

## Clinical Definition:

Officially eradicated, smallpox was a very serious disease with a 30% mortality rate in its most virulent form. There is a danger of bio-terrorism using smallpox so health providers who may be unfamiliar with the illness need to be informed.



Source of Table: Ontario Ministry of Health and Long Term Care

## Source of Infection and Transmission:

- ◆ Person to person.
- ◆ If used in biowarfare, the agent would most likely be disseminated in an aerosol cloud.
- ◆ Communicability from the time of development of the earliest lesions to disappearance of all scabs; about 3 weeks. The person is most contagious during the first week of illness since that is when the viral load is the highest in the saliva.

The last naturally acquired case of smallpox in the world occurred in October 1977. Global eradication of the disease was certified by the World Health Organization in 1980. Currently this virus is maintained in designated laboratories; however there is concern that clandestine stockpiles may exist elsewhere in the world and that these sources may be accessed by terrorists. The virus causing this systemic disease is a potential biological weapon because it can be aerosolized, has a low infective dose and is communicable from person to person. Also, the population is increasingly susceptible since immunization programs were stopped over 20 years ago and there is no treatment.

## Incubation Period:

- ◆ 7-19 days. Commonly 10-14 days to onset of illness and 2-4 days more to onset of rash.

## Symptoms:

The early symptoms of smallpox resemble influenza. There is sudden onset of fever, malaise, headache, vomiting, prostration, severe backache and occasionally abdominal pain and delirium. Two to four days after the onset of illness, the fever begins to fall and a deep-seated rash develops. The rash progresses through successive stages of macules, papules, vesicles, pustules and crusted scabs; starting on the face and extremities and then spreading to the trunk. The early lesions may occur in the mouth and pharynx. The scabs are formed by early in the second week and then separate and fall off in about 3-4 weeks. When the scabs separate, pigment-free skin remains and eventually pitted scars form. Historically, in vaccinated individuals, the rash was less severe and the stages of the rash were accelerated with crusting by the 10th day.

- ◆ Fulminating disease with a severe prodrome, prostration, and bleeding into the skin and mucous membranes was observed in less than 3% of variola major cases. These cases were rapidly fatal.

- ◆ Smallpox can be differentiated from chickenpox by several clinical features. The following table is provided to assist with this differentiation.

|                  | Smallpox   | Chickenpox  |
|------------------|--|---|
| Prodromal period | 3 day period of chills, headache, backache and severe malaise  | usually absent in children as rash and constitutional symptoms occur simultaneously                   |
|                  | typically rash starts when fever breaks  | in adolescents and adults there may be a 1 or 2 day prodrome of fever, headache, malaise and anorexia |
| Rash             | slow evolution of macules to papules to vesicles to pustules to crusts   | rapid evolution of macules to papules to vesicles to crusts   |
|                  | the vesicles are multiloculated, non-collapsing  | the vesicles are monoloculated and collapse on puncture   |
|                  | peripheral distribution of lesions, which are most prominent on the exposed skin surfaces, especially the face | central distribution of lesions which appear in crops   |
|                  | rash starts on face and extremities and spreads inward to the trunk where it is relatively sparse              |   |
|                  | lesions are virtually never seen at the apex of the axilla, but may be seen on the palms and soles             | rash is sparse distally and is rarely seen on the palms or soles                                      |
|                  | presence of lesions in the same stage in any one anatomical area   | presence of lesions in all stages in any one anatomical area  |
|                  | skin lesions are more deep-seated than those of varicella  | presence of scalp lesions   |

## **Major Complications:**

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- ◆ Frequently fatal.

## **Diagnosis and Treatment:**

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- ◆ Specimens of vesicular or pustular fluid or scabs taken from the lesions of a suspect case of smallpox can be examined by negative stain electron microscopy for rapid presumptive diagnosis of smallpox infection. PCR testing and viral isolation would be required for definitive identification and classification of the virus. Specimen collection for the purpose of confirming a suspect case of smallpox must be done under strict isolation and preferably by a recently immunized person. These specimens would have to be packaged and transported in a specific manner to a bio-safety level 4 laboratory.
- ◆ There is no proven treatment for smallpox. Research to evaluate new antiviral agents is ongoing.

- ◆ Management of smallpox patients would include supportive therapy in the form of intravenous fluids, antipyretics, and antibiotics for any secondary bacterial infections that may occur.
- ◆ In people exposed to smallpox, administration of the smallpox vaccine within 4 days of exposure may lessen the severity of or even prevent illness.

### **Public Health Measures:**

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- ◆ Under epidemic circumstances, widespread immunization would be indicated.
- ◆ Smallpox vaccine has been successfully administered to persons of all ages in the past. However, there are certain groups of peoples for whom elective immunization has not been recommended because of the risk of complications.
- ◆ Under epidemic conditions, however, such contraindications will have to be weighed against the grave risks posed by smallpox. Vaccinia immune globulin (VIG) can be administered concomitantly with vaccine to minimize the risk of complications in these people. VIG is also recommended for the treatment of severe cutaneous reaction occurring as a complication of immunization. Smallpox vaccine is not currently available from commercial sources.
- ◆ Strict isolation of cases would be essential to prevent the spread of this disease.

### **Reporting and Follow-Up:**

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- ◆ Any suspected cases are to be reported to the Office of the Chief Medical Health Officer (OCMHO) immediately.

### **Public Education: (Key Messages)**

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- ◆ None, since no personal prevention measures apply.