

PERTUSSIS SURVEILLANCE PROTOCOL FOR ONTARIO HOSPITALS

Developed by the Ontario Hospital Association and the
Ontario Medical Association
Joint Communicable Diseases Surveillance Protocols Committee

Approved by:
The OHA and The OMA Board of Directors
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This protocol was developed jointly by the Ontario Hospital Association and the Ontario Medical Association to meet the requirements of the *Public Hospitals Act 1990*, Revised Statutes of Ontario, Regulation 965.

This protocol is based on current scientific and medical knowledge and a desire to ensure maximum cost effectiveness of programs while protecting health care workers. It is intended as a minimum practical standard for Ontario hospitals. However, hospitals may adopt additional strategies when indicated by local conditions.

Members of the Joint OHA/OMA Communicable Disease Surveillance Protocols Committee

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The Ottawa Hospital
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Occupational Health & Safety
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Ontario Occupational Health Nurses

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St. Michael's Hospital

Infection Control Ontario

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Providence Care

Ontario Hospital Association

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Rationale for Pertussis Surveillance Protocol

Pertussis (whooping cough) is a highly communicable infection of the respiratory tract caused by the bacterium *Bordetella pertussis* and spread by large respiratory droplets. Pertussis is primarily a toxin-mediated disease that can affect individuals of any age, although the severity is greatest among young infants who may experience complications such as pneumonia, seizures and encephalitis and who are at the greatest risk of dying.^{1,2}

Pertussis is a vaccine preventable disease. With the introduction of the whole cell adsorbed pertussis vaccine in 1943, rates of pertussis decreased over 90% in Canada. The greatest incidence remains among infants <1 year of age and since the early 1990s, there has been an increased incidence among children aged 10 to 14 which has been partly attributable to waning vaccine immunity.³ Acellular pertussis vaccine has replaced the whole cell adsorbed vaccine and has been used since 1997.

In Canada and the United States, there has been a resurgence of pertussis, with the greatest relative increase in incidence noted among adolescents and adults. The US Centers for Disease Control and Prevention (CDC) compared the number of cases from 1990-1993 to the number of cases between 1996-2000 and reported that the incidence of pertussis in the 10 to 19 year old group had increased by >100% and in the >20 year old group by >95%.⁴

In Ontario, between 2000 and 2010, significant trends were observed in the annual incidence of pertussis as a result of changes in vaccine immunogenicity, laboratory testing and reporting standards, so comparisons of annual rates should be interpreted with caution. From 2000-2003 there was a reduction in incidence; from 2004-2009 the incidence increased; from 2009-2010 incidence declined to the lowest in the past decade.

Results of three Canadian studies estimating the secondary attack rate in household contacts, together with results of the Sentinel Health Unit Surveillance System, conclude that 10% to 25% of adolescents and adults in Canada are susceptible to pertussis and that these individuals play a role in its transmission.^{5,6}

Adults have been increasingly recognized as the main reservoir for pertussis infection and numerous outbreaks of pertussis in health care facilities have been reported in the literature.^{7,8,9,10} Adults are the primary source of pertussis for infants who are in hospital. Infection in health care workers (HCWs) is of particular concern as they may put susceptible patients at risk for infection.¹¹ Mild and atypical manifestations of pertussis among infected persons and the lack of quick and accurate diagnostic tests can make pertussis outbreaks difficult to recognize and therefore difficult to control. Nosocomial acquisition of pertussis by HCWs has occurred during several outbreaks.¹² Early recognition and treatment of pertussis in adults and adolescents may be helpful in limiting transmission to very young children.¹³

Recognizing that adults and adolescents are now also major reservoirs of pertussis in

the community,^{14,15} the goal of pertussis control is to decrease morbidity and mortality from pertussis across the entire life span. Protection of adolescents and adults is a worthy goal for the benefit of these people themselves. Both the National Advisory Committee on Immunization (NACI) in Canada and the Advisory Committee on Immunization Practices (ACIP) in the United States recommend a single booster dose of Tdap (diphtheria, tetanus and acellular pertussis) in adults who have not previously received a dose of acellular pertussis vaccine.^{17,18}

Prevention is always the primary goal and HCWs should protect themselves and their patients by being vaccinated. It is also important to recognize the disease and to be able to implement recommendations and protocols for the management of pertussis in health care facilities.

The incubation period is commonly 7-10 days, with a range of 4-21 days.¹⁹ The clinical course is divided into three stages. Persons with pertussis are most infectious during the first phase, known as the catarrhal phase (runny nose, sneezing, low-grade fever, and a mild cough, similar to the common cold) that lasts approximately two weeks. The second stage, or paroxysmal cough stage lasts 1-6 weeks and the third stage, or convalescent stage lasts weeks to months with gradual recovery.

