

# PERTUSSIS

## Case definition

### CONFIRMED CASE

Laboratory confirmation of infection:

- isolation of *Bordetella pertussis* from an appropriate clinical specimen
- OR**
- detection of *B. pertussis* DNA from an appropriate clinical specimen **AND** one or more of the following:
    - cough lasting 2 weeks or longer
    - paroxysmal cough of any duration
    - cough with inspiratory “whoop”
    - cough ending in vomiting or gagging, or associated with apnea

**OR**

Epidemiologic link to a laboratory-confirmed case **AND** one or more of the following for which there is no other known cause:

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

### PROBABLE CASE

Cough lasting 2 weeks or longer in the absence of appropriate laboratory tests and not epidemiologically linked to a laboratory-confirmed case **AND** one or more of the following, with no other known cause:

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

### SUSPECT CASE

One or more of the following, with no other known cause:

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

## Causative agent

*Bordetella pertussis*, a gram-negative bacillus

## Source

Humans

## Incubation

An average of 9-10 days [range 6-20 days] and may rarely be as long as 42 days.

## Transmission

Direct contact with airborne droplets from the respiratory system; indirect spread through contaminated objects may rarely occur.

## Communicability

From the early catarrhal stage (1-2 weeks before the onset of the paroxysmal cough) to 3 weeks after the onset of typical paroxysms in individuals not treated with antibiotics. Individuals treated with appropriate antibiotics should be considered non-infectious after 5 days from the onset of treatment.

## Symptoms

In classic pertussis, there are three clinical stages of the disease:

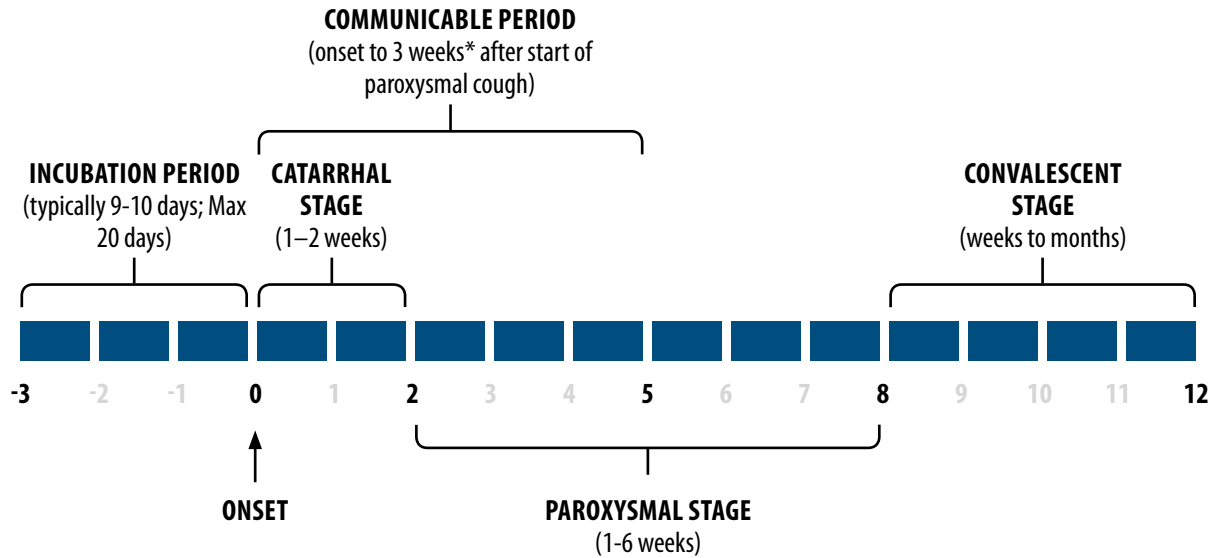
- Catarrhal: cough, rhinorrhea and possible fever; lasts 1-2 weeks.
- Paroxysmal: paroxysmal cough that may be followed by vigorous inspiration [whoop], expulsion of clear mucous and vomiting; lasts 1-2 months.
- Convalescent: gradual recovery with possible setbacks; lasts weeks to months.

