

ROTAVIRUS IN ASIA
A Special Supplement in the *Journal of Infectious Diseases*
September 2005

SUMMARY OF FINDINGS

Rotavirus is one of the most common causes of childhood death and disease worldwide, claiming the lives of nearly 500,000 children a year.¹ Most deaths from rotavirus diarrhea occur in Asia, with about one-third of all annual rotavirus deaths estimated to occur in the People's Republic of China, India, and Indonesia alone. Rotavirus is the most common cause of severe diarrhea and vomiting in infants and young children, and is more likely than other causes of diarrhea to lead to dehydration and death. Even where improvements in water, sanitation, and hygiene have dramatically lowered the overall incidence of diarrheal diseases, the toll taken by rotavirus remains. New rotavirus vaccines have the potential to improve global child survival and health.

The *Journal of Infectious Diseases* supplement spotlights the recent work of the Asian Rotavirus Surveillance Network (ARSN), which since 2001 has been active in 36 cities and nine countries in Asia. The ARSN—a network of scientists, doctors, institutions, and health ministries—is at the forefront of a new effort to track the disease, determine its extent and diverse strains, and provide governments and vaccine manufacturers with data they need to develop and evaluate rotavirus vaccines. The ARSN has expanded to include new countries in Asia, and continues to work to establish the need for rotavirus vaccines in the region. The supplement is especially timely given that two new vaccines have either recently entered the market or appear on the verge of doing so.

Among the findings reported in the supplement are the following:

Surveillance

- New surveillance shows that the impact of rotavirus on children in Asia is much higher than previously estimated. On average in Asia, rotavirus causes 45 percent of childhood hospitalizations for gastroenteritis. This is almost twice as high as previous estimates and twice as high as rates that have been used to calculate global disease estimates.
- Many of the supplement studies represent new benchmarks in understanding the incidence of rotavirus. In Hong Kong, for example, incidence rates were four-fold higher than that found in previous estimates, and research indicates that the cumulative risk of hospitalization with rotavirus by age five is 1 in 24.

¹ Parashar UD, Hummelman EG, Bresee JS, Miller MA, Glass RI. "Global illness and deaths caused by rotavirus disease in children". *Emerging Infectious Diseases* 2003; 9:565-72.

Economic Burden

- New estimates of the economics of rotavirus disease and vaccination in Asia show that a universal rotavirus immunization program has the potential, each year, to save US \$118 million in healthcare costs in the region. It would avert 93,000 deaths, 1.1 million hospitalizations, and 7.2 million outpatient visits.
- Research in individual countries adds detail to this picture:
 - Research from Japan shows that the average direct medical cost of a single case of rotavirus is 136,000 yen (US \$1,236). Experts estimate that 1 in 15 Japanese children, or 78,000, will require hospitalization due to rotavirus by the age of five—a toll of 10 billion yen (US \$96 million).
 - In Hong Kong, researchers have assessed the total social cost of rotavirus infection to be US \$4.3 million per year. The majority of this social cost (US \$4 million) was the direct medical cost of hospitalizations. Even though Hong Kong's public health care system subsidizes most of the cost of hospitalization, the data shows that, on average, families of unskilled or service workers still spend approximately 10 percent of their monthly income, or US \$120, to pay for their children's rotavirus hospitalizations. Each rotavirus hospitalization was estimated to cost the government over US\$1800.

Trends in Age of Infection

- Data show that children in the poorer countries of the region are hospitalized at younger ages than those in higher income countries. In India and Myanmar, for example, about 80 percent of rotavirus-related hospitalizations occur in children under one year of age, while in Korea, Hong Kong, and Taiwan, only 30 percent of hospitalizations occur in that age group. These trends reinforce the necessity of timely vaccination.

Genetic Diversity of Rotavirus Strains

- Rotavirus strains in the region were more genetically diverse than previously believed. Only 57 percent of the Asian strains analyzed in the past two years belonged to the four most common types worldwide (twenty years ago, these four types represented 90 percent of all globally circulating strains). An accurate understanding of strain diversity will be an important consideration in evaluating the impact of vaccines and in decisions about vaccine introduction.
- A previously emerging strain, G9, accounted for almost 30 percent of all strains detected in Asia. In Thailand, G9 accounted for more than half of all strains identified, and a study in Korea showed 39 percent of strains were G9. In Korea, the globally uncommon G4P6 type was most prevalent at 27 percent.

New Vaccines Are Being Formulated and Tested, including in Asia

- For the first time, a current vaccine candidate has been tested in Asia. A clinical trial of GSK's Rotarix® vaccine in Singapore showed that it was highly effective and well tolerated. A clinical trial in Bangladesh is currently underway.
- RotaTeq™, a pentavalent vaccine developed by Merck, is a bovine-human reassortant vaccine representing more than 80 percent of strains responsible for rotavirus disease worldwide. Clinical trials to date have demonstrated the strong safety and effectiveness of this vaccine.
- A unique project in India is developing a live, oral vaccine based on strains found in Indian newborns more than a decade ago. The vaccine is being clinically tested, and would be produced by an Indian manufacturer, meaning potentially significant cost savings and expedited introduction.
- RV3, a neonatal rotavirus strain, is being developed by BioPharma in Indonesia, in collaboration with University of Melbourne, Australia. This strain has been shown to protect children from rotavirus diarrhea when infected as neonates, and has shown promise when given in clinical trials.

Through offering the newest data on disease burden and strains in Asia, the most recent cost-effectiveness analysis of rotavirus vaccines, and updates on the principal vaccine candidates, the *Journal of Infectious Diseases* supplement provides invaluable information as public health and finance officials evaluate the potential and priority of rotavirus vaccine introduction.