terms

Match the definition with the description:

Hydrostatic pressure	A force pressing outward against a surface.
Osmotic pressure	An inward pulling pressure towards a higher concentration.
Diffusion	Passive movement of particles down a concentration gradient.
Active transport	Using energy to move electrolytes across cell membranes.

Osmolality and Types of Fluid

Match the correct osmolality to the types of fluid.

High osmolality	hypertonic solution
Balanced osmolality	isotonic solution
Low osmolality	hypotonic solution

Self-Check: Tonicity

To show an understanding of tonicity, think about the following equations and see if you can figure out what happens when you add fluids with different concentrations. Complete the following calculations:

Hypotonic solution + Hypertonic solution = Isotonic solution
Isotonic solution + Isotonic solution = Isotonic solution
Hypertonic solution + Isotonic solution = Hypertonic solution
Hypotonic solution + Isotonic solution = Hypotonic solution

Self-Check: Getting to the Cell

The nurse has initiated an intravenous administration of fluids. Place the following in the order the fluid moves to cell.

1. Vascular System
2. Capillary membrane
3. Interstitial Area
4. Cell membrane

Self-Check: Diabetes Insipidus

Consider this case. A 43-year-old client was hit by a car while riding their bicycle. The client sustained a head inju and was diagnosed with diabetes insipidus. This condition causes urination with limited filtration (urine is very dilute). The client's brain has swelling, so they are losing dilute fluid into the brain and into urine. The client's labs

show the following:

- **Serum osmolality of 318mmol/kg (normal 280-300)**
- **Urine specific gravity of 1.001 (normal 1.002 to 1.030)**
- **Serum sodium is 155 mEq/L (normal 135 to 145)**

Which of the following would be most appropriate to help the client get better?

A hypertonic solution given IV No need for fluids at this time A hypotonic solution given IV A isotonic solution given IV

Self-Check: Osmotic and Hydrostatic

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Select the correct choices to complete the following statement. If particles are pushed from one compartment to the next regardless of the concentration of the different compartments, hydrostatic pressure is used. When particles are pulled to ar area that has less of a concentration of those particles, it is called osmotic pressure.

Self-Check: Electrolyte Imbalance

Which of the following will cause an electrolyte imbalance? Select all that apply.

Furosemide injection
Renal insufficiency
Taking a daily multivitamin
Clostridium difficile infection
Ingesting an oral electrolyte replacement fluid

Reflect: Fluid and Electrolytes

Patient Scenario – Heart Failure

Sally, a 75-year-old female is admitted with heart failure. She has pitting edema to both lower extremities. Her labs show the following:

- **Serum osmolality of 275 mmol/kg (normal 280-300)**
- **Serum sodium is 130 mEq/L (normal 135 to 145)**

Which of the following would be most appropriate to help her get better?

A isotonic solution given IV
A hypertonic solution given IV
A hypotonic solution given IV
No need for fluids at this time.

Electrolyte Abnormalities

The healthcare provider orders a diuretic (furosemide 80mg IV) for Sally, who is in heart failure. Which of the following electrolyte abnormalities would you be most concerned about in the next two to four hours as the medication works?

Hypokalemia
Hyponatremia
Hyperkalemia
Hypernatremia

Administering Potassium Chloride

The healthcare provider prescribed potassium chloride 40 mEq/L to be given intravenously. Which is the safest wa to give this?

Mix potassium chloride 40 mEq in 100mL of normal saline (NS) and give over 10 minutes.
Mix potassium chloride 40 mEq in 1000mL of normal saline (NS) and give over 4 hours.
Mix potassium chloride 40 mEq in 500mL of normal saline (NS) and give over 2 hour.