

Diarrhoea and vomiting in children

EBM Guidelines

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Essentials

- Usually due to viral gastroenteritis causing vomiting and diarrhoea
- Consider other possible causes, such as infections, diabetic ketoacidosis and other GI tract problems, such as intussusception and pyloric stenosis.
- Assess the degree of dehydration and plan the treatment accordingly. The primary treatment is oral rehydration, via nasogastric tube if necessary.
- Assessment in specialized care is without hesitation indicated in children less than 6 months of age, as well as in children with a severe or atypical clinical picture or with at least moderately severe dehydration.

Aetiology

- Gastroenteritis viruses, such as noro-, rota- and sapoviruses, and common respiratory viruses, such as adenovirus, can cause gastroenteritis. In children, infections are commonly associated with loose stools and regurgitation. Due to vaccination, rotavirus infections are rare today (applies to countries where vaccination coverage is adequate).
- An aetiology other than a virus should be suspected if a child with diarrhoea has bloody diarrhoea, significantly raised inflammatory markers, a history of travelling abroad, a preceding long antimicrobial treatment, prolonged diarrhoea, or a feeling of being ill that is disproportionate to the level of dehydration. During epidemics, disease spreading among the patient's close environment or in daycare increases the probability of a viral aetiology.

Differential diagnosis

- The most important differential diagnostic alternatives:
 - Diabetic ketoacidosis!
 - May cause severe vomiting.
 - Always refer the patient immediately to specialized care.
 - Mechanical problems of the GI tract, such as intussusception or pyloric stenosis [1](#)
 - Other infections, such as pneumonia [2](#), sepsis, pyelonephritis [3](#) or otitis media [4](#)
- The treatment of vomiting or diarrhoea due to a cause other than gastroenteritis depends on the cause.

Symptoms and findings

- It is most essential to assess the degree of dehydration and the possibilities of correcting it.
 - The aim should always be to use oral rehydration, via nasogastric tube if necessary. Intravenous rehydration should only be used if rehydration by other means is unsuccessful.
- Dehydration should always be assessed clinically or based on weight loss (often both), not based on laboratory tests.
- The development of dehydration essentially depends on the severity of symptoms and on the patient's age. A small baby will become dehydrated clearly more quickly than a bigger child or one with fewer symptoms.

- Degree of dehydration
 - **Mild dehydration (approx. 4–5% of weight):** Dry mucous membranes, decreased tear production and oliguria suggest mild dehydration.
 - **Moderately severe dehydration (approx. 8–10% of weight):** The above-listed signs combined with cool periphery, loss of skin elasticity and prolonged (> 2 seconds) capillary refill time of the distal fingertip suggest moderate dehydration. The loss of skin elasticity is shown in the “tent” phenomenon: when a fold of abdominal skin is pinched and raised, it remains raised like a tent and does not immediately retract like it normally would.
 - **Severe dehydration (approx. 12–15% of weight):** The above-listed signs plus deep, gasping breathing, ice-cold periphery and poor general condition indicate severe dehydration.
- Observed or assessed weight loss helps to estimate dehydration in grams if recent data are available.
 - In acute disease, the degree of dehydration is practically equal to the degree of weight loss.
 - The growth prognosis from growth curves can be utilized.
 - In prolonged disease, there is weight loss in addition to that caused by dehydration, complicating assessment.

Workup

- History and clinical examination are usually sufficient. If a viral disease is suspected, no blood tests need to be done if the child is in a good general condition.
- Do not hesitate to perform a rapid blood glucose test to exclude new-onset diabetes or hypoglycaemia.
- If intravenous rehydration is needed, blood gas analysis should be done and electrolytes (K, Na) should be checked.
 - If the child is in a poor general condition, blood count and CRP should also be checked, as well as plasma creatinine and chemical urinalysis, as necessary.
- If bacterial diarrhoea is suspected, faecal bacterial culture and nucleic acid detection test should be done.
 - If there is bloody diarrhoea, EHEC culture and toxin detection should be done.
 - If EHEC is suspected, blood count with platelet count and plasma creatinine need to be checked in addition because approx. 10% of children develop haemolytic uraemic syndrome as a complication.
- After prolonged antimicrobial treatment, a test for *Clostridioides difficile* (nucleic acid detection test, toxin gene) should be done.
 - As children below 1–2 years of age may be asymptomatic carriers of *C. difficile*, the test should normally not be done in children of this age group.
- Parasite tests should not be done in patients with acute gastroenteritis.
- If a child returning from the tropics has fever, blood culture should be performed if intravenous antimicrobial medication is going to be started.

