

## Chapter 8 — School and Child Care Settings

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*Revised June 2000*

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School or child care outbreak: two or more cases clustered in time in a school or child care center; the outbreak case definition may be used to count cases if one case has been confirmed. Because pertussis tends to be a milder disease in older and/or vaccinated persons, it may not be recognized in a timely manner which may allow the spread of disease to other students and adults in a school setting.

### **BACKGROUND**

Outbreaks of pertussis may occur due to the waning of vaccine-induced immunity with increasing age (beginning approximately four years after the last dose).<sup>1,2</sup> Outbreaks may also occur when persons are under- or unimmunized (including those with religious exemptions). In some circumstances it has been suggested that low to medium vaccine effectiveness may leave some individuals susceptible to pertussis.<sup>3</sup> However, there is no evidence that this is the case in the U.S. Because pertussis tends to be a milder disease in older, vaccinated persons, it may not be recognized in a timely manner, allowing the spread of disease to other students and adults in a school setting.<sup>4</sup> In addition, adolescents and adults may play an important role in transmitting pertussis to young infants who are too young to have received three or more doses of a pertussis-containing vaccine.<sup>5,6</sup>

### **Child Care Settings**

A review of outbreaks of pertussis in child care settings revealed that outbreaks occur in unimmunized populations (**Table 8-1**).<sup>3,7-9</sup> The attack rates in these child care settings ranged from 12.3% to 91%.<sup>3,7-9</sup> The high attack rate of 91% was determined using a case definition based on parent's report of illness in the child.<sup>8</sup> In two of the outbreaks among persons rejecting immunizations because of religious beliefs, the risk of illness among unimmunized children was 10.6 and 3.3 times greater than in immunized children.<sup>9</sup> In the outbreaks in child care settings where the sources of transmission were described, other children in the classroom or household members were identified as sources of transmission to children.<sup>8,9</sup>

### **School Settings**

Pertussis outbreaks in elementary, middle, and high schools have occurred even with high coverage levels (3 or more doses) (**Table 8-2**).<sup>4,7,9-16</sup> Often outbreaks in schools are not limited to a single class or grade,<sup>14-16</sup> and outbreaks in middle and high schools have been reported to occur concurrently.<sup>3,9</sup>

Attack rates varied by grade and by school activities. In elementary schools, among children aged 6-11 years, attack rates ranged from 5% to 74%.<sup>3,4,7,9-18</sup> In middle and high school settings, among children aged 11-13 and 13-18 years, respectively, attack rates

ranged from 3% to 50%.<sup>4,7,9,12,14-18</sup> Sources of transmission in school settings included other children, the teacher in the classroom, or household members.<sup>9,11,12,14-18</sup>

Described in the literature are control measures implemented in outbreaks in child care and school settings: providing erythromycin to culture-positive individuals and excluding cases from the child care center or school for the first five days of antibiotic treatment;<sup>7,8,10</sup> treating cases with erythromycin and providing chemoprophylaxis to close contacts and household contacts of symptomatic children while excluding patients who do not take antibiotics for 21 days after most recent exposure in the child care center or school, and informing health care providers in the area;<sup>4,9,12</sup> enhancing surveillance with physicians and public health nurses;<sup>4</sup> providing chemoprophylaxis to all household contacts of a confirmed case but not classroom contacts;<sup>12</sup> and providing pertussis outbreak control guidelines with community surveillance and aggressive outreach.<sup>13</sup>

Pertussis outbreaks described in the literature and reviewed here did not always use clear definitions for a case of pertussis, a contact, laboratory confirmed case, and vaccination status, and definitions varied among studies. In addition, studies did not report the effectiveness of the implemented control measures.

### **DEFINITION OF AN OUTBREAK IN A CHILD CARE CENTER OR SCHOOL**

Two or more cases clustered in time (e.g., cases occurring within 42 days of each other) and space (e.g., in one child care center or class); the outbreak case definition may be used to count cases if one case has been confirmed (see **Chapter 11: Definitions**).

