ID CONSULT

Larger-Than-Expected Impact of Rotavirus Vaccine

We're starting to see the first evidence that rotavirus disease rates are going down, perhaps even more than we expected, thanks to the vaccine.

Although rates of both respiratory syncytial virus and influenza were up this past winter, compared with the previous couple of years, it's been very gratifying for the infectious disease community to see, for the first time, a paucity of rotavirus cases.

BY MARY ANNE JACKSON, M.D.

As every practitioner who treats children knows, rotavirus is the most common cause of severe wintertime gastroenteritis among children younger than 5 years. The numbers have stayed consistent: Every year, approximately 3 million children get rotavirus disease, about 700,000 seek health care for it, 250,000 present to the emergency department, 50,000 are admitted, and a small number (20-60) die. A recent analysis from the Centers for Disease Control and Prevention (CDC) showed that the total annual cost to society from rotavirus in the United States (in 2004 dollars) was $893 million, $319 million of which was to the health care system (Pediatrics 2007;119:684-97).

A previous oral rotavirus vaccine—the tetravalent rhesus vaccine, RotaShield—was removed from the market in 1999 because of a detected increase in intussusception after about a half-million children had received one or more doses. In February 2006, Rotateq—a new live, oral pentavalent human-bovine reassortment rotavirus vaccine (Merck & Co.)—was licensed and recommended. I'm excited about preliminary numbers, which suggest that rotavirus immunization may be more successful than predicted.

Here at Children's Mercy Hospital in Kansas City (317 beds/14,000 annual admissions), we test only the sickest children for rotavirus. During the 2006 rotavirus season, we tested 1,009 and got 514 positives (51%). In 2007, we had 686 positives out of 1,271 tested (54%)—not much different. We wouldn't have expected an impact that soon after the vaccine was licensed.

This year, however, we saw a dramatic change. Only 495 children presented with gastroenteritis who were sick enough to prompt testing, and of those, just 93 (19%) were positive. Even more amazing, only 38 children were admitted to the hospital, which represented a 10-fold decrease, compared with previous years. What happened to all our rotavirus cases?

This finding is even more remarkable when you look at how consistent our rotavirus disease rates have been over time. Last year, we combined our rotavirus data for the years 2000-2005 with those from Children's Hospital of Philadelphia (CHOP) from 2004-2006 and reported that approximately half of children admitted with severe diarrhea were tested for rotavirus (47% of 2,552 children at Mercy and 56% of 779 at CHOP). Of those, 71% of our 1,197 and 55% of CHOP's 438 were positive (Pediatr. Infect. Dis. J. 2007;26:914-9).

We haven't changed anything about our testing or admitting practices since those data were collected, which strongly suggests that our new numbers represent a real drop.

Moreover, if you look at the CDC's rotavirus surveillance data (www.cdc.gov/rotavirus), both the national and regional graphs show distinctly lower peaks for 2008 than for the previous two seasons, with the exception of the western region of the United States. It's not clear why that is, but it's possible the western states have different strains circulating and/or more imported cases. While the CDC data are incomplete and don't include the denominator of how many were tested, they still appear to show a strong trend toward fewer cases in the 2008 season.

If nationwide surveillance data continue to bear out what we've seen at my hospital, the vaccine's impact will have far exceeded expectations. In the CDC cost analysis I mentioned earlier, investigators estimated that if vaccine coverage were equivalent to current national estimates for other vaccines such as diphtheria-tetanus-acellular pertussis—which is probably a big overestimate—a routine rotavirus vaccination program would prevent 51% of all cases of rotavirus gastroenteritis and 64% of all serious cases, including rotavirus-related hospitalization and emergency department visits.

Our 86% decrease (93 cases this year vs. 686 in 2007) is far greater than predicted by the CDC's analysis. Although viral shedding of the rotavirus vaccine is nowhere near what we used to see with oral polio vaccine, there is evidence that it occurs. In one study, fecal shedding of vaccine–virus strains was found in 8.9% of 360 recipients after the first dose (Int. J. Infect. Dis. 2007;11[Suppl 2]:S36-42), which raises the question of possible herd immunity.

Now, with the recent approval of Rotarix (GlaxoSmithKline)—another oral rotavirus vaccine that is given in two doses, compared with Rotateq's three—I'm optimistic that there will be more good news in the battle against this common childhood infection. Can you imagine the day when a pediatric resident will not see a hospitalized child who has rotavirus infection during the winter months?

