

# Rotavirus and rotavirus vaccination

## What is rotavirus?

Rotavirus is an RNA virus classified in the Reoviridae family. Rotavirus is a common cause of viral [gastroenteritis](#) and mainly affects young children, especially children between the ages of 6 months and 2 years.

Rotavirus causes a self-limiting infection. However, stool fluid losses may be dramatic and death from dehydration may occur, especially in developing countries.

Rotavirus vaccination is effective in reducing the incidence and severity of rotavirus infection. A new UK vaccination programme began in July 2013. See the 'Rotavirus vaccination' section at the end of this article for further information.

## How common is rotavirus? (Epidemiology)

- Transmission of rotavirus is by person-to-person spread, either directly by faecal to oral route or by environmental contamination.<sup>[1]</sup>
- Rotavirus infection is the most common cause of severe gastroenteritis in children.<sup>[2] [3]</sup>
- Rotavirus causes about 140,000 cases of diarrhoea a year in the under-5s in the UK. It has been estimated that approximately 18,000 children are hospitalised annually in England and Wales as a result of rotavirus-related disease.<sup>[1]</sup>
- Rotavirus infection most often occurs during the winter months.
- Approximately 500,000 deaths in children younger than 5 years are seen worldwide due to rotavirus. Virtually all these deaths occur as a result of dehydration.

- Adults may become infected but repeat infections are generally much less severe than infections during childhood.<sup>[1]</sup>

## Risk factors

- Young children aged 4-24 months, particularly those in group daycare settings.
- Low birth weight, prematurity and bottle-feeding have been associated with increased risk of admission to hospital because of rotavirus infection.

## Symptoms of rotavirus (presentation)

Rotaviruses, a member of Reoviridae family, are a major cause of severe diarrhoea in children under 5 years of age worldwide, infecting mainly the gastrointestinal tract, although recent findings have shown extraintestinal spread of rotavirus infections.<sup>[4]</sup>

- The incubation period is approximately 48 hours. Common clinical features include watery diarrhoea and vomiting.
- Fever, anorexia and abdominal pain are also frequently reported.<sup>[1]</sup>
- Diarrhoea can be severe and dehydration is a common presenting complaint. See also the separate article [Dehydration in Children](#).
- Apart from dehydration, the other main clinical sign is hyperactive bowel sounds.
- Adults, if affected, usually have a few days of nausea, anorexia and cramping pain. Diarrhoea is usually much less severe in adults than in children.

## Diagnosing rotavirus (investigations)

In the absence of dehydration, investigations are often not required because the management is the same as for any cause of gastroenteritis. However, stool samples will need to be sent to the laboratory when there is an outbreak of infection, such as in a children's nursery.

- Stool sample: rotavirus can be identified by several means - eg, enzyme immunoassay (the most common), latex agglutination, electron microscopy or culture.

- Renal function and electrolyte levels should be measured if there is significant dehydration.
- Blood glucose levels should be measured in very young infants and in any child with associated lethargy.

Investigations may also be required if there is any suspicion of a non-infective cause of diarrhoea. See also the separate article [Childhood Diarrhoea](#).

## Differential diagnosis

- Other causes of infective gastroenteritis.
- Other sites of infection – eg, urinary tract infection, otitis media, meningitis, pneumonia.
- Other causes of diarrhoea – eg, toddler's diarrhoea, constipation with overflow, [intussusception](#), [coeliac disease](#).

## Management of rotavirus

The key issues in management are treating dehydration or, if not dehydrated, maintaining hydration. See the separate articles [Gastroenteritis in Children](#) and [Dehydration in Children](#).

## Complications of rotavirus

- The most important complication of rotavirus infection is dehydration and the potential complications of dehydration – eg, seizures, [acute kidney injury](#) and venous thrombosis.
- Loss of lactase from the gut (causing lactose intolerance) may occur. See also the separate article [Lactose Intolerance](#).

