

# Varicella (Chickenpox)

Case Definition	Jan 2012
Reporting Requirements	Nov 2014
Remainder of the Guideline (i.e., Etiology to References sections inclusive)	Jan 2012*

\* Treatment guideline amended for VZIG recommendations November 2014

## Case Definition

### Confirmed Case

Clinical illness<sup>[1]</sup> with laboratory confirmation of infection:

- Isolation or direct antigen detection of varicella-zoster virus (VZV)\* from an appropriate clinical specimen\*\*

OR

- Detection of VZV nucleic acid (e.g., PCR) in an appropriate clinical specimen\*\*

OR

- Positive serologic test for VZV IgM antibody in the absence of recent immunization<sup>[2]</sup> with varicella vaccine.

OR

- Seroconversion or significant change between acute and convalescent varicella-zoster IgG titre by any standard serologic assay in the absence of recent administration of any blood product or immunization with varicella vaccine.

OR

Clinical illness<sup>[1]</sup> in a person with an epidemiological link to a laboratory-confirmed case of varicella (chickenpox) or VZV (shingles) infection.

### Probable Case

Clinical illness<sup>[1]</sup> in the absence of laboratory confirmation or epidemiological link to a laboratory-confirmed case.

<sup>[1]</sup> Clinical illness is characterized by a rash with rapid evolution of macules to papules, vesicles and crusts; all stages are simultaneously present; lesions are superficial and may appear in crops.

<sup>[2]</sup> Clinical illness less than 14 days and more than 42 days after immunization is significant and if confirmed, is reportable via NDR.

\* Varicella-zoster virus refers to the virus that causes varicella (chickenpox) and reactivation of VZV results in herpes zoster (shingles).

\*\* Appropriate clinical specimens include swab from fresh lesion, CSF or eye fluid aspirate.

**Laboratory comments:** Vaccine and wild-type VZV strains can be differentiated by PCR-based protocols performed at the National Microbiology Laboratory (NML) in Winnipeg.

## Reporting Requirements

### 1. Physicians/Health Practitioners and others

A physician, health practitioner or person in charge of an institution shall in accordance with Sections 22(1) or 22(2) of the *Public Health Act*, notify the Medical Officer of Health (MOH) (or designate) of the health zone, of all confirmed and probable cases in the prescribed form by mail, fax or electronic transfer within 48 hours (two days).

### 2. Laboratories

All laboratories, including regional laboratories and the Provincial Laboratory for Public Health (ProvLab) shall in accordance with Section 23(a)(ii) of the *Public Health Act*, report all positive laboratory results by mail, fax or electronic transfer within 48 hours (two days) to the:

- Chief Medical Officer of Health (CMOH) (or designate),
- MOH (or designate) and
- Attending/ordering physician.

### 3. Alberta Health Services and First Nations and Inuit Health Branch

- The MOH (or designate) of the health zone where the case currently resides shall forward the preliminary Notifiable Disease Report(NDR) of all confirmed and probable cases to the CMOH (or designate) within two weeks of notification and the final NDR(amendment) within four weeks of notification.
  - This reporting responsibility applies to Alberta residents when the infection was likely acquired within or outside Alberta. It also applies to non-Alberta residents when the infection was likely acquired within Alberta.
- Where the MOH receives notification of a suspected case in an Albertan that was likely acquired outside the boundaries of the health zone, the MOH shall in accordance to Section 25 of the *Public Health Act*, immediately notify the MOH of the health zone where the case was likely acquired.
- Where the MOH receives notification of a suspected case in an Albertan that was likely acquired outside Alberta, the MOH shall in accordance to Section 25 of the *Public Health Act*, immediately notify the CMOH.
- Where a MOH receives notification of a suspected case in a non-Alberta resident likely acquired outside Alberta, the MOH shall immediately forward to the CMOH the following information by fax or electronic transfer:
  - name,
  - date of birth,
  - out-of-province health care number,
  - out-of-province/country address and phone number,
  - attending physician (locally and out-of-province), and
  - positive laboratory report (faxed).

