Ministry of Health

Ontario Public Health Standards:
Requirements for Programs, Services and Accountability

Infectious Disease Protocol

# Appendix 1: Case Definitions and Disease-Specific Information

## Disease: Chickenpox (Varicella)

Effective: May 2022

Ontario

# Chickenpox (Varicella)

☒ Communicable
☐ Virulent

***Health Protection and Promotion Act*** **(HPPA):**
**Ontario Regulation (O. Reg.) 135/18 (Designation of Diseases)**

## Provincial Reporting Requirements

☒ Confirmed case
☐ Probable case

As per Requirement #3 of the "Reporting of Infectious Diseases" section of the *Infectious Diseases Protocol, 2018* (or as current), the minimum data elements to be reported for each case are specified in the following:

- O. Reg. 569 (Reports) under the HPPA;[7]
- The iPHIS User Guides published by Public Health Ontario (PHO);
- For certain vaccines, information to be entered into the applicable provincial inventory system (i.e. Panorama or COVaxON); and
- Bulletins and directives issued by PHO.

## Report individual cases that are:

- Confirmed cases;
- Hospitalized cases; and
- Cases with complications, including death.

In addition, all cases of chickenpox should be reported as aggregate. This includes those that have been entered as individual cases since aggregate data cannot be linked to individual cases.

## Type of Surveillance

Case-by-case and aggregate reporting.

## Case Definition

### Confirmed Case

Clinical evidence of illness (see Clinical Evidence section) and laboratory confirmation of infection:

- Isolation or direct antigen detection of varicella-zoster virus (VZV) from an appropriate clinical specimen (e.g., vesicle/lesion fluid or swab)

**OR**

- Detection of VZV deoxyribonucleic acid (DNA)

**OR**

- Seroconversion or a significant rise (e.g. fourfold or greater) by any standard serologic assay in varicella-zoster Immunoglobulin G (IgG) titre between acute and convalescent sera

**OR**

- Positive serologic test for varicella-zoster Immunoglobulin M (IgM) antibody

**OR**

Clinical evidence of illness (see Clinical evidence section) in a person with an epidemiologic link to a laboratory-confirmed case of chickenpox or VZV infection.

## Probable Case

Clinical evidence of illness in the absence of laboratory confirmation or epidemiological link to a laboratory confirmed case.

**Note:** Probable case definitions are provided as guidelines to assist with case finding and public health management and are not for reporting purposes.

### Outbreak Case Definition

The outbreak case definition varies with the outbreak under investigation. Please refer to the Infectious Diseases Protocol, 2018 (or as current) for guidance in developing an outbreak case definition as needed.

The outbreak case definitions are established to reflect the disease and circumstances of the outbreak under investigation. The outbreak case definitions should be developed for each individual outbreak based on its characteristics, reviewed during the course of the outbreak, and modified if necessary, to ensure that the majority of cases are captured by the definition. The case definitions should be created in consideration of the outbreak definitions.

Outbreak cases may be classified by levels of probability (i.e. confirmed and/or probable).

## Clinical Information

### Clinical Evidence

Clinical illness is characterized by a pruritic rash with rapid evolution from macules to papules, vesicles and crusts; all stages may be simultaneously present; lesions are superficial and may appear in crops.

### Clinical Presentation

VZV causes two separate diseases: varicella (chickenpox) and herpes zoster (shingles). Varicella is the primary infection and is a reportable disease. Herpes zoster is caused by the reactivation of latent varicella infection in the dorsal root ganglia and is not a reportable disease.[1]

Varicella is an acute illness characterized by fever and generalized, pruritic, vesicular rash numbering 250-500 lesions in varying, successive stages of development called "crops".[1,3] Lesions progress rapidly from maculopapular rash to vesicular rash, then crusts, resulting in granular scabs.[1,4] In children, the first sign of disease is often rash, while in adults, mild prodromal symptoms of fever and malaise may precede 1-2 days from the onset of rash.[4,5]

"Breakthrough varicella" can occur among vaccinated individuals characterized by mild, atypical and inapparent infections. Individuals are afebrile, have uncharacteristic lesions numbering ≤50 with papules that do not progress to vesicles.[1]

Fetal infection as a result of maternal varicella infection during the first and early second trimester of pregnancy occasionally results in fetal death, congenital varicella syndrome (CVS) and other complications.[6]

# Laboratory Evidence

## Laboratory Confirmation

Any of the following will constitute a confirmed case of varicella:

- Culture isolation of VZV
- Detection of VZV DNA by nucleic acid amplification test (NAAT)
- Antigen detection of VZV DNA
- Seroconversion or a significant rise (e.g., fourfold or greater) in VZV IgG titre by any standard serologic assay
- Positive serologic test for VZV IgM antibody using capture assay

## Approved/Validated Tests

- Standard culture for VZV
- Direct fluorescent antibody (DFA) test of VZV antigen
- NAAT for VZV DNA
- Commercial tests for anti-VZV IgG and IgM antibody

For further testing information including specimen collection, refer to the PHO Laboratories Test Directory.