#### **Contact Definitions (see Chapter 11: Definitions)**

Close contact: direct contact with respiratory, oral, or nasal secretions from a symptomatic case-patient, direct face-to-face contact, regardless of duration, with a case-patient who is symptomatic (e.g., in the catarrhal or paroxysmal period of illness); or shared confined space in close proximity for a prolonged<sup>1</sup> period of time with a symptomatic case-patient.

High-risk contact: persons at risk for developing severe disease and adverse outcomes. Infants aged <1 year are high-risk contacts. Persons who have an immunodeficiency or other underlying severe disease such as chronic lung disease or cystic fibrosis may be at risk for severe disease, but few data are available on pertussis among persons with these conditions.

#### **Close Contacts of Child Care/School Children**

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<sup>1</sup>The definition of *prolonged* will vary depending on the setting; defer to the interpretation of the local/state health department.

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Close contacts to observe for acute cough illness and to consider for chemoprophylaxis can include the following persons:

1. household contacts and family members
2. infants, children, and other individuals at high risk for severe disease
3. caregivers, staff, aides, and volunteers
4. children attending a regular after-school care group or a play group
5. core group of close friends, social contacts, boyfriends or girlfriends
6. students who work closely together
7. students sitting next to a case-patient in school, or in same school or extra-curricular activities, including field trips
8. bus seat-mates and carpool contacts
9. contacts at regular social or church activities, or part-time jobs

## **IDENTIFYING AND INVESTIGATING CASES AND CONTACTS**

### **Evaluate Suspected Cases**

If a suspected, or a confirmed case, of pertussis is identified in a child care or school setting:

- notify the local health department and school nurse immediately
- collect a nasopharyngeal specimen for isolation of *B. pertussis*
- begin treatment of the case-patient (see **Chapter 3: Treatment and Chemoprophylaxis** and **Chapter 6: General Guidelines for pertussis Case Investigation and Surveillance**).

### **Identify High-Risk Contacts and Close Contacts**

The procedure will vary for every situation and contacts should be identified on a case-by-case basis. Identifying the outbreak setting (e.g., child care in a home or a center, elementary school, middle school, high school) will help to identify close contacts and contacts at risk for severe disease.

### **Initiate Active Surveillance**

Surveillance activities will vary by setting (see below). Active surveillance for pertussis among close contacts should be initiated in affected child care centers/schools, and be continued until six weeks after cough onset of the last confirmed or suspected case.

#### **Conducting Active Surveillance**

1. Determine exposed groups:
  1. In all settings collect dates that the suspected pertussis case-patient attended child care or school during his/her infectious period (see **Chapter 1: Background**); and determine the number and ages of individuals potentially exposed.
  2. For child care centers and elementary schools, also determine the number of

- classrooms, the ages of the children in each class, and the number of staff and volunteers per room (for child care in home settings, include the children of the child-care provider).
3. Determine if the case-patient is involved in any after-school or school-based activities, such as a being on a sports team.
  2. Evaluate close contacts of case-patient for an acute cough illness. The school nurse or investigator should consider asking close contacts the following questions:
    - Do you have symptoms of a cold (runny nose, sneezing)? When did these symptoms begin?
    - Do you have a cough and when did it begin?
    - Describe your cough
      - Do you have coughing spells where you feel like you cannot stop?
      - Do you cough at night or is the cough worse at night?
      - Do you feel as if you are choking and cannot breathe?
      - Do you vomit after coughing?
    - Are there other people with cough in your house (class, team, extra-curricular group, work site, close friends/playmates)?
      - How long have they been coughing?
      - What is their cough like?
      - Where do they work? Which schools/child care centers do they attend?
  3. Assess the immunization status of students aged  $\leq 6$  years, refer for immunization as needed, and create a line-listing of all children who are not up-to-date or unimmunized in child care, kindergarten, and first grade (see **Chapter 4: Use of Pertussis Vaccine in Outbreaks**).
  4. Notify the class instructor and other staff (teachers, coaches, instructors) to refer students with cough illness  $\geq 7$  days, or paroxysmal cough of any duration, to the school nurse.
  5. Refer symptomatic students, teachers, volunteers, other staff, and all high-risk contacts to their health care providers for nasopharyngeal specimen and treatment or chemoprophylaxis. Also refer all of their asymptomatic high-risk contacts to their health care providers for chemoprophylaxis.

