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PERTUSSIS: THE COUGH THAT *STILL* WON'T GO AWAY

*Joey, a pleasant 4-year-old male, visits his family doctor after five days of paroxysmal coughing, whooping and posttussive vomiting. The physician swabs for a specimen, prescribes antimicrobial therapy and reports Joey to the local health department as a suspect case of pertussis. Bill, a rather unpleasant 40-year-old male (who occasionally baby sits Joey), visits another doctor after two weeks of spasmodic coughing, posttussive choking, sore throat, and "sweating attacks." The physician, not thinking pertussis (age discrimination?), prescribes empiric therapy with a broad-spectrum antibiotic and a cough suppressant, but does not order any diagnostic tests. Local health department investigators, embroiled in an exploding pertussis outbreak, eventually determine that Bill has pertussis after he is epidemiologically linked to Joey. Unfortunately, in the meantime Bill has visited his three-month-old niece, who is in day care. The wheel turns. Within six months, 143 cases have been linked to Bill through this and similar chains of transmission. Two infants have died, and 41 have been hospitalized.**

* * *

THE PERTUSSIS PROBLEM is not the same as it was in the 1950s—or even the 1970s. Whooping cough, once a common disease of young children, is now a not-so-common-but-still-not-rare disease of older teenagers and adults. This *CD Summary* describes changes in the epidemiology, clinical manifestations and diagnostic testing.

In 1996, 72% of two-year-old Oregonians had vaccine-induced immunity to pertussis.[1] As childhood-specific incidence rates have steadily declined, the proportion of cases among older persons has increased. In 1993 5% of cases were ≥15; by 1997 that proportion was 20%. Because whole-cell pertussis vaccine is only administered to children under seven and because immunity declines to zip within 10-12 years (and because the vaccine is at best only 70% effective), there remains a substantial population of susceptible adults who, like the hapless Bill above, can be infected and go on to unwittingly expose susceptible young children.

A recent study of patients enrolled in an urban health plan showed that 12% of adults with two or more weeks of cough had serologic evidence of pertussis.[2] The same study estimated an incidence rate of 176 cases per 100,000 person years—nearly 100 times the rate of reported cases of pertussis in that age group. Misdiagnosis of adult pertussis cases no doubt accounts for some of this under-reporting.

THE CLINICAL PICTURE

Paroxysmal or spasmodic coughing is common in both children and adults, occurring in 63%-100% of adult cases, and should be a "red flag." Whooping and posttussive vomiting occur in only about 18% of adult cases. Symptomatic adult illness is characterized by tingling or sore throat (31%-44%), facial flushing (21%) and sweating attacks (14%-15%).[3] When presented with this clinical picture, it is prudent to obtain nasopharyngeal specimens (see box), prescribe appropriate antimicrobial therapy, and notify the local health department about the suspected case.

Because of an unfortunate loophole in Oregon reporting laws, diagnostic laboratories are not currently required to report the results of *B. pertussis* diagnostic tests. In other words, pertussis reporting and public health follow-up depend entirely on physician reporting; there is no laboratory back-up. Both lab-confirmed and clinically suspect cases should be reported.

Pertussis is usually treated with erythromycin (2 g/day in four divided doses) for 14 days (the 14 day regimen has been shown to decrease infectivity by 20%).[3] For those who cannot tolerate erythromycin, an alternative regimen, though of unproven efficacy, is trimethoprim/sulfmethoxazole (160 mg/800 mg b.i.d for adults). A small study on the use of clarithromycin and azithromycin (the new macrolides) showed promising results in treating pertussis,[4] but neither drug is currently recommended for treatment by the FDA.

LABORATORY DIAGNOSIS

Culturing the fastidious *Bordetella pertussis* from nasopharyngeal secretions is the "gold standard" for definitive diagnosis of pertussis. Isolation rates are low, however, when specimens are collected after two weeks of coughing (as often happens with adults), when specimens are improperly collected (see box, *verso*), and in laboratories where *B. pertussis* isolation is infrequently performed.[4] Direct fluorescent antibody (DFA) techniques identify the antigens of *B. pertussis* in nasopharyngeal secretions. Recent studies using the highly sensitive polymerase chain reaction (PCR) assay found that DFA techniques produce a high percentage of false-positive results: 85% of DFA-positive, culture-negative specimens obtained during a major Canadian pertussis outbreak were also PCR-negative.[5] Until reagents are developed that do not cross-react or bind with other organisms found in respiratory secretions, and problems related to inter-observer variability are corrected, positive DFA results cannot now be considered indicative of pertussis. The Public Health Laboratory accepts both primary nasopharyngeal swabs for culture and culture isolates for identification. Nasopharyngeal smears for direct fluorescent antibody testing are not accepted.

