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
The Ministry of Health and Long-Term Care –
The Minister of Health and Long-Term Care

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for Ontario Hospitals

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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 regulation requires each hospital to have by-laws that establish and provide for the operation of a health surveillance program including a communicable disease surveillance program in respect of all persons carrying on activities in the hospital. The communicable disease program is to include the tests and examinations set out in any applicable communicable disease surveillance protocol. The regulation states that the communicable disease surveillance protocols that hospitals must adopt are those "published jointly by the Ontario Hospital Association (OHA) and the Ontario Medical Association (OMA) and approved by the Minister (of Health and Long-Term Care)."

This Protocol has been reviewed since the previous version; changes have been highlighted in yellow for easy identification. Protocols are reviewed on a regular basis, every two years or as required.

The protocol reflects clinical knowledge, current data and experience, and a desire to ensure maximum cost effectiveness of programs, while protecting health care workers and patients. It is intended as a minimum standard that is practical to apply in most Ontario hospital settings. It does not preclude hospitals from adopting additional strategies that may be indicated by local conditions.
Members of the Joint OHA/OMA Communicable Disease Surveillance Protocols Committee

**Representing the Ontario Hospital Association**

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<th>Title/Role</th>
<th>Organization</th>
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**Ontario Hospital Association**

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<td>Director, Health and Safety</td>
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<td>Henrietta Van hulle</td>
<td>Executive Director, Health and Community Services</td>
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**EX-OFFICIO**

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<td>Chief Physician, Ministry of Labour</td>
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<td>Henrietta Van hulle</td>
<td>Executive Director, Health and Community Services</td>
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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.¹²

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.² 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. According to the CDC, in 2012, 48,277 cases were reported nationwide, exceeding levels observed since 1955. Reported pertussis cases decreased during 2013 to 28,639; however, levels remain significantly increased compared to those observed during the 1990s and early 2000s. Multiple factors have likely contributed to the increase including heightened provider and public awareness, improved diagnostic testing, waning immunity from acellular pertussis vaccines, and possibly molecular changes within the pertussis bacterium. The incidence of pertussis remains highest among young infants.¹

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 2003-2006 the incidence increased; from 2006-2010 incidence declined to the lowest in the past decade. There was an increase in incidence of pertussis in Canada observed in 2012 and this was due to outbreaks in several jurisdictions across the country.⁴ Reasons for pertussis resurgence could include low vaccine coverage and waning immunity among young adolescents affected by the outbreak.¹

In Ontario, a provincial outbreak of pertussis was reported in January 2012, initially detected in an under-immunized religious community that subsequently spread to the general community and to a second under-immunized religious community.⁵ Ultimately there were 443 cases reported by seven health units, with 273 cases in the general community in this prolonged outbreak of 17 months. There were 13 hospitalized cases, all children, with eight under 1 year of age. There were no deaths. A proportion of cases occurred in fully immunized individuals, which is not uncommon in outbreak settings but warrants further study.¹

From 1991 to 2012, 30 deaths have been reported through the Canadian Immunization
Monitoring Program Active (IMPACT). All deaths were reported in infants less than one year of age, with the majority of deaths occurring in infants less than two months of age. Most children were previously healthy and had no history of immunization.\(^2\) In the United States in 2014 there were 32,971 cases of pertussis. The majority of deaths occurred in infants under three months of age.\(^3\)

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.\(^4\) 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.\(^5\)\(^,\)\(^6\) 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.\(^7\) Early recognition and treatment of pertussis in adults and adolescents may be helpful in limiting transmission to very young children.\(^8\)

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)\(^13\) in Canada and the Advisory Committee on Immunization Practices (ACIP)\(^14\) in the United States recommend a single booster dose of Tdap (diphtheria, tetanus and acellular pertussis) in adults. The adult dose is in addition to the routine adolescent booster dose.\(^2\)

**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. 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 post-exposure 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.\(^11\)\(^,\)\(^15\) It is important to remember to perform hand hygiene before and after patient contact and use appropriate personal protective equipment (i.e. droplet precautions) including mask and eye protection.

**This protocol is only one component of an infection prevention and control program; HCWs must consistently adhere to Routine Practices.**
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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. This protocol provides the minimum standard required under the Ontario Public Hospitals Act, Regulation 965.

II. Applicability

This protocol applies to all persons carrying on activities in the hospital, including but not limited to employees, physicians, nurses, contract workers, students, post-graduate medical trainees, researchers 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 student/contractors are managed according to this protocol.

This protocol is for the use of the Occupational Health Service (OHS) in hospitals. It is expected that OHS collaborate with Infection Prevention and Control and other departments, as appropriate.