### **Maintain Pertussis Surveillance Log**

Create a line-listing (see **Chapter 6: General Guidelines for Pertussis Outbreak Investigation**) for all students with symptoms and record paroxysmal cough of any duration. Another listing of exposed groups (e.g., sports teams) should be considered to determine if, or when, entire groups require chemoprophylaxis.

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### **Increase Awareness of Outbreak, Notify Parents/Guardians, and Alert Providers**

If there is a case of pertussis in a child care or school setting, consider sending a letter to notify parents/guardians and staff about pertussis. An alert to health care providers should also be considered. [Sample letters from California, Hawaii, Iowa, and Vermont are available in Appendix 10-1 to 10-5.] Letters can be distributed to classes, grades, extra-curricular groups, or to the entire child care center or school depending on the situation. School-wide or community-wide notification, through a media alert, will require a consensus between school officials, and local health department staff.

Suggestions of topics to cover in the letters mentioned above may include:

#### Parent/guardian letters

- describe pertussis disease (how it is spread and symptoms)
- describe treatment for cases
- describe preventive treatment for contacts
- describe pertussis disease in infants and control measures
- explain about pertussis vaccines and the vaccination recommendations
- tell persons to visit their physicians if they become symptomatic or if they have been exposed
- provide a health department contact with a telephone number

For symptomatic persons include: what treatment will be offered, how a specimen will be obtained for testing, and which contacts will be considered for preventive treatment. Indicate that the letter should be taken to a health care provider.

#### Health care providers

- describe pertussis disease (include how it is spread and symptoms)
- describe treatment and prophylaxis regimens
- describe specimen collection methods
- describe pertussis in infants; explain the importance of culture-confirmation and the importance of providing chemoprophylaxis
- outline the current pertussis vaccination recommendations
- provide a health department contact with a telephone number

## **CONTROL MEASURES**

### **Treatment and Chemoprophylaxis**

Decisions about who and how to provide chemoprophylaxis in child care centers and schools should depend on setting, patterns of student interaction, number of cases, and number of affected groups, etc. If the laboratory-confirmed case was absent from school, class(es), or other groups and activities during his/her infectious period (see **Chapter 1: Background**), there is no need to provide chemoprophylaxis to contacts. General guidelines for chemoprophylaxis of cases and contacts are described in this section.

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  $\geq 3$  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**.

Contacts: If pertussis is confirmed in a patient, chemoprophylaxis of all close contacts and high-risk contacts with erythromycin is recommended regardless of their age and vaccination status. Chemoprophylaxis should also be considered if pertussis is highly-suspected in an individual. Initiating chemoprophylaxis  $\geq 3$  weeks after exposure has limited benefit for the contacts. However, chemoprophylaxis should be considered for high-risk contacts up to 6 weeks after exposure. For more information, including information about chemoprophylaxis of neonates see **Chapter 3: Treatment and Chemoprophylaxis**.

*One laboratory-confirmed case (Figure 8-1)*

(a) Child care centers: Usually children in child care centers have extensive contact with each other and it is very difficult to distinguish individuals with or without significant exposure. Under these circumstances the entire class, if the child care is divided into classes, or the entire child care center, if it is not separated into class rooms, should receive prophylaxis. In the case of minimum interaction among children only individuals or groups with significant exposure should receive chemoprophylaxis (i.e., children seated near the case or in the same play group).