Although PCR testing is rapid, sensitive (80%-99%) and specific (100%?) method that can provide a definitive diagnosis, it is very expensive and not widely available outside research settings at present.

The principal antigenic components of *B. pertussis* are undetectable several weeks after symptoms begin, but antibodies persist for weeks to years, depending on the patient's disease and immunization history.[6] Substantial progress toward developing antibody detection assays

**Not only have the names been changed to maintain confidentiality , in fact we made up the entire anecdote —sort of like the *Boston Globe.* But it could happen ....*

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(e.g., ELISAs) was made during the acellular pertussis vaccine trials. Serology may be a weak foundation for a pertussis diagnosis, however, as antibodies may reflect an earlier exposure and be unrelated to current illness.[6] In general, definitive serologic diagnosis of pertussis can be done only in specialized research laboratories using an array of assays not generally available to clinicians.

EXECUTIVE SUMMARY

Consider the possibility that older children and adults may have pertussis when they have a history of two or more weeks of spasmodic or paroxysmal coughing. Under such circumstances, it may be prudent for physicians to identify and administer vaccine to infants in the patient's family, and to prescribe erythromycin for other family members. Same-day notification of the local health department ensures identification and vaccination or prophylaxis of case contacts. Prophylaxis prevents secondary cases, severe illness, complications, transmission to susceptible children and so forth in the chain of infection. We want our opening scenario to remain fictional. Of course, all kids should be properly immunized, particularly infants (over 2 months old) who are greatest risk of dying of pertussis. Although the newly developed acellular pertussis vaccine holds promise both to decrease the incidence of infection or colonization in adults, and to protect infants via passive antibody transfer from moms immunized in the second or third trimester, that vaccine is currently licensed only for children. We can anticipate adult pertussis for some time to come.

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Vaccine Information Statements Redux

LET US RETURN briefly to the dreary topic of Vaccine Information Statements (VIS) and their relation to informed consent issues for immunizations. Use of the VIS is a *federal* (as in "if you don't like it don't call us") mandate of the National Childhood Vaccine Injury Act (NCVIA). The VISes provide information about vaccines, including the benefits, risks, and potential reactions associated with each vaccine. According to this *federal* law, all providers—public and private—who administer vaccines covered by the NCVIA (hepatitis B,* Hib,* varicella,* diphtheria, tetanus, pertussis, measles, mumps, rubella, and polio) must give the relevant VIS to the patient (or parent or attorney) every time one of these vaccines is administered. This holds true regardless of whether the vaccine is purchased with public or private funds. To comply with the Act, the VIS gift must be documented in the patient's permanent medical record. No signed receipt is required. The medical record must also include the date of vaccine administration, the manufacturer and lot number of the product, and the provider's name and address.

There is no requirement that VIS duties be performed by the physician; office staff can handle it. Camera-ready copies of the various VISes are available from the OHD Immunization Program (503/731-4020; David Broyles) or can be downloaded at *http://www.cdc.gov/nip/vistable.htm*.

All VIS-related mandates are independent of Oregon state laws requiring informed consent for medical procedures, which include immunizations, brain surgery, and the like. Oregon physicians should follow their standard procedures for obtaining and documenting informed consent for immunizations.

* Added August 1997.

PERTUSSIS SPECIMEN COLLECTION AND TRANSPORT*

- Collect specimens from the nasopharynx (not the throat) with a calcium alginate swab (Calgiswab™).
- Insert the Calgiswab completely into charcoal transport medium (CTM).
- Refrigerate and ship immediately to the Public Health Laboratory, or incubate at 35˚C for 24-48 hours, then ship at room temperature. Call the Lab (503/229-5885) if you have any questions.

**Although probably similar, specimen handling procedures may vary for in-house labs or for shipment to your regular private lab. Check with your lab before you collect specimens.*