



BY MARY ANNE JACKSON, M.D.

## ID CONSULT

# The Paradox of Pertussis

Soon we will be routinely vaccinating our adolescent patients against pertussis. This will certainly go a long way toward reversing the disease's recent upward trend, but there's still more we need to do.

Specifically, physicians must not only consider the diagnosis in every patient with persistent cough, regardless of age, but should begin treatment presumptively in those who meet the clinical case definition—and their close contacts—without waiting for culture results to come back. Indeed, until physicians begin recognizing that pertussis is widely circulating and is serious, we're not going to be able to reverse the increase that has been occurring since the mid-1970s.

There's an odd paradox to pertussis. It's the only vaccine-preventable disease for which rates are rising instead of falling. Provisional data from the Centers for Disease Control and Prevention for 2004 show a record 18,957 confirmed cases of pertussis, a huge jump from the 11,647 in 2003 and the highest number of cases reported in the United States since 1959. Prior to last year, there had been 9,771 cases in 2002; 7,580 in 2001; and 7,867 in 2000. Compare those numbers with the 4,570 reported in 1990 and 1,730 in 1980. The nadir occurred in 1976, with just 1,010 cases.

Yet, this rise has coincided with the proportion of children aged 19-35 months who received all four doses of DTaP vaccine reaching a record high of 85.6%, according to the CDC's June 2003 to June 2004 National Immunization Survey.

Of course, that still leaves about 15% of unimmunized and underimmunized children—many of whom come from pockets in communities where immunization rates lag significantly behind—with the rest having received a vaccine that's only about 85% effective to begin with. Acellular pertussis vaccine efficacy is hard to determine; the best studies suggest that most vaccines are around 85%, which may be slightly less than the old whole-cell formulations, some of which were estimated to be 90% effective.

Part of the problem is that pertussis con-

tinues to be underrecognized and underappreciated as a major public health threat, even though it kills 2 in every 1,000 infants. There were 16 pertussis-related deaths in the 2004 provisional data, 18 in 2003, 22 in 2002, and 15 in 2001. Nearly all were in children under 6 months of age, who had not yet completed the primary immunization series and contracted the disease from undiagnosed adolescents or adults.

Indeed, pertussis is rarely considered by our adult medicine colleagues, even though numerous studies have suggested that pertussis comprises 20%-30% of all cases of persistent cough among adults lasting 2 weeks or longer.

At my center in Kansas City, we had a dramatic increase in confirmed cases of pertussis in children during 2004: 79 cases, compared with an average of 30 per year during 2000-2003, and 20 per year between 1984 and 1999. We diagnosed 26 pertussis cases in the month of December alone, more than the number seen in every previous entire year since 1984. While the proportion of cases in children less than 6 months of age didn't change over time, we did see a statistically significant increase in the proportion among children older than 10 years: 14% in 2004 versus just 1% in prior years.

Hispanic children represented 15% of our cases in 2004, twice as many as in the previous 4 years combined. (Hispanics make up 7% of the population.) Data suggest that foreign-born children may be at particularly high risk for being underimmunized. The percentage of cases receiving state-supported health coverage increased from 50% to 68%, even though studies suggest that children who receive state-funded vaccine tend to be just as well immunized as are privately insured patients. Lastly, children in 2004 were seen in urgent care and emergency department settings more frequently.

Angela L. Myers, M.D., a fellow in pediatric infectious diseases at our institution, conducted an analysis of the medical records of all 79 patients, and compared them with all patients with confirmed pertussis in 2000-2003, with some very interesting results. Although clinical case presentations of pertussis were consistent with previous years, with paroxysmal cough and posttussive vomiting most commonly recorded, the diagnosis had not been con-

sidered on initial presentation in 29%.

These findings, which are similar to other U.S. data, illustrate several important points. Many of these children presented at urgent care settings, in which staff are trained to look for the ill child. But children (and adults) with pertussis typically look and feel fine when they're not coughing. The key is ascertaining a detailed history, including whether the cough is paroxysmal, its duration, and an association with other symptoms including posttussive emesis or whoop.

It's also important to document vaccine status and to identify coughing family members. In most cases an adult, often the mother, is the vector for infection in a young infant.

