Pediatric Fluid and Electrolyte Management

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Pediatric Fluid and Electrolytes

- List four reasons why children are more prone to fluid and electrolyte imbalances
- List assessment parameters to determine a child’s hydration status
- Identify the three degrees of dehydration
- Define three types of dehydration and treatments
- Calculate fluid maintenance and KCL studies
Infants and children are more prone to fluid and electrolyte imbalances because:

- Greater extracellular fluid
- Higher metabolic rate
- More insensible losses
• have a higher BSA relative to weight

• until 2 years of age, can’t concentrate waste and need more water to excrete
Evaluating Hydration status

- Weight
- I & O (6-10 wet diapers/day)
- Skin turgor
- Mucous membranes
- Fontanelles
- Skin temperature
- Color
- LOC
- RR rate
Evaluating Circulating blood volume

- Hematocrit and hemoglobin
- Respiratory rate
- Underlying conditions – burns, infection
- CNS status
- CV status
  - Heart rate
  - Pulses
  - Capillary refill
# Fluid Maintenance Requirements

<table>
<thead>
<tr>
<th>Weight in kg</th>
<th>ml/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 10 kg</td>
<td>100 ml/kg</td>
</tr>
<tr>
<td>11 - 20 kg</td>
<td>1000 ml for the first 10 kg, then 50 ml/kg for each kg over 10 kg</td>
</tr>
<tr>
<td>21 - 30 kg</td>
<td>1500 ml for the first 20 kg, then 20 ml/kg for each kg over 20 kg</td>
</tr>
</tbody>
</table>
### Calculating Maintenance Electrolyte requirements

<table>
<thead>
<tr>
<th>Component</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium</td>
<td>4 meq/kg/24 hours</td>
</tr>
<tr>
<td>Potassium</td>
<td>2 meq/kg/24 hours</td>
</tr>
<tr>
<td>Chloride</td>
<td>4 meq/kg/24 hours</td>
</tr>
<tr>
<td>Calcium</td>
<td>50 - 200 mg/kg/24 hours</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.4 - 0.8 meq/kg/24 hours</td>
</tr>
<tr>
<td>Phosphate</td>
<td>15 - 50 mg/kg/24 hours</td>
</tr>
<tr>
<td>Glucose</td>
<td>100 - 200 mg/kg/24 hours</td>
</tr>
</tbody>
</table>
Factors affecting actual fluid requirements

- Increased requirements
  - Fever
  - Burns
  - Trauma
  - Bleeding
  - GI – vomiting/diarrhea
Decreased requirements

- Renal failure
- Pulmonary edema
- Cerebral edema
- Hepatic failure
## Types of Dehydration

- **Hypotonic** – Loss of NaCl is > the loss of water, serum NaCl < 130 meq/L

- **Isotonic** – Loss of water is = to the loss of NaCl. Fluid loss is from both intra and extra cellular compartments.

- **Hypertonic** – Loss of water is > loss of NaCl, Serum Na exceeds 145-150 Meq/L
Hypotonic Dehydration

**CAUSES**
- Gastroenteritis
- Inappropriate IV therapy
- Gastric suction
- SIADH

**TREATMENT** — replacement of the deficit over 24 hrs (above maintenance)
Isotonic Dehydration

**CAUSES**

- Vomiting and diarrhea

**TREATMENT**

- Replacement of deficit over 24 hours, above maintenance.
Hypertonic Dehydration

**CAUSES**
- Vomiting and diarrhea
- Diabetes insipidus

**TREATMENT**
- Replacement of deficit over 48 hours (don’t want to reduce NaCl too quickly, > Than 10 meq/day can cause seizures)
Hypokalemia

- In adults when serum K+ declines from 4.0 to 3.0 this represents a deficit of 100-200meq.
- Hypokalemia indicates “the tip of the iceberg” of total K+ deficits.
- Anticipate K+ losses from chemo, DKA, diarrhea, diuretics
- DO NOT WAIT until serum K+ <3.5 meq/L
Oral KCL replacement

- Preferred route of replacement
- Usual dose of Kay Ciel is 0.5meq/kg/dose
- Maximum dose is 40 meq.
Parenteral Route

- **Peripheral Lines** –
  - MAXIMUM concentration is 40meq/L

- **Central Lines** –
  - Greater concentrations may be given (60-100meq/L) with attending physician approval.
Central Hyperalimentation

- Up to 100 meq/L (1-2 meq/kg.day)
- Maximum: 150 meq/day
- The rate should not exceed 0.6 meq/kg/hr due to possible induction of cardiac dysrhythmias.
- Attending approval required for the higher concentrations.
KCL bolus

- Minimum rate of infusion – 1 hour
- Max # of consecutive infusions – 3
- Follow up with lab studies
KCL Bolus

- Serum K+ - 3 – 3.5 Meq but falling
- Administer 0.2 meq/kg/hr for up to 3 consecutive runs.
Serum K+ 2.5 – 2.9 meq/L
KCL may be administered at 0.3 meq/kg/hr for three runs.
Serum K = 2.4 meq/L

Move the patient to an ICU!

KCL may be administered IV at 0.4 meq/kg/hr for up to three runs.

The concentration of KCL in the IV fluid even with central venous access should not exceed 0.1 meq/ml