**Note:** Lesion specimens should be sent to the PHO Laboratories for virus detection and genotyping when it is necessary to differentiate between wild-type vs. vaccine strains. PHO Laboratories refers specimen samples to the National Microbiology Lab for genotyping.

## Indications and Limitations

- Detection of VZV may be performed in non-routine specimens (e.g., sterile or respiratory sites). Consult with the microbiologist at the PHO Laboratory prior to submitting specimen(s).
- Optimal recovery of VZV is achieved if specimens (e.g., vesicle/lesion fluid or swab) are obtained 2-3 days after rash onset and from fresh vesicles.
- For serology, an acute serum specimen for VZV IgM and IgG testing should be collected within 7-10 days of symptom onset and convalescent serum

specimen for VZV IgG testing should be repeated 2-3 weeks after the initial (acute) sample.

- Caution must be taken when reviewing serological data without reference to the clinical evidence as the response to VZV reactivation (herpes zoster) may be the same as to primary varicella.
- For urgent testing in cases of VZV (e.g., pregnancy, immunocompromised), call the PHO Laboratory Customer Service Centre prior to submission.

For further information about human diagnostic testing, contact the PHO Laboratories or refer to the PHO Laboratory Services.

## Case Management

In addition to the requirements set out in the Requirement #2 of the "Management of Infectious Diseases – Sporadic Cases" and "Investigation and Management of Infectious Diseases Outbreaks" sections of the *Infectious Diseases Protocol, 2018* (or as current), the board of health shall investigate cases to determine the source of infection. Refer to Provincial Reporting Requirements above for relevant data to be collected during case investigation.

Cases of varicella that present with mild illness may be permitted to return to child care settings or school as soon as cases are well enough to participate in normal activities, regardless of the state of the rash.[11] Exclusion of children from school or child care settings after the onset of the varicella rash is not expected to slow down the transmission.[11] Parents and staff should be notified of varicella in a classroom, particularly those of immunocompromised children, in addition to pregnant staff.

Health care workers (HCWs) with acute varicella illness must be excluded from work until lesions are dried and crusted. Refer to the Varicella/ Zoster (Chickenpox/Shingles) Surveillance Protocol for Ontario Hospitals when dealing with cases that work in health care settings.[12]

Treatment of cases where indicated is under the direction of the attending health care provider. Varicella infection in pregnancy requires prompt treatment initiated within 24-48 hours of rash onset to prevent maternal and fetal sequelae.[13] Children in whom varicella disease occurred at <12 months of age should receive the routine two-dose varicella-containing vaccine schedule.[2]

## Contact Management

A contact of varicella is any susceptible individual who has had significant exposure

(defined below) with a case during the period of communicability. Susceptible persons should be considered potentially infectious between eight to 21 days following exposure.[6] Exposure to VZV is considered significant if it involves:[2]

- Continuous household contact (living in the same dwelling) with a person with varicella. Occurrence rate among susceptible household contacts is approximately 65%-87%.
- Being indoors for more than 1 hour with a case of varicella.
- Being in the same hospital room for more than 1 hour, or more than 15 minutes of face-to-face contact with a patient with varicella.
- Touching the lesions or articles freshly soiled by discharge from vesicles.
- Close exposure with a person with herpes zoster.[2]
- HCWs with direct face-to-face contact with persons who have varicella or disseminated zoster, or any direct contact with fluid from lesions or objects contaminated with this fluid.[12]

Susceptible contacts include those without:[2]

- Documented evidence of immunization with 2 doses of a varicella-containing vaccine;
- A history of laboratory confirmed varicella infection;
- Laboratory evidence of immunity;
- Self-reported history or health care provider diagnosis of varicella before 2004 (year that the one-dose varicella program was introduced in Ontario) for healthy individuals, including pregnant women without a significant exposure and HCWs currently or previously employed in a Canadian health care setting. In general, healthy adults 50 years of age and older are presumed to be immune to varicella.[2]

Contacts should be advised about signs and symptoms of VZV infection that can occur within 21 days after exposure and seek medical attention upon symptom onset. Univalent varicella vaccine should be administered to susceptible individuals within 3 days of exposure. Administration up to five days after exposure has been shown to be effective in preventing or reducing the severity of varicella.[2]

Varicella zoster immune globulin (VarIg) should be considered for individuals at increased risk of severe varicella, including newborns of mothers who develop varicella, neonates in intensive care settings, immunocompromised persons and

hematopoietic stem cell transplant (HSCT) recipients.[2] Optimal benefit of VarIg is achieved if administered within 96 hours after first exposure, with protection lasting approximately three weeks.[2] If VarIg is used between 96 hours to 10 days after exposure it may help to attenuate disease.[2]

