

A physician shares the lessons he learned after unknowingly exposing patients and staff to whooping cough.

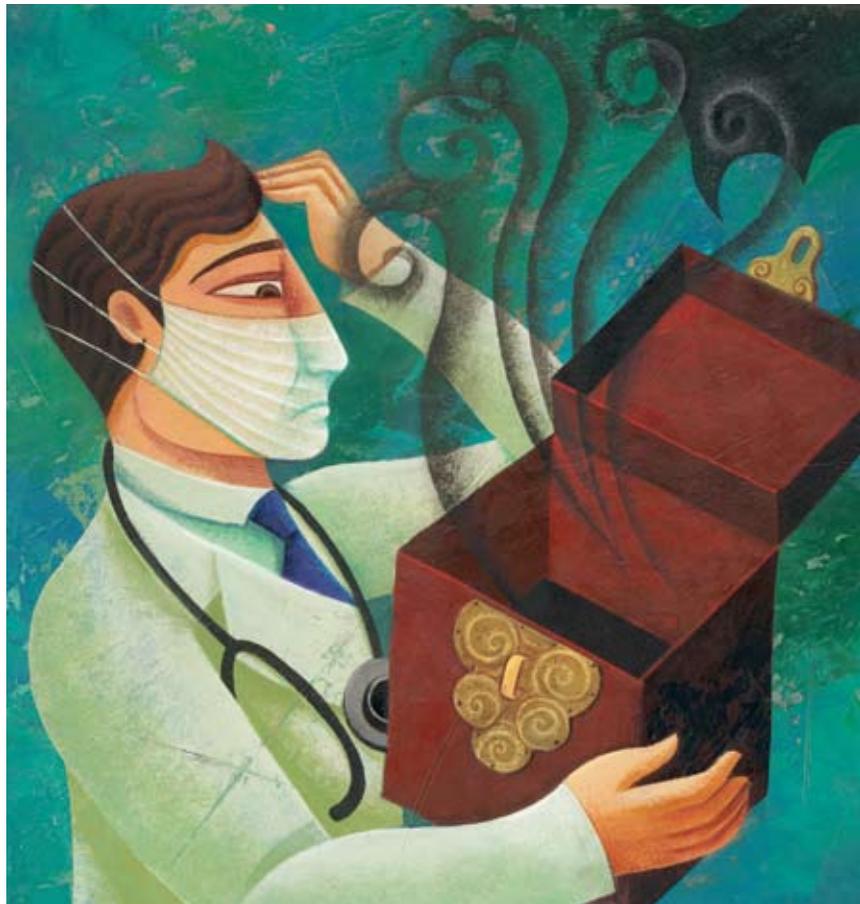
How to Manage a **PERTUSSIS OUTBREAK** *in Your Practice*

Vaccines for measles and polio have effectively reduced those diseases to rarities almost never encountered by today's family physician. In addition, the disease burden of pertussis, like tetanus and diphtheria, has been dramatically reduced in the United States through relatively high immunization rates with efficacious vaccines. Contrary to the perception of many physicians, however, waning pertussis immunity in adults and adolescents means that whooping cough is not a relic of the past.

Our practice was reminded of this recently when I became the index case in a community-wide pertussis outbreak. In the time before I started antibiotics and was diagnosed, I continued to fulfill my duties, as most mildly ill but committed physicians would have done. I saw patients at the office, rounded at the hospital and taught medical students, despite an increasingly intrusive cough. Although I had a polymerase chain reaction (PCR) for pertussis sent off, it wasn't until I found myself coughing one night and heard a single, questionable "whoop" that I began to seriously suspect pertussis. Even then, I didn't fully comprehend the implications of this, nor did my partners. I began to mask before examining children and awaited my PCR results.

The test returned positive, and our medical director contacted the state health department, which recommended that I stop seeing patients until I had been on five

Michael P. Flanagan, MD, FAAFP



Dr. Flanagan practices in State College, Pa., and is an associate professor of family and community medicine with the Penn State College of Medicine's Milton S. Hershey Medical Center. Kathleen Julian, MD, who recently finished a fellowship in infectious diseases at the Milton S. Hershey Medical Center, was consulted in this article's preparation. Conflicts of interest: Dr. Flanagan serves in the men's health division of the Pfizer Speaker's Bureau.



The U.S. rate of pertussis, or whooping cough, is on the rise after having dropped 99 percent from the mid-1940s to 1976; the number of cases reported in 2004 was 18,957.



When a physician in Pennsylvania was diagnosed with pertussis, his office quickly developed a strategy for contacting and screening the more than 300 people he had exposed.



The office contacted exposed patients by phone or in person.



The office was most concerned with getting in touch with the parents of infants less than 6 to 12 months of age, pregnant patients and patients with small children.

full days of an appropriate antibiotic. At that point, I had already taken azithromycin for three days. This meant that I had to stop seeing patients for two full days, including my 8 a.m. patient who was already waiting for me in the exam room. The health department also recommended that our office follow up with and treat prophylactically all the patients and nonpatients I had contacted since my symptoms began. With that advice, we were initially on our own to deal with the situation, though a public health nurse was briefly sent to our office the following week to monitor our progress.

