Pertussis: Recent California Outbreak and Issues of Assessment, Prevention, and Treatment
by Margaret A. Fitzgerald
DNP, FNP-BC, NP-C, FAANP, CSP

The deaths of five infants in California have been linked to a recent outbreak of pertussis. The acute illness, also known as whooping cough, is caused by the bacterium *Bordetella pertussis*, an aerobic gram-negative rod. The outbreak, now an estimated 910 cases, has been deemed an epidemic. The five children shared common characteristics; age less than three months and Latino ancestry. Low inoculation rates in agricultural regions of California are likely a contributing factor for the high number of cases of the disease. Residents of California, particularly those from the Latino community, have been urged to become vaccinated against the disease. Sadly, pertussis is the only vaccine-preventable disease that is increasing in prevalence in North America.

Prior to widespread use of the vaccine, available since the 1940s, more than 200,000 cases of this infection were reported annually in the United States. In developing countries with low levels of immunization against pertussis, this illness causes at least 250,000 deaths per year. In North America, the incidence of pertussis infection has dropped dramatically in the post-vaccine era; however, this disease remains a significant public health threat with increasing number of cases appearing in the past two decades, usually in 3 to 5 year cycles with peak occurrence between June and September.

*Bordetella pertussis* transmission most commonly occurs through contact with respiratory droplets and less commonly through contact with recently contaminated

(Continued on page 4)
Methicillin-Resistant Staphylococcus aureus (MRSA) Mastitis
by Marie L. Bosco, BSN, RNC, IBCLC

Mastitis is a breast infection that affects approximately 9.5% of breastfeeding women. Risk factors for mastitis include cracked nipples, incomplete breast emptying either by infant or pump, previous history of mastitis, and recent use of antifungal nipple cream. There is also speculation that first time mothers are at increased risk for mastitis. Clinical symptoms of this illness include unilateral breast pain, erythema, fever, and flu-like symptoms. Frequent and complete breast emptying is imperative to recovery. Breastfeeding is not contraindicated during this infection and should be continued. Mothers attempting to wean should maintain lactation until the infection is resolved. Supportive care includes rest and analgesics.

Staphylococcus aureus is a common cause for mastitis and has historically responded well to antibiotics such as dicloxacillin, cephalaxin, and amoxicillin/clavulanic acid; these antibiotics are effective against the methicillin-sensitive form of this ubiquitous organism. However, methicillin-resistant Staphylococcus aureus (MRSA) has become a prominent pathogen causing mastitis in the United States. A 2007 study conducted by Pavani Reddy found that as many as 44% of cultured Staphylococcus aureus mastitis infections was positive for community-acquired MRSA. This incidence is also rising in women who experience breast abscess complications. Antibiotics of choice when this MRSA is identified include clindamycin and trimethoprim/sulfamethoxazole; when parenteral therapy is indicated, parenteral vancomycin and linezolid are options. Mothers can continue to breastfeed during treatment as long as the antibiotic’s use is not contraindicated to nursing. Some antibiotics are considered safe for use while breastfeeding but may cause the infant gastrointestinal upset such as vomiting and diarrhea. If the antibiotic’s use is contraindicated during lactation, continued frequent and complete breast emptying is recommended.

The incidence of MRSA infection is rising in the community. Healthcare professionals caring for lactating women should consider the possibility of MRSA when mastitis is diagnosed and does not respond to traditional antibiotic therapy.

References:


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Update on Events for 2010 and 2011
By Marc W. Comstock, CEO
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items from an infected person. The incubation period is usually 7 to 10 days (range=4 to 21 days, rarely as long as 42 days). Pertussis is highly communicable, as evidenced by secondary attack rates of up to 80% reported among susceptible household contacts.

The clinical course of pertussis is divided into three stages.

1. **The catarrhal stage**
   The illness is quite similar to the common cold and is characterized by upper respiratory tract infection complaints including nasal discharge, sneezing, low-grade fever, and an intermittent cough. Conjunctival irritation and tearing is also common. The person with pertussis is highly infectious during the catarrhal stage, a period of time that lasts about 1 to 2 weeks but occasionally as long as 3 weeks.

2. **The paroxysmal stage**
   At the onset of this stage, the person with pertussis appears to have a lingering cold. However, while the nasal symptoms are usually resolved, the cough worsens as the pathogen has attached to the respiratory tract tissue and begun to produce toxins that cause ciliary paralysis. Consequently, inflammatory changes in the airways ensue. The result is an inability to normally clear the airways and a resulting stagnation of pulmonary secretions. Paroxysms occur, with numerous, rapid coughs as the airways attempt to mobilize and expel thick sputum. An episode of paroxysmal cough is followed by a long inspiration with a characteristic whooping sound. The "whoop" of whooping cough occurs during the inspiratory phase and not with the cough, or expiratory phase.


