

Whooping Cough: An Introduction to Pertussis

1.0 Contact Hour

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An Introduction to Pertussis (Whooping Cough)

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Objectives

1. Define pertussis and name the organism responsible.
2. Explain why the incidence of pertussis has increased since 1980.
3. List and explain the three stages of a pertussis infection.
4. List the possible complications of a pertussis infection *other* than pneumonia.
5. Explain the manner of transmission of the pertussis organism.

Whooping cough, also known as pertussis, is a highly contagious respiratory disease caused by the bacterium *Bordetella pertussis*, a gram-negative coccobacillus. Pertussis causes a severe cough with little or no fever and can become severe enough to cause vomiting or gagging. Some of those infected make a “whooping” sound when they breathe in after coughing, thus the name “whooping cough”. Pertussis continues to be a significant cause of death and illness among nonimmunized infants. Though immunization programs have been successful in reducing the incidence of the disease in children and infants, waning immunity in adolescents and adults can allow the transmission of the disease to unimmunized infants;¹ however, new adult- and adolescent-formulated combination diphtheria, tetanus toxoid and pertussis (DTaP) vaccines will soon be available in the United States.² This should be helpful in decreasing the incidence of pertussis because numerous studies have shown that adults and adolescents provide a reservoir of *B. pertussis* and are the major source of transmission to partially immunized infants and children.^{3,4,5} Pertussis is still common in areas of the world where vaccine use is low; recent studies suggest that there are presently about 48.5 million yearly cases of pertussis worldwide, with as many as 295,000 deaths.³

Pertussis follows a cyclic pattern, peaking at 2-to-5-year intervals.⁶ Many adults believe pertussis disappeared with polio and diphtheria; however the incidence of

pertussis has gradually increased since the early 1980s. Before the availability of the pertussis vaccine in the 1940s, more than 200,000 cases of pertussis were reported annually. Since the introduction of the vaccine, the incidence of the disease has decreased by more than 80% compared to the prevaccine age.⁷ Almost 26,000 cases were reported in the United States in 2004, the largest number since 1959, however, the cause of the increase is not clear.⁸ The disease is now being seen more and more in older age groups, particularly in adolescents and adults. Household-contact studies have indicated that infection without illness is common; this suggests that frequent exposure keeps the antibody levels in many persons at protective levels, with illness only occurring when the level of antibody falls below a certain threshold and then exposure occurs.^{9,10}

Symptoms of Pertussis

Symptoms of pertussis usually appear between 6 to 21 days after exposure to an infected person. Throughout the course of the disease, fever is minimal.

The course of the disease is divided into three stages:⁸

- Stage 1 (the catarrhal stage): symptoms resembling a common cold begin, such as a runny nose, headache, sneezing, low-grade fever and a mild, occasional cough. The cough gradually becomes more severe, and after 1 to 2 weeks, the second stage begins.
- Stage 2 (the paroxysmal stage): The patient has bursts (paroxysms) of numerous, rapid coughing fits. At the end of the paroxysm, a long inhalation is accompanied by a high-pitched whoop. During such an attack, the patient may turn blue. Children and infants in particular appear very ill and in distress. Vomiting and exhaustion commonly follow these episodes. The child usually appears normal between attacks. It is at this point when the diagnosis of pertussis is suspected.

Paroxysmal attacks usually occur more frequently at night, averaging 15 attacks per 24 hours. During the first or second week in this stage, the attacks occur more frequently, remain at the same level for 2 to 3 weeks, then gradually decrease. The paroxysmal stage usually lasts 1 to 6 weeks, but may persist up to 10 weeks. Infants younger than six

months-old may not have enough strength to make a whooping sound, but they do have the paroxysms of coughing.

- Stage 3 (the convalescent stage): The cough becomes less paroxysmal and disappears in 2 to 3 weeks; however, paroxysms often recur with subsequent upper respiratory infections. These paroxysms can occur many months after the onset of the initial pertussis infection.

Complications

Young infants are at highest risk for acquiring pertussis-related complications. The most common complication, and the cause of most pertussis-related deaths, is bacterial pneumonia, most likely due to the child just becoming worn out from coughing. Data from 1997-2000 indicate that pneumonia occurred in 5% of all reported pertussis cases, and in almost 12% of infants less than 6 months-old.⁷

Neurological complications, such as seizures, can develop as a result of the low oxygen level to the brain that may occur during the fits of coughing. Other complications such as hypoxia, apnea, ear infections, malnutrition and dehydration can occur. During the paroxysmal coughing, pressure effects, such as pneumothorax, epistaxis, cranial hemorrhage, hernias, subarachnoid and intraventricular hemorrhage, subdural and spinal epidural hematoma, ulcer or laceration of the frenulum of the tongue, melena, subconjunctival hemorrhage, rupture of the diaphragm, umbilical and inguinal hernia, rectal prolapse and rib fracture can develop.¹¹

Among persons of all ages with pertussis during 2004-2005, there were 66 deaths; children 3-months-old or less accounted for 85 % of these deaths.⁷

Prevention

Pertussis, like many other respiratory diseases, is spread through droplet spray from the mouth and nose when an infected person coughs, sneezes or speaks. These droplets then enter the uninfected person's respiratory tract - the individual is now infected.

Pertussis is preventable through proper immunization. Unimmunized or inadequately immunized people are at the highest risk of becoming infected with pertussis. Although the immunizations may not be 100% effective, the immunization significantly reduces the severity of the disease. Adults 19-to-64 may receive a booster shot if any doubt exists that the person received the full complement of shots as a child.¹² All children should have five doses of the DTaP vaccine by the time they are seven-years-old. The shots are usually given at two, four, six and 15-18 months old, and another between four- and six- years-old; however, each state will have its own shot schedule.

Side effects of the vaccine are minimal: about 25% of children may get a fever, redness and soreness at the site of the injection. About 1/3rd of children may have some fussiness after the shot.

Treatment

According to the American Academy of Family Physicians Practice Guidelines (updated July 15, 2006), erythromycin, clarithromycin (Biaxin), and azithromycin (Zithromax) are preferred for the treatment of pertussis in persons one month and older. In those younger than one month, the use of erythromycin and clarithromycin is not recommended, and azithromycin is preferred. For patients two months and older, an alternative agent, trimethoprim/sulfamethoxazole (Bactrim, Septra), is available.⁷

Any person diagnosed with pertussis should stay home and avoid contact with others until after they have been on antibiotics for five days. Anyone exposed to a person with a known case of pertussis should contact their health care provider; the exposed

person may receive a pertussis booster shot and possibly put on a short course of antibiotics to prevent the disease.⁷ The family should also be expected to be questioned by the public health authorities because, in most states, the health care provider is required to report the disease to public health officials.

Pertussis is making a comeback, and all health care providers need to be aware of this problem to minimize and hopefully control further outbreaks of the disease.

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