

## Chapter 5 — Special Conditions

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This chapter contains guidelines for the management of pertussis in individuals with special medical or physiologic conditions. Pertussis in individuals infected with the HIV virus and in pregnant women has been described in the literature and is included in detail in this chapter. Pertussis in individuals with other immunocompromising conditions (e.g., cancer, immune deficiency disorders) and chronic respiratory diseases (asthma, cystic fibrosis) is also discussed in this chapter, but has been less well characterized.

### HIV/AIDS

#### Case Reports

Persons infected with the human immunodeficiency virus (HIV) may frequently experience changes in pulmonary status due to a variety of respiratory pathogens. Although the most common pulmonary infection in persons with acquired immune deficiency syndrome (AIDS) is *Pneumocystis carini*, other viral, bacterial, mycobacterial and fungal infections are also common.<sup>1</sup> *Bordetella pertussis* infection has been described in both HIV-infected adults<sup>2,3</sup> and children.<sup>4</sup> Pneumonia due to *Bordetella bronchiseptica* in a patient with AIDS has also been described.<sup>5,6</sup> Additionally, there has been at least one reported pertussis death in a 5-year old AIDS patient.<sup>7</sup>

In several of these case reports, the diagnosis of pertussis was not suspected upon presentation and was made only following an extensive work-up. Similarly, an additional case series reports unexpected isolation of *B. pertussis* from specimens of three adults with AIDS who underwent diagnostic bronchoscopy for the evaluation of respiratory symptoms.<sup>8</sup>

#### Prospective Studies

The prevalence of pertussis was studied prospectively in 60 adult HIV-infected persons presenting with respiratory symptoms to a tertiary care center. Nasopharyngeal specimens were obtained for culture from all patients. Seventy-two percent had cough and 33% had cough >14 days, but none of the cultures were positive for pertussis.<sup>9</sup> In another study, bronchoalveolar lavage specimens from 20 children infected with HIV were evaluated for evidence of pertussis. All cultures were negative, but testing with indirect immunofluorescence with a monoclonal antibody revealed three had *B. pertussis* associated with pulmonary alveolar macrophages.<sup>10</sup> Interpretation of these results should be made with caution because of the limitations to this test (see **Chapter 2: Diagnosis and Laboratory Methods**).

#### Vaccine Safety and Immunogenicity

Vaccination of HIV-infected children appears to be safe and at least partially immunogenic. In one study of HIV-infected children, there were no cases of pertussis in 239 child-years of follow-up among children vaccinated with acellular pertussis vaccine

versus 3 cases of pertussis in 171 child-years of follow-up among unvaccinated HIV-infected children.<sup>11</sup> In this study, antibody response to all 3 antigens in the acellular vaccine was evident in half of HIV-infected children and partial response (to one or two antigens) was evident in an additional 25%. However, antibody levels were lower than controls and correlated with pre-immunization CD4 counts.<sup>12</sup> No adverse events from pertussis vaccination among HIV-infected children have been reported,<sup>11,12,13,14</sup> and vaccination has not been shown to affect clinical deterioration or lower CD4 cell count in perinatally HIV-infected children.<sup>13</sup>

### **Recommendations**

Although pertussis infection and death have been described in HIV-infected individuals, current evidence does not suggest that pertussis is a common infection in these persons. Furthermore, no outbreaks of pertussis have been described among persons with HIV infection. Immunization of children aged <7 years with a pertussis-containing vaccine should be completed according to the childhood immunization schedule, as no severe adverse events have been reported and the vaccine provides protection in most HIV-infected children.

## **PREGNANCY**

### **Maternal Illness**

There are no known obstetric or neonatal adverse outcomes associated with pertussis in a pregnant woman if she is no longer infectious at the time of delivery. However, paroxysmal cough during pregnancy can lead to extreme discomfort and erythromycin may not be well tolerated due to gastrointestinal side effects. Although most cases of pertussis in pregnant women do not differ in severity from those of other adults, severe cases have been reported.<sup>15</sup>

### **Mother-to-Infant Transmission**

Several case reports exist that document mother-to-infant transmission of pertussis at the time of or shortly after birth.<sup>16,17,18,19</sup> In these cases, pertussis in the mother was often mild and not suspected until the development of symptoms in the neonate. In contrast, pertussis among infants was severe, usually resulting in complications, and in some cases, death. Several mothers were young (aged <25 years) and began coughing three weeks antepartum to one week post-partum.