## Etiology

Varicella is caused by the human herpes virus 3, a member of the *Herpesvirus* group.<sup>(1)</sup>

## Clinical Presentation<sup>(2-5)</sup>

Varicella may or may not begin with a prodromal period. The prodromal period, when present, is characterized by fever, malaise and upper respiratory tract infection followed by characteristic lesions. The lesions appear in successive crops over the first 3 – 4 days of the rash and tend to develop on the trunk and face, progressing to the extremities. They progress rapidly from macules to vesicles to pustules and scab over within a few days. Lesions in all stages may be present in the early phase of illness. Ulcerated lesions may also be present on mucous membranes including the oropharynx and upper respiratory tract, conjunctiva, and rectal and vaginal mucosa. Subclinical infections are rare.

Varicella is generally considered a mild disease, however, 5 – 10% of otherwise healthy children develop complications that may be fatal. Complications may include secondary bacterial infections, soft tissue infections, otitis media, bacteremia, pneumonitis, osteomyelitis, septic arthritis, endocarditis, necrotizing fasciitis, toxic shock-like syndrome, hepatitis, thrombocytopenia, cerebellar ataxia and encephalitis.

The risk of severe invasive group A streptococcal infection has been estimated at 40 – 60 times higher among previously healthy children with varicella. Complications such as pneumonia, encephalitis, and death are more likely to occur in adolescents, adults or immunocompromised hosts. This group has a case fatality rate 10 – 30 times higher than in children. In both adults and children, the majority who die from complications of varicella have no identifiable risk factor for severe disease.

Congenital varicella following maternal infection with varicella is very rare when the infection occurs in the first or second trimester. The incidence of congenital varicella syndrome is approximately 1 – 2% when infection occurs before 20 weeks of gestation.

Children exposed in utero during the second 20 weeks of pregnancy can develop inapparent varicella and subsequent shingles early in life without ever having had extrauterine varicella.

Maternal varicella occurring in the five days before to two days after birth may result in overwhelming infection of the neonate and a fatality rate as high as 30%.

Recurrences of varicella-like rash have been reported by 4 – 13% of people who had previous varicella infection. Risk factors include having a first infection at a young age (less than 12 months of age) or having a mild first infection.

The virus remains latent and may recur years later as shingles. Reactivation of varicella virus results in herpes zoster and is also referred to as shingles. Exactly how the virus remains latent in the body and subsequently reactivates is not clearly understood.

## Diagnosis<sup>(6)</sup>

The diagnosis of varicella has been most often made clinically by history and physical examination. Confirmation of disease is done by taking a swab/scraping from the base of a fresh vesicular lesion. There are four testing approaches used at the ProVLab: direct detection of viral antigen by direct fluorescent antigen test (DFA); polymerase chain reaction (PCR) amplification and detection of virus; modified culture (shell vial) of material and testing a blood sample (serum separator tube) for VZV IgM and IgG tests. (Seroconversion for VZV IgG may indicate a recent acute VZV infection).

See [Annex A: Laboratory diagnosis of Varicella-zoster Infections \(primary or reactivation\)](#) for testing and specimen collection.

Clinical illness in unimmunized individuals is characterized by a rash with rapid evolution of macules to papules to vesicles, and crusts; all stages can be simultaneously present. Lesions are superficial and may appear in crops.

Varicella disease in individuals who have received varicella vaccine is referred to as vaccine modified disease. In general, vaccine modified disease in vaccine recipients is associated with a significantly reduced number of lesions (< 50 lesions and little or no fever). See [Annex B: Varicella \(Chickenpox\) and Shingles \(Herpes Zoster\)](#) for description of vaccine modified disease.

- Varicella-like rash that occurs within two weeks of immunization is most likely attributable to wild type VZV.
- Varicella-like rash that occurs >42 days post immunization is most likely attributable to wild type VZV.

