Dehydration & Overhydration

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Dehydration

• 3 Major Types
• Isotonic - Fluid has the same osmolarity as plasma
• Hypotonic - Fluid has fewer solutes than plasma
• Hypertonic - Fluid has more solutes than plasma
Isotonic Dehydration

Prevention of Isotonic Dehydration:

• Most Common form of Dehydration Occurs when fluids and electrolytes are lost in even amounts

• There are no intercellular fluid shifts in isotonic dehydration
Common Causes

- Diuretic therapy
- Excessive vomiting
- Excessive urine loss
- Haemorrhage
- Decreased fluid intake
Assessment of Isotonic Dehydration

- Weight Loss
- Hypotension and Orthostatic Hypotension
- Rapid, weak pulse
- Oliguria - (dark, concentrated, scanty urine)
- Decreased skin turgor
- Dry mucous membranes
- Elevated urine specific gravity
- Altered Level of Consciousness
- Increased Hematocrit (except in hemorrhage), serum protein and BUN
- Severe Isotonic Dehydration can lead to SHOCK
Interventions for Isotonic Dehydration

- Monitor daily weight, I&O, Skin turgor, LOC and VS
- Check Skin turgor on forehead or sternum on elderly
- Monitor Lab values - Urine SpG, BUN, FBC and U&Es
- Replace fluid loss using ISOTONIC fluids
- Treat the underlying cause
Hypertonic Dehydration

- Second most common type of dehydration. Occurs when water loss from ECF is greater than solute loss.
Prevention of Hypertonic dehydration

• Prevent Insensible Fluid Loss - Hyperventilation, pure water loss with high fevers, and watery diarrhoea.
• Control Disease Processes - Diabetic Ketoacidosis and Diabetes Insipidus
• Prevent Iatrogenic Causes - Prolonged NBM, excessive administration of hypertonic fluids, sodium bicarbonate, or tube feedings with inadequate amounts of water
Assessment of Hypertonic Dehydration

• Hypertonic Dehydration causes fluid to be pulled from the cells into the blood stream, leading to cellular shrinkage.
• Thirst
• Decreased Skin Turgor
• Dry Mucous Membranes
• Increased Serum Sodium and Serum Osmolarity
• Increased Urine Specific Gravity
• Signs of Shock are usually not present
Interventions for Hypertonic Dehydration

• Prevent Hypertonic Dehydration by diluting tube feedings with adequate amounts of water.
• Monitor I&O, daily weight, skin turgor, LOC, Serum Sodium and Serum Osmolarity
• Administer Hypotonic fluids orally or SLOWLY by IV.
• Be aware that rapid administration of hypotonic IV fluids can cause cerebral swelling, and increased ICP.
Hypotonic Dehydration

• Relatively Uncommon - Loss of more solute (usually sodium) than water.
• Hypotonic Dehydration causes fluid to shift from the blood stream into the cells, leading to decreased vascular volume and eventual shock.
• Seen in Heat Exhaustion
• Increased cellular swelling -causes increased ICP - Confusion.
• Seen in Heat Stroke
Prevention of Hypotonic Dehydration

• Avoid over Administration of Hypotonic Fluids - Most common cause of Hypotonic Dehydration
• Replace fluid lost during exercise with isotonic fluids to patients with Isotonic dehydration.
• Select the correct IV fluid and rate to meet patients rehydration needs
• Watch for low serum osmolarity and serum sodium
• Persons at Risk: Persons on hypotonic IV fluids, Chronic Renal Failure, Chronic Malnutrition
Assessment of Hypotonic Dehydration

- Hypotension
- Tachycardia
- Changes in LOC
- Low Serum Sodium
- Low Serum Osmolarity
- Low Urine Specific Gravity
- Increased Urine Volume
Interventions for Hypotonic Dehydration

• Treat the underlying cause
• Rehydrate orally with hypertonic fluids
• IV administration of N/S to restore sodium balance.
• In rare instances hypertonic Sodium (N/S 3%) may be used.
Clinical Application - SHOCK

- Shock is the body's reaction to decreased tissue perfusion
**Common Causes of Shock**

- Hypovolemic Shock: Acute fluid loss
- Cardiogenic Shock: Heart Failure
- Neurogenic Shock: results in dilation of blood vessels
- Vasogenic Shock: due to acute allergic reactions
- Septic Shock: due to the release of bacterial endotoxins
Assessment of Shock

• Hypotension
• Cold, moist, clammy skin
• Deep, rapid respirations (Kussmaul’s)
• Decreased urinary output
• Thirst
• Changes in LOC
• Early - Apprehension and restlessness
• Late - Lethargy to coma
Interventions for Shock

• Goal is to increase ECF volume and pressure, in order to increase tissue perfusion
• Maintain airway
• Start O2 if indicated
• Position with legs elevated 45 degrees
• Keep warm
• Start IV with 16 or 18 gauge needle
• Start N/S, be ready to give blood or plasma expanders if indicated
• Cardiac Monitor
• External pressure devices can be used for hypovolemic shock
Overhydration

• Isotonic Overhydration
• Hypotonic Overhydration
• Hypertonic Overhydration
Isotonic Overhydration