In a ten-year prospective study in Sweden, 35 mothers with serologically- or culture-confirmed pertussis at the time of delivery were evaluated.<sup>20</sup> Thirty-two of the mothers were treated with erythromycin and allowed to nurse their newborns, and 28 of these newborns received prophylactic erythromycin. None of the 32 newborns developed symptoms of pertussis, suggesting that erythromycin given to a mother prior to or at the time of birth, and to the newborn, eliminated the risk of pertussis transmission. No adverse drug reactions were reported in these newborns.<sup>20,21</sup> However, adverse drug

reactions in infants have been reported. (See **Chapter 3: Treatment and Chemoprophylaxis**).

### Summary

Pertussis early in pregnancy does not pose substantial risk to mother or fetus, but infants born to mothers infected with pertussis at delivery are at high risk for acquiring severe infection. In such instances the following recommendations are made:

#### 1. Treatment and Chemoprophylaxis

- a. **Cases.** Antimicrobial treatment should be initiated as soon as pertussis is suspected in a pregnant woman, regardless of trimester. The antimicrobial of choice is erythromycin. Initiating treatment  $\geq 3$  weeks after cough onset has limited benefit to the patient or contacts. However, treatment is recommended up to six weeks after cough onset in late pregnancy. For dosage and duration of therapy and further information, see **Chapter 3: Treatment and Chemoprophylaxis**.
- b. **Contacts.** If pertussis is highly suspected in a pregnant or post-partum woman, chemoprophylaxis of all household and close contacts with erythromycin is recommended regardless of their age and vaccination status. Initiating chemoprophylaxis  $\geq 3$  weeks after exposure has limited benefit for the contacts. However, chemoprophylaxis should be considered for high-risk contacts (e.g., infants) up to 6 weeks after exposure. For more information about chemoprophylaxis and adverse reactions in neonates, see **Chapter 3: Treatment and Chemoprophylaxis**.

#### 2. Other Recommendations

- a. Mothers should be placed on droplet precautions (see **Chapter 11: Definitions**) during their hospitalization for delivery or until they have received 5 days of a full course of antibiotics. However, if both mother and infant are receiving 14-day courses of erythromycin, it is not necessary to isolate the baby from the mother and breast feeding is encouraged.
- b. Measurement of antibody levels in cord blood is not recommended as there is no correlation of maternal antibody with infant protection.

## OTHER SPECIAL CONDITIONS

### Asthma

There is no evidence to suggest that childhood pertussis is a predisposing factor for the development of asthma.<sup>22</sup> Pertussis may present with a clinical picture similar to asthma (nocturnal cough); therefore the diagnosis of pertussis may be delayed in children with a known history of asthma.<sup>23</sup> It is unknown if asthmatic children have a more severe or prolonged course of pertussis, although a severe case has been described in an asthmatic child.<sup>24</sup> It is unlikely that bronchodilators improve the clinical course of pertussis in an

asthmatic child. Two studies found salbutamol provided no benefit in the treatment of pertussis.<sup>25,26</sup>

### **Cystic fibrosis**

Pertussis does not appear to be a common problematic infection in children with cystic fibrosis. However, two deaths from pertussis in siblings with cystic fibrosis have been reported.<sup>7</sup>

### **Other Immunocompromising Conditions**

Pertussis infection is not well described in persons with other immunocompromising conditions, such as immunodeficiencies due to congenital conditions, malignancies, cancer chemotherapy, or chronic steroid therapy. One case of severe pertussis pneumonia requiring intensive care has been described in an adult bone marrow transplant recipient.<sup>27</sup>

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