While a distressing symptom for the adult, the infant or young child with pertussis often vomits in response to the cough episode and becomes exhausted. Infants age <= 6 months often have a period of apnea post-coughing spell. In addition, younger children often lack the respiratory effort required for the rapid intake of air needed to produce a whooping sound. Therefore, the absence of this characteristic sound should not cause the clinician to eliminate pertussis as a possible cause of persistent cough. During the first week of this stage, the number of daily cough attacks increases to an average of 15 per day, most often occurring at night. This level of cough remains unchanged for 2 to 3 weeks then gradually becomes less frequent. The paroxysmal stage usually lasts 1 to 10 weeks with an average duration of 5 to 6 weeks. The person with pertussis remains infectious for the first 2 weeks of the catarrhal stage; adding the length of the catarrhal and paroxysmal stages, the person with pertussis can transmit the causative organism to others for about a 4 week period of time. Even without treatment, the organism will clear from the airways about 4 to 5 weeks after onset of the illness.

3. **The convalescent stage**
   Gradual recovery occurs in this stage. The cough is less paroxysmal and slowly resolves over a period of 2 to 3 weeks. However, the cough can return if the person with recent pertussis develops a respiratory tract infection over the next 6 to 12 months post illness. The mechanism of this cough is likely residual airway inflammation and does not signify a recurrence of the original illness. At this point, the person with pertussis is unlikely to be able to transmit the causative organism.

While adolescents and younger adults account for the majority of recently reported cases of pertussis, often the first person in the household with the infection is an older adult who was immunized during childhood against the disease but, due to waning protection, has contracted this illness. What follows is weeks to months of incapacitating and debilitating illness. Pertussis-related death in the older child and adult is rare. The situation with infants is quite different, because this group is at highest risk for pertussis-associated complications. The most common complication, and the cause of most pertussis-related deaths, is secondary bacterial pneumonia. Neurological complications are...
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found in infants and include seizures and encephalopathy, often induced by the hypoxia caused by coughing or pathogen-related toxins. Older children and adults can develop encephalopathy. Rib fracture, pneumothorax, and subdural hematomas, are all complications directly related to cough paroxysms.

Diagnosing pertussis requires a high level of suspicion when assessing the person with an illness with protracted cough. On occasion, the diagnosis of pertussis is made largely by clinical findings. A clinical case of pertussis is defined as an acute coughing illness that lasts at least 14 days in a person with at least one characteristic pertussis symptom such as paroxysmal cough, posttussive vomiting, or inspiratory whoop, or a cough that lasts at least 14 days in an outbreak setting. A confirmed case of pertussis meets one of the following conditions: a cough illness (regardless of duration or severity) in which *B. pertussis* is isolated and cultured, a case consistent with the clinical case definition confirmed by polymerase chain reaction (PCR) findings, or epidemiologic linkage to a laboratory-confirmed case. Specimens for analysis should be obtained from the posterior nasopharynx. Testing options include polymerase chain reaction (PCR), direct fluorescent antibody ( DFA) testing, and standard bacterial culture. Culture results are often negative even in the presence of disease if the person has taken an antibiotic or has had a cough for more than 3 weeks. Given the challenges of obtaining a clinically useful specimen and the finer points of assessment with this contagious condition, consultation with the local or regional public health department is advised when considering the diagnosis of pertussis. Serologic testing is also available and is the subject of ongoing study.


Treatment of the person with pertussis is largely supportive and often aimed at treating the disease’s complication. Antimicrobial therapy helps eliminate the organisms from airways, therefore limiting the likelihood of communicating the disease to another person. At the same time, antimicrobial therapy does not necessarily hasten recovery. According to the 2010 Sanford Guide, following the recommendations of the Centers for Disease Control and Prevention (CDC), pertussis treatment options for infants and children include azithromycin, erythromycin, and clarithromycin. Options for adults include azithromycin, erythromycin, and clarithromycin, with trimethoprim-sulfamethoxazole as a non-macrolide alternative, azithromycin use provides the most rapid elimination of pathogen nasal carriage. Beta-2 agonists such as albuterol and inhaled or systemic corticosteroids do not appear to help with the airway dysfunction found in the disease. In addition to treating the person with pertussis, equally important is the provision of prophylactic antimicrobial therapy to close contacts regardless of age and immunization status with the above-mentioned antimicrobials. Reasons for the disease’s persistence are numerous and include waning immunity and failure to amount a protective immunologic response post-vaccination. Adults and children who have not received pertussis immunization are obviously at increased risk for becoming ill and transmitting pertussis. Young infants receive immunization against pertussis at ages 2, 4, and 6 months, mounting a progressively greater protective response with each dose. Given the ease of communication as well as severity and duration of pertussis, primary prevention of the disease via immunization is critically important.

Recommendations for the use of pertussis vaccine in the form of Tdap (tetanus, diphtheria, and acellular pertussis vaccine) and DTaP (diphtheria, tetanus, and acellular pertussis vaccine) can be found at: [http://www.cdc.gov/vaccines/recs/schedules/default.htm](http://www.cdc.gov/vaccines/recs/schedules/default.htm), accessed 6.29.10.

Certain populations should be targeted for updated pertussis immunization via Tdap including adults with close contact to infants <12 months of age (the population most at risk for pertussis death), parents, grandparents <65 years of age, child care workers, any woman who might become pregnant, and postpartum women. Healthcare workers are another population at high risk for acquisition and transmission of the illness and should also be targeted for immunization.

**References**

The New York Times: Whooping Cough Kills 5 in California; State Declares an Epidemic


Centers for Disease Control and Prevention: Recommended Antimicrobial Agents for the Treatment and Postexposure Prophylaxis of Pertussis. Available at [http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5414a1.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5414a1.htm), accessed 6.29.10.


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