

# Varicella

## Surveillance and Investigation Protocol

### **Disease Summary:**

Varicella is an acute infectious disease caused by the varicella zoster virus, (VZV). VZV is a DNA virus and is a member of the herpes virus group. Primary infection with VZV results in chickenpox. Varicella is spread through direct contact with patients with either varicella or herpes zoster lesions, by airborne droplets, infected respiratory secretions, or from contact with vesicular zoster lesions. Individuals are contagious from 1-2 days before rash onset and until all lesions are crusted over which normally takes about 5 days. Outbreaks of varicella should be reported to the local health department immediately. Aggregate number of varicella cases are to be reported from local health department to the Division of Infectious Disease Epidemiology, DIDE weekly.

### **Healthcare Provider Responsibilities:**

1. Manage patients with varicella and their close contacts in accordance with physician's guidance available at:  
<http://www.dhhr.wv.gov/oeps/disease/ob/documents/toolkits/varicella/Chickenpox-Provider-fact-sheet.pdf>
2. Reporting varicella:
  - a. Immediately report all outbreaks of varicella in any setting to your local health department by phone. You may also report to West Virginia Division of Infectious Disease Epidemiology (DIDE) at 800-423-1271 in WV or 304-558-5358.
  - b. Weekly report the total number of cases of varicella to your local health department by entering information into WVEDSS.
  - c. Within one week, report death associated with varicella to your local health department or DIDE, by using West Virginia Electronic Disease Surveillance System (WVEDSS) form for Chickenpox (Varicella) death:  
[http://www.dhhr.wv.gov/oeps/disease/IBD\\_VPD/VPD/Documents/chickenpoxDeath.pdf](http://www.dhhr.wv.gov/oeps/disease/IBD_VPD/VPD/Documents/chickenpoxDeath.pdf).

### **Laboratory Responsibilities:**

1. Varicella is reportable as an aggregate total in West Virginia. You may report a positive laboratory test result of varicella, including patient demographic information to the appropriate local health department and the local health department will file a report into WVEDSS within one week of receiving report.
2. The infection control practitioner or the healthcare provider who ordered the test should be notified of a positive result immediately.

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### **Local Health Responsibilities:**

1. Educate your health care providers to report outbreak(s) of varicella immediately and report aggregate total chicken pox cases weekly to their respective local health department.
2. Reporting:
  - a. Report weekly to DIDE aggregate total of chickenpox through WVEDSS. Send the report to DIDE every Monday for previous weeks total.
  - b. Report death due to chicken pox (varicella) by using West Virginia Electronic Disease Surveillance System (WVEDSS) form for Chickenpox (Varicella) death: [http://www.dhhr.wv.gov/oeps/disease/IBD\\_VPD/VPD/Documents/chickenpoxDeath.pdf](http://www.dhhr.wv.gov/oeps/disease/IBD_VPD/VPD/Documents/chickenpoxDeath.pdf)
  - c. Immediately report varicella outbreaks in any setting to your regional epidemiologist and the Division of Infectious Disease Epidemiology (DIDE) via phone: 800-423-1271 in WV or 304-558-5358.
3. Educate the public, such as parents and guardians of infants, children, adolescents, adults, and pregnant women about the disease and the importance of varicella vaccine. Adults aged 60 and older should be offered the shingles vaccine according to the ACIP recommendations.
4. Educate healthcare providers to track immune status of staff in healthcare settings. Offer vaccine to non-immune staff that has no contraindications.
5. Varicella infection is significantly milder in those who have been immunized with the varicella vaccine. It can be difficult to make a diagnosis on presentation alone. Laboratory testing is increasingly important for confirming varicella and appropriately managing cases and their contacts.
6. Work collaboratively with school nurses
7. Educate partners on reporting

### **State Health Responsibilities:**

1. Ensure local health departments are reporting varicella counts on a weekly basis
2. Ensure local health departments are reporting varicella outbreaks immediately
3. Feedback data that is collected and analyzed in relation to varicella
4. Report to CDC data elements for varicella cases in outbreaks
5. Facilitate specimen collection
6. Coordinate with the immunization program to be sure that we have vaccines available when needed

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7. Provided guidance and technical support to local health departments and providers detecting varicella
8. Work collaboratively with school nurses
9. Educate partners on reporting
10. Update protocols and surveillance indicators.
11. Assist with outbreak response

### **Occupational Health**

Employees who will conduct interview or face-to-face contact with infectious persons should be immune to varicella. If there is no contraindication, immunize with varicella vaccine to those who are non-immune following Advisory Committee of Immunization Practices (ACIP) recommendations.

