Varicella/Herpes Zoster
(Chickenpox/Shingles)

Manitoba Health
Public Health

Communicable Disease Control Unit

Case Definition

Confirmed Case: One or more of the following:

- isolation of virus in cell cultures;
- demonstration of viral antigen in smears using FA, or viral DNA by PCR;
- multinucleated giant cells detected in Giemsa-stained scrapings from the base of a lesion (does not rule out herpes simplex infections);
- presence of specific IgM or significant rise in serum antibodies in serological testing;
- clinical illness in a person who is epidemiologically linked to one confirmed case.

Clinical Case:

Varicella: Rash with rapid evolution of macules, to papules, vesicles and crusts. All stages are simultaneously present, lesions are superficial and distribution is centrifugal.

Zoster:

localized: Vesicles with an erythematous base are restricted to skin areas supplied by sensory nerves of a single or associated group of dorsal root ganglia. Lesions may appear in crops in irregular fashion along nerve pathways, are unilateral, deeper seated and more closely aggregated than those of varicella; histologically they are identical.

disseminated: As above with one or more of bilateral involvement, spread beyond contiguous dermatomes or involvement of lungs, liver, brain, etc.

Reporting Requirements

Varicella: Individual cases are not reportable. Outbreaks are reportable by attending health care professional.

Zoster: Not reportable.

Clinical Presentation/Natural History

Varicella is an acute, generalized viral disease with sudden onset of slight fever, mild constitutional symptoms and an itchy skin eruption that is maculopapular for a few hours, subsequently vesicular, and leaves a granular scab. The vesicles are monolocular and collapse on puncture, in contrast to the multilocular, noncollapsing vesicles of smallpox. Lesions commonly occur in successive crops, with several stages of maturity present at the same time; they tend to be more abundant on covered than on exposed parts of the body. Lesions may appear on the scalp, high in the axilla, on mucous membranes of the mouth and upper respiratory tract and on the conjunctivae; they tend to occur in areas of irritation, such as sunburn or diaper rash. They may be so few as to escape observation. Mild, atypical and inapparent infections occur.

Complications are more frequent in immunocompromised and pregnant persons, as well as adults. The overall case-fatality rate in the United States is 2/100,000 but it rises to 30/100,000 in adults. The most common cause of death in adults is primary viral pneumonia; among children, it is septic complications and encephalitis. Children with acute leukemia, including those in remission after chemotherapy, are at increased risk of disseminated disease, fatal in 5-10% of cases. Children infected with HIV can have chronic or recurrent chickenpox. Neonates developing varicella between ages five and 10 days, and those whose mothers develop the disease five days prior to or within two days after delivery, are at increased risk of developing severe generalized varicella, with a fatality rate of up to 30%.

Since about 90% of chickenpox cases occur in children one to 12 years of age, this group accounts for the largest proportion of complications, although the risk in any otherwise healthy child is small. The most frequent complication in this group is skin and soft tissue infection. Although most infections are minor, chickenpox has been identified as a risk factor for invasive group A streptococcal infections.

Infection in the first and early second trimester is associated with a less than 7% risk of the congenital

varicella syndrome consisting of skin scarring, limb atrophy, and possible CNS and eye defects. Clinical varicella was previously a frequent antecedent of Reye syndrome but is now rare since recommendations not to give children ASA.

Zoster is an external manifestation of reactivation of latent varicella infection in the dorsal root ganglia. Severe pain and paresthesia are common and as many as 30% of the elderly may suffer post-herpetic neuralgia. The incidence of zoster and of post-herpetic neuralgia both increase with age, and there is some evidence that almost 10% of children being treated for a malignant neoplasm are prone to develop zoster. Persons with HIV infection are also at increased risk of zoster. In the immunosuppressed and those with diagnosed malignancies, extensive varicella-like lesions may appear outside the dermatome; this may also occur in otherwise normal individuals with fewer lesions. Intrauterine infection and varicella before two years of age are also associated with zoster at an early age. Occasionally, a varicelliform eruption follows some days after herpes zoster, and rarely there is a secondary eruption of zoster after varicella. Maternal zoster does not pose a risk for severe varicella in the neonate.

Etiology

Human (alpha) herpesvirus 3 (varicella-zoster virus, V-Z virus), a member of the Herpesvirus group.