At present, the most effective control of transmission of pertussis in hospital settings includes isolation of suspected or known infected patients using droplet precautions, provision of postexposure prophylaxis for asymptomatic exposed HCWs as indicated, evaluation of all symptomatic HCWs for pertussis and provision of appropriate therapy and exclusion of all symptomatic HCWs during the first 5 days of their therapy.^{20,21}

It is important to remember to perform hand hygiene before and after patient contact and utilize appropriate personal protective equipment (i.e. droplet precautions) including mask and eye protection.

Vaccination of susceptible health care workers with acellular pertussis vaccine during a pertussis outbreak in a hospital setting is being investigated as an additional option for outbreak control.²²

Pertussis Surveillance Protocol for Ontario Hospitals

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I. Purpose

The purpose of this protocol is to provide direction to hospitals to prevent the transmission of *Bordetella pertussis* (pertussis, whooping cough) among health care workers (HCWs) and patients.

II. Applicability

This protocol applies to all persons carrying on activities in the hospital, including employees, physicians, nurses, contract workers, students, post-graduate medical trainees and volunteers. The term Health Care Worker (HCW) is used in this protocol to describe these individuals. This protocol does not apply to patients or residents of the facility or to visitors.

When training students or hiring contract workers, the hospital must inform the school/supplying agency that the school/agency is responsible for ensuring that their students/contractors are managed according to this protocol.

This protocol is for the use of the Occupational Health Service (OHS) in hospitals.

III. Pre-placement

At the time of pre-placement, pertussis immunization status of all HCWs should be determined and recorded. A single dose of Tdap should be offered to all HCWs who have not previously received an adolescent or adult dose of Tdap.²³ The interval between the last tetanus-diphtheria booster and the tetanus-diphtheria-acellular pertussis vaccine does not matter. The long-term effectiveness of a single dose of acellular pertussis vaccine is unknown at this time.

Previous immunization against pertussis or a history of natural pertussis infection does not provide lifelong immunity. There is no routine antibody testing available to determine immune status to pertussis.

IV. Continuing Surveillance for Pertussis

No routine continuing surveillance of any persons carrying on activities in the hospital is required for pertussis. Contact tracing is conducted for active cases only.

There should be a routine internal reporting process in OHS for HCWs to report occurrence of and absences for respiratory infection.²⁵ When there is an outbreak of pertussis in the hospital, OHS will follow-up contacts of cases and absences of HCWs with respiratory symptoms who work in the affected area(s).

V. Exposure

Any HCW with an **exposure** who meets the definition of **close contact** or **high risk contact** (see Glossary) must report this exposure to the OHS. HCWs should only be considered exposed and regarded as close contacts if the source is a confirmed case of pertussis or meets the Surveillance Case Definition for Pertussis (See Glossary).

Exclusion of asymptomatic contacts from any setting is not indicated.

All HCWs working with patients may be considered at high risk of exposure to pertussis and should be considered susceptible. HCWs should wear facial protection, i.e. surgical/procedure masks and eye protection, within 2 meters of a pertussis patient and if indicated by Routine Practices, gloves and gown, and perform hand hygiene. If the HCW exposure occurs in the community (e.g., household contact), OHS should still be notified, and follow-up will occur through Public Health and the HCW's treating physician.

Procedure for Management of Health Care Worker Contacts

- Identify high risk contacts.
- Identify close contacts.
- **Symptomatic** contacts should have a medical examination and nasopharyngeal swab (NPS) for *B. pertussis*; testing should be done prior to the start of antibiotics. (See section VI.)
- Ensure that high risk contacts are started on chemoprophylaxis.
- Ensure that close contacts are assessed on a case by case basis for chemoprophylaxis.
- NPS of asymptomatic contacts should not be done. They are not useful for outbreak control or assessing the need for antibiotics.
- **Educate asymptomatic contacts about the symptoms of pertussis** (See Glossary); early symptoms mimic the "common cold". Advise them to inform OHS and consult a physician for medical examination and *B. pertussis* testing as soon as symptoms develop, as they are most infectious in the early stage.

- NPS can be performed or arranged through the OHS if clinically indicated. Ensure that the correct sampling technique and transport medium is used.

Chemoprophylaxis (See Appendix)

Chemoprophylaxis is the use of antibiotics in exposed persons to prevent the development of a disease. If exposure to pertussis has occurred, **chemoprophylaxis** may be recommended. (See Appendix)

Chemoprophylaxis in hospital settings is only recommended for **high risk contacts** and **close contacts** if indicated. (See Glossary.)

High risk contacts in a health care setting are **pregnant HCWs in their third trimester or parents of infants** (<12 months). Chemoprophylaxis of all high-risk contacts is recommended because to date immunization provides only partial protection and immunized people may still acquire and transmit *B. pertussis*.²⁶

Asymptomatic HCWs who have had **close contact** with a pertussis case should be advised of the early symptoms of pertussis (see Glossary, Symptoms of Pertussis, catarrhal phase) and be put under close surveillance by OHS. HCWs who have not received acellular pertussis vaccine (Tdap) should be given chemoprophylaxis. HCWs who have received acellular pertussis vaccine do not require chemoprophylaxis, but must report development of symptoms to OHS.

