

Rotavirus Infection

A Disease of the Past?



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KEYWORDS

- Rotavirus • Rotavirus vaccine • Rotavirus gastroenteritis • Rotavirus surveillance
- Rotavirus immunity

KEY POINTS

- Rotavirus vaccination had been implemented in national vaccination programs in 77 countries worldwide.
- Rotavirus vaccines have reduced the burden of rotavirus disease in the United States and other high- and middle-income countries.
- The real-world effectiveness data for both vaccines are consistent with efficacy data obtained from clinical trials.
- Herd immunity has also been seen after vaccine introduction.
- Vaccine introduction has led to no significant strain shifts or escape mutants as yet.

ROTAVIRUS DISEASE BURDEN

Rotavirus infection is the leading cause of severe acute diarrhea among children less than 5 years of age worldwide, causing an estimated

- 453,000 deaths each year, with greater than 85% of these deaths occurring in low-income countries of Africa and Asia¹
- 5% of all deaths worldwide¹
- 114 million episodes of gastroenteritis requiring only home care, 24 million clinic visits, and 2.4 million hospitalizations²
- 36% of all diarrhea hospitalizations³

The public health burden of rotavirus was confirmed by the Global Enteric Multi-center Study (GEMS), the first comprehensive global study of childhood diarrheal disease, which was conducted in 7 study sites in sub-Saharan Africa and South Asia.

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Infect Dis Clin N Am 29 (2015) 617–635
<http://dx.doi.org/10.1016/j.idc.2015.07.002>

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GEMS found that rotavirus is the overall leading cause of moderate to severe diarrhea among infants and toddlers less than 2 years of age and a major cause among children less than 5 years of age in these settings.⁴

In the United States before the introduction of rotavirus vaccine in 2006, 95% of children experienced at least one rotavirus infection by age 5 years.⁵ A significant illness burden was attributable to rotavirus gastroenteritis, including an estimated

- 20 to 60 deaths, 55,000 to 70,000 hospitalizations, more than 200,000 emergency department visits, and more than 400,000 outpatient visits annually⁶
- 5% to 10% of all gastroenteritis episodes among children less than 5 years of age⁷
- 30% to 50% of all hospitalizations for gastroenteritis among children aged less than 5 years, and more than 70% of hospitalizations for gastroenteritis during the seasonal peaks of rotavirus disease⁷
- Annual direct and indirect costs of approximately \$1 billion, primarily because of the cost of time lost from work to care for an ill child^{8,9}

CLINICAL ASPECTS OF ROTAVIRUS DISEASE

The clinical manifestations of infection vary and depend on whether risk factors for severe disease are present (**Box 1**). Rotavirus predominantly infects children, but infection also occurs in adults.

Box 1

Risk factors for severe rotavirus disease

Primary infection

- Initial infection after age 3 months is most likely to cause severe diarrhea and dehydration.

Age

- In industrialized countries, severe, dehydrating rotavirus gastroenteritis primarily occurs among infants and children aged 3 to 35 months, although 25% of cases of severe disease occur after 2 years of age.
- In resource-poor countries, the vast proportion of severe rotavirus disease (60%–80%) occurs by 12 to 15 months of age.

Preterm birth

- Most mothers have rotavirus antibody from previous infection that is passed transplacentally, protecting the neonate. As a result, most infected neonates will have asymptomatic or mild disease.
- An exception is the preterm infant, who is at greater risk of severe illness than the term infant because of the lack of transplacental maternal antibodies.

Immunodeficiencies

- Severe and prolonged rotavirus gastroenteritis has been reported in children with T-cell immunodeficiencies or severe combined immunodeficiency, and after bone marrow transplantation.
- Infection of children after solid organ transplantation is usually self-limited but more severe than in healthy children.
- Rotavirus does not seem to be a common cause of severe or persistent diarrhea in individuals with human immunodeficiency virus infection.

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