

Chapter 9 — Hospitals, Institutions and Clinics

Lynn Zanardi, MD, MPH and Charles Vitek, MD, MPH

Revised May 2000

BACKGROUND

Hospitals

Nosocomial transmission of pertussis in hospitals among patients, health care workers (HCWs), or both, poses a high risk of transmission to children without immunity or to patients with compromised health status due to other medical conditions. Nosocomial outbreaks with multiple cases of pertussis among adults were well-documented even before the susceptibility of adults to pertussis was widely recognized.¹⁻⁴ These outbreaks continue to occur,⁵ and while published outbreaks have not involved large numbers of cases and have not resulted in fatalities, nosocomial transmission of pertussis results in avoidable morbidity, disruptive furloughs of personnel, and thousands of dollars of direct costs.¹⁻⁶ Serologic data suggest that exposure to pertussis is common among HCWs, especially those providing clinical care to pediatric patients.^{1,4,7,8} Frequently, nosocomial outbreaks are initiated by admission of an infant with cough illness or pneumonia due to pertussis, but introduction of pertussis into the hospital from adult visitors² or medical staff¹ has been documented.

Institutions

Sizeable outbreaks of pertussis with nosocomial transmission have been documented in closed institutions such as nursing homes and institutions for the developmentally disabled.⁹⁻¹¹ Pertussis can be introduced by health care workers (HCWs), visitors, or by residents exposed in other settings. HCWs have been linked to transmission between units in the institution.¹ Rapid control of the outbreaks has followed erythromycin treatment/prophylaxis targeted broadly at all potentially exposed residents and staff, not only those clearly identified as being in close contact with pertussis cases. In one institutional outbreak, pertussis infections occurred in 16% of residents on wards where erythromycin prophylaxis was instituted within 2 weeks of the onset of symptoms in the case as contrasted to an infection rate of 75% on wards where prophylaxis was instituted ≥ 4 weeks after onset.

Recently, an investigation of an outbreak of cough illness in an adult probation camp found positive PCR or serologic results for pertussis in specimens from 15 of 31 patients with cough illness clinically compatible with pertussis (M. Smolinski, personal communication, 1997). No cases in this outbreak were culture-confirmed and it remains unclear whether pertussis outbreaks occur frequently in these types of institutions.

Clinic and Outpatient Settings

Transmission of pertussis can occur in health care clinics although published accounts of outbreaks are lacking. Pediatric clinics are the usual site of reported transmission, but it is likely that transmission in adult health care settings also occurs.

IMPLEMENTATION OF CONTROL MEASURES

Control measures should be implemented when one or more cases of pertussis is recognized in a hospital, institution, outpatient clinic, or other health-care setting. Confirmed and suspected cases should be reported to local and/or state health departments.

IDENTIFYING AND INVESTIGATING CASES AND CONTACTS

Identifying Close Contacts and High-Risk Groups

Health Care Workers. HCWs should be considered exposed and regarded as close contacts only if the source is a confirmed case (CDC/CSTE definition, see **Chapter 11: Definitions**) or if the source is a suspected case during an outbreak. Close contact includes activities such as performing a physical examination, suctioning, intubation, bronchoscopy, feeding, bathing, and other procedures requiring prolonged or close interaction.¹² HCWs working with pediatric patients, particularly in emergency rooms or a hospital ward setting, should be considered at high risk of exposure to pertussis. All HCWs should wear respiratory masks when examining a patient with suspected or confirmed pertussis. If HCWs contract pertussis they will become high-risk cases because of their high probability of exposing susceptible individuals who have an increased risk of morbidity. For further explanation of high-risk cases, see **Chapter 11: Definitions**.

Patients. Patients should be considered exposed and regarded as close contacts only if the source is a confirmed case (CSTE definition, see **Chapter 11: Definitions**) or if the source is a probable case during an outbreak. Close contact includes patients who have shared a room or common living space with a pertussis case, or patients who have been directly cared for by a HCW with pertussis.

Note for Hospitals: Determination of close contacts should be more inclusive in settings such as a neonatal intensive care unit, newborn nursery, or infant ward, because infants are at risk for developing severe disease.

