PURPOSE

The purpose of this clinical guideline is to facilitate appropriate screening, prescription and monitoring of Intravenous fluids and electrolyte administration in children treated in ER or admitted to Pediatrics.

DEFINITIONS

Bolus fluid therapy: to expand circulating volume to children with hypovolemia.

Fluid therapy: to replace abnormal losses from the GI tract.

Maintenance fluids: to replace estimated output in children with reduced oral intake.

Rapid IV Rehydration (RIVR): a larger initial bolus of 0.9% normal saline of 50 – 60 mL/kg compared to the standard IV rehydration bolus of 20 mL/kg administered over one hour to manage dehydration from gastroenteritis in children over the age of 3 months.

POLICY

1. Drawing BASELINE SERUM ELECTROLYTES (Na, K, bicarb, glucose, and creatinine) are recommended before starting IV fluids, unless there is a time factor i.e. in a trauma or emergency situation.

2. Children undergoing short procedures (i.e. day care pediatric surgeries) do not need electrolytes done.

3. Prescribing IV fluids:

   3.1 IV BOLUS (for use in children with significant extracellular fluid (ECF) contraction or impending shock) – NaCl 0.9% OR Ringers Lactate
3.2 MAINTENANCE – Initially NaCl 0.9% or Ringers Lactate. IV solutions with added dextrose may be required based on patient age and blood glucose. Adjust solution when serum electrolytes available.

3.3 Intravenous solutions that contain substantial amounts of electrolyte free water MUST NOT be used as MAINTENANCE FLUIDS in pediatric patients. Do NOT use the following solutions:

- 2/3 & 1/3
- 0.2% N/S with dextrose
- 5% DW
- 10% DW (can be used for maintenance fluids in neonates)

3.4 Until serum electrolytes are known USE ONLY 0.9% NaCl or Ringers Lactate.

Table 1. Recommended IV fluids based on Serum Sodium

<table>
<thead>
<tr>
<th>Serum Sodium</th>
<th>Recommended IV solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum [Na+] less than 138 mmol/L</td>
<td>0.9% NaCl with or without dextrose OR Ringers Lactate with or without Dextrose</td>
</tr>
<tr>
<td>Serum [Na+] 138 – 144 mmol/L</td>
<td>0.45% NaCL with Dextrose OR 0.9% NaCL with or without dextrose OR Ringers Lactate with or without Dextrose</td>
</tr>
<tr>
<td>Serum [Na+] 145 – 154 mmol/L</td>
<td>0.45% NaCL with Dextrose</td>
</tr>
<tr>
<td>Serum [Na+] more than 154 mmol/L</td>
<td>Differentiate between dehydration or salt gain (use of IV solutions with high sodium concentration) Dehydration - 0.9% NaCL replace slowly at 0.5 mEq/hr over 48 – 72 hours Salt Gain – 0.2% NaCL with Dextrose OR D5W</td>
</tr>
</tbody>
</table>
4. Monitoring:

4.1. All children receiving IV fluids need accurate intake and output and a daily weight.

4.2. Children receiving more than 50% of maintenance fluids by IV OR as replacement for ongoing losses are to have electrolytes and blood sugar done at least once daily for three days or until electrolytes are stable.

4.3. If serum sodium is less than 130mmol/litre, electrolytes should be checked every four to six hours until stable.

5. For fluid therapy to replace ongoing fluid loss:

5.1. Reassess fluid loss every four hours

5.2. Replacement fluid should reflect the electrolyte composition of lost fluids

5.3. Start with 0.9% NaCl in most cases. Add potassium chloride and dextrose as needed

5.4. After 24 hours adjust type of solution according to electrolyte composition of lost fluids

6. Check electrolytes STAT if clinical signs and symptoms of hyponatremia develop (vomiting, headache, sensory disturbances, seizures, dilated pupils, posturing)

REFERENCES


Appendix A. – Guidelines for Pediatric Intravenous Therapy

1. Start IV

2. Baseline bloodwork
   Na, K, HCO₃, Cr, Glucose

3. Hypovolemic shock:
   0.9% NaCl bolus -

3. a. Repeat bolus if needed.
   Monitor cardiac status

4. Fluid loss replacement:
   Standard rehydration -
   0.9% NaCl 20 mL/kg
   RIVR - 0.9% NaCl 50-60 mL/kg

4. a. Persistent fluid loss replacement over 12 to 24 hrs:
   Reassess fluid loss q4h
   Replacement fluid should reflect the electrolyte composition of lost fluids
   Start with 0.9% NaCl in most cases
   Add KCl and DW as needed

5. Maintenance fluids:
   Start with 0.9%NaCl with or without 5%DW, add KCl 20mEq/liter after

5.a. Calculation of Maintenance Fluids in Children

<table>
<thead>
<tr>
<th>Body Weight</th>
<th>Fluid needs per Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>First 10 kg</td>
<td>4mL/kg</td>
</tr>
<tr>
<td>Second 10 kg</td>
<td>2mL/kg (for each kg over 10kg)</td>
</tr>
<tr>
<td>Each additional kg</td>
<td>1mL/kg (for each kg over 20kg)</td>
</tr>
</tbody>
</table>

6. On going management for inpatients:
   Daily weights
   Strict fluid balance q12h
   Check electrolytes and glucose daily for the first three days (once stable may decrease frequency)
   If Na < 130mmol/liter repeat electrolytes q4-6hrs until stable
   After 2-3 days could consider the use of D5W and 0.45% NaCl based on serum sodium
   Continue checking electrolytes

   If showing signs of hyponatremia:
   vomiting, headache, change in LOC, seizures, posturing, or dilated pupils
   order STAT electrolytes