Note: Varicella-like rash that occurs  $\geq$  two weeks and  $\leq$  42 days is generally due to vaccine. Refer to Alberta Health *Surveillance of Adverse Reactions to Immunizing Agents Manual*.

## Epidemiology <sup>(1,6)</sup>

### Reservoir

Humans.

### Transmission

Transmission occurs via the airborne route, environmental contamination, direct contact with vesicular zoster lesions or respiratory secretions and also, the hands of health care workers.<sup>(7)</sup> In utero, infection also can occur as a result of transplacental passage of virus during maternal varicella infection. VZV infection in a household results in infection in 60 – 100% of all susceptible people in that household.

### Incubation Period

The incubation period is generally 14 – 16 days but may range from 10 days to three weeks. This period may be prolonged in persons who have had passive immunization (e.g., varicella-zoster immune globulin) against varicella or are immunocompromised.

### Period of Communicability

The period of communicability is typically 1 – 2 days before the onset of the rash and continuing until all lesions are crusted. This generally occurs after 3 – 5 days. In immunocompetent individuals most virus replication has stopped by 72 hours after onset of the rash. The duration may be longer in immunocompromised individuals.

### Host Susceptibility

Susceptibility is universal among those who have not previously had disease or vaccine. Susceptible contacts have a 60 – 100% risk of infection following a household exposure to disease. Susceptible individuals should be considered infectious for 10 – 21 days following exposure.

Persons from tropical countries are less likely to acquire immunity in childhood and thus, adults from tropical countries have a higher rate of susceptibility. The lifetime risk of developing varicella is 95% in temperate climates. Infection usually confers lifelong immunity.

In healthy children 12 months to 12 years of age, a single vaccine dose has resulted in a seroconversion rate of 98% at 4 – 6 weeks post immunization with antibodies persisting in 98% at 5 years and 96% at 7 years post immunization.

In retrospective studies done in the United States, it was found that there was an overall vaccine effectiveness of 70 – 90% in preventing varicella disease of any severity and 95% protection against severe varicella for at least 7 – 10 years after immunization.

A susceptible individual is identified as:

- no or uncertain history of chickenpox or shingles or
- negative serology (i.e., VZV IgG negative) or
- no history of vaccine.

Any person with one of the following are considered immune to varicella:

- self reported history of varicella or herpes zoster or
- physician-diagnosed varicella or herpes zoster or
- documentation of positive VZV IgG serology or
- isolation of varicella virus from an appropriate clinical specimen or
- documented receipt of the appropriate number of doses of live varicella vaccine, given at the appropriate interval. (See [Routine Immunization Schedule](#))

## Occurrence

### General

Worldwide occurrence. In temperate climates, at least 90% of the population have had varicella disease by the age of 15 years and at least 95% of the population by young adulthood. The disease occurs most frequently in winter and early spring. In tropical countries the epidemiology of the disease is quite different. In these areas a higher proportion of cases occur among adults.

### Canada<sup>(2,6)</sup>

The reporting of varicella across Canada is considered an underestimate of actual cases. In the pre-vaccine era the estimate is about 350,000 cases per year (Incidence of 11.7/1000 population). The highest morbidity rates occur during the first year of life and after age 15 years. Pediatric deaths among infants less than one year old are relatively uncommon (seven deaths/100,000 cases), followed by those 1 – 19 years old which accounted for 1 – 1.5 deaths/100,000 cases. Of the 59 deaths attributed to varicella disease between 1987 and 1996, 70% occurred in those older than 15 years of age.

A review of data from 1994 – 2000 indicate that over 1550 varicella hospitalizations occurred annually for all age groups. Information from the Immunization Monitoring Program ACTive (IMPACT) system for the periods 1990 – 1996 and 1999 – 2004 indicate that the majority of hospitalizations occur in previously healthy children.

