Acute Watery Diarrhea

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Acute watery diarrhea is defined as a change in the consistency of stool leading to loose or liquid stools and/or an increase in the frequency of evacuations to three or more in 24 hours, with or without fever or vomiting lasting 7 days or less.

Frequent passing of formed stools is not diarrhea. Babies fed only on breast milk often pass loose, “pasty” stools; this also is not diarrhea.

Viruses are the most common agents accounting for >60% of cases, followed by bacteria and parasites. Globally, Rotavirus infection remains the leading cause of diarrhea in children < 5 years.

Water and electrolytes (sodium, chloride, potassium, and bicarbonate) are lost through liquid stools, vomit, sweat, urine, and breathing. Dehydration occurs when these losses are not replaced.
The degree of dehydration is rated on a scale of three.

**Severe dehydration** (at least two of the following signs):
- Lethargy/unconsciousness
- Sunken eyes
- Unable to drink or drink poorly
- Skin pinch goes back very slowly (≥2 seconds)

**Some dehydration** (two or more of the following signs):
- Restlessness and irritability
- Sunken eyes
- Drinks eagerly and thirsty

**No dehydration**
- Not enough signs to classify as some or severe dehydration.

In most cases, children with acute watery diarrhea do not require any diagnostic workup.

In severe conditions and/or in the hospital setting, investigations may be appropriate in individual cases.

Microbiological investigations should be considered in the following:
- Children with underlying chronic conditions (e.g., oncologic diseases, inflammatory bowel disease, and immunodeficiency)
- Extremely severe clinical conditions (e.g., sepsis)
- Prolonged symptoms (>7 days)
- During outbreaks (childcare, school, and hospital)
- Children with high fever
- History of travel to at-risk areas

In children with severe dehydration, renal function test, serum electrolytes, and blood glucose should be done.

To prevent potentially fatal complications including dehydration, metabolic acidosis, electrolyte disturbances, and sepsis.
Oral rehydration solution (ORS) (low osmolarity 75 mmol/L Na) is the first line of treatment for acute watery diarrhea (Table 1).

**TABLE 1:** Rehydration therapy in acute diarrhea.

<table>
<thead>
<tr>
<th>Treatment plan</th>
<th>Plan–A</th>
<th>Plan–B</th>
<th>Plan–C</th>
</tr>
</thead>
<tbody>
<tr>
<td>State of hydration</td>
<td>No dehydration</td>
<td>Some dehydration</td>
<td>Severe dehydration</td>
</tr>
<tr>
<td>Percentage of body</td>
<td>&lt;5</td>
<td>5–10</td>
<td>&gt;10</td>
</tr>
<tr>
<td>weight loss</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated fluid</td>
<td>&lt;50</td>
<td>50–10</td>
<td>&gt;100</td>
</tr>
<tr>
<td>deficit (mL/kg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goals of management</td>
<td>Replacement of ongoing losses of fluid and</td>
<td>Correction of existing deficits of fluid</td>
<td>Urgent replacement of existing deficits of</td>
</tr>
<tr>
<td></td>
<td>electrolytes</td>
<td>and electrolytes</td>
<td>fluid and electrolytes</td>
</tr>
<tr>
<td>Fluid therapy</td>
<td>Maintenance (oral)</td>
<td>Rehydration (oral)</td>
<td>Rehydration (intravenous (IV))</td>
</tr>
<tr>
<td>Treatment facility</td>
<td>Home</td>
<td>Health facility</td>
<td>Health facility</td>
</tr>
<tr>
<td>Rehydration fluid</td>
<td>Oral rehydration solution (ORS)/homemade</td>
<td>ORS</td>
<td>RL*</td>
</tr>
<tr>
<td></td>
<td>solutions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amount of rehydrating</td>
<td>For every loose stool:</td>
<td>75 mL/kg</td>
<td>IV fluid</td>
</tr>
<tr>
<td>fluid</td>
<td>10 mL/kg</td>
<td>Over 4 hours</td>
<td>Infants</td>
</tr>
<tr>
<td></td>
<td>Age up to 2 months—5 teaspoons/purge</td>
<td></td>
<td>30 mL/kg</td>
</tr>
<tr>
<td></td>
<td>2 months to &lt; 2 years → 50–100 mL</td>
<td></td>
<td>70 mL/kg</td>
</tr>
<tr>
<td></td>
<td>Age 2–10 years → 100–200 mL</td>
<td></td>
<td>Age &gt; 1 year</td>
</tr>
<tr>
<td></td>
<td>Older child: As much as desired</td>
<td></td>
<td>30 mL/kg</td>
</tr>
<tr>
<td></td>
<td>Plus Free access to drinking water</td>
<td></td>
<td>70 mL/kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Plus</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ORS (5 mL/kg/h) start orally as soon as</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>child is able to drink</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Watch for vomiting, early signs of dehydration,</td>
<td>Monitor every hour and reassess after 4</td>
<td>Monitor ½ hourly and reassess after 6 hours</td>
</tr>
<tr>
<td></td>
<td>blood in stools, etc.</td>
<td>hours</td>
<td>(infants)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If still in plan B, repeat as above</td>
<td>If still in plan C, repeat as above</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If rehydrated, shift to plan A</td>
<td>If rehydrated, shift to plan B/A</td>
</tr>
</tbody>
</table>

*Normal saline (0.9% NaCl) or half strength Darrow’s solution may be used if Ringer Lactate (RL) is not available. Severely malnourished children rehydrated slowly over 6–12 hours.