In some cases of infant, childhood or adult pertussis, and in immunized individuals classic symptoms may not be present.

For a visual representation of the clinical course of pertussis refer to [Figure 1](#)

## Figure 1: Clinical course of pertussis [in weeks].

Adapted from CDC Pertussis [cdc.gov/pertussis/clinical/features.html](http://cdc.gov/pertussis/clinical/features.html)



\*without treatment with antibiotics. If treated with antibiotics the case is not considered infectious after 5 days of antibiotic treatment.

## Diagnostic testing

Nasopharyngeal [NP] swab for polymerase chain reaction [PCR]

## Treatment

Antibiotic treatment shortens the period of communicability but does not reduce symptoms unless given during incubation, catarrhal stage or early paroxysmal stage.

Any of the following can be used for treatment of pertussis. All have the same efficacy. Newer macrolides tend to be better tolerated but are more expensive:

- Azithromycin
- Clarithromycin
- Erythromycin
- Trimethoprim-Sulfamethoxazole – for individuals  $\geq 2$  months who have contraindication to or cannot tolerate macrolide agents.

Note:

Infants < 2 months of age who are receiving macrolide antibiotics should be monitored for symptoms and signs of pyloric stenosis.

A pediatric infectious disease consult should be considered for infants < 6 months of age because of the potential side effects.

Primary health care providers should consult their drug reference guidelines for appropriate dosing of the antibiotics.

## **PUBLIC HEALTH MANAGEMENT & CONTROL**

---

### **Case management**

- Determine if the case meets the [\*case definition\*](#)
- Contact the primary care provider to obtain clinical information on the case.
- Interview the case or parent/guardian to assess risk factors and susceptibility: obtain immunization and/or disease history, assess epidemiological links to cases or settings, including travel to other provinces or countries.
- Provide education to the case or parent/guardian about pertussis and prevention measures using the [\*Pertussis General Information Sheet\*](#).
- Ensure that the case has received the appropriate treatment and refer to their health care provider if needed.
- Determine contacts and initiate contact tracing

### **Exclusion**

Exclusion is not a proven effective strategy in pertussis control. However, it can be recommended by the Medical Officer of Health (MOH) in high-risk situations (in case of close contact with infants < 12 months of age or a pregnant woman in the third trimester of pregnancy). When indicated, exclusion should be implemented:

- until 5 days after the start of antibiotic therapy
- OR**
- if no treatment is given, until after 21 days from onset of cough and negative PCR or culture results have been obtained.

## Education

- Encourage good hand hygiene practice, avoid sharing drinking glasses or utensils, and cover coughs and sneezes with a tissue or forearm.
- Encourage cases who are incompletely or unimmunized to complete their immunization as per the recommended Nova Scotia Immunization Schedules (See [“Immunization”](#) section)
- Advise the parent/guardian that their child is considered infectious for 3 weeks after the onset of the paroxysmal cough or until 5 days after they begin treatment with the appropriate antibiotic.
- If the case is a health care worker, advise them to contact Occupational Health or Infection Control at their place of employment.

## Contact tracing

### Definition of close contact/exposure criteria

A contact is an individual who has had the following contact with a case during the period of communicability: face-to-face contact, sharing the same continued air space with the case for a prolonged period (i.e., > one hour) or direct contact with the respiratory secretions of the infected person.

### Susceptibility

Due to waning immunity from the pertussis vaccine or from having natural disease any individual is considered susceptible to pertussis. The highest risk of complications associated with pertussis is in infants who are too young to be protected by a complete vaccine series. It is also important to identify pregnant women in the third trimester of pregnancy because of the risk of disease transmission to the newborn.

### Initiate contact tracing

Identified contacts should be followed up to:

- determine if there are further cases.
- determine if there are any individuals who require prophylaxis (see indications in the [“Prophylaxis”](#) section).
- determine if there are situations where exclusion may be necessary. Such situations need to be discussed with the MOH.

If the case is in a child care setting: Child care settings should be contacted twice weekly (or as directed by the MOH) for a 3-week period following last contact with a case during the infectious period to determine if there are any other ill children or staff. If additional children or staff are diagnosed with pertussis the child care setting should be monitored until there has been a 3-week period of no additional cases.

