

**VARICELLA/ZOSTER
(CHICKENPOX/SHINGLES)
SURVEILLANCE PROTOCOL
FOR ONTARIO HOSPITALS**

Developed by the Ontario Hospital Association and the
Ontario Medical Association
Joint Communicable Diseases Surveillance Protocols Committee
in collaboration with the Ministry of Health and Long-Term Care

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 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.

Rationale for Varicella/Zoster Surveillance Protocol

Varicella (chickenpox) is a common childhood infection caused by varicella-zoster virus (VZV), a herpes virus. Following primary infection, the virus becomes latent, and may reactivate later as herpes zoster (shingles); the lifetime risk of herpes zoster has been estimated to be as high as 30% in the general population.¹ Chickenpox is highly contagious and is spread by the airborne route and by direct contact with the skin lesions or oral secretions. Shingles is spread by direct contact with lesions before they are crusted. Disseminated shingles can also be spread by the airborne route.

Among susceptible household contacts attack rates are in the range of 65-87%.^{2,3} Attack rates in other settings are less well documented, but are likely to be lower. In countries without vaccination programs, varicella is mainly a disease of childhood, developing in 50% of children by five years of age and 90% by 12 years.² People from tropical regions are less likely to acquire immunity in childhood and, therefore, have higher rates of susceptibility as adults.^{2,3}

The incubation period is usually 14-16 days (range 10-21 days) and may be shortened in the immunodeficient and prolonged as long as 28 days after passive immunization against varicella.^{2,3} Symptoms of chickenpox in healthy children include a generalized, vesicular, pruritic rash with a low-grade fever and systemic symptoms.³ Infected individuals are infectious 1-2 days prior to onset of the rash, and continue to be until the last lesion of the rash has crusted.² Contagiousness may be prolonged in individuals with altered immunity.⁴

Complications include bacterial superinfection of skin lesions with or without bacterial sepsis, pneumonia, central nervous system involvement (acute cerebellar ataxia, encephalitis, stroke/vasculopathy), thrombocytopenia, and other rare complications, such as glomerulonephritis, arthritis, and hepatitis.³ Complications are more common in adolescence, adults and people with conditions that compromise their immune system, in whom there are higher rates of pneumonia, encephalitis and death.² Varicella increases the risk of severe invasive group A streptococcal infection in previously healthy children by 40-fold to 60-fold.² Rarely, complications may result in death; the case fatality rate is lower for children (1:100,000 varicella cases in the 5-9 age group) than for adults (1:5,000).⁵

In 2016, 1766 cases of chickenpox were reported in Ontario;⁶ cases have been declining since the introduction of publicly funded varicella vaccine in Ontario in 2004 and the 2011 change to a two-dose chickenpox routine vaccination schedule for children.⁷ Children aged 5-9 years had the highest incidence of varicella in Ontario (86.7/100,000 population) and accounted for just over one-third of all cases in 2016.⁶

Health care workers (HCWs) are at risk of exposure to and occupational acquisition of chickenpox, which may lead to further exposure of and transmission to staff and patients. Management of nosocomial outbreaks of varicella is costly. As early as 1988, estimates were about US\$ 41,000 - 56,000, for annual infection control costs related to VZV in US acute care hospitals, with the cost of an outbreak about US\$ 9,000 - 19,000.⁸ A Canadian multicenter study estimated the total medical and societal costs of varicella to be \$122.4 million yearly or \$353.00 per individual case, 10% attributed to hospital-based medical care.^{9,10}

With the licensing of live attenuated varicella vaccine in Canada, varicella is a preventable disease. The estimated vaccine effectiveness 10 years following the receipt of 2 doses of univalent varicella vaccine is estimated at over 98% against any varicella disease and 100% against severe varicella.² Immunization efficacy in children is estimated to be 94.4% after the first dose and 98.3% after the second dose of varicella vaccine.²

Transmission of vaccine strain virus from a healthy vaccine recipient is very rare. There have been few documented cases, all associated with a rash in the vaccine recipient.² Contraindications to immunization include, but are not limited to, a prior history of hypersensitivity to any component of the vaccine, immunosuppression, and pregnancy.²

