

Differences Between Adults and Children

- Differences in acid/base balance can happen really quick and be life threatening
- Percentage and distribution of body water; lose water more quickly than adults b/c of a higher BMR
- Body surface area is greater
- Rate of basal metabolism is increased
- Status of kidney function; infants can concentrate or dilute urine; difficulty conserving body water; infant requires more body water per kg of body weight than an adult; urine will be consistently yellow regardless of hydration status

Total Body Water

- Intracellular fluid (30-40% of body weight)
- Extracellular fluid (20-25%)
 - Interstitial (15%)
 - Plasma (5%)
- Infant is 80% of body weight as water; extracellular fluid is much higher in infant than in adult
- Adult is about 50% TBW; about 65% in children, about 80% in infants

NCLEX Question!

Which one of the following factors contributes to the infant and young child's high risk for fluid & electrolyte imbalance?

- a. Decreased body surface area
- b. Lower metabolic rate
- c. Mature kidney function
- d. Increased extracellular fluid volume**

Picture of Infant with dehydration: emaciated, eyes sunken, ribs sticking out, lethargic

Fluid Maintenance

- 100 ml/kg for 1st 10kg
- 50 ml/kg for next 10 kg (11-20)
- 20 ml/kg for remaining kg

Osmosis

- Movement of pure solvent, such as water, from lower concentration to an area of higher concentration.
- Example is boiling of a hot dog. The concentration of the solutes inside the hotdog is greater than in the water, so the skin of that water is acting as a semi-permeable membrane. This allows water to go into the hotdog. When the hotdog cannot hold any more water, it ruptures.

Electrolyte Imbalances

- Sodium
 - Normal 135 to 145
 - major ECF electrolyte
- Potassium
 - Normal 3.5 to 4.5
 - major ICF electrolyte
- Chloride
 - largely in ECF

When child is vomiting, they lose fluid from ECF...that's mainly where all their water is. They also have higher water loss from skin and lungs d/t higher surface area.

Types of dehydration.

- Types of Dehydration
 - Hypotonic: Na loss > water loss...water moves into the cell causing the cell to be puffy. Na level < 130
 - Isotonic: Na & water loss equal (most common type of dehydration)
 - Hypertonic: water loss > Na loss...the water leaves the cell causing the cell to shrink. Na level > 150; this is the most dangerous type of dehydration; more difficult to manage
- Dehydration results from ECF loss; very common

Types of IV solutions

- Isotonic – 0.9% NS, LR, D5W
- Hypotonic —water
- Hypertonic —D5 1/2 NS, D5 LR, D10W

Adding Potassium to the IV

- Why do we do this? We can't conserve potassium...vomiting, gastric suctioning, intestinal fistulas, diarrhea can cause a severe potassium loss.
- Signs of low K?
 - weakness, inability to move right, floppy muscles/limbs

Acid-Base Balance

- Normal blood pH = 7.35 to 7.45
- Acidosis: blood pH < 7.35
- Alkalosis: blood pH > 7.45
- Respiratory acidosis: can be caused by slow or shallow breaths (CO2 goes up)
- Respiratory alkalosis: mechanical overventilation, but don't do ABGs often in kids unless on vent; numbness in toes, confusion
- Metabolic acidosis:
- Metabolic alkalosis

Degrees of Dehydration

- Two different ways to measure dehydration
 - Change in body weight or body water

	Mild	Moderate	Severe
Infant	< 5% wt < 50 ml/kg	5-10% wt 50-90 mg/kg	> 10% wt > 100 ml/kg
Child	3% wt 30 ml/kg	6% wt 60 ml/kg	9% wt 90 ml/kg

- Mild to moderate: oral rehydration is the treatment; but in ED they'll get IV b/c it's faster
- Assessment for dehydration
 - Skin for color,
 - warmth, turgor
 - Cap refill, HR,
 - peripheral pulses, BP (late sign)
 - Mucous membranes dry, no tears
 - LOC, fontanel, eyes
 - I & O, weight, urineoutput & specificgravity

Treatment of Dehydration

- Oral rehydration therapy therapy (ORT)
 - For mild to moderate dehydration
 - Pedialyte, Lytren, Infalyte, Resol
- IV fluids: 20ml/kg bolus NS

NCLEX Question!

What is the most appropriate treatment for rehydration of an 8-month-old child diagnosed w/ acute diarrhea and mild dehydration?

- a. **Beginning oral rehydration of 50ml/kg within 4 hours**
- b. Restarting lactose-free formula
- c. Encouraging oral intake of clear fluids such as fruit juice and gelatin
- d. Feeding the BRAT diet