Home child-care settings: All children, the child-care provider, and members of his/her family who have had any contact with the case during the infectious period (see **Chapter 1: Background**) should receive chemoprophylaxis.

(b) Schools: It is generally recommended to provide chemoprophylaxis to groups with significant exposure to the confirmed case-patient.

- It is important to determine if there are any patterns of interaction that would increase exposure time among a group (such as children living in the same neighborhood, riding the same bus, going to the same school, and participating in the same activities, etc.).
- In certain special circumstances it may be appropriate to recommend chemoprophylaxis to an entire classroom of children in an elementary or middle school where students do not change classes frequently or in certain high-risk settings such as residential schools for ill or developmentally delayed children (see **Chapter 9: Hospitals, Institutions and Clinics**). The extent to which this recommendation is applied will vary according to

the extent of exposure, the presence/absence of other coughing persons in the class, whether any other pertussis cases have been reported in the area, and whether high-risk individuals or unvaccinated young children are present.

- (c) Extra-curricular activity groups: Teammates are usually considered to be close contacts, therefore, recommending chemoprophylaxis to the entire team (e.g., sports teams) should be considered. The decision of how widely to offer chemoprophylaxis to other extra-curricular activity groups should be based on the extent of exposure; existence of subgroups with significant exposure; the presence/absence of other coughing persons in the group; whether any other pertussis cases have been reported in the area; and whether high-risk individuals or unvaccinated young children are present.

*More than one laboratory-confirmed case (Figure 8-2)*

For classrooms, teams and other groups in which there are at least two confirmed cases (including at least one laboratory-confirmed case), it is appropriate to consider providing prophylaxis to the entire class, team or group, especially if there is a high degree of student interaction within groups. The extent to which this recommendation is applied will vary according to the extent of exposure, the presence/absence of other coughing persons in the group, whether any other pertussis cases have been reported in the area and whether high-risk individuals or unvaccinated young children are present.

Providing chemoprophylaxis to an entire school or child care center is generally not recommended. Widespread chemoprophylaxis may be considered if there are a large number of laboratory confirmed cases in multiple classes and a high degree of student interaction across classes and grades, or if there is a high absenteeism rate together with a small number of students in the entire school.

## **Vaccination**

Assess the immunization status of all students  $\leq 6$  years of age and refer for immunization as needed. All contacts  $\leq 6$  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  $\geq 7$  years of age. For more detailed information see **Chapter 4: Use of Pertussis Vaccine in Outbreaks**.

**Exclusion**

- a. Symptomatic persons should be excluded from child care or school for the first 5 days of a full course of antimicrobial treatment.
- b. Symptomatic persons who do not take antimicrobial treatment should be excluded from child care or school for 21 days from onset of cough.
- c. Asymptomatic contacts who elect not to take antibiotics, or persons who are not up-to-date with their pertussis immunizations (especially infants who have not had 3 doses of a pertussis-containing vaccine) may be considered for exclusion from child care or school for 21 days after their last exposure. This preventive measure may help protect children from getting pertussis and is especially important for infants in whom pertussis can be severe.