## Prognosis

- Most children recover within a week of the onset of symptoms. However, re-infection is common.
- In developed countries, the prognosis for rotavirus infection is excellent as long as adequate hydration is maintained.

- Rotavirus is associated with significant mortality in developing countries, with more than 500,000 children dying each year as a result of severe dehydration associated with rotavirus disease.<sup>[5]</sup>
- Worldwide in 2008, diarrhoea due to rotavirus infection caused 37% of deaths attributable to diarrhoea and 5% of all deaths in children younger than 5 years. Five countries accounted for more than half of all deaths attributable to rotavirus infection: Democratic Republic of the Congo, Ethiopia, India, Nigeria, and Pakistan.<sup>[6]</sup>

## Prevention of rotavirus

- Good hygiene is the most important way of preventing the spread of rotavirus.<sup>[1]</sup> See also the separate article [Gastroenteritis in Children](#).
- Rotavirus vaccination (see below).

## Rotavirus vaccination

Rotavirus vaccination is effective in reducing the incidence and severity of rotavirus gastroenteritis.<sup>[7]</sup>

- In high- and middle-income countries, rotavirus vaccines have achieved 85–100% protection against severe disease. In low-income countries in Africa and Asia, protection is less (50–75%).<sup>[2]</sup>
- Despite this reduced efficacy in low-income countries, the high burden of diarrhoeal disease in these regions means that proportionately more severe cases are prevented by vaccination than elsewhere.<sup>[2]</sup>

- A significant decline in acute gastroenteritis-related deaths among Latin American children was observed after the introduction of rotavirus vaccination:<sup>[8]</sup>
  - Vaccination achieved a decrease in the number of cases of rotavirus acute gastroenteritis and of severe rotavirus diseases.
  - Vaccination was also associated with a dramatic reduction in hospitalisations and outpatient visits for all-cause acute gastroenteritis.
  - Safety studies showed that adverse events, such as intussusception, occur only rarely (rates <1 in 50,000).

### **UK vaccination programme**<sup>[9]</sup>

The UK rotavirus vaccination programme began in July 2013.<sup>[10]</sup>

The first dose of 1.5 ml of Rotarix<sup>®</sup> vaccine is given at 2 months (approximately 8 weeks) of age. A second dose of 1.5 ml is given at least 4 weeks after the first dose. It is preferable that the full course of two doses of Rotarix<sup>®</sup> be completed before 16 weeks of age to provide early protection and avoid temporal association between vaccination and intussusception. Rotarix<sup>®</sup> should not be given to infants under 6 weeks of age, or who is 24 weeks and 0 days of age or older.

### **Contra-indications**

Rotarix<sup>®</sup> should not be given to:

- Infants with a confirmed anaphylactic reaction to a previous dose of rotavirus vaccine.
- Infants with a confirmed anaphylactic reaction to any components of the vaccine.
- Infants with a previous history of intussusception.
- Infants under 6 weeks of age.
- Infants aged 24 weeks and zero days of age or older,
- Infants with severe combined immunodeficiency (SCID) disorder.

- Infants who have a malformation of the gastrointestinal tract that could predispose them to intussusception.
- Infants with rare hereditary problems of fructose intolerance, glucose-galactose malabsorption or sucrase-isomaltase insufficiency.

The vaccine contains a live attenuated virus, and there is limited evidence of safety and efficacy data in infants with immunosuppression. Other than severe combined immune deficiency, the vaccine may be considered.

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## Further reading

- [Diarrhoea and vomiting in children under 5](#); NICE Clinical Guideline (April 2009; updated October 2022).
- [Parashar UD, Nelson EA, Kang G](#); Diagnosis, management, and prevention of rotavirus gastroenteritis in children. *BMJ*. 2013 Dec 30;347:f7204. doi: 10.1136/bmj.f7204.
- [Gastroenteritis](#); NICE CKS, May 2024 (UK access only)

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