Epidemiology

Reservoir and Source: Humans

Transmission: Person-to-person by airborne, droplet contact with respiratory secretions or direct contact with vesicle fluid of varicella cases or direct contact with the vesicle fluid of persons with herpes zoster; indirectly through articles freshly soiled by discharges from vesicles and mucous membranes of infected persons. In contrast to vaccinia and variola, scabs from varicella lesions are not infective. Varicella is one of the most readily communicable diseases, especially in the early stages of the eruption. Localized zoster has a much lower rate of transmission and is rare if lesions are covered with clothing or dressings (varicella-seronegative contacts develop varicella). Disseminated zoster may result in airborne transmission.

Occurrence:

General: Worldwide. Infection with varicella zoster virus is nearly universal. In industrialized communities, at least 95% of the population has had varicella by age 15. Zoster occurs more commonly in older or immunocompromised persons. In temperate zones, varicella occurs most frequently in winter and early spring.

Manitoba: Anecdotally, the fall of 1997 and winter/spring of 1998 saw an unusually large number of cases.

Incubation Period: From nine to 21 days; commonly 13 to 17 days. Ten to 21 days is the usual range used for infection control purposes. It may be prolonged to 28 days after use of Varicella Zoster Immune Globulin (VZIG).

Susceptibility and Resistance: A personal history of chickenpox has a high positive predictive value for serologic evidence of immunity. In children, a history of not having had chickenpox has high negative predictive value (90% in children at age seven years of age); in adults it is substantially lower, so adults with a negative history should be tested.

Persons who are receiving high dose IVIG (100 to 400 mg/kg) are likely protected against infection if the last dose was within three weeks of the time of exposure. Infection confers long immunity; second attacks are rare, although subclinical re-infection is common. Viral infection remains latent and disease may recur years later as herpes zoster in a proportion of older adults, sometimes in children.

The secondary attack rate among susceptible siblings is 70-90%.

Certain neonates, whose mothers are not immune, and persons with leukemia may suffer severe, prolonged or fatal varicella. Adults with cancer, especially of lymphoid tissue, with or without steroid therapy, immunodeficient patients and those on immunosuppressive therapy may have an increased frequency of severe zoster, both localized and disseminated.

Period of Communicability: As long as five but usually one to two days before onset of rash. Twenty-four hours is common for infection control purposes. Persons are contagious until all lesions have crusted; in some cases this can be delayed until two weeks or more after rash onset. Contagiousness may be prolonged in persons with altered immunity. Persons with zoster may be sources of infection for a week after the appearance of their vesiculopustular lesions. Susceptible persons should be considered potentially infectious eight to 21 days following exposure (28 days if VZIG was given).

Diagnosis

See **Case Definition**.

Key Investigations

None

Control

Management of Cases:

Treatment:

- When treatment for chickenpox or shingles is indicated, acyclovir is the preferred treatment.
- For healthy children with chickenpox, the clinical benefit of rash resolution occurring 24 hours sooner is not clear and thus treatment is rarely indicated.
- Oral acylcovir is recommended for the following selected individuals at risk for complicated illness, provided therapy can be initiated within 24 to 48 hours of rash:
  - persons over 13 years of age, including pregnant women (within 24 hours);
  - children over 12 months of age who have a chronic skin or lung disorder or are on chronic salicylate therapy;
  - children receiving short term, intermittent or low dose, oral and inhaled steroids.
- Intravenous acyclovir should be considered for all persons at risk for severe complicated disease including immunocompromised hosts, premature infants and neonates with onset in the first month of life or while still in hospital, and otherwise healthy adults. Acyclovir and famciclovir shorten the duration of symptoms and pain of zoster in the normal older patient.
- VZIG (varicella zoster immune globulin) is not effective once symptoms develop.
- **Children must not be treated with aspirin because of the risk of Reye's syndrome.**

Public Health Measures:

- *Hospital:* Airborne and contact precautions are appropriate due to risk of serious varicella in susceptible immunocompromised persons. Persons with zoster need only routine precautions provided they do not have disseminated disease or are not immunocompromised, and lesions are either crusted or well covered by clothing or dressings. If zoster is disseminated or is not disseminated but occurs in an immunocompromised person, airborne precautions are required. Visitors should not be allowed entry to hospitals until all lesions have crusted. Outpatients and day-surgery patients should be advised to notify staff if they develop chickenpox or zoster and are scheduled to come to hospital when their lesions are not all crusted. If they develop a chickenpox rash within 24 hours of leaving, notification should also occur. Staff developing chickenpox or zoster should not be allowed to return to work until all lesions have crusted over, or are well covered by clothing in the case of non-disseminated zoster.
- *Community:* Persons with varicella in the community need not be excluded from

regular activities including day care, school, or work except home care or long term care workers with immunocompromised clients known to be susceptible.