**Table 8-1. Comparison of Outbreaks in Child Care Settings**

Author & Year	Setting	Age of cases	Case definition	Attack rates	Vaccination status	Transmission source	Control measures
He Q, 1994 <sup>10</sup>	Finland	1-3 yrs	Clinical: paroxysmal cough lasting $\geq 3$ weeks and contact with a lab-confirmed case of pertussis  Lab-confirmed: (one of the following) isolation of <i>B. pertussis</i> by culture, PCR (+), or by serology (IgG, IgA, IgM)	45% of daycare attendees had lab evidence (13/28)	3 doses in infancy: 100% 4 doses: 79%	Not described	Erythromycin given to culture (+) persons. Culture (+) children excluded from daycare for first 5 days of treatment. No prophylaxis provided.
Roberts A, 1978 <sup>13</sup>	West Glamorgan	4-6 yrs	Not well-defined. Some cases were culture (+), others had "symptoms"	91% (21/23)	35%	student in class	Exclusion of symptomatic children --time varied
Okinshevich EA, 1974 <sup>17</sup>	Moscow	0-16 yrs	Not stated clearly. Some cases were culture (+), others were based on retrospective clinical diagnosis	culture (+): 5.1% clinical dx: 12.3%	98.5%	Not described	Not described
Etkind P, 1992 <sup>18</sup>	Massachusetts	a) 2-60 years; b) 9 months to 44 years; c) 15 months to 35 years; d) school-age	Culture (+), DFA (+), and/or serologic (+) for <i>B. pertussis</i> OR Minimum 2 weeks of cough or $\geq 7$ days of paroxysmal cough and epi-linked to a lab-confirmed case	3-8 years = 22% unknown for the other age groups	a) 29%; b) 14%; c) 7% (risk of illness in unimmunize 10.6X greater); d) 16% (risk of illness in unimmunize 3.3x greater)	a) grandfather; b) unknown; c) Kindergarten student; d) close-knit community	1) Treatment and prophylaxis with erythromycin; 2) prophylaxis for all household contacts of symptomatic children; 3) exclude symptomatics from play group or school until 7 days of antibiotics; 4) exclude symptomatics for 21 days if not antibiotics; 5) inform health care providers of increase in pertussis; 6) provide surveillance and control advice to others at risk
De Serres, 1996 <sup>3</sup>	Quebec City, Canada	median - 36 mos	Surveillance: acute cough $\geq 2$ weeks with $\geq 1$ pertussis-associated symptom with no other apparent cause.	15%	3 doses: 95%	Not described	Not described

**Table 8-2. Comparison of Outbreaks in School Settings**

Author & Year	Setting	Age of cases	Case definition	Attack rates	Vaccination status	Transmission source	Control measures
He Q, 1994 <sup>10</sup>	Finland	1-12 yrs	Clinical: paroxysmal cough lasting $\geq 3$ weeks and contact with a lab-confirmed case of pertussis  Lab-confirmed: culture (+), PCR (+), or serologically (IgG, IgA, IgM)	Overall for 2 schools: 30%	3 doses in infancy: 100% 4 doses: 79%	Not described	Erythromycin given to culture (+) persons. Culture (+) children excluded from daycare for first 5 days of treatment. No prophylaxis provided.
He Q, 1994 <sup>11</sup>	Finland	7-12 yrs	Clinical: paroxysmal cough lasting $>3$ weeks and contact with a lab-confirmed case of pertussis  Lab-confirmed: culture (+), PCR (+), or serologically (IgG, IgA, IgM)	Overall: 74%	3 doses in infancy: 100%; 4 doses: 80%	Not described	Erythromycin given to culture (+) persons. Culture (+) children excluded from daycare for first 5 days of treatment. No prophylaxis provided.
Aoyama T, 1987 <sup>7</sup>	Japan	11-12 yrs	Paroxysmal coughing attacks lasting for $\geq 14$ days  Serology - indirect ELISA for IgG against PT and FHA; microagglutination test [(+)]: $\geq$ fourfold increase in titers of paired sera with 1 of 3 assays	18.6% (includes school teacher)	$\geq 3$ doses: 88%; 2 doses: 5%; zero doses: 7%	Three students symptomatic at same time	Not described
Clark A, 1940 <sup>19</sup>	New York	4-15 yrs	parent reported pertussis based on symptoms	Overall: 51% K: 59%; 1 <sup>st</sup> : 78%; 2 <sup>nd</sup> : 50%; 3 <sup>rd</sup> : 79%; 4 <sup>th</sup> : 64%; 5 <sup>th</sup> : 23%; 6 <sup>th</sup> : 13%; 7 <sup>th</sup> : 20%; 8 <sup>th</sup> : 0% AR in vaccinated: 28%; vs. AR in unvaccinated: 59%	Not clearly described	Family with 6 children (household to school exposure)	Not described
Okinshevich EA, 1974 <sup>17</sup>	Moscow	0-16 yrs	Not stated clearly. Some cases were culture (+), others were based on retrospective clinical diagnosis	Overall: 15% K: 22%; School-age (6-16 years): 13%	98.5% (definition unclear)	Unknown	Not described