Varicella vaccine is recommended for those aged 12 months and older. Two doses are recommended for all ages. For those 13 years and older, two doses are given subcutaneously at least 4-6 weeks apart as per the manufacturer's recommendation. The schedule need not be restarted if the second dose is delayed. Booster doses beyond the 2 recommended doses of varicella-containing vaccines are not necessary.² Although it is not harmful to immunize a previously immune person, the vaccine need not be given if the person has documented immunity.²

Susceptible HCWs are considered a priority group for immunization by the National Advisory Committee on Immunization (NACI).²

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 transmission of varicella-zoster virus (VZV) between health care workers (HCWs) and patients.

Infected persons and their personal physicians are responsible for follow-up care and therapy.

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 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.

These guidelines are for use by the Occupational Health Service (OHS) in the hospital. It is expected that OHS collaborate with Infection Prevention and Control and other departments, as appropriate.

III. Preplacement

At the time of hiring or placing, OHS must ascertain the HCW's immune status to varicella. Evidence of immunity includes:^{2,11}

- documentation of receipt of 2 doses of varicella-containing vaccine
- laboratory evidence of immunity
- laboratory confirmation of disease

Although NACI may consider a self-reported history of varicella or herpes zoster as evidence of immunity for some HCW's,¹² due to the vulnerable populations cared for in hospitals and the possibility of a false-positive self-reported history, all HCWs should be assessed for immunity, as defined above, at the time of hiring or placing in hospital settings. HCWs

with a self-reported history of chickenpox or zoster who are working in hospital settings should not be assumed to be immune.^{11,}

Evidence of immunity must be recorded in the HCW's OHS health record. In the case of contract workers, this information must be kept by the supplying agency. If this documentation is not available, OHS must offer varicella immunization (2 doses) to the HCW.

Varicella vaccine (two doses) is recommended at the expense of the hospital for all non-immune HCWs. Refusal of vaccination should be documented in the HCW's OHS health record. If, after vaccination, a varicella-like rash localized to the injection site develops, the HCW may continue to work if the rash is covered.² A small proportion (approximately 3% to 5% after the first dose and 1% after a second dose) of vaccinated persons will develop a varicella-like rash not localized to the injection site.² Although vaccine recipients with a post vaccine varicella-like rash rarely transmit the vaccine associated virus, these HCWs should be excluded from work with high-risk patients (i.e., children, newborns, obstetrical patients, transplant patients, oncology patients) until lesions are dry and crusted.² As this is a live vaccine, and the effects of varicella vaccine on the fetus are unknown, pregnant women should not be vaccinated.² Women should delay pregnancy for at least four weeks following vaccination. **Varicella vaccine is contraindicated for some immunocompromised individuals.**²

Serologic testing for immunity after immunization is not recommended. Currently available serologic tests, although useful to determine natural immunity, are not sensitive enough to determine post-vaccine immunity.²

Only HCWs known to be immune (as above) may be assigned to care for patients with chickenpox or zoster. If no immune HCWs are available and patient safety would be compromised by not allowing the susceptible HCW to attend the patient, the susceptible HCWs must wear a fit-tested, seal-checked N95 respirator. There are no efficacy data for N95 respirators for this application. Non-immune pregnant HCWs must not be assigned to care for a patient with chickenpox or zoster.

IV. Continuing Surveillance

No routine continuing surveillance of any persons carrying on activities in the hospital is needed for varicella or zoster.

Due to the changing requirements at preplacement, based on evolving vaccines and best evidence, hospitals should develop a plan to assess the immune status of existing HCWs whose varicella status was not determined at their time of hire.^{13,14} Priority should be given to assessing HCWs who work with high-risk patients (i.e., children, newborns, obstetrical patients, transplant patients, oncology patients) or in areas with increased risk of encountering patients presenting with varicella (e.g., emergency departments, family practice units). Results must be recorded in the HCW's OHS health record.

