Gastroenteritis in Children

Infective gastroenteritis in young children is characterised by the sudden onset of diarrhoea, with or without vomiting. Most cases are due to a viral infection but some are caused by bacterial or protozoal infections. The illness usually resolves without treatment within days but severe diarrhoea can rapidly cause dehydration, which may be life-threatening.[1]

See also separate articles Gastroenteritis in Adults and Older Children, Traveller's Diarrhoea and Childhood Diarrhoea.

Epidemiology

- Gastroenteritis is very common, with many children having more than one episode a year. Many children are treated by parents or other carers without seeking professional advice but approximately 10% of children younger than 5 years present with gastroenteritis to healthcare services each year. In a UK study, diarrhoeal illness accounted for 16% of medical presentations to a major paediatric emergency department.[1]
- Worldwide, 2 billion cases of acute gastroenteritis and 1.9 million deaths occur each year in children under 5 years.[2]
- Gastroenteritis is caused by a variety of viral, bacterial and parasitic pathogens. Of the infectious agents isolated from children with enteric infections in 2009 in England, rotavirus was found most commonly (56%), followed by Campylobacter spp. (28%), Salmonella spp. (11%), norovirus (3%), Shigella spp. (1%), and Escherichia coli O157 (1%).[3]
- Another infective cause of diarrhoea is the Ebola virus. The 2014 outbreak is one of the largest in history and the first in West Africa. Ebola should be considered in any child or young person who has developed diarrhoea, vomiting and weakness and who has arrived from Guinea, Liberia or Sierra Leone or spent time in these countries within the previous 21 days.[4]
- The causative agent for most cases of gastroenteritis is never isolated and the responsible agent never diagnosed.

Risk factors

- Poor hygiene and lack of sanitation increase the incidence - eg, bad water in the developing world.
- Compromised immune system.
- Infection may arise from poorly cooked food, cooked food that has been left too long at room temperature or from uncooked food. Insufficient reheating of food not only fails to kill bacteria but may speed up multiplication and increase the bacterial load ingested. Even if reheating of cooked food kills bacteria, enterotoxins such as staphylococcal exotoxin are not destroyed.

Assessment[1]

- Gastroenteritis should be suspected if there is a sudden change in stool consistency to loose or watery stools and/or a sudden onset of vomiting.
- If gastroenteritis is suspected then ask about recent contact with someone with acute diarrhoea and/or vomiting, exposure to a possible or known source of bowel infection (eg, contaminated water or food) and any recent travel abroad.
- Children are often febrile with any type of infective gastroenteritis.
- Antibiotics may cause Clostridium difficile colitis.
Bloody diarrhoea is usually caused by either *Campylobacter* spp. (mainly *Campylobacter jejuni*), where bloody diarrhoea may be present in up to 29% of cases, and *E. coli* O157 infections, where bloody diarrhoea may be present in up to 90% of cases. However, the possibility of Ebola should be borne in mind due to spread outside Africa. The Department of Health's advice is that the risk of contracting Ebola in the UK is currently low.

Red flags
- Appears to be unwell or deteriorating.
- Altered responsiveness (eg, irritable, lethargic).
- Sunken eyes.
- Tachycardia.
- Tachypnoea.
- Reduced skin turgor.

Shock

Arrange emergency transfer to secondary care
- Decreased level of consciousness.
- Pale or mottled skin.
- Cold extremities.
- Decreased level of consciousness.
- Tachycardia.
- Tachypnoea.
- Weak peripheral pulses.
- Prolonged capillary refill time.
- Hypotension.

Differential diagnosis

Not all diarrhoea or vomiting is gastroenteritis, especially in children, and other causes must be considered, including the following:

- Other sites of infection - eg, urinary tract infection, otitis media, meningitis, pneumonia.
- Toddler's diarrhoea.
- Constipation with overflow.
- Acute appendicitis (older children) but other conditions can present in a similar way, including mesenteric adenitis and malrotation of the gut.
- Intussusception produces a 'redcurrant jelly' stool; however, the parents may report this as bloody diarrhoea.
- Coeliac disease.
- Parents often use the words 'projectile vomiting' inappropriately but the age of children with pyloric stenosis is characteristic and the force of the vomit in such cases is most impressive.
- Babies may be getting regurgitation, possetting or even gastro-oesophageal reflux.
- Diabetic ketoacidosis.
- Addison's disease.