- Hypervolemia - Oedema from excess fluid in the extracellular spaces - Rarely happens in persons with normal heart and kidneys
Prevention of Isotonic Overhydration

- Avoid over administration of Isotonic Fluids
- Avoid excessive sodium to decrease water retention
- Avoid excessive saline enemas
- Monitor those with:
  - Congestive Heart Failure
  - Chronic Renal Failure
  - Chronic Liver Disease
Assessment of Isotonic Overhydration

- Weight Gain
- Distended neck veins (JVP)
- Polyuria (if normal kidneys)
- Hypertension
- Full bounding pulses
- Crackles in lungs (pulmonary edema) SOB
- Elevated Respirations
- Ascites (particularly with liver disease)
- Peripheral oedema
- Decreased Hematocrit - hemodilution
- Decreased BUN - hemodilution
Interventions for Isotonic Overhydration

- Monitor I&O and Weight
- Monitor V/S, Lung sounds, CXR, Lab and SOB
- O2 as indicated
- Diuretic Therapy as indicated
- Monitor Sodium and Fluid intake and restrict as indicated
- Monitor Medications which contribute to overhydration
- Treat Underlying Condition
Hypotonic Overhydration

- Pathophysiology
  - Overload of hypotonic fluids decreases serum osmolarity leads to fluid shifting from the blood stream into the cells
  - Causes interstitial oedema, cellular swelling, and electrolyte dilution
Prevention of Hypotonic Overhydration

• Avoid too much D5W - The body metabolizes the glucose rapidly, leaving plain hypotonic water in the blood stream.

• Avoid tap water enemas

• Avoid drinking excessive amounts of plain water (usually psychogenic causes)

• Monitor those with SIADH - Too much water is retained by the kidneys, while sodium is not retained.
Assessment of Hypotonic Overhydration

- Most Symptoms are related to low sodium levels and fluid shifts which cause cellular swelling - increased ICP, Low serum sodium, osmolarity and protein
- Overall Headache and Photophobia
- Confusion and Disorientation
- Muscle Twitching
- Hyperirritability
- Nausea and Vomiting
- Polyuria in persons with normal kidneys
- Convulsions and Coma
Interventions for Hypotonic Overhydration

- Monitor I&O, weight, VS and LOC
- Place on fall precautions
- Reduce stimuli, pain meds
- Restrict fluids as ordered
- Monitor serum sodium and osmolarity
- Restore sodium by oral administration of hypertonic foods and fluids
- Slow IV N/S or 3% N/S if can't take orally
- Administer osmotic diuretics as ordered
Clinical Application - SIADH (Syndrome of Inappropriate Antidiuretic Hormone)

• Abnormal secretion of antidiuretic hormone in conjunction with neoplastic growth occurring anywhere in the body.
Clinical Application - SIADH

- Often associated with lung cancer, lung disease and CNS damage
- Increased release of ADH from the posterior pituitary gland
- ADH acts on the membranes of the distal convoluted tubules and causes more water to be reabsorbed back into the body
- Water retention leads to hypotonic overhydration
Assessment of SIADH

- Decreased Output in relation to input
- Rapid weight gain
- Decreased Serum Sodium
- Fluid shifts to cells, causing interstitial oedema
- Increased Urine Specific Gravity, osmolarity and sodium
- Low Serum Sodium leads to Weakness, Muscle cramps, confusion, irritability, seizures, coma, and can lead to death
Interventions for SIADH

- Monitor I&O, Wt, Serum Sodium, U&Es
- Fluid Restrictions as indicated to avoid circulatory overload
- Diuretics
- Add sodium to diet
- Slow IV of N/S or 3% Saline may be used to increase serum sodium levels
- Demeclocycline (ADH antagonist) may be used for chronic SIADH-Rare
Hypertonic Overhydration

Pathophysiology

- Increased serum osmolarity leads to fluid shifting from the cells into the blood stream
- Causes cell shrinkage and fluid volume overload
- Fluid volume overload leads to increased blood pressure and increased cardiac workload
- Can eventually lead to decrease cardiac output and congestive heart failure
Prevention of Hypertonic Overhydration

- Avoid over administration of hypertonic IV fluids
- Avoid over use of hypertonic enemas
- Add water or flush with water when giving hypertonic tube feedings
- Monitor those with renal failure
- Inability to excrete solutes and fluids lead to hypertonic overhydration
Assessment of Hypertonic Overhydration

- Elevated Blood Pressure
- Elevated CVP and JVP
- Full, bounding pulses
- Thirst - from cellular shrinkage
- High serum sodium
- High serum osmolarity
- Decreased Urine output - body retains water to dilute the sodium
- High urine sodium levels in persons with normal kidneys
- If serum sodium becomes very high, can lead to disorientation, lethargy and coma
Interventions for Hypertonic Overhydration

• Monitor I&O, Wt, V/S, LOC, Serum sodium and Serum Osmolarity
• Fall precautions, Seizure Precautions
• Restrict foods and fluids high in Sodium
• Oral administration of hypotonic fluids
• May SLOWLY administer hypotonic IV solutions
Thank you