Vaccine status had not been recorded for 48% of patients aged 2 months or older. Specific information regarding the number of pertussis-containing vaccine doses received was infrequently recorded. Contact isolation was discussed in just 8% of cases, despite the fact that restriction from school attendance is very important in school-aged children. Household chemoprophylaxis had been provided in just 51%, and of those diagnosed where vaccine status could be ascertained, just 10% were appropriate for age.

Attempts to document vaccine status are notoriously difficult as many parents do not carry an immunization card, and obtaining details from a public health de-

partment or primary care office after hours is nearly impossible. A check of the box "vaccines up to date" relies on simply asking the parent who may or may not know for sure the child's vaccine status.

Among those who had been tested for pertussis, correct treatment was prescribed in just 62%. In many cases, therapy was not optimal: In some cases, amoxicillin was prescribed when otitis was concurrently diagnosed, while in others a macrolide was given but in the wrong dose. For pertussis, a correct regimen would be 10-12 mg/kg per day of azithromycin for each of 5 days, as opposed to 10 mg/kg per day on day 1 followed by 5 mg/kg per day for days 2-5 for otitis media.

And we know that pediatricians are often reluctant to write prescriptions for adults, even though pertussis is highly transmissible and the sooner chemoprophylaxis is given, the better the chance to interrupt transmission. An adult with the disease presents a threat to a young infant living in the same household. (The adult dose is 500 mg/day azithromycin for 5 days.)

Indeed, after educating our local pediatricians about treating pertussis presumptively, we have seen a drop in cases thus far in 2005. ■

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## Pertussis Case Definition

### Clinical Case Definition

► A cough illness lasting at least 2 weeks with one of the following: paroxysms of coughing, inspiratory "whoop," or posttussive vomiting, and without other apparent cause (as reported by a health professional).

### Laboratory Criteria for Diagnosis

► Isolation of *Bordetella pertussis* from a clinical specimen or positive polymerase chain reaction (PCR) assay for *B. pertussis*.

### Case Classification

► Confirmed: an acute cough illness of any duration associated with *B. per-*

*tussis* isolation; or a case that meets the clinical case definition and is confirmed by PCR; or a case that meets the clinical case definition and is epidemiologically linked directly to a case confirmed by either culture or PCR.

► Probable: meets the clinical case definition, is not laboratory confirmed, and is not epidemiologically linked to a laboratory confirmed case.

Both probable and confirmed cases should be reported to the local health department.

Source: Centers for Disease Control and Prevention and the Council of State and Territorial Epidemiologists

## Poor Guideline Compliance on First Urinary Tract Infection

BY KEVIN FOLEY  
Senior Writer

Guidelines for treating a first urinary tract infection were not followed in more than half of Medicaid-enrolled infants in Washington State, reported Adam L. Cohen, M.D., and his colleagues at the University of Washington, Seattle.

Although recent studies have questioned the guidelines from the American Academy of Pediatrics, they are "nevertheless generally accepted as recommended care, particularly in high-risk

populations in which medical follow-up is uncertain," Dr. Cohen said (*Pediatrics* 2005;115:1474-8).

Adhering to the guidelines requires three things: anatomic imaging (urinary tract ultrasonography or renal scan within 3 months of diagnosis), imaging for reflux (voiding cystourethrography or renal scan within 3 months of diagnosis), and antimicrobial prophylaxis (antibiotic therapy after diagnosis until imaging for reflux is performed).

In a retrospective cohort study of Washington's Medicaid data, 780 patients

(2.1% of eligible patients in their first year of life) were diagnosed with a first urinary tract infection, and 302 (38.7%) were hospitalized.

Of those who were diagnosed with a urinary tract infection, 28.2% of patients received both anatomic imaging and imaging for reflux, 15.8% received only anatomic imaging, and 11.3% received only imaging for reflux. Of those who received imaging for reflux, more than half (51%) had adequate antibiotics between diagnosis and imaging.

Hospitalization was associated with bet-

ter adherence to imaging recommendations, perhaps because these patients were more acutely ill or because hospitals may have policies in place to ensure guideline compliance, the investigators said. In a controlled, multivariate analysis, hospitalized patients were significantly more likely than were outpatients to get anatomic imaging (relative risk 1.38) and imaging for reflux (relative risk 1.62).

And patients 90 days or younger were less likely to receive antimicrobial prophylaxis than were older patients (relative risk 0.59). ■