### **Prophylaxis**

Prophylaxis for contacts should be implemented as soon as possible. Prophylaxis is unlikely to be of any benefit if started more than 21 days since the first contact with the case during the infectious period.

### **Indications**

Prophylaxis should be given, regardless of age or immunization status, ONLY to:

- All household contacts (including attendees at family daycare centres) of a lab-confirmed, probable or suspect pertussis case where there is an infant < 1 year of age or when there is a pregnant woman in the third trimester of pregnancy within the household
- Contacts in non-household settings who are infants < 1 year of age or pregnant women in the third trimester who have had face-to-face exposure and/or have shared confined air for > 1 hour with a lab-confirmed, probable or suspect pertussis case

**Table 1: Recommended antimicrobials for prophylaxis for indicated contacts without contraindications**

Drug	Dosage	Comments
<b>Azithromycin</b>	<p><u>Infants &lt; 6 months:</u> 10 mg/kg per day as single dose for 5 days</p> <p><u>Infants ≥ 6 months and children:</u> 10 mg/kg as a single dose (max 500 mg) on day 1, then 5 mg/kg/day as a single dose on days 2 through 5 (max 250 mg/day)</p> <p><u>Adolescents and Adults:</u> 500 mg as a single dose on day 1, then 250 mg as a single dose on days 2 through 5</p>	Preferred for infants < 1 month of age over Erythromycin
<b>Erythromycin</b>	<p><u>Infants &lt; 6 months:</u> 40 mg/kg/day in 4 divided doses for 7 days</p> <p><u>Infants ≥ 6 months and children:</u> 40 mg/kg/day in 4 divided doses for 7 days (max 1-2 g/day)</p> <p><u>Adolescents and Adults:</u> 2 g/day in 4 divided doses for 7 days</p>	Not preferred for infants < 1 month of age
<b>Clarithromycin</b>	<p><u>Infants &lt; 6 months:</u> 15 mg/kg/day in 2 divided doses for 7 days</p> <p><u>Infants ≥ 6 months and children:</u> 15 mg/kg/day in 2 divided doses for 7 days (max 1 g/day)</p> <p><u>Adolescents and Adults:</u> 1 g/day in 2 divided doses for 7 days</p>	Not recommended for infants < 1 month of age Not recommended in pregnancy
<b>Trimethoprim-Sulphamethoxazole</b>	<p><u>Infants &lt; 6 months:</u> Trimethoprim 8 mg/kg/day and Sulfamethoxazole 40 mg/kg/day in 2 divided doses for 14 days</p> <p><u>Infants ≥ 6 months and children:</u> Trimethoprim 8 mg/kg/day and Sulfamethoxazole 40 mg/kg/day in 2 divided doses for 14 days</p> <p><u>Adolescents and Adults:</u> Trimethoprim 320 mg/day and Sulfamethoxazole 1600 mg/day in 2 divided doses for 14 days</p>	<p><b>Alternative for individuals ≥ 2 months who have a contraindication to or cannot tolerate macrolide agents or who are infected with a macrolide-resistant strain of <i>B. pertussis</i>.</b></p> <p>Contraindicated in infants &lt; 2 months</p> <p>Not recommended in pregnancy.</p>

## **Immunization**

Initiation of active immunization following recent exposure is not effective against infection; use the opportunity to update routinely scheduled immunizations for contacts as per the [\*\*\*Nova Scotia Immunization Schedule\*\*\*](#) to prevent further exposure:

- Immunization of all infants at 2, 4, 6, and 18 months followed by a booster given at school entry [4-6 years]
- A second booster to adolescents in the School Immunization Program [Grade 7] given as Tdap
- A booster dose of Tdap is recommended in adulthood. This includes pregnant women and close contacts and caregivers of pregnant women, infants and young children

## **Exclusion**

Exclusion is not recommended for close contacts.