- Follow standard precautions plus airborne precautions (negative air-flow rooms) and contact precautions until lesions are dry and crusted
- If negative air-flow rooms are not available, patients with varicella should be isolated in closed rooms with no contact with persons without evidence of immunity
- Patients with varicella should be cared for by staff with evidence of immunity

### **Outbreak Recognition (Definition)**

To facilitate disease prevention and control, health departments should encourage varicella outbreak reporting in the following situations: three cases or more from any given school, day care facility, or long term care facility or other congregate settings within one incubation period.

### **Steps for Outbreak management:**

- a. Check to confirm that the reported cases meet the clinical criteria of Varicella and outbreak case definition.
- b. Immediately notify DIDE to assist you with outbreak investigation.
- c. Initiate rapid case and contact identification to prevent the spread of disease, especially among susceptible persons at high risk for serious complications of varicella, such as immunocompromised persons and pregnant women. For identification of close contacts, see table 1

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**Table 1- Types of Exposure to Varicella or Zoster**

Type of Contact	Description
Household	Residing in the same household
Playmate	Face-to-face indoor play $\geq 5$ minutes (some experts use $>1$ hour)
<i>Hospital Setting</i> Varicella	In same 2 to 4 bedroom or adjacent beds in a large ward, face-to-face contact with an infectious staff member or patient, or visit by a person deemed contagious
Zoster	Intimate contact (e.g., touching or hugging) with a person deemed contagious
Newborn Infant	Onset of Varicella in the mother 5 days or less before or within 48 hours after delivery; VariZig or IGIV is not indicated if the mother has zoster.

- d. Rapidly triage (interview) all cases of chickenpox by completing the chickenpox outbreak line listing form:

[http://www.dhhr.wv.gov/oeps/disease/IBD\\_VPD/VPD/Pages/Varicella.aspx](http://www.dhhr.wv.gov/oeps/disease/IBD_VPD/VPD/Pages/Varicella.aspx)

Determine vaccination status by first contacting the parent for vaccination records. If the parent does not have this information, request that they obtain the information through their health care provider. WVSIIIS will be checked if the parent and provider are unable to provide this information.

- e. Issue a healthcare provider alert and parent/guardian notification letter in settings where exposed persons may seek post exposure prophylaxis with vaccine or immune globulin or antiviral from their providers in the community. Sample healthcare provider and parent/guardian letters are available at [http://www.dhhr.wv.gov/oeps/disease/IBD\\_VPD/VPD/Pages/Varicella.aspx](http://www.dhhr.wv.gov/oeps/disease/IBD_VPD/VPD/Pages/Varicella.aspx)
- f. Isolate (exclude) or cohort individuals with varicella until all of their lesions have formed scabs or crusts (usually 5 days after rash onset).

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- g. Post exposure Immunization: Varicella vaccine should be administered to healthy people without evidence of immunity who are 12 months or older, including adults, as soon as possible, preferably within 3 days and possibly up to 5 days after varicella or herpes zoster exposure, if there are not contraindications to vaccine use. During a varicella outbreak, persons who do not have adequate evidence of immunity should receive their first or second dose as appropriate. Additionally, in outbreaks among preschool-aged children, 2-dose vaccination is recommended for optimal protection, and children vaccinated with 1 dose should receive their second dose provided 3 months have elapsed since the first dose. West Virginia Division of Immunization Services may provide varicella containing vaccines for outbreak control when resources are available. Please contact DIDE immediately after verifying the Varicella outbreak to initiate control measures.

The Advisory Committee on Immunization Practices (ACIP) Criteria for Evidence of Immunity to Varicella:

1. Documentation of age-appropriate vaccination with a varicella vaccine
  - a. Preschool-aged children 12 months of age or older: one dose
  - b. School-aged children, adolescents, and adults: two doses
2. Laboratory evidence of immunity or laboratory confirmation of prior disease.
3. Born in the United States before 1980, except health-care workers, pregnant women, and immunocompromised individuals. These individuals need to meet one of the other criteria.
4. A healthcare provider diagnosis of chickenpox or history of chickenpox.
5. Diagnosis or verification of a history of herpes zoster by a health-care provider.