**Table 8-2 (Continued). Comparison of Outbreaks in School Settings**

Author & Year	Setting	Age of cases	Case definition	Attack rates	Vaccination status	Transmission source	Control measures
Gordon S, unpubl (1982)	Colorado	Grades 7-12	Clinical: paroxysmal cough	Students: 50%; staff: 30%; 8 <sup>th</sup> : 63%; 11 <sup>th</sup> : 37%	≥3 doses among cases: 84%; non-cases: 84%	Unknown	Enhanced surveillance involving local physicians, nearby hospital and PH nurse; 2) contacted households with high school students and infants aged <1 year: immunizations updated and erythromycin prophylaxis given to contacts of suspected cases; 3) cases treated with erythromycin
Mink CM, 1991 <sup>9</sup>	Missouri	13-14 yrs	culture (+), DFA (+), or positive serologic assay (elevated antibody concentration in at least 5 of the 13 serologic assays with a minimum of one IgA antibody elevation)	47% in classmates 23% in household contacts	100% received ≥4 doses; 76% received all 5 doses	Two classmates	Not described
MMWR, 1993 <sup>12</sup>	Massachusetts and Maryland	MA- 10-19 yrs MD- 10 yrs	MA: clinical: cough lasting ≥14 days; lab-confirmed: clinical plus culture (+), or anti-PT IgG serologically (+) at the MA State Laboratory Institute  MD: clinical: cough lasting ≥14 days with paroxysms, whoop, or vomiting without other apparent cause; lab-confirmed: culture (+) for <i>B. pertussis</i>	MA: (by grade) 5 <sup>th</sup> - 4.9% 6 <sup>th</sup> - 5.6% 7 <sup>th</sup> - 12.3% 8 <sup>th</sup> - 15.6% 9 <sup>th</sup> - 27.9% 10 <sup>th</sup> - 26.4% 11 <sup>th</sup> - 21.6% 12 <sup>th</sup> - 19.2%  MD: 14% + 1 teacher	≥4 doses: MA: 96% MD: 100%	MA: Unknown MD: classmate	MA: provided prophylaxis to all students and staff in 9-12th grades; provided prophylaxis to all students in 7-8th grades  MD: provided prophylaxis to all household contacts but NOT classmates
Etkind P, 1992 <sup>18</sup>	Massachusetts	a) 2-60 years; b) 9 months to 44 years; c) 15 months to 35 years; d) school-age	Culture (+), DFA (+), and/or serologic (+) for <i>B. pertussis</i> OR Minimum 2 weeks of cough or ≥7 days of paroxysmal cough and epi-linked to a lab-confirmed case	see Table 8-1	see Table 8-1	see Table 8-1	1) Treatment and prophylaxis with erythromycin; 2) prophylaxis for all household contacts of symptomatic children; 3) exclude symptomatics from play group or school until 7 days of antibiotics; 4) exclude symptomatics for 21 days if not antibiotics; 5) inform health care providers of increase in pertussis; 6) provide surveillance and control advice to others at risk
De Serres G, 1996 <sup>7</sup>	Quebec City, Canada	4-10 yrs (K - Grade 3)	Surveillance: acute cough ≥2 weeks with ≥1 pertussis-associated symptom with no other apparent cause.	10%	98% had ≥4 doses	Not described	Not described