In December 1998, varicella vaccine was licensed for use in Canada. The Public Health Agency of Canada (PHAC) recommended universal immunization for varicella by means of a consensus conference in May 1999.

### Alberta<sup>(8)</sup>

It is estimated that varicella affects about 36,000 Albertans each year. From 1996 – 2000, a mean of 7,810 cases were reported to Alberta Health through the aggregate reporting system.

From 2000 – 2010, there has been an average of 2210 cases (aggregate) per year reported in Alberta with the amount of cases declining over the years from 7187 reported in 2000 to 823 reported in 2009. In 2010 there were 1039 cases reported through the aggregate reporting system.

A provincial varicella immunization program began in the spring of 2001 targeting infants and youth and was fully implemented by April 2003.

## Key Investigation<sup>(2,4,9,10)</sup>

### Single Case/Household Cluster

- Assess for evidence of immunity and vaccine history.  
Note: Clinical illness  $\geq$  two weeks and up to  $\leq$  42 days post immunization – refer to the current Alberta Health and Wellness *Surveillance of Adverse Reactions to Immunizing Agents Manual*.<sup>(10)</sup>
- Assess for [vaccine-modified disease](#) (breakthrough infection).
- Identify susceptible contacts with significant exposure.
  - Varicella [susceptible contacts](#) include:
    - newborns of mothers who develop varicella between five days prior to delivery and 48 hours (two days) after delivery,
    - immunocompromised individuals,
    - hospitalized patients especially premature infants,
    - pregnant women who have never had varicella disease, shingles, or varicella vaccine, and
    - healthy individuals who have never had varicella disease, shingles, or varicella vaccine.
  - Significant exposure is considered:
    - continuous household contact (living with the case),
    - sharing the same hospital room as a case,
    - prolonged face-to-face contact (more than five minutes)<sup>(4)</sup>, and
    - health care workers with more than 15 minutes of face-to-face contact or one hour in patient's room.<sup>(2)</sup>
  - Exposure needs to fall within the period of communicability which is defined as 48 hours before to 5 days after onset of rash.
    - First day of exposure equals Day 0.

## Control

### Management of a Case

- Children and adults with mild clinical illness, (i.e., disease with no complications) are permitted to return to daycare, school or work regardless of the state of the rash as soon as they feel well enough to participate in regular activities.
  - Exclusion applies only to activities where all other persons attending that activity have not previously been exposed e.g., weekly club or dance class.
  - In circumstances when an immunocompromised individual is present in the facility, the immunocompromised individual should be excluded (not the case) and referred to their physician. Rationale: other individuals in the facility may be incubating varicella creating further potential exposures. This decision is made on a case-by-case basis.
- Air travel is not recommended until lesions have crusted due to the recirculation of cabin air. If inadvertent exposure occurs during air travel, no follow-up of contacts will take place.



- Swimming in public pools is not recommended until lesions have healed and crusts are no longer present to avoid exposing individuals not previously exposed.
- Hospitals
  - Airborne and contact precautions, in addition to routine practices, are appropriate due to risk of serious varicella in susceptible immunocompromised persons.
  - Persons with varicella lesions should not enter the hospital until all lesions have crusted. This includes visitors and healthcare workers.
  - Outpatients and day-surgery patients should be advised to notify staff if they develop varicella and should be rescheduled to come to hospital when their lesions are not crusted.
  - The hospital unit should be notified if a patient develops a varicella rash within 48 hours of leaving the hospital.