Treatment

- Treatment can usually be provided at home. For indications for referral to specialized care, see below.

- If there is no oral rehydration solution (ORS) available at home, treatment can be started by giving the child potato chips and sugary juice, depending on their age.
 - For rehydration, fluid should be given frequently in small doses (to avoid provoking vomiting).
- For rehydration, ORS equivalent to approx. 1.5 × the amount of dehydration or weight loss should be given slowly over 4–6 hours.
 - The drink can be given from a bottle or a drinking glass, or with a spoon or syringe.
 - Many children prefer a cold drink.
- If rehydration at home is not successful, it can often be done by administration of an ORS via nasogastric tube at the emergency department of a health centre or a hospital.
 - Even if there is vomiting, children can usually tolerate slow rehydration via nasogastric tube.
 - After rehydration, the child should be examined and weighed and can usually be discharged for follow-up care at home.
- After rehydration, a normal diet can be resumed. Breastfeeding of infants should be continued normally during the illness.
- If diarrhoea continues, 30 mg/kg/day of ORS can be given, or 0.5 or 1 dl for each diarrhoeal stool for children younger or older than 2 years, respectively.
- A light age-appropriate diet should be continued while the child has symptoms, and normal maintenance hydration should not be forgotten during the treatment of gastroenteritis.
- In a child, the normal fluid requirement per 24 hours is
 - 100 ml/kg for the first 1–10 kilograms of body weight
 - 50 ml/kg for the next 11–20 kilograms of body weight
 - 20 ml/kg for every kilogram of body weight exceeding 20 kg.
 - Example: maintenance fluid requirement in a child weighing 26 kg is $10 \times 100 \text{ ml} + 10 \times 50 \text{ ml} + 6 \times 20 \text{ ml} = 1\,620 \text{ ml}$.
- On discharge, inform the family about the probable duration of the disease and provide clear instructions for treatment at home, including the fluid volumes needed.
 - Viral gastroenteritis usually continues for 2–7 days, rotavirus disease sometimes longer.
 - Remember to inform the family about the infectiousness of the disease and periods of treatment at home before returning to daycare centre or school (normally 2 days without symptoms).
 - Ask them to get in touch again if the child does not start to perk up or gets more tired.

Indications for referral to hospital

- Assessment by specialized care should be requested in any of the following cases:
 - Age below 6 months
 - Profuse diarrhoea or vomiting, impaired general condition
 - Dehydration of 8% or more (at least moderately severe dehydration)
 - Unsuccessful rehydration
 - Diarrhoea lasting for more than 5 days (general condition and loss of weight are decisive factors)
 - Intermittent abdominal pain and poor general condition: intussusception? See [1](#).
 - Bloody diarrhoea

- Suspicion of hypo- or hyperosmolalic dehydration based on the clinical picture or preceding management (for example, if the child gets worse and the parents say he/she hasn't taken anything but water for several days)
 - Inability to treat the child at home
- If the child is in shock when referred, infuse Ringer solution 20 ml/kg in 15 minutes.

Follow-up

- Improvement in general condition
- Sufficient urine excretion
- Weight gain

References

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3. Guarino A, Ashkenazi S, Gendrel D ym. European Society for Pediatric Gastroenterology, Hepatology, and Nutrition/European Society for Pediatric Infectious Diseases evidence-based guidelines for the management of acute gastroenteritis in children in Europe: update 2014. *J Pediatr Gastroenterol Nutr* 2014;59(1):132-52. [PubMed](#)

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