Pregnant contacts should be advised to consult with their physician promptly to confirm history of varicella vaccination or disease. In the absence of a history of vaccination or disease, serologic testing should be performed. VarIg should be offered if serologic testing shows no evidence of immunity or serologic testing results cannot be obtained within 96 hours if there has been a significant exposure.[2]

Susceptible HCWs with significant exposure are required to be excluded from any work in hospital from 10 days after the first exposure until 21 days after the last exposure. Contact with dried scabs from varicella or zoster lesions does not constitute significant exposure.[12]

## Outbreak Management

Please see the *Infectious Diseases Protocol, 2018* (or as current) for the public health management of outbreaks or clusters in order to identify the source of illness, manage the outbreak and limit secondary spread.

## Prevention and Control Measures

In the event that publicly funded vaccine doses are needed for case and contact management, the public health unit should contact the Ministry of Health's (ministry) immunization program at vaccine.program@ontario.ca as soon as possible.

### Personal Prevention Measures

Immunize as per the current *Publicly Funded Immunization Schedules for Ontario*.[8]

In Ontario, the *Immunization of School Pupils Act* (ISPA) is the legislation that governs the immunization of school pupils for the designated diseases that are included in the Act. All students born in 2010 or later without a valid exemption must have documented receipt of two doses of varicella containing vaccine according to the specified schedule.[9]

In Ontario, the *Child Care and Early Years Act, 2014* (CCEYA) is the legislation that governs licensed child care settings. Pursuant to O. Reg. 137/15 under the CCEYA, children who are not in school and who are attending licensed child care settings must be immunized as recommended by the local medical officer of health prior to being admitted. Under the CCEYA parents can provide a medical reason as to why

the child should not be immunized or object to immunization on religious/conscience grounds.[10]

In children, vaccine effectiveness is estimated to be 94.4% after the first dose and 98.3% after the second dose of varicella vaccine.[2] Susceptible household contacts of immunocompromised, immunodeficient and/or pregnant persons should receive varicella-containing vaccination as appropriate for age and risk factors.[2] Varicella vaccination is indicated in women of child-bearing age to prevent CVS and reduce maternal morbidity.[2]

The one-dose varicella immunization program was introduced in Ontario in 2004. The program was expanded in August 2011 to include a second dose to mediate breakthrough infections from waning immunity in individuals who previously received a single dose.

### Infection Prevention and Control Strategies

For hospitalized cases, in addition to routine practices, airborne and contact precautions are recommended for a minimum of five days after onset of rash and until all lesions are crusted, which can be ≥ 1 week for immunocompromised patients. Airborne and contact precautions are recommended for neonates born to mothers with varicella infection.[6]

Refer to PHO's website to search for the most up-to-date information on Infection Prevention and Control.

## Disease Characteristics

**Aetiologic Agent -** Human (alpha) herpesvirus 3 (VZV), a (DNA) virus of the *Herpesviru*s group.[1,2]

**Modes of Transmission -** Person-to-person by direct contact, droplet or airborne spread of vesicle fluid or secretions of the respiratory tract of infected cases or indirectly by freshly contaminated fomites. Scabs from lesions are not infectious. Transmission during pregnancy to the fetus can also occur.[1]

**Incubation Period -** Ten to 21 days; commonly 14-16 days; may be shortened in the immunodeficient and prolonged as long as 28 days after passive immunization against varicella.[1]

**Period of Communicability -** As long as five days but usually one to two days

before onset of rash and until all lesions are crusted, usually about five days after the rash onset. Contagiousness may be prolonged in individuals with altered immunity.[1]

**Reservoir -** Humans.[1]

**Host Susceptibility and Resistance -** Susceptibility is universal in persons not previously infected or vaccinated. Infection usually confers lifelong immunity. VZV remains latent in the dorsal root ganglia and disease may recur years later as herpes zoster (shingles) in about 15% of older adults and sometimes in children.[1]

Please refer to PHO's Reportable Disease Trends in Ontario reporting tool and other reports for the most up-to-date information on infectious disease trends in Ontario.

For additional national and international epidemiological information, please refer to the Public Health Agency of Canada and the World Health Organization.

## Comments

Varicella-like rashes that occur within two weeks after immunization may be due to either wild-type or vaccine-virus. Appropriate specimen(s) should be collected for laboratory determination of wild-type vs. vaccine strains. After immunization, a varicella-like rash can present at the injection site or is generalized in 3%-5% of vaccinees after the first dose and 1% after a second dose, usually within five to 26 days. A varicella-like rash occurring between 5-42 days after varicella vaccination should be reported as an adverse event following immunization (AEFI) if they meet the provincial case definition, unless wild-type virus is detected.