#### **Treatment of a Case<sup>(4,11)</sup>**

- Supportive therapy as indicated.
- In persons under the age of 18 years, avoid the use of acetylsalicylic acid (ASA, Aspirin) because of the association with Reye's syndrome.
- Antivirals have a limited window of opportunity to affect the outcome of VZV infection and are usually reserved for:
  - any adult with or without complicated varicella disease,
  - children with complicated varicella disease when presenting within 72 hours of the onset of the rash, or
  - an immunocompromised individual still getting new lesions.
- Antiviral treatment may be considered for:
  - neonates in the first month of life (mother seropositive),
  - persons over 13 years of age including pregnant women (within 24 hours of rash eruption),
  - children over 12 months of age with chronic skin or lung disorders,
  - children over 12 months of age who are on chronic salicylate therapy (as defined by attending physician),
  - children who are receiving oral or long term inhaled steroids, and
  - healthy children. It will slightly shorten the duration of the disease reducing school absenteeism but the clinical benefit is minimal. <sup>(11)</sup>
- Intravenous acyclovir should be considered for persons at risk of severe complicated disease including:
  - immunocompromised hosts,
  - premature infants while still in hospital, and
  - neonates of seronegative mothers with onset in the first month of life.

#### **Management of Contacts<sup>(1,2,4,6,9,12)</sup>**

- Assess disease history or serological evidence of disease.
- Assess shingles disease history.
- Assess vaccine history.
- [Susceptible household contacts](#) of confirmed and probable cases should avoid contact for the incubation period with:
  - immunocompromised individuals
  - susceptible pregnant women (particularly those in the third trimester)
  - hospitalized premature infants, and
  - infants born to susceptible mothers.
- Varicella-zoster Immune globulin (VZIG) may be administered to non-immune individuals who are at high-risk for severe disease. VZIG should be administered as soon as possible after exposure and preferably within 96 hours of exposure for the greatest effectiveness. It may be

given up to 10 days after exposure but attenuation of disease is likely to decrease as the length of time between exposure and administration of VZIG increases.<sup>(13)</sup>

- VZIG should be considered for:
  - newborns whose mothers develop varicella within five days prior to delivery up to 48 hours after delivery,
  - immunocompromised individuals with congenital, acquired immunodeficiency disease, or immunosuppression due to disease or therapy. This includes persons receiving corticosteroid therapy who are taking a high dose systemic steroid ( $\geq$  two mg/kg per day or  $\geq$  20 mg per day) when given for more than two weeks.
  - hospitalized premature infants exposed during the first four weeks of life. If less than 28 weeks gestation, give VZIG regardless of maternal status.
  - exposed infants of 29 – 37 weeks gestation if the mother was not immune at the time of birth, and
  - exposed pregnant women who have never had varicella disease, shingles, or varicella vaccine. They are at risk of complications and should be offered VZIG. It should be noted that there is no evidence that VZIG will prevent or alter disease in the fetus.
  - Note: VZIG is **not** required for:
    - ◇ persons receiving regular monthly infusions of  $\geq$  400 mg/kg of intravenous immunoglobulin (IVIg) and
    - ◇ those whose most recent dose of IVIg was within the three weeks before exposure.
- If a second exposure occurs more than three weeks after the administration of VZIG in a recipient in whom varicella did not develop, another dose of VZIG should be considered.
- Varicella vaccine has been shown to be effective in preventing or reducing the severity of disease if given to susceptible individuals within 72 hours and no longer than five days after exposure.
  - Refer to the current *Alberta Immunization Policy Manual* for recommendations on post-exposure immunization.
- Exposure needs to fall in the period of communicability which is defined as 48 hours before to 5 days after onset of rash. First day of exposure equals Day 0.
- Airline travel is not recommended for exposed susceptible household contacts for 8 – 21 days from the date of exposure.
  - No follow-up of contacts exposed to a case while traveling by airline will take place.

### Preventive Measures<sup>(6,12)</sup>

- Immunize children according to the Provincial Immunization Schedule.
- Offer vaccine to susceptible individuals.
- Susceptibility will be based on definition of [susceptible individual](#).
  - History of disease can be determined with the following questions;
    - Have they ever had varicella?
    - Does their parent remember them having varicella?
    - Do they have varicella scars?
    - Have they had shingles?
- For grade nine students in the school setting susceptibility will be based on history of disease or appropriate past varicella immunization. Serological testing will not be required.
- Healthcare workers should demonstrate proof of immunity upon hire.
  - Proof of immunity may include history of disease, serological evidence of disease or documented age-appropriate doses of varicella vaccine.
- Immunize non-immune persons according to the Provincial Immunization Schedule.