To be effective, chemoprophylaxis must be started as soon as possible after the contact.²⁷

VI. Acute Disease

Confirmed or probable pertussis cases are reportable to the local Medical Officer of Health. (See case definitions in Glossary) Occupationally acquired pertussis is reportable to the Ministry of Labour and WSIB.

OHS should report symptomatic HCWs to Infection Prevention and Control for assessment and management of patient contacts.

HCWs with symptoms of pertussis must be excluded from work anywhere in the hospital for at least the first 5 days of antimicrobial treatment (See Recommended Treatment in Appendix). Antimicrobial therapy should be started as soon as possible after onset of illness. There is no time limit for initiation of antibiotic treatment following onset of symptoms in cases of laboratory confirmed or epidemiologically linked clinical cases of pertussis.

HCWs with symptoms of pertussis who cannot or refuse to take antimicrobial therapy must be excluded from work for 21 days from onset of cough.²⁸ The use

of a surgical/procedure mask by a HCW is not sufficient protection for patients and other staff during this time.²⁹

Glossary

Case Definition for Pertussis (Ontario MOHLTC Public Health Branch)

1. Confirmed Case:

Laboratory confirmation of *Bordetella pertussis* with clinically compatible signs and symptoms:

- isolation from an appropriate clinical specimen (e.g. NPS), or
- detection of DNA by nucleic acid amplification test (e.g. polymerase chain reaction (PCR)) from an appropriate clinical specimen (e.g. NPS)

or

Clinically compatible signs and symptoms with an epidemiologic link (i.e. close contact) to a laboratory confirmed case.

2. Probable Case:

Clinically compatible signs and symptoms, specifically cough lasting 2 weeks or longer, in the absence of appropriate laboratory tests and in the absence of an epidemiologic link to a laboratory confirmed case,

and

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

- Paroxysmal cough of any duration
- Cough with inspiratory whoop

Definition of Exposure, i.e. Close Contact and High Risk Contact

Close Contact:

Transmission of Pertussis can be expected with:

- **Unprotected** direct face-to-face contact (<2 metres) for a period (not defined) with a case-patient who is symptomatic (i.e., in the catarrhal or paroxysmal period of illness)
- Direct contact with respiratory, oral, or nasal secretions from a symptomatic case-patient (e.g., an explosive cough or sneeze in the face, mouth-to-mouth resuscitation, performing a full medical exam including examination of the nose and throat, without appropriate personal protective equipment; sharing food or eating utensils during a meal).

Identification and chemoprophylaxis of contacts needs to be individualized with consideration of the risk of pertussis to the individual and the specifics of the exposure.

High Risk Contact **is a Close Contact plus:**

- Infants < 1 year of age and their HCW parents by extension
- Pregnant women in the 3rd trimester (Newborns whose mothers contract pertussis 2-3 weeks prior to their delivery are at high risk for severe pertussis disease and its complications).

Symptoms of Pertussis

- First phase (catarrhal phase): runny nose, sneezing, low-grade fever, and a mild cough, similar to the common cold; usually afebrile; lasts approximately two weeks.
- Second stage: or paroxysmal cough; there may be an inspiratory whoop; cough may end with apnea or vomiting; lasts 1-6 weeks
- Third stage: convalescence; lasts weeks to months

Note: Symptoms of pertussis in adults may be mild and/or atypical; cough may persist for several weeks, but the characteristic whoop is not usually present. Recognition of pertussis in adults may be difficult due to the nonspecific symptoms.

Appendix

Recommended Antimicrobial Treatment of Pertussis and Postexposure Chemoprophylaxis of Pertussis Contacts

Any of the following drug regimens can be used for either treatment or chemoprophylaxis: (Choice based on cost, contraindications, side effects, etc.)

DOSAGE	CONTRAINDICATIONS*	COMMON SIDE-EFFECTS *	NOTES
ERYTHROMYCIN: 500 mg po qid for 14 days	Allergy to erythromycin or other macrolides Estolate salt should not be given during pregnancy	Nausea, vomiting diarrhea, abdominal pain	Avoid estolate salt in those with hepatic dysfunction
AZITHROMYCIN: 500 mg po once for 1 day, THEN 250 mg po once daily for 4 days	Allergy to azithromycin or other macrolides Safety during pregnancy has not been established	Nausea, vomiting diarrhea, abdominal pain	Use with caution in those with hepatic dysfunction Do not take with aluminum or magnesium containing antacids.
CLARITHROMYCIN: 500 mg. po bid for 7 days	Allergy to clarithromycin or other macrolides Pregnancy	Nausea, vomiting diarrhea, abdominal pain	Use with caution in those with hepatic or renal impairment

Alternate agent (if allergic to macrolides):

Trimethoprim/ Sulfamethoxazole DS (double strength) 1 tab po bid for 14 days	Allergy to trimethoprim or sulfonamides Pregnancy or lactation Severe renal impairment	Nausea, vomiting, skin rash
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*Consult the Compendium of Pharmaceutical and Specialties (CPS) for a complete listing of contraindications and side-effects.

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