## References


1. Heymann DL, editor. Control of Communicable Diseases Manual. 20 ed. Washington, D.C: American Public Health Association; 2015.
2. National Advisory Committee on Immunization, Public Health Agency of Canada. Part 4- Active Vaccines: Varicella (Chickenpox) Vaccine. 2018. In: Canadian Immunization Guide [Internet]. Evergreen ed. Ottawa, ON: Her Majesty the Queen in Right of Canada, [cited March 8, 2018]. Available from:

https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines/page-24-varicella-chickenpox-vaccine.html

3. Government of Canada. Varicella (Chickenpox) [Internet]. Ottawa, ON: Her Majesty the Queen in Right of Canada; 2012 [updated July 23, 2012; cited March 8, 2018]. Available from: https://www.canada.ca/en/public-health/services/immunization/vaccine-preventable-diseases/varicella-chickenpox.html
4. Centers for Disease Control and Prevention. Varicella. 2015. In: Epidemiology and Prevention of Vaccine-Preventable Diseases [Internet]. 13 ed. Washington, DC: Public Health Foundation, [cited March 8, 2018]. Available from: https://www.cdc.gov/vaccines/pubs/pinkbook/varicella.html
5. Moore D, editor. Your child's best shot: a parent's guide to vaccination. 4 ed. Ottawa, ON: Canadian Paediatric Society; 2015.
6. Committee on Infectious Diseases, American Academy of Pediatrics. Section 3: Summaries of Infectious Diseases: Varicella-Zoster Infections. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, editors. Red Book: 2018 Report of the Committee on Infectious Diseases. 31 ed. Itasca, IL: American Academy of Pediatrics; 2018.
7. Health Protection and Promotion Act, R.S.O. 1990, Reg. 569, Reports, (2018). Available from: https://www.ontario.ca/laws/regulation/900569
8. Ontario, Ministry of Health and Long-Term Care. Publicly Funded Immunization Schedules for Ontario: December 2016. Toronto, ON: Queen's Printer for Ontario; 2016. Available from: http://www.health.gov.on.ca/en/pro/programs/immunization/schedule.aspx
9. Immunization of School Pupils Act, R.S.O. 1990, c.I.1, (2018). Available from: https://www.ontario.ca/laws/statute/90i01
10. Child Care and Early Years Act, 2014, S.O. 2014, c. 11, Sched. 1, (2018). Available from: https://www.ontario.ca/laws/statute/14c11
11. MacDonald N, Canadian Paediatric Society, Infectious Diseases and Immunization Committee. School and daycare exclusion policies for chickenpox: A rational approach. Paediatrics & Child Health. 1999;4(4):287-8.

12. Ontario Hospital Association, Ontario Medical Association. Varicella/Zoster (Chickenpox/Shingles) Surveillance Protocol for Ontario Hospitals. Toronto, ON: Ontario Hospital Association; 2016. Available from: https://www.oha.com/labour-relations-and-human-resources/health-and-safety/communicable-diseases-surveillance-protocols
13. Shrim A, Koren G, Yudin MH, Farine D. Management of varicella infection (chickenpox) in pregnancy. Journal of Obstetrics and Gynaecology Canada. 2012;34(3):287-92.

## Case Definition Sources

Centers for Disease Control and Prevention. Varicella. 2015. In: Epidemiology and Prevention of Vaccine-Preventable Diseases [Internet]. 13 ed. Washington, DC: Public Health Foundation, [cited March 8, 2018]. Available from: https://www.cdc.gov/vaccines/pubs/pinkbook/varicella.html

Pathogen Regulation Directorate, Public Health Agency of Canada. Pathogen Safety Data Sheets: Infectious Substances – Varicella-zoster virus [Internet]. Ottawa, ON: Her Majesty the Queen in Right of Canada; 2011 [cited May 11, 2018]. Available from: https://www.canada.ca/en/public-health/services/laboratory-biosafety-biosecurity/pathogen-safety-data-sheets-risk-assessment/varicella-zoster-virus.html

Public Health Agency of Canada. Varicella (Chickenpox). In: Case Definitions for Communicable Diseases under National Surveillance. Canada Communicable Disease Report. 2009;35S2.

Public Health Agency of Canada, National Microbiology Laboratory. Guide to Services: Genotyping of varicella-zoster virus (VZV) to differentiate between wild-type strain and vaccine strain [Internet]. Ottawa, ON: Her Majesty the Queen in Right of Canada; 2018 [cited May 11, 2018]. Available from: https://cnphi.canada.ca/gts/reference-diagnostic-test/5460?searchQuery=varicella

## Document History

| Revision Date | Document Section | Description of Revisions |
|---|---|---|
| April 2022 | Entire Document | New template. Appendix A and B merged. No material content changes. |
| April 2022 | Epidemiology: Occurrence section | Removed. |
| April 2022 | ICD Codes | Removed. |