- For persons  $\geq 13$  years who have negative or uncertain history of disease, immune status is determined by serology. The exception would be grade nine students in the school setting where serology is not required.
- For persons  $< 13$  years of age, immune status will be determined by history of disease or varicella immunization. Serological testing will not be required.

Superseded

## Annex A: Laboratory Diagnosis of Varicella-Zoster Virus Infections (primary or reactivation) <sup>(14)</sup>

### Acute presentation of a vesicular rash

Rash may be generalized (primary chickenpox), dermatomal (herpes zoster or shingles) or sometimes “atypical” (limited lesions in a partially immune or immunocompromised individual).

For optimal laboratory diagnosis of varicella-zoster virus (VZV) infection, lesion swab(s) and serology, as described below, are necessary:

1. Take a **swab/scraping from the base of a fresh vesicular lesion** (blister). Unroof the larger blister and using the appropriate swab, press and rub over the base of the blister vigorously (the goal being to collect abundant cellular matter). The swab should be placed into Universal Transport Medium (UTM) and transferred to the laboratory for three possible testing approaches.

Direct detection of viral antigen by direct fluorescent antigen test (DFA).	<ul style="list-style-type: none"> <li>• The first line, rapid test most appropriate for acute investigation.</li> <li>• Rapid but may not be sensitive if a good cellular sample has not been submitted.</li> </ul>
Polymerase chain reaction (PCR) amplification and detection of virus.	<ul style="list-style-type: none"> <li>• If vesicles not present as can be seen in atypical lesions in immunized patient, swabs of papules/ulcers may also be submitted for PCR.</li> <li>• Very sensitive for detection of the virus, may eventually replace culture-based procedures but requires further validation and comparison with DFA (validation currently in progress within ProVLab).</li> </ul>
Modified culture (shell vial) of material.	<ul style="list-style-type: none"> <li>• Relatively insensitive and a positive result may take up to six days.</li> </ul>

2. Take a **blood sample (serum separator tube)** for VZV IgM and IgG tests.
  - An IgM positive result may indicate an acute VZV infection (usually primary).
    - The assay may lack sensitivity early in acute infection and in patients who are partially immune (i.e., immunized).
    - False positive VZV IgM results can occur i.e., due to rheumatoid factor.
    - VZV IgM may be detectable in recurrent VZV infection (herpes zoster).
  - Seroconversion for VZV IgG may indicate a recent acute VZV infection.
    - Immunocompromised individuals may not develop a detectable antibody response.
    - Immunized individuals may not develop VZV IgG detectable by standard laboratory assays making IgG detection an unreliable measure of immunity or protection in this population.
    - Seroconversion is retrospective and not immediately useful for patient and contact management or for deciding on infection control measures.

### **Atypical rash presentation after vaccination**

Samples should be taken as above. If there are no fresh vesicular lesions then swabs of papules/ulcers and serum for IgM/IgG testing should be collected. Lesion samples will be tested first using DFA (if enough cells) and then PCR (maximum sensitivity). ***The PCR test currently requires discussion with the Virologist-on-call.***

### **Neurological symptoms in the context of possible primary or recurrent VZV**

If a lumbar puncture is undertaken because of neurological symptoms and VZV is suspected, cerebrospinal fluid (CSF) should be collected and submitted for PCR testing alongside blood for serological testing and analysis of lesions, as appropriate.

### **Disseminated infections of the immunocompromised, notably stem cell transplant patients.**

Donor-derived VZV infections are rare, more frequently reactivation of latent virus can result in disseminated disease, presenting as abdominal pain and/or hepatitis prior to rash onset. Collection of plasma (EDTA whole blood) for molecular detection is the method of choice and requires consultation with Virologist-on-call.