Investigations[1]
• Stool samples - for microscopy (include ova, cysts and parasites), culture and sensitivity. Usually samples are not required but should be sent for microbiological investigation in outbreaks - eg, in schools, or if:
  • Septicaemia is suspected.
  • There is blood and/or mucus in the stool.
  • The child is immunocompromised.
  • The child has recently been abroad.
  • The diarrhoea has not improved by day seven.
  • There is uncertainty about the diagnosis of gastroenteritis.

• Blood tests - FBC, renal function and electrolytes for patients in the hospital setting.
• Perform a blood culture if giving antibiotic therapy.
• Children with *E. coli* O157 infection require specialist advice on monitoring for haemolytic uraemic syndrome.\(^1\)
• Other tests will depend on the individual case and the need to rule out other possible diagnoses.

Both dysentery and food poisoning are **notifiable diseases**. The laboratory may report the isolation to the relevant authority but it is better to duplicate notification than to overlook it. Notification is a statutory duty.

**Management**\(^1\)

During remote (eg, telephone) assessment:

• **Arrange emergency transfer to secondary care for children with symptoms suggesting shock.**
• **Arrange face-to-face assessment for children:**
  • With symptoms suggesting an alternative serious diagnosis.
  • At high risk of dehydration.
  • With symptoms suggesting clinical dehydration.
  • Whose social circumstances make remote assessment unreliable.

• **Consider repeat face-to-face assessment or referral to secondary care for children:**
  • With symptoms and/or signs suggesting an alternative serious diagnosis.
  • With red flag symptoms and/or signs.
  • Whose social circumstances require continued involvement of healthcare professionals.

• **Provide a safety net for children who will be managed at home, including:**
  • Information for parents and carers on how to recognise developing red flag symptoms.
  • Information on how to get immediate help from an appropriate healthcare professional if red flag symptoms develop.
  • Arrangements for follow-up at a specified time and place, if necessary.

**Fluid management**

In children with gastroenteritis but without clinical dehydration:

• Continue breast-feeding and other milk feeds.
• Encourage fluid intake.
• Discourage the drinking of fruit juices and carbonated drinks, especially in those at increased risk of dehydration.
• Offer oral rehydration salt (ORS) solution as supplemental fluid to those at increased risk of dehydration.

In children with clinical dehydration, including hypernatraemic dehydration:

• Use low-osmolarity ORS solution (240-250 mOsm/L).
• Give 50 ml/kg for fluid deficit replacement over four hours as well as maintenance fluid for oral rehydration therapy.
• Give the ORS solution frequently and in small amounts.
Racecadotril is an intestinal antisecretory enkephalinase inhibitor that inhibits the breakdown of endogenous enkephalins. It reduces the hypersecretion of water and electrolytes into the intestine. It is licensed for the complementary symptomatic treatment of acute diarrhoea in infants aged over 3 months, together with oral rehydration and the usual support measures (dietary advice and increased daily fluid intake), when these measures alone are insufficient to control the clinical condition.

Consider supplementation with their usual fluids (including milk feeds or water but not fruit juices or carbonated drinks) if they refuse to take sufficient quantities of ORS solution and do not have red flag symptoms or signs.

Consider giving the ORS solution via a nasogastric tube if they are unable to drink it or if they vomit persistently.

Monitor the response to oral rehydration therapy by regular clinical assessment.

**Fluid management**

Use intravenous fluid therapy for clinical dehydration if:

- Shock is suspected or confirmed.
- A child with red flag symptoms or signs (see 'Red flags' box, above) shows clinical evidence of deterioration despite oral rehydration therapy.
- A child persistently vomits the ORS solution, given orally or via a nasogastric tube.

If intravenous fluid therapy is required for rehydration (and the child is not hypematraemic at presentation):

- Use an isotonic solution, such as 0.9% sodium chloride, or 0.9% sodium chloride with 5% glucose, for both fluid deficit replacement and maintenance.
- For those who required initial rapid intravenous fluid boluses for suspected or confirmed shock, add 100 ml/kg for fluid deficit replacement to maintenance fluid requirements and monitor the clinical response.
- For those who were not shocked at presentation, add 50 ml/kg for fluid deficit replacement to maintenance fluid requirements and monitor the clinical response.
- Measure plasma sodium, potassium, urea, creatinine and glucose at the outset, monitor regularly and alter the fluid composition or rate of administration if necessary.
- Consider providing intravenous potassium supplementation once the plasma potassium level is known.

**Nutritional management**

During rehydration therapy:

- Continue breast-feeding.
- Do not give solid foods.
- In children without red flag symptoms or signs, do not routinely give oral fluids other than ORS solution; however, consider supplementation with the child's usual fluids (including milk feeds or water but not fruit juices or carbonated drinks) if they consistently refuse ORS solution.
- In children with red flag symptoms or signs, do not give oral fluids other than ORS solution.

