

# Smallpox

## Reporting Obligations

Smallpox is designated as a disease of public health significance and is reportable under the *Ontario Health Protection and Promotion Act*. Report all suspect and confirmed cases **immediately by phone** to the health unit.

## Epidemiology

### Aetiologic Agent:

Infectious agent is the *variola virus*, a species of *Orthopoxvirus*. The virus used in the live smallpox vaccine is known as the *vaccinia virus* also a member of the genus *Orthopoxvirus*. In 1979, the World Health Organization declared that smallpox (*variola*) had been eradicated successfully worldwide; however, it does remain as a potential bioterrorism weapon.

### Clinical Presentation:

Smallpox is a systemic viral disease. The clinical presentation has been described as sudden onset with fever, malaise, headache, prostration, severe backache and occasional abdominal pain and vomiting; followed by a characteristic skin eruption after 2-4 days when the fever begins to fall. A rash progresses through successive stages of macules, papules, vesicles, pustules, then crusted scabs that fall off 3 - 4 weeks later.

### Modes of transmission:

Smallpox is spread most commonly in droplets from the oropharynx of infected individuals. Rare transmission from aerosol and direct contact with infected lesions, clothing or bedding has been reported.

### Incubation Period:

From 7-19 days; commonly 10-14 days from infection to onset of illness (first symptoms/prodrome period), then 2-4 more days to onset of rash.

### Period of Communicability:

From the time of development of the earliest lesions to disappearance of all scabs, about 3 weeks. The risk of transmission appears to have been highest at the appearance of the earliest lesions through droplet spread from the oropharyngeal enanthem.

## Risk Factors/Susceptibility

Smallpox has been eradicated worldwide. The virus is only approved to exist in two main research centers, one in the United States and the other in the Russian Federation.

- Deliberate use (e.g., bioterrorism)
- All unvaccinated individuals are susceptible

## Diagnosis & Laboratory Testing

**Clinicians are strongly recommended to contact their local medical officer of health prior to collecting specimens on any suspect case of smallpox for laboratory diagnosis. Any testing related to suspected smallpox should be carried out under level 4 containment facilities at National Microbiology Laboratory (NML).**

### Confirmed case:

Laboratory confirmation of infection with clinically compatible signs and symptoms:

- Detection of variola virus nucleic acid, **OR**
- Isolation of variola virus from an appropriate clinical specimen (e.g., blood, vesicular fluid, scabs) followed by confirmation through detection of variola virus nucleic acid **OR**
- Detection of poxvirus particles in a clinical specimen by electron microscopy followed by confirmation through detection of variola virus nucleic acid

### Clinical Evidence:

- Acute onset of fever of > 38.3 C followed by a rash involving vesicles or firm pustules in the same stage of development without other apparent cause
- Major distinguishing features include a febrile prodrome with a temperature of > 38.9 C and systemic symptoms (prostration, severe headache, backache, abdominal pain, or vomiting) 1-4 days before rash onset; lesions are deep, firm, well-circumscribed pustules (may be confluent or umbilicated)
- Other distinguishing features include rash concentrated on face and extremities; rash in same stage of evolution on any one part of the body; first lesions on oral mucosa/palate followed by centrifugal rash on face or forearm; and lesions on palms and soles (seen in > 50% of cases); lesions evolve from papule to pustule in days, illness lasts 14-21 days.
- A typical presentation of smallpox includes a) hemorrhagic lesions **or** b) flat velvety lesions not appearing as typical vesicles or not progressing to pustules

## SUSPICIOUS PACKAGES

## TESTING INFORMATION & REQUISITION

## Treatment & Case Management

The World Health Organization regards even a single case of smallpox anywhere in the world as a global health emergency. In Ontario, the response would include the activation of the emergency management system. Public health staff will investigate the case to determine source of infection.

## Patient Information

### PATIENT FACT SHEET

## References

1. Heymann, D.L. Control of Communicable Disease Manual (21st Ed.). Washington, American Public Health Association, 2022.
2. Ontario. Ministry of Health. [Infectious Diseases Protocol, Appendix 1: Smallpox and other Orthopoxviruses including mpox \(mpox\)](#). Toronto: Queen's Printer for Ontario; 2022 [effective 2023 May] [cited 2024 Mar 12].

## Additional Resources

1. [Public Health Agency of Canada. "Canadian Immunization Guide, Smallpox Vaccine."](#)
2. [Centers for Disease Control and Prevention. "Smallpox Fact Sheet."](#)
3. [Smallpox. Toronto: PHO; 2023 Dec 15.](#) [cited 2024 Mar 12].