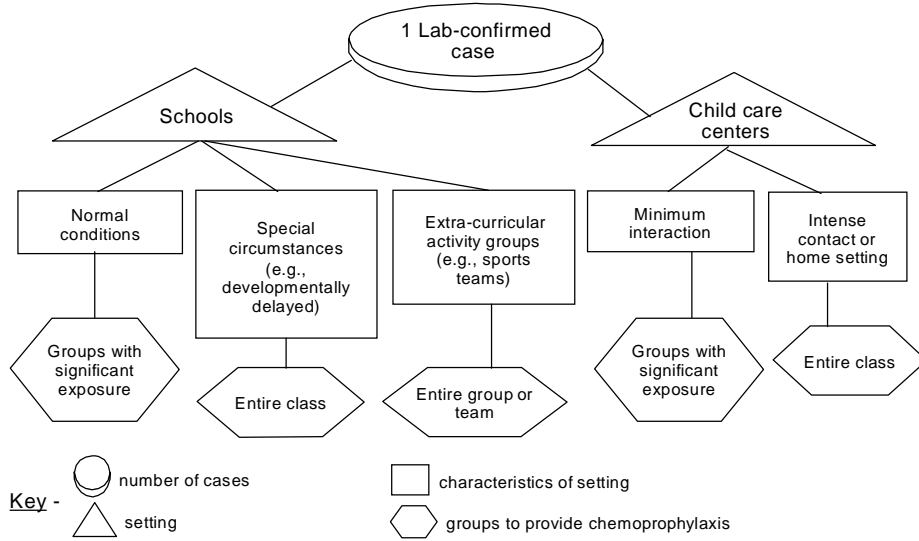
**Table 8-2 (Continued). Comparison of Outbreaks in School Settings**

Author & Year	Setting	Age of cases	Case definition	Attack rates	Vaccination status	Transmission source	Control measures
He Q, 1998 <sup>8</sup>	Finland	7 days - 74 yrs (median- 9 yrs)	Not described (see other He articles)	93 cases by culture/PCR	Not discussed	Not described	Not described
Brennan M, 1997 <sup>15</sup>	Massachusetts	9-12 Grades (13-19 yrs)	Clinical: an acute cough illness $\geq 2$ weeks in an outbreak setting  Lab-confirmed: culture (+), or anti-PT IgG serologically (+) at the MA State Laboratory Institute	Overall: 5.4 (5.4%) of 997 9 <sup>th</sup> grade: 3.9% 10 <sup>th</sup> grade: 4.0% 11 <sup>th</sup> grade: 6.0% 12 <sup>th</sup> grade: 2.7% Sports teams: Small ( $\leq 15$ ): 15.6%; large ( $\geq 16$ ): 3.3%; non-members: 3.4%	$\geq 4$ doses: 95%	teammates and classmates	Active surveillance Chemoprophylaxis of close contacts and household members - including team members Treatment of cases
Martin R, 1997 <sup>16</sup>	Massachusetts	6-12 Grades (13-17 yrs)	See above.	Overall in high school: 4.2% of 1021 9 <sup>th</sup> grade: 4.8% 10 <sup>th</sup> grade: 5.4% 11 <sup>th</sup> grade: 3.4% 12 <sup>th</sup> grade: 3.1% Overall in middle school: 0.7% of 953 6 <sup>th</sup> grade: 0.3% 7 <sup>th</sup> grade: 1.5% 8 <sup>th</sup> grade: 0.3%	$\geq 4$ doses: 81%	teammates and classmates	Active surveillance Chemoprophylaxis of close contacts and household members Treatment of cases