As a primary care physician in a busy five-provider office, I had exposed more than 300 people, all of whom needed to be contacted, screened for pertussis symptoms, and prophylaxed or treated. The prospect was daunting, but it was only after making 10 to 20 phone calls that the gravity of the situation became clear. A “Concise Guide to Dealing With a Pertussis Outbreak in a Primary Care Office” would have been a valuable commodity at that point. Instead, we found lengthy and sometimes conflicting information from the Internet, printed materials and verbal sources that we investigated. Nevertheless, in the end we were highly successful in preventing a potentially large outbreak from starting in our office, although this success came at the price of large amounts of time and energy.

The onset

I had begun the catarrhal (i.e., nasal congestion) stage of pertussis on Oct. 11, 2004. I was sure of this date because my wife had noted in her diary that I was “coming down with a bug” that day. This onset date became particularly important because it established the start of my infectious period and determined the number of patients we would need to contact and treat. I initially underestimated the onset of my symptoms by three to four days. Like many health care providers, I wasn’t significantly concerned with typical viral symptoms in myself. The diary entry, therefore, became a key part of the epidemiological data.

Because the highest morbidity and mortality associated with *Bordetella pertussis* is seen in infants less than 6 to 12 months of age, my office was most concerned with contacting this group, along with pregnant patients and patients with small children at

KEY POINTS

- The incidence of pertussis in the United States continues to rise as immunity in adults and adolescents wanes.
- Family physicians need to think about how they would respond if someone in their practice became the index case in a pertussis outbreak.
- Defining treatment options is a critical part of pertussis outbreak management.

home. Before the mid-1940s, when whole-cell diphtheria-tetanus-pertussis (DTP) vaccine was first introduced, the United States averaged more than 160,000 pertussis cases annually and more than 5,000 pertussis-related deaths each year.¹ Most of these deaths were in children less than 6 months of age, with bacterial pneumonia being the most common complication.

After routine immunizations began, however, the pertussis rate dropped 99 percent by 1976.¹ Nevertheless, between 1980 and 2000 the incidence of pertussis in the United States quadrupled.² The number of cases reported was 11,647 in 2003 and jumped to 18,957 in 2004.^{3,4} Our practice had become part of this surge in new cases.

Screening and treatment

We dedicated our office manager and two of our six nurses to focus on the administrative task before us. Conversations with key staff at our hospital about medicolegal concerns convinced us that we needed to contact each patient individually by phone or in person, not by mail as we had originally planned.

On the first day of outbreak control, Oct. 23, we began calling patients and recording our conversations in the chart. Our initial progress was slow, making it apparent that it would take longer than anticipated to contact the patients represented by the charts surrounding us. These charts had been pulled based on lists of patients whom I had seen during the 12 days since the onset.

To facilitate the process of identifying patients who had pertussis symptoms, I created a template that we used to screen the patients we contacted. This form (see opposite page) documents the following: symptoms, drug allergies, contraindications to treatment, and prophylactic treatment provided or recommendations to be seen

immediately for testing and treatment. Any patient who was symptomatic was seen and evaluated, after being masked upon entering the office. If appropriate symptoms were confirmed at the visit, the patient was tested for pertussis and advised to avoid close contact with others during treatment.

Our medical center's infectious diseases team recommended PCR testing on symp-

tomatic patients. This method provides relatively rapid results and is useful even when patients have already been treated with antibiotics, which is not the case with culture. Nevertheless, culture is still considered the gold standard for diagnosing pertussis because it is 100 percent specific. Sensitivity varies significantly, however, ranging from greater than 50 percent under ideal condi-

PERTUSSIS SCREENING FORM

This form can be used by both doctors and nurses throughout the process of contacting and treating patients who might have been exposed to pertussis. Patients are first contacted by phone. Any who are symptomatic are seen and evaluated. If appropriate symptoms are confirmed during the visit, the patient should be tested for pertussis and advised to avoid close contact with others during treatment.

Patient name: _____

Date: _____ Date of birth: _____

Inform patient of exposure. Review chart.

Is patient newly symptomatic (congestion, runny nose, fever, cough) since the exposure?

No

Yes Describe: whoop/paroxysmal/prolonged cough/
post-tussive emesis/apnea/other:

Note time of onset: _____

Recommend medical evaluation/treatment.

Was anyone else with patient in the exam room at time of visit?

No

Yes Name: _____

Not our patient: Refer for preventive treatment.

Our patient: Pull chart and schedule patient for treatment.

Document in patient's chart.

Inform patient of treatment options.

Does patient have antibiotic allergies?