### **Differentiation between wild-type and vaccine VZV (and Strain Characterization)**

If a sample contains detectable VZV by DFA, PCR or culture, it may be important to know if the causative virus is wild-type or related to vaccination. Such analysis can be undertaken by nucleic acid sequencing, which also may provide sufficient detail to confirm whether cases are linked in an outbreak setting. If considered necessary, or in the case of linked (outbreak) cases, then samples would be forwarded to the NML for sequence-based analysis.

## Annex B – Varicella (Chickenpox) and Shingles (Herpes Zoster)

	Varicella	Vaccine-Modified Disease	Shingles
Distinguishing Characteristics	<ul style="list-style-type: none"> <li>Vesicular (fluid-filled) rash that progresses to scab.</li> <li>Maculopapules, vesicles and scabs in varying stages of evolution.<sup>(7,15)</sup></li> </ul>	<ul style="list-style-type: none"> <li>Maculopapular rash (reddened area with small, solid bumps) occurring &gt;42 days after varicella immunization.</li> <li>Usually mild with &lt;50 lesions.</li> </ul>	<ul style="list-style-type: none"> <li>Characterized by grouped vesicular eruptions mostly unilaterally in the distribution of a sensory nerve. Most often this involves the trunk or the fifth cranial nerve.</li> <li>Occasionally can become disseminated and lesions can occur outside the primary dermatomes and with visceral complications.</li> </ul>
Clinical Manifestations	<ul style="list-style-type: none"> <li>May be mild or severe.<sup>(17)</sup></li> <li>A mild prodrome (fever, malaise and upper respiratory tract infection) may precede rash by 1 or 2 days. Prodrome does not usually occur in children.<sup>(7,15)</sup></li> <li>Generalized, pruritic (itchy), vesicular (fluid-filled) rash typically consisting of 200 – 500 lesions, mild fever and general malaise.<sup>(4,9,15,16)</sup></li> <li>Lesions tend to develop on the trunk and face, progressing to extremities.<sup>(7,15)</sup></li> <li>Ulcerated lesions may be present on mucous membranes (e.g., mouth, throat, conjunctiva, rectum and vagina).<sup>(15)</sup></li> <li>10 – 20 times more severe in adolescents and adults.<sup>(2,7,17,18)</sup></li> </ul>	<ul style="list-style-type: none"> <li>A mild illness with usually &lt;50 lesions (usually maculopapular rather than vesicular).<sup>(2,4,15-18)</sup></li> <li>Systemic symptoms such as fever occur less frequently.<sup>(15-17)</sup></li> <li>Shorter duration.<sup>(17)</sup></li> </ul>	<ul style="list-style-type: none"> <li>Pain (preherpetic neuralgia) within dermatome may precede lesions by 48 – 72 hours.<sup>(18)</sup></li> <li>Grouped vesicular lesions appear in 1 – 3 sensory dermatomes (often unilateral but can be bilateral).<sup>(7)</sup></li> <li>Symptoms and lesions tend to resolve over 10 – 15 days.</li> <li>Is usually benign and not associated with pain in children but tingling may be present.<sup>(7)</sup></li> <li>Approximately 30% of elderly will have post herpetic neuralgia.</li> </ul>
Mode of Transmission / Host Susceptibility	<ul style="list-style-type: none"> <li>Person-to-person by direct contact, droplet or airborne spread of vesicle fluid or secretions of the respiratory tract of cases.<sup>(2,15)</sup></li> <li>Direct contact with vesicle fluid of persons with shingles.<sup>(2,15)</sup></li> <li>Indirectly by touching articles soiled by discharges from vesicles and mucous membranes of cases.</li> <li>Up to 90% of susceptible children exposed to VZV will develop disease.<sup>(2,7)</sup></li> </ul>	<ul style="list-style-type: none"> <li>Person-to-person by direct contact, droplet or airborne spread of vesicle fluid or secretions of the respiratory tract of cases.<sup>(15,19)</sup></li> <li>Contact can be months or years post immunization.</li> </ul>	<ul style="list-style-type: none"> <li>Direct contact with fluid in vesicle or respiratory droplets can cause varicella (not shingles) in susceptible persons.<sup>(4,15,17)</sup></li> <li>Respiratory droplet transmission is more likely to occur in patients with disseminated shingles and/or who are immunocompromised.<sup>(17)</sup></li> <li>The lifetime risk of having at least one reactivation of varicella zoster is 15 – 20 % occurring predominantly in older adults and rarely, in children.</li> </ul>

