



Pertussis (Whooping Cough)

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Pertussis, commonly known as whooping cough, is a highly infectious disease of the respiratory tract caused by the bacterium *Bordetella pertussis*. In a young child it can be very serious and may cause pneumonia, apnea, seizures, cerebral hemorrhage, and even death. Newborns and infants not yet immunized are at the highest risk for serious infection and complications. Other people at risk include young adults who were not immunized as children or whose immunity from the vaccine routinely given in childhood has waned.

Three Stages of Pertussis

The course of pertussis involves three stages. Each stage lasts an average of 2 weeks. The usual incubation period is 7 to 10 days.

Catarrhal stage

Stage I is the catarrhal or “cold-like” stage. This usually begins with mild cold symptoms: sneezing, runny nose, tearing, and mild conjunctival infection. Later in this phase, a mild cough develops and soon becomes worse. The pertussis bacteria is most easily spread from one person to another during the first stage.

Paroxysmal stage

Stage II is the paroxysmal or “coughing” stage. During this stage, the cough becomes harsh, dry, and irritating. Spasms of sudden coughing happen in clusters or repetitive bursts, lasting 10 to 20 seconds. These episodes often end with a deep breath that causes the characteristic “whooping”

sound. Vomiting, cyanosis, and exhaustion often follow these bursts of coughing.

Paroxysmal coughing is more common at night but can happen several times a day to several times an hour. External stimuli (cold air and smoke) and internal stimuli (stress) can trigger the episodes. The paroxysmal stage usually lasts 1 to 2 weeks but may last 4 weeks or longer.

Convalescent stage

Stage III is the convalescent or “recovery” stage, normally lasting several weeks. The cough becomes milder and less frequent during this phase. If a person develops an upper respiratory infection such as bronchitis during the third stage, the paroxysms will increase. Despite the cough, people are usually not infectious at this point in the course of the disease.

In older children and adults, the disease may be somewhat milder or atypical, sometimes with only a cough that lingers for several weeks.

*This exuberant boy is flexing his muscles for our photographer in the parking lot of the motel where he lived with his mother and two brothers for one year.
Photo by
Stephen Savoia*

Transmission

Pertussis spreads by direct contact with secretions from the nose or throat of an infected person, or by breathing the droplets dispersed in the air when an infected person coughs.

Pertussis most easily passes between people in the initial catarrhal stage of illness, often before diagnosis. While the organism can spread throughout the course of illness, the degree of infectivity decreases with time and depends on environmental conditions, such as crowding and ventilation.

Diagnosis

Diagnosis of pertussis depends on a patient's history and a physical examination. Caregivers should suspect pertussis in anyone with:

- a new cough lasting 14 days or more; or
- a cough followed by vomiting that lasts 7 days or more.

A confirmed diagnosis depends on culturing secretions from the nose and throat in the early stages of the disease. Culturing must be done on media that specifically supports the growth of *Bordetella pertussis* organisms. The local or state health departments can provide information about obtaining these kits. People on antibiotic therapy and those who have been ill for several weeks are less likely to have positive cultures.

In addition, a blood test to detect antibodies to pertussis is available on a limited basis and can be used for diagnosis.

Treatment

A person diagnosed with pertussis needs strict respiratory isolation for 5 days from the initiation of antibiotic treatment. Staff should not admit infected children to a shelter until they have completed 7 days of medication. If antibiotic treatment is impossible, the patient should remain isolated until 3 weeks after the onset of paroxysms.

Young children need careful management because the paroxysms may make feeding and breathing difficult. Also, thick mucous in the nose and throat can block the airways. Some children may need frequent suctioning to remove the mucous. In cases with severe complications, such as respiratory distress or dehydration, hospitalization may be required.

For children and adults, the antibiotic of choice is erythromycin (E-mycin™, Eryc™). However, for those individuals unable to tolerate erythromycin, newer macrolides, such as clarithromycin (Biaxin™) and azithromycin (Zithromax™), may

be as effective as erythromycin and have fewer adverse side effects and better compliance. The course of the illness may be less severe if the patient receives antibiotic treatment during the incubation period or early in the catarrhal stage (stage I). Treatment begun after the paroxysmal stage (stage II) does not change the course of the illness. However, antibiotic treatment after stage II will prevent further spread of the disease by killing the remaining bacteria in the body.

The dose of erythromycin estolate is 40-50 mg/kg/day, orally, divided into 4 daily doses for 14 days. The maximum daily dose is 2 grams. The dose of clarithromycin is 15-20 mg/kg/day, orally, divided into 2 daily doses for 7 days. The maximum daily dose is 1 gram. The dose of azithromycin is 10-12 mg/kg/day, orally, as 1 dose daily for 5 days. The maximum daily dose is 500 mg.

Prevention

Immunization with pertussis vaccine is the most important measure to prevent the spread of the organism. Immunization is particularly important for young children in whom the disease is likely to be most severe.