Note for Institutions: In outbreaks in closed institutions, residents frequently have multiple sources of exposure to pertussis case-patients. Residents may have an increased risk of infection or an increased risk of serious disease, if infected, due to the conditions responsible for institutionalization (e.g. developmental disability, chronic medical conditions). Attack rates as documented by culture and serologic investigations may reach 90% in the absence of widespread prophylaxis.⁹ The multiple potential exposures and the increased risk of infection and morbidity may warrant more inclusive criteria in classifying individuals as close contacts.

Note for Clinics and Outpatient Settings: Most individuals who were in waiting rooms or other care areas at the same time as a pertussis case should not be considered close

contacts; however, control recommendations should be individualized. Patients and care-takers who had direct contact with respiratory secretions from the case, or who had intense close contact (e.g. playing with a pertussis case in the waiting room for an extended period of time) may be considered close contacts. Patients who were in direct contact with respiratory secretions from a symptomatic HCW with pertussis or who received direct care of an extended nature (e.g., a complete physical exam) from a symptomatic HCW with pertussis should be considered close contacts. High-risk contacts (e.g. young infants, unimmunized children) who received any care from a HCW with pertussis or had extensive contact with a suspected case-patient should be considered close contacts.

Identifying Cases

Health Care Workers. If exposed to a case of pertussis, health care personnel should be questioned about symptoms of cough illness and should be counseled to report the development of symptoms consistent with pertussis to infection control staff. All symptomatic HCWs should be tested for pertussis by culture as soon as possible. HCWs should be aware that individuals are highly contagious even during the catarrhal phase of pertussis illness; transmission from a health care worker to patients during this phase has been documented.⁵

Patients. Symptomatic patients should have a nasopharyngeal specimen taken for culture as soon as pertussis is suspected.

Note for Hospitals: Close surveillance of hospitalized patients exposed to other patients or HCWs with pertussis is warranted, especially in the nursery and on hospital wards admitting infants. Exposed patients or their care-givers should be instructed to report to their physician any symptoms consistent with pertussis that develop after discharge and within 42 days of the last hospital exposure.

Note for Institutions: Patients/residents who share common living area or interact socially with pertussis cases or who are cared for by HCWs with pertussis should be considered close contacts, and should be under surveillance for symptoms of pertussis for 42 days.

Note for Clinics and Outpatient Settings: Close contacts (or their care-givers) should be notified of the exposure to pertussis and be instructed to report to their physician any symptoms consistent with pertussis that develop within 42 days of the last clinic exposure.

CONTROL MEASURES

1. Treatment and Chemoprophylaxis

- a. **Cases.** Antimicrobial treatment should be initiated as soon as pertussis is suspected in a patient or a health care worker. The antimicrobial agent of choice is erythromycin. Initiating treatment ≥ 3 weeks after cough onset has

limited benefit to the patient or contacts. However, treatment is recommended up to 6 weeks after cough onset in high-risk cases. For dosage and duration of therapy and further information, see **Chapter 3: Treatment and Chemoprophylaxis**.

- b. **Contacts.** If pertussis is highly suspected in a patient, chemoprophylaxis of all close contacts and high-risk contacts with erythromycin is recommended regardless of their age and vaccination status. Initiating chemoprophylaxis ≥ 3 weeks after exposure has limited benefit for the contacts. However, chemoprophylaxis should be considered for high-risk contacts up to 6 weeks after exposure. Health-care workers who are close contacts of a pertussis case while wearing a mask should still receive prophylaxis. For more information, including information about chemoprophylaxis of neonates see **Chapter 3: Treatment and Chemoprophylaxis**.
Note for Institutions: Due to the closed nature of most institutions and potential frequent and/or repeated exposures to pertussis, entire wards or institutions may receive chemoprophylaxis.

2. Vaccination

- a. All contacts ≤ 6 years of age who have not completed the four-dose series should complete the series with the minimum intervals. Children aged 4-6 years who have completed a primary series but have not received the pertussis vaccination booster dose should be given this dose. Pertussis vaccines are not currently licensed for use in persons ≥ 7 years of age. For more detailed information, see **Chapter 4: Use of Pertussis Vaccine in Outbreaks**.