V. Exposure to Varicella

Exposure to VZV is considered significant if it involves direct or face-to-face contact with persons who have chickenpox or disseminated zoster, or any direct contact with fluid from lesions or objects contaminated with this fluid. Contact with dried scabs from varicella or zoster lesions does not constitute exposure.^{2,5}

Chickenpox and disseminated zoster are spread by direct or indirect contact with vesicle fluid, and by the airborne route. Surgical masks do not provide complete protection for a susceptible individual. Therefore, a susceptible individual could still have a significant exposure to an infectious patient, even if a mask is worn. Patients are highly infectious the day before onset of rash.^{2,5}

When determining whether an HCW has had significant exposure to VZV, consider the following:²

- immune status of the exposed HCW;
- frequency of contact with the infected patient;
- proximity to the infected patient; and
- duration of face-to-face contact with the infected patient.

Localized zoster is transmitted by direct contact with fluid from lesions, or by contact with objects contaminated with this fluid. The role of airborne spread of localized zoster is not clear.

Work Restrictions

Any susceptible HCW or HCW whose immune status is unknown and who has a significant exposure to a person with acute chickenpox or zoster must report this exposure to the OHS. The HCW must be tested immediately for the presence of VZV antibodies. If the immune status cannot be determined within 10 days of the exposure, the HCW must be regarded as susceptible until results are obtained.

Susceptible exposed HCWs must be excluded from any work in the hospital from 10 days after the first exposure until 21 days after the last exposure. If clinical chickenpox develops during that period, the HCW must remain off work until all lesions are dried and crusted.²

Immune HCWs may continue to work as usual.

Varicella vaccine is 90% effective in preventing or modifying severity of varicella if given within five days after exposure.² If the exposure does not result in infection, post-exposure vaccination should induce protection against subsequent exposures. The second dose should be given at the usual time if illness does not develop. Since illness may still occur, the post-exposure vaccinated HCW should remain off work from day 10 after the first exposure until day 21 after the last exposure.

Varicella may develop in HCWs previously immunized with varicella vaccine. Exposed, immunized HCWs may continue to work, but should be assessed at the start of each working day from day 10 until day 21 for signs/symptoms of varicella. If varicella develops during that period, the person must remain off work until lesions are dried and crusted.

Varicella-susceptible pregnant women are at higher risk for serious complications than adults in general.³ Varicella immune globulin (Varlg) is indicated for these women after significant exposure as it can prevent and attenuate varicella infection in those at high risk of severe disease.¹⁵ For maximal benefit, Varlg should be administered as soon as possible after exposure, ideally within 96 hours after the first exposure, but up to 10 days after the last exposure.^{15,16} Protection conferred by Varlg lasts approximately 21 days. Varlg may prolong the incubation period; therefore staff who receive Varlg must be excluded from any work in the hospital from 10 days after the first exposure until 28 days after the last exposure. Varlg may also be indicated for some susceptible immunocompromised people.

VI. Acute Disease

OHS should work with Infection Prevention and Control to identify patient contacts of symptomatic HCWs with acute chickenpox or disseminated zoster.

Work Restrictions

HCWs with acute chickenpox or disseminated zoster must be excluded from work anywhere in the hospital until lesions are dried and crusted.

HCWs with localized zoster may work in most cases if appropriate barriers are used (i.e., all lesions are covered and good hand hygiene is used before patient contact). HCWs with zoster may not work with high-risk patients (i.e., children, newborns, obstetrical patients, transplant patients, oncology patients) until lesions are dried and crusted.

VII. Reporting

Suspect or confirmed chickenpox (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, and/or a Workplace Safety and Insurance Board (WSIB) claim has been filed by or on behalf of the worker with respect to an occupational illness, including an occupational infection, 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 WSIB.

VIII. Glossary

Disseminated herpes zoster

Herpes zoster which affects three or more dermatomes, and generally occurs only in people with compromised or suppressed immune systems. Disseminated zoster can be difficult to distinguish from varicella.¹⁷

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