I have no financial relationships with either Merck or GSK. ■

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Nontraditional Pets Pose Increased Risk of Serious Infections

BY DOUG BRUNK
San Diego Bureau

LA JOLLA, CALIF. — Parrots, baby chicks, and turtles may be endearing to young children, but exposure to such exotic and nontraditional pets in the home and in public settings puts children at risk for serious infectious diseases.

"When a child visits your office and has [*Escherichia*] *coli* 0157 or campylobacter or salmonella, a thorough history should be performed to determine whether or not he or she has been exposed to an animal in a public setting or whether [there are] some of these pets at home," Dr. Larry K. Pickering said at a meeting sponsored by Rady Children's Hospital and the American Academy of Pediatrics.

In 2007, about 63% of households in the United States contained one or more pets. Of these, 3% contained exotic or nontraditional pets.

"In 2005, approximately 88,000 mammals were imported legally into the United States, including 29 species of rodents," added Dr. Pickering, executive secretary of the Advisory Committee on Immunization Practices at the Centers for Disease Control and Prevention, Atlanta. "The illegal importation of animals into the United States and worldwide is huge. It's second only to drug and arms trafficking."

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Salmonellosis from turtles, lizards, and other reptiles represents 11% of such infections in people under age 21 years.

Exposure to parrots, parakeets, and cockatiels can lead to *Chlamydia psittaci*, an intracellular bacterial pathogen that causes acute febrile respiratory tract illness. In the United States, there were 12-19 cases per year reported annually from 2002 to 2006, "but the number of cases is probably higher," Dr. Pickering said. If you see a child or an adult with atypical pneumonia, ask if there is a bird in the home. "All birds can spread this infection. Diagnosis is difficult, confirmed only by serology." Treatment involves tetracycline or macrolides.

Contact with baby poultry such as chicks, duckling, goslings, and turkeys increases the risk of developing salmonellosis. Children, the elderly, and immunocompromised people are especially vulnerable (MMWR 2007;56:273-6).

Salmonella can be found in chicken feces, feathers, or their environment. Each year, 1.4 million salmonella infections are reported "but we don't know what percent is due to contact with baby poultry," Dr. Pickering said. "Fewer than 20 hatcheries in the United States provide the majority of baby poultry sold in agricultural feed stores. This is good and bad. It's good because surveillance can be set up easily. The bad part is, if you get salmonella in a flock, an outbreak can be fairly widespread."

He pointed out that that many parents who purchase baby poultry for their children "remain unaware that the bird puts them in contact with salmonellosis and that these little critters will eventually grow to be adults and not be desirable pets."

Certain salmonella serotypes are isolated from specific animals, so if a child presents with salmonellosis, the organism should be serotyped to determine if it is an unusual species. Salmonellosis from turtles, lizards, and other reptiles represents 6% of all salmonella infections in the United States and 11% of infections in people less than 21 years of age (Clin. Infect. Dis. 2004;38:S353-61). Reptiles excrete salmonella in feces while asymptomatic. Dr. Pickering said that reptile-associated salmonellosis "is more likely to be associated with invasive disease, to involve infants, and to lead to hospitalization."

He warned that ferrets, which belong to the weasel family, are unsuitable pets for children younger than 5 years of age. A report from the late 1980s described severe facial injuries to infants from unprovoked attacks by pet ferrets (JAMA 1988;259:2005-6). "Ferrets can be aggressive animals," he said.

The chances of a child acquiring salmonella, *E. coli* 0157 or some other infectious disease at a public zoo are "very low, because most zoos are well maintained," Dr. Pickering said. "Petting zoos can be a problem, as can animal swap meets where children can handle animals and there are no hand-washing facilities on site."

Diseases that have been reported associated with pet store animals include salmonella in hamsters, mice, and rats; rabies in kittens; tularemia and lymphocytic choriomeningitis in hamsters; and monkeypox in prairie dogs.

The American Academy of Pediatrics is developing guidelines for nontraditional pets in the home, Dr. Pickering said.

The CDC advises washing hands after contact with animals, animal products, or their environment, and supervising children younger than age 5 years while interacting with animals. For more information, see MMWR 2005;54[RR04]:1-12 and www.cdc.gov/healthypets. ■

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