**Table 8-2 (Continued). Comparison of Outbreaks in School Settings**

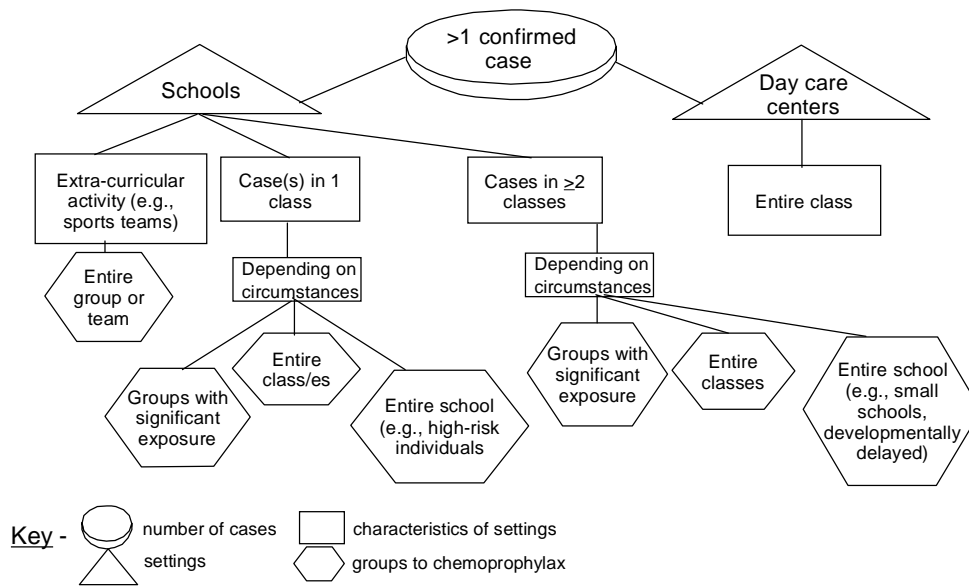
Author & Year	Setting	Age of cases	Case definition	Attack rates	Vaccination status	Transmission source	Control measures
Christie CDC, 1997 <sup>4</sup>	Cincinnati	3-15 yrs (median- 8 yrs)	Clinical (outbreak settings) - unexplained cough $\geq$ 2 weeks  Lab-confirmed - culture or DFA (+)	22 cases by culture and DFA	86% received 4 or 5 doses	Not described	1) Teachers and students should have a high index of suspicion of cough illnesses and persons with cough illness should be seen by a physician; 2) Persons with lab confirmed pertussis should be barred from school until completed 5 days of an antibiotic course.; 3) Persons with cough illness OR symptomatic or have cough and contact with a known case, should be barred from school until seen by a physician; 4) Asymptomatic siblings of cases should remain in school but complete a 14 day course of antibiotics; 5) Classroom exposures of cases with $\geq$ 3 hour contact who are up to date on their DTPs and asymptomatic should remain in school with no antibiotic treatment 6) Symptomatic persons who are up to date on their DTPs should be barred from school until seen by a physician; 7) Asymptomatic exposed persons who are delayed on their DTPs should remain in school, update their vaccines, and take a 14 day course of antibiotics; 8) Symptomatic exposed persons with delayed DTPs should be excluded until they have completed 5 days of a 14 day course of antibiotics
CDC (N. Khetsuriani, et al; submitted to J Inf Dis)	Iowa	K-6 (median 10yrs)	Clinical case: a cough illness lasting at least 2 weeks with one of the following: paroxysmal cough, whooping, or post-tussive vomiting without other apparent cause Laboratory positive: isolation of <i>B. pertussis</i> from a clinical specimen; positive PCR assay for <i>B. pertussis</i> . Probable case: meets the clinical case definition, not lab confirmed, and not epi-linked to lab confirmed case Confirmed case: acute cough illness, any duration, and culture (+) ; OR meets the clinical case definition and is lab (+) by PCR; OR meets the clinical case definition and epi-linked directly to a confirmed case by culture or PCR	overall: 17%  K: 14% 1-3 <sup>rd</sup> : 8% 4-6 <sup>th</sup> : 25%	95% had received $\geq$ 3 doses  94% fully vaccinated	teammates and classmates	Active surveillance Chemoprophylaxis of close contacts and household members Treatment of cases

Figure 8-1. Antimicrobial prophylaxis algorithms for a case of pertussis in a child care or school setting



Note: Every situation is different and should be evaluated separately.

Figure 8-2. Antimicrobial prophylaxis algorithms for a pertussis outbreak in a child care or school setting



Note: Every situation is different and should be evaluated separately.

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