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

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

<table>
<thead>
<tr>
<th></th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant</td>
<td>&lt; 5% wt</td>
<td>5-10% wt</td>
<td>&gt; 10% wt</td>
</tr>
<tr>
<td></td>
<td>&lt; 50 ml/kg</td>
<td>50-90 mg/kg</td>
<td>&gt; 100 ml/kg</td>
</tr>
<tr>
<td>Child</td>
<td>3% wt</td>
<td>6% wt</td>
<td>9% wt</td>
</tr>
<tr>
<td></td>
<td>30 ml/kg</td>
<td>60 mg/kg</td>
<td>90 ml/kg</td>
</tr>
</tbody>
</table>

- 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, urine output & specific gravity

Treatment of Dehydration
- Oral rehydration therapy therapy (ORT)
  - For mild to moderately dehydrated
  - Pedialyte, Lytren, Infalyte, Resol
- IV fluids: 20ml/kg bolus NS