	Varicella	Vaccine-Modified Disease	Shingles
<b>Incubation Period</b>	<ul style="list-style-type: none"> <li>2 – 3 weeks (commonly 14 to 16 days).<sup>(4,6,7,15)</sup></li> </ul>	<ul style="list-style-type: none"> <li>2 – 3 weeks (commonly 14 to 16 days).<sup>(4,6,7,15)</sup></li> </ul>	<ul style="list-style-type: none"> <li>VZV remains latent for a few to many years and then reactivates.<sup>(17)</sup></li> </ul>
<b>Period of Communicability</b>	<ul style="list-style-type: none"> <li>Usually 1 – 2 days and up to 5 days before the onset of the rash until all lesions are crusted over (3 – 5 days).<sup>(6,15,17)</sup></li> <li>May be longer in immunocompromised persons.<sup>(4)</sup></li> </ul>	<ul style="list-style-type: none"> <li>Same as varicella.</li> </ul>	<ul style="list-style-type: none"> <li>For 7 days after rash appears.</li> </ul>
<b>Risk of Transmission</b>	<ul style="list-style-type: none"> <li>VZV is spread by the airborne route as well as by direct contact with the virus shed from skin lesions therefore transmission rates can be high.</li> </ul>	<ul style="list-style-type: none"> <li>Rare but likely increases with number of lesions that develop.<sup>(2,4)</sup></li> </ul>	<ul style="list-style-type: none"> <li>The fluid in shingles vesicles contains VZV but is much less contagious than varicella.<sup>(17)</sup></li> </ul>
<b>Occurrence of varicella disease after Immunization</b>	<ul style="list-style-type: none"> <li>See vaccine-modified disease.</li> </ul>	<ul style="list-style-type: none"> <li>Vaccine is 70 – 90% effective in preventing all varicella disease and &gt; 95% effective in preventing serious varicella complications.<sup>(2,15,16)</sup></li> <li>Of those immunized; up to 4% per year will develop vaccine-modified disease if exposed to VZV outside a household setting and up to 20% will develop vaccine-modified disease if exposed to VZV in a household setting.<sup>(1,2,4,7,15,16,20)</sup></li> </ul>	<ul style="list-style-type: none"> <li>Usually a milder form of shingles.<sup>(15)</sup></li> <li>Not associated with complications such as post herpetic neuralgia.<sup>(15)</sup></li> <li>2.6 cases per 100,000 vaccine doses.<sup>(4,9,16)</sup></li> <li>14 cases per 100,000 person years.<sup>(2)</sup></li> </ul>
<b>Occurrence or re-occurrence after natural varicella infection</b>	<ul style="list-style-type: none"> <li>Recovery from primary varicella infection usually results in lifetime immunity.<sup>(15)</sup></li> <li>Clinical re-infections have been reported usually in children who were less than one year of age at first infection and/or had a milder first infection.<sup>(2,4,6,17,19)</sup></li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Occurs in individuals after primary varicella infection at a rate of 68 per 100,000 person years.<sup>(4,16)</sup></li> <li>The lifetime risk of having reactivation to herpes zoster is 15 – 20%.<sup>(2,17,18)</sup></li> <li>Approximately 4% of people will experience a second episode of shingles.<sup>(7)</sup></li> </ul>



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