In children who fail on oral rehydration, administration of rehydration fluids either by nasogastric (NG) tube or intravenously (IV) is effective and recommended.
Acute Watery Diarrhea

Management

- Zinc
  - It helps in reducing the duration, severity of diarrhea, and in preventing further episodes of diarrhea for next 3 months.
  - Dose: 6 months to 5 years of age: 20 mg/day × 14 days
    - 2–6 months: 10 mg/day × 14 days

- Antiemetics
  - Ondansetron administered either orally or intravenously (0.15 mg/kg/dose, maximum: 8 mg) is effective in reducing vomiting.

- Probiotics
  - Effective in reducing the duration and intensity of symptoms
  - Selected probiotic strains (including *Lactobacillus rhamnosus* GG, *Saccharomyces boulardii*, and also *L. reuteri* DSM 17938) can be considered as an adjunct to ORS.

- Nutritional Management
  - Infants younger than 6 months to continue breastfeeding and for non-breastfed, not to introduce diluted or modified formula.
  - Regular oral feeding to be reintroduced no later than 4–6 hours after the onset of rehydration.
  - In children with severe acute malnutrition (SAM), food offered during rehydration phase.
  - Home available fluids can be given such as rice or pulses-based drink (rice water and *dal* water); vegetable soup; yogurt drink with salt (salted *Lassi*); lemon drink (*Shikanji* with added salt and less sugar), and coconut water. Plain water can be given in between.
  - Elimination diet is usually not indicated
  - An extra meal a day with energy rich foods for at least a week or two, after the diarrhea stops or until the child is back on its original weight.

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Indications for Antibiotics

Routine use of antibiotics is not recommended for the treatment of acute watery diarrhea. The use of antibiotics may be considered in:

- Infants < 3 months
- Children with underlying chronic conditions or immunodeficiency
- Children with SAM
- Infections with *Shigella*, enterotoxigenic *Escherichia coli* (ETEC) (not Shiga-like toxin producing), *Vibrio cholerae*, and *Yersinia enterocolitica*
- Invasive bacterial infection.

The routinely used antibiotics are given in **Table 2**.

<p>| <strong>TABLE 2</strong>: Antibiotics recommended for the treatment of acute watery diarrhea. |</p>
<table>
<thead>
<tr>
<th><strong>Pathogen</strong></th>
<th><strong>Drug of choice</strong></th>
<th><strong>Alternative</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Shigella</em></td>
<td>Parenteral, IV, IM: Ceftriaxone (50 mg/kg for 2–5 days)</td>
<td>Cefixime PO (8 mg/kg/day); ciprofloxacin PO (20–30 mg/kg/day)</td>
</tr>
<tr>
<td><em>Salmonella (non-typhi)</em> Only in high-risk children</td>
<td>Parenteral ceftriaxone (50–100 mg/kg/day)</td>
<td>Azithromycin PO (10 mg/kg/day); ciprofloxacin PO (20–30 mg/kg/day)</td>
</tr>
<tr>
<td>Enterotoxigenic <em>Escherichia coli</em></td>
<td>Azithromycin PO (10 mg/kg/day) for 3 days</td>
<td>Cefixime (8 mg/kg/day) for 5 days</td>
</tr>
<tr>
<td><em>Vibrio cholerae</em></td>
<td>Single dose of doxycycline (&gt;2 years) 2–4 mg/kg</td>
<td>Single dose of azithromycin/ciprofloxacin 20 mg/kg</td>
</tr>
</tbody>
</table>

Up-to-date immunization, especially for *Rotavirus* and measles, helps in preventing diarrhea.
Assessment and management of dehydration in an SAM child differs from children without malnutrition. Diagnosis is by history:

- Definite history of diarrhea of sudden onset within few hours or days
- Recent change in the child’s appearance
- Mother says the eyes have changed to become sunken since the diarrhea started
- Eagerness to drink

SAM child in shock:

- Cold hands with
- Slow capillary refill >3 seconds and
- Weak and fast pulse.
Management

- Managed in a health facility.
- Oral rehydration. NG tube used for children who drink poorly.
- IV fluids used only for the treatment of shock, due to risk of overhydration and heart failure.
- Oral rehydration 70–100 mL/kg over 12 hours. Start 10 mL/kg/hour in the first 2 hours. Then alternate hours give starter diet.
- Continue at this rate or a lower rate based on the child’s thirst and ongoing stool losses.
- Increasing edema is evidence of overhydration.
- Full-strength ORS solution should not be used for oral or NG rehydration. It provides too much sodium and too little potassium.
- When using the new ORS solution containing 75 mmol/L of sodium:
  - Dissolve one ORS packet into 2 L of clean water (to make 2 L instead of 1 L);
  - Add 45 mL of potassium chloride solution (from stock solution containing 100 g KCl/L)
  - Add and dissolve 50 g sucrose
- Rehydration solution for malnourished (ReSoMal) can be used, dilute one sachet in 2 L water. It has high potassium and low sodium.

Further Reading