After rehydration:

- Give full-strength milk straightaway.
- Re-introduce the child's usual solid food.
- Avoid giving fruit juices and carbonated drinks until the diarrhoea has stopped.

**Drugs**
Antibiotic therapy should not be used routinely but should be given:
- For suspected or confirmed septicaemia.
- With extra-intestinal spread of bacterial infection.
- When younger than 6 months with salmonella gastroenteritis.
- In those who are malnourished or immunocompromised with salmonella gastroenteritis.
- Where there is *C. difficile*-associated pseudomembranous enterocolitis, giardiasis, bacillary dysentery, amoebiasis or cholera.
- For children who have recently been abroad, seek specialist advice about antibiotic therapy.

- Antidiarrhoeal medications should not be used.
- A Cochrane review found that the therapeutic effects of probiotics were at best moderate. *Lactobacillus GG* and *Saccharomyces boulardii* were effective in the treatment of acute watery diarrhoea, particularly due to rotavirus; however, the benefit amounted to a reduction of diarrhoeal duration of approximately one day. The effect was strain-dependent and dose-dependent.[6]
- A Cochrane review found that zinc may be of therapeutic benefit in children aged 6 months or more in areas where the prevalence of zinc deficiency or the prevalence of moderate malnutrition is high, Current evidence however did not support the use of zinc supplementation in children below 6 months of age.[7]

**Information and advice for parents and carers**

Advise parents, carers and children that:
- Washing hands with soap (liquid if possible) in warm running water and careful drying are the most important factors in preventing the spread of gastroenteritis.
- Hands should be washed after going to the toilet or changing nappies (parents/carers) and before preparing, serving or eating food.
- Towels used by infected children should not be shared.
- Children should not attend any school or other childcare facility while they have diarrhoea or vomiting caused by gastroenteritis.
- Children should not go back to their school or other childcare facility until at least 48 hours after the last episode of diarrhoea or vomiting.
- Children should not swim in swimming pools for two weeks after the last episode of diarrhoea.

**Complications**

- There is an increased risk of dehydration in:[1]
  - Children younger than 1 year, particularly those younger than 6 months.
  - Infants who were of low birth weight.
  - Children who have passed more than five diarrhoeal stools in the previous 24 hours.
  - Children who have vomited more than twice in the previous 24 hours.
  - Children who have not been offered or have not been able to tolerate supplementary fluids before presentation.
  - Infants who have stopped breast-feeding during the illness.
  - Children with signs of malnutrition.

  - **Haemolytic uraemic syndrome** is a serious complication.
  - Loss of lactase from the gut (causing lactose intolerance) may occur, especially after viral infection. This is quite common but usually not a problem. See also separate article Lactose Intolerance.

**Prognosis**[1]

- Usually there is uneventful recovery. Diarrhoea usually lasts for 5-7 days and in most it stops within two weeks. Vomiting usually lasts for 1-2 days and in most it stops within three days.
- The number of deaths from rotavirus in children in England and Wales is probably no more than three or four a year, although it will be much greater in less developed countries and worldwide the number is probably 600,000 to 800,000 a year. [8] It is hoped that the prognosis will improve considerably in those countries (such as the UK) in which the rotavirus vaccination has been instituted. [9]
- Infants and those with immunological compromise are more likely to have more severe disease and to require admission to hospital for rehydration. In severe cases, hypovolaemic shock and even death can occur.
Prevention

- Breast-feeding confers some protection against gastroenteritis. One study found that exclusive breast-feeding, compared with not breast-feeding, protects against hospitalisation for diarrhoea and lower respiratory tract infection; this is especially important in developing countries.\textsuperscript{[10]}
- There is now an effective rotavirus vaccine available.\textsuperscript{[11]} Routine immunisation against rotavirus has been added to the UK immunisation schedule, and was available from September 2013. Rotarix\textregistered is administered orally at 2 and 3 months of age.\textsuperscript{[12]}
Further reading & references

- Acute diarrhoea in children: racecadotril as an adjunct to oral rehydration; NICE Evidence Summary, March 2013
- Gastroenteritis; NICE CKS, August 2014 (UK access only)
- Guidance on infection control in schools and other childcare settings; Public Health England (September 2014)

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3. The management of acute bloody diarrhoea potentially caused by vero cytotoxin-producing Escherichia coli in children; Public Health England (July 2011)
9. Successful start to rotavirus vaccination programme; GOV.UK, 2014
12. Rotavirus; Public Health England

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