Management of Contacts:

Definition of exposure:

- A significant exposure in a non-immune person is defined as one or more of the following with someone known to have chickenpox during the contagious period, disseminated zoster or an immunocompromised host with zoster:
  - continuous household contact (living in the same dwelling);
  - sharing the same hospital room with a contagious person;
  - face-to-face contact for five or more minutes;
  - direct contact with zoster or varicella vesicular fluid if not followed by immediate handwashing.
- Non-disseminated zoster lesions in a non-immunocompromised host, well covered by clothing or dressings, do not constitute an exposure.
- In hospital, staff and patient susceptibility should be established as soon as possible and before 96 hours post exposure at the latest. VZIG should be administered as appropriate (see below). All susceptible patient contacts should be discharged, if possible, before the start of the contagious period. If discharge is not possible, airborne precautions should be undertaken from day eight to 21, post exposure (day 28 if VZIG was administered). Susceptible hospital workers, as well as home care and long term care workers with known susceptible clients, are usually furloughed from day eight to 21, post exposure. Alternatively, for health care workers who are not working with immunocompromised patients, pregnant women or newborns, some institutions recommend immediate immunization,† with self-exclusion if one or more of fever, malaise or rash* develop.

† Limited data suggests that vaccine, given up to five days following exposure, may prevent or modify illness.

* If a *vaccine-induced* rash develops at the injection site only, and can be covered, the health care worker can continue to work.

Determination of immunity:

- Seventy to 90% of persons without a reliable history of varicella are nonetheless immune.
- A positive history is highly correlated with serologic immunity. However, history should be definite; hearsay, such as "my mother thinks I had chickenpox, or my brothers and sisters had it so I must have had it too," is not acceptable. When a definite history is lacking in an otherwise healthy person over seven years of age, serologic testing should be undertaken.
- Cadham Provincial Laboratory (CPL) routinely does testing on Tuesday and Thursday. To expedite sample processing, call CPL at 945-6123.
- Testing may not be reliable in immuno-compromised patients.
- Persons who have received a heterologous bone marrow transplant should be considered susceptible in the early post-transplantation period regardless of a past history of varicella or positive serology.

Varicella-Zoster Immune Globin (VZIG):

- Is prepared from the plasma of normal blood donors with high antibody titre to varicella-zoster virus.
- Prevents infection and modifies illness in normal hosts and modifies illness in immuno-compromised hosts and neonates whose mothers developed chickenpox five days prior to delivery.
- Data to show that it prevents maternal viremia, fetal infection, congenital varicella syndrome, or neonatal varicella is not available.
- **Indications:** VZIG should be offered as soon as possible to the following susceptible persons

following exposure to natural disease (not vaccine rashes):

- those who are immunocompromised. Persons receiving regular monthly infusions of 100 to 400 mg/kg of IGIV and whose most recent dose was within three weeks before exposure do not require VZIG;
- bone marrow transplant patients immediately following transplantation (regardless of past history or serologic test results);
- pregnant women;
- neonates:
  - whose mothers develop signs of infection from five days prior to delivery to 48 hours afterwards;
  - who are born less than 28 weeks gestation or less than 1,000 g regardless of maternal immune status;
  - who are born 28 weeks gestation or more to susceptible mothers and are in hospital.
- infants:
  - with severe skin conditions;
  - who are born less than 28 weeks gestation or less than 1,000 g who have not been discharged from hospital and reached term weight.

- **Second exposure:** If a second exposure occurs in a person who received VZIG and did not develop disease, a second dose should be given if the exposure occurred three or more weeks following the first dose.

- **Dose:** 125 units (1 vial) per 10 kg body weight to max of 625 units. In immunocompromised persons more than this amount may be required; further consultation with an expert is advised. Administer IM.

- **Timing:** The utility of VZIG beyond 96 hours post-exposure is not clear.

- **Availability: VZIG is obtained through Canadian Blood Services. Call 789-1034.**

Preventive Measures:

- Determine and record susceptibility in health care workers and immunocompromised persons without a history of infection.

- Susceptible persons may be immunized with varicella vaccine. See other references for dose, schedule, contraindications, etc.