For people reporting a history of or presenting with atypical and/or mild case, assessment by a physician or their designee is recommended and one of the following should be sought:

- a. An epidemiologic link to a typical varicella case or
- b. Evidence of laboratory confirmation.

When such documentation is lacking, people should not be considered as having a valid history of disease because other diseases may mimic mild atypical varicella.

- h. Recommend varicella vaccination to non-immune childcare or school contacts even if the time since exposure is greater than 5 days, to protect from future exposure, especially if there is ongoing transmission in that setting, Note: Varicella vaccine should not be administered to people who are immunocompromised or had an anaphylactic-type reaction to any component of the vaccine, including gelatin and neomycin.
- i. For individuals for whom varicella vaccine is contraindicated and history of Varicella is unknown or negative serologic test, offer Varicella-Zoster Immune Globulin (VariZIG) as soon as possible within 96 hours of varicella exposure.

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For detailed information about VariZIG refer to WVDHHR “Provider Information Sheet”:

<http://www.dhhr.wv.gov/oeps/disease/ob/documents/toolkits/varicella/Chickenpox-Provider-fact-sheet.pdf>

- j. Chemoprophylaxis: If VariZIG or IGIV are not available, some experts recommend prophylaxis with acyclovir or valacyclovir beginning 7 to 10 days after exposure and continuing for 7 days for immunocompromised patients without evidence of immunity who have been exposed to varicella or herpes zoster.
- k. Exclude exposed susceptible individuals who may be in contact with persons at high risk of serious complications (e.g., health-care workers, family members of immunocompromised persons) for the duration of the period of communicability (i.e., 8 to 21 days after exposure).
- l. Assess the status of the outbreak control within the outbreak setting. Complete the outbreak line list and fax to DIDE, 304-558-8736.
- m. To prevent disease and spread of varicella in health care institutions, the institutions should ensure that all healthcare personnel have evidence of immunity to varicella. If there is no evidence of immunity, staff should be offered 2 doses of varicella vaccine administered 4-8 weeks apart when they begin employment.
- n. Patients with diagnosed varicella should be cared for by staff with evidence of immunity.
- o. For healthcare exposure, refer to <http://www.dhhr.wv.gov/oeps/disease/ob/documents/toolkits/varicella/Chickenpox-Provider-fact-sheet.pdf>
- p. In outbreaks where there are childcare or school requirements, proof of immunity should be provided. Those without proof of immunity, a 2-dose vaccination is recommended for optimal protection. In children who are vaccinated with 1 dose should receive their second dose provided 3 months have elapsed since first dose. Unvaccinated children with no history of varicella should be excluded from school until 21 days after the onset of rash in the last case of varicella.
- q. No cases of Reye syndrome have been reported in children who receive the varicella vaccine while receiving salicylates. However, because of the association with Reye syndrome, natural varicella infection, and salicylates, the vaccine manufacturer recommends that salicylates be avoided for 6 weeks after administration of varicella vaccine.

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### Disease Prevention Objective

1. The best way to prevent chickenpox is to get the chickenpox vaccine. Children, adolescents, and adults should get two doses of the chickenpox vaccine.

### Disease Control Objectives

After a case of chickenpox is identified in a setting, reduce further transmission by educating providers to:

1. Isolate (exclude) or cohort individuals with varicella until all of their lesions have crusted and no new lesions appear within a 24 hour period.
2. Offer chickenpox vaccine within 72 hours (3 days) and possibly up to 120 hours (5 days) following varicella exposure. Encourage vaccination even if exposure is greater than 5 days.
3. Offer VariZIG or IGIV as soon as possible, but within 96 hours to susceptible persons who are at high risk for developing severe disease and when varicella vaccine is contraindicated.
4. Prophylactic administration of oral acyclovir beginning 7 days after exposure also may prevent or attenuate varicella in healthy children.
5. Exclude exposed susceptible individuals who may be in contact with persons at high risk of serious complications (e.g. health care workers, family members of immunocompromised persons) for the duration of the period of communicability (i.e. from the 8<sup>th</sup> until the 21<sup>st</sup> day post exposure).

