# Pertussis/Parapertussis

Manitoba Health
Public Health
Communicable Disease Control Unit

## Case Definition

**Confirmed Case:** Isolation of *Bordetella pertussis* or *Bordetella parapertussis* on culture or positive results on nucleic acid testing (e.g., polymerase chain reaction (PCR) (laboratory-confirmed)

OR

A person who is epidemiologically linked to a laboratory-confirmed case with one or more of the following for which there is no other known cause:

- paroxysmal cough of any duration
- cough ending in vomiting, or associated with apnea
- cough with inspiratory whoop

**Clinical Case:** Any duration of paroxysmal cough, cough with inspiratory whoop or cough ending in apnea, vomiting or gagging for which there is no other known cause

OR

Catarrh or cough in a person exposed to a confirmed case.

## Reporting Requirements

- All specimens positive for *Bordetella pertussis* or *Bordetella parapertussis* are reportable by laboratory.
- All cases are reportable by the attending health care professional.

## Clinical Presentation/Natural History

Pertussis is an acute bacterial disease involving the respiratory tract. The initial catarrhal stage has an insidious onset with an irritating cough that gradually becomes paroxysmal, usually within one to two weeks, and lasts for one to two months or longer. Paroxysms are characterized by repeated violent coughs; each series of paroxysms has many coughs without intervening inhalation and can be followed by a characteristic crowing or high-pitched inspiratory whoop. Paroxysms frequently end with the expulsion of clear, tenacious mucus, often followed by vomiting. Infants less than six months old, adolescents and adults often do not have the typical whoop or cough paroxysm.

The number of fatalities in Canada is currently low; Manitoba had one death in 1994 in a child with additional medical problems. In the United States approximately 80% of deaths are among children under one year of age, and 70% are under six months. Case-fatality rate is less than 1% in infants less than six months old in the United States. In a series of 136 children two years old or younger, who were hospitalized in Canada at several children's hospitals from 1991-1993, the fatality rate was 0.7%. In Manitoba, from April 1, 1992 to March 31, 1996, approximately 215 children were hospitalized. Morbidity is slightly higher in females than males. In non-immunized populations, especially those with underlying malnutrition and multiple enteric and respiratory infections, pertussis is among the most lethal diseases of infants and young children. Pneumonia is the most common cause of death; fatal encephalopathy, probably hypoxic, and inanition from repeated vomiting occasionally occur.

In recent years in the United States, pertussis in adolescents and young adults, varying in severity from a mild, atypical respiratory illness to the full-blown syndrome, has been recognized with increasing frequency. Many of these cases occur in previously immunized persons, indicating waning immunity.

Parapertussis is a similar, but usually milder, disease. It usually occurs in school-aged children and is relatively infrequent. Differentiation between *Bordetella parapertussis* and *B. pertussis* is based on culture, biochemical and immunologic differences. Treatment and management of contacts is identical.

A similar acute clinical syndrome has been reported in association with viruses, especially adenoviruses; however, the duration of cough is usually less than 28 days.

## Etiology

*Bordetella pertussis*, the pertussis bacillus; *B. parapertussis* causes parapertussis.

## Epidemiology

**Reservoir and Source:** Humans

**Transmission:** Primarily by direct contact with discharges from respiratory mucous membranes of infected persons, probably by droplets. Frequently brought home by an older sibling and sometimes by a parent.

**Occurrence:**

**General:** Worldwide. An endemic disease common to children (especially young children) everywhere, regardless of ethnicity, climate or geographic location. Outbreaks occur periodically. A marked decline has occurred in incidence and mortality rates during the past four decades, chiefly in communities with active immunization programs and where good nutrition and medical care are available.

**Canada:** From 1985 to 1994, between 1,106 and 10,151 cases were reported annually in Canada. With higher immunization levels in Latin America, reported cases declined from 120,000 in 1980 to 40,000 in 1990. Incidence rates have increased in countries where pertussis immunization rates have fallen (e.g., England, Japan in the early 1980s and Sweden).

**Manitoba:** Between 1995 and 1999, 1,430 cases of pertussis were reported (667 cases in 1995, 191 cases in 1996, 103 cases in 1997, 311 cases in 1998 and 158 cases in 1999). Twenty-two cases of parapertussis were reported during this same period.

**Incubation Period:** Commonly six to 20 days; usually seven to 10.

**Susceptibility and Resistance:** Susceptibility of non-immunized persons is universal. Transplacental immunity in infants has not been demonstrated. It is predominantly a childhood disease; incidence rates of reported (i.e., recognized) disease are highest in children under five years of age. Milder and missed atypical cases occur in all age groups. One attack usually confers prolonged immunity, although second attacks can occasionally occur. Cases in previously immunized adolescents and adults in the United States occur because of waning immunity and are an increasing source of infection for non-immunized young children.

**Period of Communicability:** Highly communicable in the early catarrhal stage before the paroxysmal cough stage. Communicability gradually decreases and becomes negligible in about three weeks after the onset of paroxysmal cough. For control purposes, the communicable stage extends from the early catarrhal stage to three weeks after onset of typical paroxysms, in persons not treated with antibiotics. When treated with erythromycin, the period of infectiousness is usually five days or less after onset of therapy.