No

Yes List: _____

Select prophylactic treatment:

Biaxin XL 500 mg: Two tablets by mouth every day for 14 days.
Disp#28 Ref#0

Erythromycin 500 mg: One tablet by mouth every 6 hours for 14 days. Disp#56 Ref#0

Septra DS (TMP = 160 mg per tablet): One tablet by mouth twice daily for 14 days. Disp#28 Ref#0

Zithromax Zpack: As directed for 5 days. Disp#1 Ref#0

Second-line therapy:

Doxycycline 100 mg by mouth twice daily for 14 days.
Disp#28 Ref#0

Levaquin 500 mg: One tablet by mouth daily for 7 days.
Disp#7 Ref#0

Pediatric dosing:

Weight = _____ kg

Biaxin suspension: 15-20 mg/kg/day orally, in 2 divided doses for 7 days. (Maximum 1 g/day)

Erythromycin estolate: 40-50 mg/kg/day orally, in 4 divided doses for 14 days. (Maximum 2g/day)

Septra/Bactrim suspension: 8 mg/kg/day (based on TMP) orally, in two divided doses for 14 days.

Zithromax suspension: 10-12 mg/kg/day orally, once daily for 5 days. (Maximum 600 mg/day)

Pediatric Rx:

Call pharmacy: _____

Caution patient to be checked if symptoms develop.

Answer patient's questions.

Caller signature _____

Provider signature _____ MD/CRNP



Any patient who was newly symptomatic since the exposure was brought into the office for evaluation.



If pertussis symptoms were confirmed during the visit, the patient was tested and advised to avoid close contact with others during treatment.



The author's medical office was advised to use PCR testing, while other local medical offices elected to use culture testing.



In the end, no confirmed pertussis cases arose from direct exposure to the author.

tions to less than 20 percent.² The organism is quite fastidious and must be kept alive after sampling to allow for growth on culture media. Variables that decrease culture sensitivity include delays in direct plating of specimens, use of transport media before direct plating, delays in obtaining the specimen beyond two weeks of illness, sampling patients already treated with antibiotics, or culturing previously vaccinated patients. The result is a potentially high false-negative rate and continued spread of the illness. Culture does, however, have a significant

were not available on the first call and organizing charts as patients were reached and taken off our contact list. Having a close doctor-patient relationship with most of these patients facilitated this process.

In the end, we were able to document that no confirmed pertussis cases arose from direct exposure to me, although more than 100 unrelated, community-acquired cases were diagnosed by local physicians during the weeks that followed.

It was not until two months after my own illness that I was able to identify where

I had exposed more than 300 people, all of whom needed to be contacted, screened for pertussis symptoms, and prophylaxed or treated.

cost advantage. Consequently, other local medical offices elected to use culture rather than PCR testing.

Defining treatment options became a critical part of the pertussis outbreak management. With the help of our Hershey Medical Center phone consultants, we identified first- and second-line antibiotic therapy. Data exists for using erythromycin and the other macrolides, as well as trimethoprim/sulfamethoxazole. However, for patients allergic or intolerant to these, we were advised to offer doxycycline or levofloxacin as alternatives to no treatment. The recently released ketolide, telithromycin (Ketek), was also thought to be effective based on in vitro studies, but we did not offer it because of limited practical experience with this new drug.

A final word

After working steadily for four days, including most of a weekend, we were able to contact more than half of the people I had unknowingly exposed. We also notified other local physicians regarding the outbreak, sharing disease management information when appropriate.

Assistance from our hospital's two infectious disease nurses and our office nursing and medical staff, all of whom worked long hours, allowed us to contact all high-risk patients within 48 hours. Subsequently, we dedicated one office nurse to spend the next week making follow-up phone calls to patients who

I had contracted pertussis. My exposure likely came from a 13-year-old neighbor who was eventually designated a confirmed case based on epidemiological data, and not from a patient I had failed to diagnose. I had driven my neighbor and three other students home from a church activity two weeks before developing symptoms. Spending 45 minutes in the car together, with her coughing frequently in the passenger seat beside me, produced an adequate exposure.

It was an event that went on to become quite a learning experience, not the least of which occurred very recently, when one of my Asian patients shared the Chinese term for pertussis: the one-hundred day cough. **FPM**

Send comments to fpmedit@aafp.org.

1. Pertussis disease: questions and answers. Centers for Disease Control and Prevention. Available online at <http://www.cdc.gov/nip/diseases/pertussis/faqs.htm>. Accessed June 13, 2005.

2. Brisgard K. *Guidelines for the Control of Pertussis Outbreaks*. Chapters 1 & 2. Atlanta, Ga: Centers for Disease Control and Prevention; 2000.

3. Centers for Disease Control and Prevention. Notice to readers: final 2003 reports of notifiable diseases. *Morb Mortal Wkly Rep*. 2004;53:687.

4. Centers for Disease Control and Prevention. Notifiable diseases/deaths in selected cities weekly information. *Morb Mortal Wkly Rep*. 2005;53: 1213-1221.