### Disease Surveillance Objectives

1. To develop or improve outbreak detection and investigation.
2. To monitor effectiveness of two-dose varicella vaccination in the context of an outbreak.
3. Assess the proportion of cases related to outbreaks

### Public Health Significance

Varicella (chickenpox) is a febrile rash illness resulting from primary infection with the varicella-zoster virus (VZV). Varicella is highly infectious with secondary infection occurring in 61%-100% of susceptible household contacts. While mostly mild disorder in childhood, varicella tends to be more severe in adults. It may be fatal, especially in neonates and in immunocompromised persons. VZV causes a systemic infection that usually results in lifetime immunity. According to CDC, approximately 10,000 hospitalizations and 100 deaths occurred before the introduction of live attenuated varicella vaccine in 1995. Varicella affected mainly children with approximately 90% of cases occurring before the age of 15 years. In

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the 1970s and 1980s, the highest rates of disease were among children 5-9 years of age followed closely by children 1-4 years of age. In the 1990s, the highest rate of disease has been reported in the preschool age group. This may be due to increasing attendance at childcare and preschool. In 2014, 91% of children 19 to 35 months old in the United States had received one dose of varicella vaccine. Two doses of the vaccine are about 90% effective at preventing chickenpox. When you get vaccinated, you protect yourself and others in your community. This is especially important for people who cannot get vaccinated, such as those with weakened immune systems or pregnant women. Varicella incidence in the United States declined 98% during 1995-2010.

### **Clinical Description**

Varicella (Chickenpox) is a febrile rash illness resulting from primary infection with the varicella-zoster virus (VZV). It usually manifests in unvaccinated people as generalized, pruritic, vesicular rash typically consisting of 250 to 500 lesions, low-grade fever, and other systemic symptoms. The general course in children is usually very mild. Varicella tends to be more severe in infants, adolescents, and adults and immunocompromised individuals. Complications include bacterial infection of skin lesions, pneumonia, central nervous system manifestations, Reye syndrome, hospitalization and death. Infants born to a mother who had maternal varicella infection in the first 20 weeks of gestation is occasionally associated with abnormalities in the newborn. These abnormalities include low birth weight, hypoplasia of extremity, skin scarring, eye and neurologic abnormalities.

### **Etiologic Agent**

Varicella-zoster virus (VZV) is a member of the herpes virus family.

### **Reservoir**

Humans are the only source of infection for this virus.

### **Mode of Transmission**

Transmission occurs from person to person by direct contact with patients with either varicella or herpes zoster lesions, by airborne droplets, infected respiratory secretions, or from contact with vesicular zoster lesions.

### **Incubation Period**

The incubation period for varicella is 10-21 days, most commonly 14-16 days after exposure to rash.

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### Period of Communicability

The infectious period for varicella is usually 1-2 days before onset of rash, and continuing until all lesions are crusted which is at least 5 days after onset of rash. Contagiousness may be prolonged in patients with altered immunity.

### Case Definitions

#### Clinical case definition

An illness with acute onset of diffuse (generalized) maculo-papulovesicular rash without other apparent cause.

#### Laboratory criteria for diagnosis

- Isolation of varicella virus from a clinical specimen, OR
- Varicella antigen detected by direct fluorescent antibody test, OR
- Varicella-specific nucleic acid detected by polymerase chain reaction (PCR), OR
- Significant rise in serum anti-varicella immunoglobulin G (IgG) antibody level by any standard serologic assay.

#### Case Classification

##### Probable:

An acute illness with

- Diffuse (generalized) maculo-papulovesicular rash, AND
- Lack of laboratory confirmation, AND
- Lack of epidemiologic linkage to another probable or confirmed case.

##### Confirmed:

An acute illness with diffuse (generalized) maculo-papulovesicular rash, AND

- Epidemiologic linkage to another probable or confirmed case, OR
- Laboratory confirmation by any of the following:
  - Isolation of varicella virus from a clinical specimen, OR
  - Varicella antigen detected by direct fluorescent antibody test, OR
  - Varicella-specific nucleic acid detected by polymerase chain reaction (PCR) OR
  - Significant rise in serum anti-varicella immunoglobulin (IgG) antibody level by any standard serologic assay

#### Notes:

Two probable cases that are epidemiologically linked are considered confirmed, even in the absence of laboratory confirmation.

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In vaccinated persons who develop varicella more than 42 days after vaccination (breakthrough disease), the disease is almost always mild with fewer than 50 skin lesions and shorter duration of illness. The rash may also be atypical in appearance (maculopapular with few or no vesicles).