The pertussis vaccine is a combination of diphtheria and tetanus toxoids and acellular pertussis in a single shot called DTaP. The recommended immunization series consists of 5 doses. Infants usually receive the first dose between the ages of 6 and 8 weeks. Additional doses are given at 4 months and 6 months of age. The fourth dose comes at 18 months of age, completing the primary series. Children receive the fifth dose between the ages of 4 and 6 years. This schedule may need modification for children who have not followed a normal immunization schedule. (For more information, refer to the immunization schedules in Part 5.) Pertussis vaccine is not usually recommended for those over 7 years of age.

The rates of local reactions (erythema and induration at the injection site), fever, and other common systemic symptoms (drowsiness, fretfulness, and anorexia) are substantially lower with acellular pertussis vaccines than with the whole-cell pertussis vaccines. Rare, potentially more serious adverse events associated with the older DPT, such as seizures, have been found to occur less frequently after DTaP. The decision to give pertussis vaccine to infants and children with underlying neurologic disorder is difficult and must be made on an individual basis, after careful consideration of the risks and benefits. Deferral of pertussis immunization

should be considered in infants and children known to have, or suspected of having, an unstable or evolving neurological disorder that may predispose the child to seizures or neurological deterioration. The Red Book outlines the different categories of neurologic disorders and relevant recommendations.

Control

Caregivers should report suspected and confirmed cases of pertussis to the local health department, which can provide information about control measures.

When there has been an outbreak of pertussis in a community or shelter, the health department or consulting pediatrician may decide to begin DTaP vaccine schedule as early as 2 weeks of age with subsequent doses given as often as every 4 weeks. Generally, 3 doses will provide protection from the disease in 80% of children.

Close contacts under 7 years of age who have had at least 4 doses of vaccine should receive a booster dose unless they received a dose in the past 3 years. Children under 7 years of age with no history of DTaP vaccine or with less than 4 doses of DTaP should begin the vaccination schedule or continue on schedule.

In addition, appropriate antibiotic treatment in the dosages described above is recommended for all household contacts and other close contacts. This is because vaccine-induced immunity does not prevent disease in all cases. Also, older children and adults may develop a very mild case of pertussis that may still be transmitted to others.

All contacts to a case of pertussis should be watched closely for respiratory symptoms (sneezing, runny nose, tearing, conjunctivitis, and later, a mild cough) for 2 incubation periods (28 days) after the last exposure. New suspected cases should be promptly referred to a health provider for evaluation.

Special Considerations for Homeless Populations

Family shelters

Pertussis can create considerable problems in a family shelter, because children under 12 months are at greatest risk of infection and complications.

Anyone exposed to an infected person for more than one hour in a close setting (play group, dining area, etc.) is a close contact. These people will need antibiotic prophylaxis, as discussed above, to prevent them from developing pertussis.

The recommended course of treatment for pertussis is 14 days. After the first 7 days of

antibiotic therapy, infected people (including close contact with symptoms after exposure to an active case) no longer pose a risk to other guests or staff. Close contacts who do not show symptoms are not considered infectious.

This 7-day period of infectivity during treatment presents a special problem for group settings. The average time from exposure to the onset of disease is only 7 to 10 days. Usually an exposed person will not have had time to complete 7 days of antibiotics before beginning to show symptoms. This person may then be able to spread infection to others, creating another group of close contacts.

One solution is the provision of separate accommodations for all identified close contacts during the first 7 days of preventive treatment. This is often impractical. Therefore, staff and guests who will spend more than one hour with any close contact during the first 7 days of prophylaxis will also need to take antibiotics.

A shelter should not discharge a close contact to another shelter or group setting until completion of at least 7 of the 14 days of prophylactic therapy.

Adult shelters

In larger adult shelters, prophylaxis of all guests is clearly an impractical solution. Targets for prophylaxis should include adults and children who have shared indoor airspace with a confirmed case for at least 10 hours per week or more while the person was considered contagious. Caregivers should also consider treatment for close contacts who interact with children of any age. Prophylaxis is especially important for anyone who has contact with children under 12 months and those who have not had at least 3 doses of pertussis vaccine.

Summary

Pertussis or whooping cough is a serious infection that primarily affects the upper respiratory areas. It is spread by direct contact with infected secretions from the nose or throat or by breathing infected droplets in the air where an infected person has coughed.

Generally, pertussis begins with symptoms like a cold. The illness progresses with a cough that becomes dry and harsh and occurs in bursts especially at night. The person may turn blue while coughing. The episode may end with a large intake of air that sounds like a whoop. Vomiting and exhaustion can follow these events. Older people infected with pertussis may have a less serious illness.

Complications are greatest in children under one year and include serious problems with the lungs or brain.

Treatment of pertussis requires antibiotics and supportive care. Strict respiratory isolation is necessary for the infected person until 5 days after antibiotics have been started.

Pertussis can be prevented through the routine vaccination of children.

People of any age who have been exposed to an infected person should also see a health provider for preventive therapy with antibiotics.

The local board of health or appropriate health agency must be informed of any person who has been diagnosed with pertussis as soon as possible. The agency can also provide information about the risk to the rest of the shelter guests and staff and can help with instituting control measures. ■■

Pertussis Medication List		
Generic	Brand Name	Cost
erythromycin	E-mycin, Eryc	\$
clarithromycin	Biaxin	\$\$\$
azithromycin	Zithromax	\$\$

References

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