III. Pre-placement

At the time of pre-placement, pertussis immunization status of all HCWs should be determined and recorded in the HCW’s OHS record. All adult HCWs, regardless of age, should receive a single dose of tetanus diphtheria acellular pertussis vaccine (Tdap) for pertussis protection if not previously received in adulthood. The adult dose is in addition to the routine adolescent booster dose. Adolescent volunteers in health care settings should receive their routine booster dose of Tdap vaccine. The interval between the last tetanus-diphtheria booster and the Tdap 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.

Immunization with Tdap is safe and effective in pregnant women, and allows for high levels of antibody in newborns during the first two months of life, when morbidity and mortality from pertussis infection is the highest. “All pregnant women at or after 26 weeks of pregnancy who have not received a dose of pertussis-containing vaccine in adulthood should be encouraged to do so.”

IV. Continuing Surveillance

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. 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 close contact (see Glossary) must report this exposure to the OHS. 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 close contacts and high-risk close contacts (see Glossary)
- Ensure that high-risk close contacts are started on chemoprophylaxis
- Ensure that close contacts are assessed on a case by case basis for chemoprophylaxis (See Appendix)
- 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
- Nasopharyngeal swabs (NPS) of asymptomatic contacts should not be done as they are not useful for outbreak control or assessing the need for antibiotics
The primary objective of post-exposure chemoprophylaxis is to prevent death and serious complications from pertussis. Chemoprophylaxis in hospital settings is only recommended for high-risk close contacts and other close contacts if indicated on a case by case basis (see Glossary). To be effective, chemoprophylaxis must be started as soon as possible after the contact.17

High-risk close 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*.

Acellular pertussis vaccine has been used for the control of pertussis outbreaks in defined populations, such as hospitals, although data supporting its effectiveness are lacking. In an outbreak, Public Health may recommend that pregnant women > 26 weeks gestation be offered Tdap, regardless of their immunization history.2,16

Asymptomatic HCWs who have had close contact with a pertussis case should be advised of the early symptoms of pertussis (see Glossary) and be put under close surveillance by OHS. HCWs who have not received acellular pertussis vaccine (Tdap) should be given chemoprophylaxis and vaccinated with Tdap.

**Work Restrictions**
Exclusion of asymptomatic contacts from any setting is not indicated.

**VI. Acute Disease**

OHS should collaborate with Infection Prevention and Control in order to identify patient contacts of symptomatic HCWs. Symptomatic HCWs are required to see their personal health care provider for treatment of acute disease. A medical examination and NPS for *B pertussis* should be done prior to the start of antibiotics. NPS may be performed or arranged through the OHS if clinically indicated. Ensure the correct sampling technique and transport medium is used.

**Work Restrictions**

**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 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.**18 The use of a surgical/procedure mask by a HCW is not sufficient protection for patients and other staff during this time.15
VII. Reporting

Suspect or confirmed pertussis (as per Ontario Reg 559/91 and amendments under the Health Protection and Promotion Act) must be reported to the local Medical Officer of Health.

In accordance with the Occupational Health and Safety Act and its regulations, an employer must provide written notice within 4 days of being advised that a worker has an occupational illness, including an occupationally-acquired infection, or has filed a claim with the Workplace Safety and Insurance Board (WSIB) with respect to an occupational illness, to the:

- Ministry of Labour,
- Joint Health and Safety committee (or health and safety representative), and
- trade union, if any.

Occupationally-acquired illnesses are reportable to the Workplace Safety and Insurance Board.
IX. Glossary

Ontario MOHLTC Surveillance Case Definition for Pertussis

Confirmed Case:
Laboratory confirmation of infection: Isolation of *Bordetella pertussis* from an appropriate clinical specimen (e.g., nasopharyngeal swabs)
OR
Detection of *B. pertussis* deoxyribonucleic acid (DNA) by nucleic acid amplification test (NAAT)) from an appropriate clinical specimen (e.g., nasopharyngeal swabs) 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 for which there is no other known cause 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

Close Contacts
• **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).
There is no evidence that antibiotic chemoprophylaxis of contacts changes the epidemic course of pertussis in the community; therefore, it is only recommended for the following contacts of confirmed pertussis cases:\textsuperscript{19}

- household contacts (including attendees at home day care) where there is a vulnerable person defined as an infant $< 1$ year of age [immunized or not] or a pregnant woman in the third trimester for out of household exposures,
- vulnerable persons, defined as infants less than one year of age regardless of immunization status, and pregnant women in their third trimester who have had face-to-face exposure and/or have shared confined air for $> 1$ hour

**High-Risk Close Contacts**

- 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 (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.)

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

*Consult the Compendium of Pharmaceutical and Specialties (CPS) for a complete listing of contraindications and side-effects.*
References