Laboratory confirmation of cases of varicella is not routinely recommended; laboratory confirmation is recommended for fatal cases and in other special circumstances.

### Varicella deaths case definition and case classification

#### Case classification:

Probable: A probable case of varicella that contributes directly or indirectly to acute medical complications that result in death.

Confirmed: A confirmed case of varicella that contributes directly or indirectly to acute medical complications that result in death.

### Laboratory Diagnosis of Varicella

Laboratory testing, whenever possible, or epidemiological linkage to a typical case or laboratory-confirmed case should be sought to confirm or rule out varicella.

### Diagnostic Tests for Varicella-Zoster Virus (VZV Infection)

Test	Specimen	Comments
PCR	Vesicular swabs or scrapings, scabs from crusted lesions, biopsy tissue, CSF	Very sensitive method. Specific for VZV. Methods have been designed that distinguish vaccine strain from wild-type
DFA	Vesicle scraping, swab of lesion base (must include cells)	Specific for VZV. More rapid and more sensitive than culture, less sensitive than PCR
Viral Culture	Vesicular fluid, CSF, biopsy tissue	Distinguishes VZV from HSV=. Cost, limited availability, requires up to a week for result. Least sensitive method
Tzanck smear	Vesicle scraping, swab of lesion base (must include cells)	Observe multinucleated giant cells with inclusions. Not specific for VZV. Less sensitive and accurate than DFA.
Serology	Acute and convalescent	Specific for VZV. Commercial assays

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(IgG)	serum specimens for IgG	generally have low sensitivity to reliably detect vaccine-induced immunity. gpELISA and FAMA are the only IgG methods that can readily detect vaccine seroconversion, but these tests are not commercially available.
Capture IgM	Acute serum specimens for IgM	Specific for VZV. IgM inconsistently detected. Not reliable method for routine confirmation but positive result indicates current/recent VZV activity. Requires special equipment.

### Preventive Interventions

- The best way to prevent chickenpox is to get the chickenpox vaccine. Children, adolescents, and adults should receive two doses of chickenpox vaccine.
- Administration of varicella VZIG for high risk groups for whom varicella vaccine is contraindicated.
- Affected children should be excluded from school until the lesions have crusted. This may not prevent spread of varicella because the child is infectious before rash appears.

### Treatment:

- The decision to use antiviral therapy should be determined by specific host factors, extent of infection, and initial response to therapy. Antiviral drugs have a limited window of opportunity to affect the outcome of varicella infection.
  - Oral acyclovir or valacyclovir are not recommended for routine use in otherwise healthy children.
  - Oral acyclovir or valacyclovir should be considered for otherwise healthy people at increased risk of moderate to severe varicella; unvaccinated people older than 12 years, people with chronic cutaneous or pulmonary disorders, people receiving long-term salicylate therapy, and people receiving short, intermittent , or aerosolized courses of corticosteroids.
  - Intravenous acyclovir therapy is recommended for immunocompromised patients including patients being treated with high-dose corticosteroid therapy for more than 14 days. The acyclovir should be initiated within 24 hours of rash onset.

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- Oral acyclovir **should not** be used to treat immunocompromised children.
- Valacyclovir (20mg/kg per dose, with maximum dose of 1000mg, administered 3 times a day for 5 days) was licensed in 2008 for treatment of varicella in children 2-17 years of age.
- Some experts have used valacyclovir in selected immunocompromised patients perceived to be at low to moderate risk of developing severe varicella, such as HIV-infected patients with relatively normal concentrations of CD4+ T-lymphocytes and children with leukemia in whom careful follow-up is ensured.
- IGIV given shortly after exposure can prevent or modify the course of disease, Immune Globulin preparations are not effective in treatment once disease is established.
- Children with varicella **should not** receive salicylates or salicylate-containing products. This increases the risk of Reye syndrome.
- Use non-aspirin medications, such as acetaminophen, to relieve fever from chickenpox
- Calamine lotion and colloidal oatmeal baths may help relieve some of the itching.
- Keep fingernails trimmed and short to help prevent skin infections caused by scratching the blisters.

### Surveillance Indicators

- Proportion of MMWR weeks for which reporting of chickenpox is available (county level).

April 2017

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### **References:**

CDC Chickenpox (Varicella)- <https://www.cdc.gov/chickenpox/index.html>

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