3. Exclusion

Health Care Workers

- a. Health care workers with symptoms of pertussis should be excluded from work for at least the first 5 days of a full course of antimicrobial treatment.¹³ Some experts believe exclusion for 7 days is more appropriate.¹⁴ Asymptomatic health care workers who have had close contact with a pertussis case should be put under close surveillance with employee health and given prophylaxis; they may be excluded from work under certain circumstances.
- b. Health care workers with symptoms of pertussis who cannot or refuse to take antimicrobial therapy should be excluded from work for 21 days from onset of cough. The use of a respiratory mask is not sufficient protection during this time.

Patients

- a. Symptomatic patients should be placed in isolation and on droplet precaution for the first 5 days of a full course of antimicrobial treatment.
- b. Symptomatic patients who cannot or refuse to take antimicrobial treatment should be placed in isolation for 21 days from onset of cough.
- c. Suspect and confirmed pertussis patients should be advised that they are infectious until they have completed the first 5 days of their antimicrobial treatment or until 21 days has elapsed from onset of cough (for those who cannot take or refuse antimicrobial treatment).

Visitors

- a. During community outbreaks of pertussis, restriction of visitors from the newborn and infant units may prevent the introduction of pertussis into the hospital setting and limit exposure among a high-risk population.
- b. During community outbreaks of pertussis, hospital/institution-wide or ward-specific restriction of visitors with respiratory symptoms (consistent with pertussis) may prevent the introduction of pertussis into the hospital setting.

Surveillance and Notification

- a. Active surveillance in hospitals and institutions should be conducted for 42 days after the onset of cough of the last case of pertussis.
- b. Depending on the type/duration of exposure to a pertussis case-patient, clinics and outpatient departments may consider notifying persons who occupied waiting areas of their exposure so that at-home monitoring for pertussis symptoms and/or chemoprophylaxis can be initiated.

REFERENCES

1. Linnemann C, Ramundo N, Perlstein P, et al. Use of pertussis vaccine in an epidemic involving hospital staff. *Lancet* 1975;2:540-3.
2. Valenti W, Pincus P, Messner M. Nosocomial pertussis: possible spread by a hospital visitor. *Am J Dis Child* 1980;134:520-1.
3. Halsey N, Welling M, Lehman R. Nosocomial pertussis: a failure of erythromycin treatment and prophylaxis. *Am J Dis Child* 1980;134:521-2.
4. Kurt T, Yeager A, Guenette S, et al. Spread of pertussis by hospital staff. *JAMA* 1972;221:264-7.
5. Shefer A, Dales L, Nelson M, et al. Use and safety of acellular pertussis vaccine among adult hospital staff during an outbreak of pertussis. *J Infect Dis* 1995;171:1053-6.

6. Christie C, Glover A, Willke M, et al. Containment of pertussis in the regional pediatric hospital during the greater Cincinnati epidemic of 1993. *Infect Control Hosp Epidemiol* 1995;16:556-63.
7. Deville J, Cherry J, Christenson P, et al. Frequency of unrecognized *Bordetella pertussis* infection in adults. *Clin Infect Dis* 1995;21:639-42.
8. Broome C, Preblud S, Bruner B, et al. Epidemiology of pertussis, Atlanta, 1977. *J Pediatr* 1981;98:362-7.
9. Steketee R, Wassilak S, Adkins W, et al. Evidence for a high attack rate and efficacy of erythromycin prophylaxis in a pertussis outbreak in a facility for the developmentally disabled. *J Infect Dis* 1998;57:434-40.
10. Fisher M, Long S, McGowan K, et al. Outbreak of pertussis in a residential facility for handicapped people. *J Pediatr* 1989;114:934-9.
11. Tanaka Y, Fujinaga K, Goto A, et al. Outbreak of pertussis in a residential facility for handicapped people. *Develop Biol Standard* 1991;73:329-32.
12. Weber D, Rutala W. Management of healthcare workers exposed to pertussis. *Infect Control Hosp Epidemiol* 1994;15:411-5.
13. CDC. Immunization of health-care workers: recommendation of the Advisory Committee on Immunization Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC). *MMWR* 1998;46(RR-18):1-42.
14. Strebel P, Pertussis. In: *APIC Infection Control and Applied Epidemiology*. St. Louis: Mosby, 1996:71-1 - 71-5.