## **Education**

- Encourage good hand hygiene practice, avoid sharing drinking glasses or utensils, and cover coughs and sneezes with a tissue or forearm.
- Inform exposed individuals, especially those who are incompletely immunized, about pertussis symptoms and ask them to contact their health care provider and Public Health Services if these symptoms develop within 20 days of exposure.
- If the contact is a health care worker, advise them to contact Occupational Health or Infection Control at their place of employment to receive direction on their facility's policy regarding chemoprophylaxis or exclusion.
- If case is in a child care setting: Inform the parents/guardians of attendees of the case of pertussis and the possible risk. Provide information on pertussis and prevention measures.
- If case is in a school: Inform the parents/guardians of contacts of the case of pertussis and the possible risk. Provide information on pertussis and prevention measures.



## Outbreak Control

- For management of an outbreak please refer to the [Outbreak Response Plan](#) section in the Nova Scotia Communicable Disease and Control Manual.
- For outbreaks in child care settings also refer to the [Guidelines for Communicable Disease Prevention and Control for Child Care Settings](#).

## Surveillance forms

[novascotia.ca/dhw/populationhealth/surveillanceguidelines/NS\\_Notifiable\\_Disease\\_Surveillance\\_Case\\_Report\\_Form.docx](http://novascotia.ca/dhw/populationhealth/surveillanceguidelines/NS_Notifiable_Disease_Surveillance_Case_Report_Form.docx)

[novascotia.ca/dhw/populationhealth/surveillanceguidelines/Vaccine\\_Preventable\\_Case\\_Report\\_Form.docx](http://novascotia.ca/dhw/populationhealth/surveillanceguidelines/Vaccine_Preventable_Case_Report_Form.docx)

## General Information Sheet

## Sample Letter

## References

American Academy of Pediatrics. [2012]. *Red Book: 2012 Report of the Committee on Infectious Diseases*, [29th ed]. Elk Grove Village, IL: American Academy of Pediatrics.

Centers for Disease Control and Prevention. Pertussis. Retrieved July 30, 2015 from [cdc.gov/pertussis/clinical/features.html](http://cdc.gov/pertussis/clinical/features.html)

Centers for Disease Control and Prevention. [2005]. Recommended antimicrobial agents for the treatment and postexposure prophylaxis of pertussis. 2005 CDC Guidelines. Morbidity and Mortality Weekly Report Recommendations and Reports, 54[14], 1-16. Retrieved from: [cdc.gov/mmwr/index.html](http://cdc.gov/mmwr/index.html)

Health Canada. [2003]. National Consensus Conference on Pertussis. *Canada Communicable Disease Report*, 29S3, Retrieved from [phac-aspc.gc.ca/im/vpd-mev/pertussis/professionals-professionnels-eng.php](http://phac-aspc.gc.ca/im/vpd-mev/pertussis/professionals-professionnels-eng.php)

Heyman, D. L. [2015]. *Control of Communicable Diseases Manual* [20th ed.]. Washington, DC: American Public Health Association.

National Advisory Committee on Immunization. Canadian Immunization Guide, [Evergreen ed.]. Retrieved September 18, 2015 from [phac-aspc.gc.ca/publicat/cig-gci/index-eng.php](http://phac-aspc.gc.ca/publicat/cig-gci/index-eng.php)

Provincial Public Health Laboratory Network of Nova Scotia. [2012]. *Provincial Microbiology Users Manual*. Retrieved from [cdha.nshealth.ca/pathology-laboratory-medicine](http://cdha.nshealth.ca/pathology-laboratory-medicine)

Public Health Agency of Canada. Pertussis. Retrieved September 18, 2015 from [phac-aspc.gc.ca/im/vpd-mev/pertussis-eng.php](http://phac-aspc.gc.ca/im/vpd-mev/pertussis-eng.php)

Public Health Agency of Canada. [2009]. Case Definitions for Communicable Diseases under National Surveillance *Canada Communicable Disease Report* 35S2. Retrieved from [phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/index-eng.php](http://phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/index-eng.php)

Tozzi, A. E., Celentano, L. P., Delgi Atti, M. L. C & Salmaso, S. [2005]. Diagnosis and management of pertussis. *Canadian Medical Association Journal*, 172[4], 509-515. Retrieved from [cmaj.ca/](http://cmaj.ca/)