## Diagnosis

Diagnosis by culture is possible using appropriate culture media. Nasopharyngeal collection specimens for culture include:

- per nasal aspirate – collect by fine flexible plastic catheter connected to a syringe (preferred sample if conditions permit)
- posterior nasopharynx – use a flexible swab* passed through nares to posterior nasopharynx
- posterior pharynx to nasopharynx – insert a flexible swab* through the mouth up into the posterior pharynx and swab posterior nasopharynx (see picture)

* Calgi or Dacron (not cotton)

Swabs for culture should be placed in appropriate transport medium. Please contact your laboratory for further information.

Nasopharyngeal aspirates are preferred for diagnosis by PCR. Please consult the laboratory for availability of this test.

Direct FA staining of nasopharyngeal secretions has a low sensitivity and is not offered at all

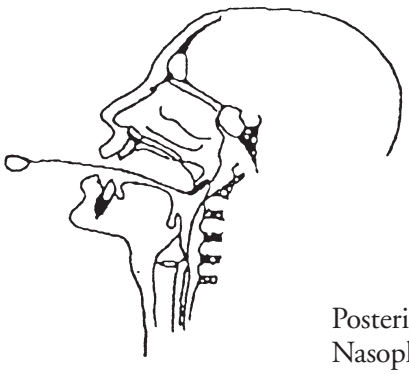
laboratories. Please consult the laboratory for availability of this test.

Strikingly high total WBC counts with a strong preponderance of lymphocytes is found as the whooping stage develops; this may not occur in young infants.

Serological testing (except under research settings) is not useful for diagnosing acute infection, however previous exposure to pertussis natural infection or immunization can be determined by testing for the presence of pertussis IgG.

## Key Investigations

- Contact history.
- Chemoprophylaxis history.
- Immunization history.



Posterior Pharynx to Nasopharynx

## Control

### Management of Cases:

**Treatment:**

- Treatment with erythromycin early on in the course of illness may ameliorate symptoms, with the added benefit of reducing infectivity for others (achieved after five days). Treatment dose is 40-50 mg/kg/d, maximum 1g/d in four divided doses, x 10d; some experts prefer the estolate preparation.
- Alternate therapy is trimethoprim/ sulfamethoxazole 8-40 mg/kg/d in two divided doses (efficacy unproven).
- Pregnant women in premature labour or 36 weeks or more gestation with catarrh and/or cough suggestive of early pertussis should be treated with erythromycin. If treatment is not tolerated or not complete by the time of delivery, it should be given post-delivery to both mother and newborn. There is no need to isolate the infant from the mother.

**Public Health Measures:**

- Hospitalized cases should be placed under Droplet precautions.
- Community cases should be excluded from day care, school and work until 5 days of a 10 day treatment course of erythromycin have been completed. If treatment is not given, they should be excluded until 3 weeks have passed since the onset of paroxysmal cough.

### Management of Contacts:

- Regional Health Authority staff will identify all contacts requiring chemoprophylaxis and refer them to their physician for prescriptions.
- Generally, a contact is someone who has face-to-face exposure for five or more minutes or who shares the same confined air space for more than one hour with a case during the period of communicability. Shorter times should be considered if contacts were directly coughed upon.
- Since pertussis is more severe in newborns, infants and young children, age of the contact should be considered when deciding whether or not to provide chemoprophylaxis.
- Risk of transmission is highest in the family setting followed in decreasing order by home day care, regular day care, school and community (generally all other situations).
  - Family contacts, regardless of age and immunization history, should receive chemoprophylaxis. Children less than seven years of age should have their immunization updated (includes review of previous contraindications for immunization).

- Home day care contacts, regardless of age (includes adult home day care workers) and immunization history, should receive chemoprophylaxis. Children less than seven years of age should have their immunizations updated.
- Non Home day care contacts, who are under one year of age, or older than one but not up-to-date with pertussis immunization, should receive chemoprophylaxis and have their immunization updated.
- School contacts who are less than seven years of age, should have their immunizations updated.
- Community contacts (i.e., contacts in situations other than those described above) less than one year of age should receive chemoprophylaxis. Children less than seven years of age should have their immunizations updated.
- Pregnant women should receive special consideration since infants of mothers who become symptomatic with pertussis up to two to three weeks before labour have an extremely high risk of disease. Pregnant women 36 weeks or more gestation should receive chemoprophylaxis regardless of the setting of exposure. Those under 36 weeks should receive prophylaxis only in selected settings as described in the bullets above. If chemoprophylaxis is not completed by the time of delivery, it should be continued for the mother and started for the newborn afterwards.

- Regardless of setting, activity restriction of asymptomatic contacts is not warranted.
- Symptomatic contacts (cough) should be investigated by a physician (including nasopharyngeal culture) and excluded from day care, school and work until it is determined that they are not a case (clinical judgement). If they are diagnosed as a case of pertussis, treatment and exclusion is as outlined above under **Management of Cases**.
- Chemoprophylaxis need not be offered if it has been 14 days or more since the *first* contact with the case. In high-risk household exposure settings this may be extended to 21 days. Erythromycin 40-50 mg/kg/d, maximum 1 g/d in divided doses x 10 days is the preferred drug; erythromycin estolate may be the preferred preparation in children.

### Management of Outbreaks:

- Accelerated immunization schedules have been recommended but there is no direct evidence of the efficacy of this approach.

### Preventive Measures:

- Routine childhood immunization with pertussis vaccine.
- For more information about pertussis vaccine please see the Canadian Immunization Guide.

## Additional Resources

Information About Pertussis (Whooping Cough)

Available from Audiovisual and Publications Department, Manitoba Health, telephone
(204) 786-7112, fax (204) 772-7213.