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## Varicella-Zoster Virus (Chickenpox / Shingles)

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## **Varicella-Zoster Virus (Chickenpox / Shingles)**

### **Overview**<sup>2, 3, 5, 6, 7, 8</sup>

Humans are the only known reservoir for varicella-zoster virus (VZV), which causes two distinct clinical diseases; varicella (chickenpox) and herpes zoster (shingles). Varicella is a febrile rash illness resulting from the primary infection with the VZV. The first noticeable symptom is the onset of a slight fever, which is usually followed by some mild constitutional symptoms, such as headache, runny nose and malaise. The classic symptom of varicella is a rash that turns into itchy, fluid-filled blisters that eventually turn into scabs. Recurrences of infection with herpes zoster (HZ), also known as shingles, result in a more localized painful rash, or small blisters. The HZ rash can appear anywhere on the body, but it typically appears on only one side of the face or body. Burning or shooting pain and tingling or itching are early signs of the HZ infection. Even after the rash is gone, the pain can continue for months, even years.

**Varicella:** Also known as chickenpox, varicella is the disease that results from primary infection with the VZV. Varicella is a highly contagious rash illness that is transmitted by airborne spread from respiratory secretions (spreads in the air when an infected person coughs or sneezes) or by touching or breathing in the virus particles that come from varicella blisters. The virus spreads easily from people with varicella to others who have never had the disease or never received the varicella vaccine. A person with active HZ can also spread the virus to another person who has never had varicella. In such cases, the person exposed to the virus might develop varicella, but they would not develop HZ.

The varicella rash is generalized and pruritic (itchy). The unilocular rash rapidly progresses from macules to papules to vesicular lesions before crusting. The rash usually appears first on the head, followed by the trunk, and then the extremities, with the highest concentration of lesions on the chest and back (centripetal distribution). The severity of varicella is based on the number of lesions (<50, 50-249, 250-500, >500). Successive crops of lesions appear across several days, with lesions present in several stages of development (a non-synchronous rash).

The average incubation period for varicella is 14 to 16 days after exposure (range 10 to 21 days). The incubation period may be prolonged in immunocompromised patients and those who have received postexposure treatment with a varicella antibody-containing product. Persons with varicella are considered infectious from one to two days before the rash appears and until all lesions are crusted (scabbed) over.

Infants, adolescents, adults, and immunocompromised persons are at higher risk for complications. Persons with underlying immunocompromising medical conditions (e.g., cancer, HIV/AIDS) are especially likely to have more severe disease and a longer time to crusting of lesions; thus, they may shed virus from skin lesions for a prolonged period. Severe complications of varicella include secondary bacterial infections, dehydration, pneumonia, encephalitis, and cerebellar ataxia, all of which may result in death.

Breakthrough varicella is defined as a case of varicella due to infection with wild-type VZV occurring more than 42 days after varicella vaccination. With decreasing incidence of varicella

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overall and increasing varicella vaccination coverage, more than half of varicella cases reported in the varicella active surveillance sites in 2010 were breakthrough varicella. In clinical trials, breakthrough varicella was substantially less severe with the median number of skin lesions commonly less than 50; vesicular lesions are less common and the lesions are commonly papules that do not progress to vesicles. Varicella in vaccinated persons is typically shorter in duration and has a lower incidence of fever than in unvaccinated persons. Breakthrough varicella has been reported in both one- and two-dose vaccine recipients. *Note: If a person vaccinated for varicella gets the disease, they can still spread it to others.* For most people, getting varicella once provides immunity for life. Nonetheless, for a few people they can get varicella more than once, although this is not common. However, second cases may occur more commonly among immunocompetent persons than previously considered.

The best way to prevent varicella is to get the varicella vaccine. The varicella vaccine is a live-attenuated preparation of the serially propagated and attenuated wild Oka strain. Pre- and post-licensure studies have demonstrated vaccine effectiveness of one dose of the varicella vaccine to be about 80 to 85% on average for prevention of disease of any severity and >95% for prevention of severe disease. CDC recommends two doses of varicella vaccine for unvaccinated children, adolescents, and adults. Children should receive the first dose at 12 through 15 months of age and a second dose at four through six years old. All persons 13 years of age and older without evidence of varicella immunity should receive two doses separated by at least four weeks. Before the vaccine, about four million people would get varicella each year in the U.S. Also, about 10,600 people were hospitalized and 100 to 150 died each year as a result of varicella.

**Herpes Zoster (HZ):** Also known as shingles, herpes zoster can occur after a person recovers from varicella. For reasons that are not fully known, the latent VZV is dormant in the body, but can reactivate years later, causing a painful skin rash. Clinical features of HZ include a localized pruritic, often painful, vesicular rash that generally appears unilaterally in one or more dermatomes. Persons with HZ are infectious during the vesicular stages of rash; the rash typically crusts over within seven to 10 days but may take from two to six weeks to heal completely. HZ cannot be passed from one person to another. However, a person with active HZ can spread the virus to another person who has never had varicella or who has not been immunized. The person exposed to the virus might develop varicella, but they would not develop HZ. Immunocompromised persons are at increased risk of disseminated or more severe disease. Almost one out of every three people in the U.S. will develop HZ in their lifetime. Anyone who has had varicella or received varicella vaccine in the past may develop HZ. The risk of HZ increases as you get older. About half of all cases occur in men and women 60 years of age or older.

HZ vaccine reduces the risk of developing HZ and the long-term pain from post-herpetic neuralgia caused by shingles. The Advisory Committee on Immunization Practices (ACIP) recommends HZ vaccine for people aged 60 years and older. *NOTE: Even people who have had HZ can receive the vaccine to help prevent future occurrences of the disease.*

For a complete description of varicella and HZ, refer to the following texts:

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- *Control of Communicable Diseases Manual (CCDM)*. 20<sup>th</sup> ed. Washington, D.C.: American Public Health Association, 2015.
- American Academy of Pediatrics. *Red Book: 2015 Report of the Committee on Infectious Diseases*. 30th ed. Elk Grove Village, IL. American Academy of Pediatrics; 2015.
- *Mandell, Douglas, and Bennett's Principles and Practices of Infectious Diseases: Vol. 2*. 8<sup>th</sup> ed. 2015.

## **2010 Case Definition – Varicella (Chickenpox)<sup>4</sup> – (6/2017)**

### **Clinical Description**

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 G (IgG) antibody level by any standard serologic assay.

### **Comments**

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

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.

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## **1998 Case Definition – Varicella deaths<sup>4</sup> – (6/2017)**

### **Case Classification**

#### **Probable**

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

#### **Confirmed**

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

### **Information Needed for Investigation<sup>5</sup>**

Although a thorough investigation of all cases of varicella may not be feasible in all settings; the identification of a single case of varicella should trigger appropriate intervention measures (such as postexposure prophylaxis). Prophylaxis may be required to prevent transmission to persons without [evidence of immunity](#) to varicella who are at high-risk of serious complications of varicella. *NOTE: A single case of varicella can be the source of a potential outbreak.*

A thorough investigation is warranted in some specific circumstances; including deaths associated with varicella (complete the [Varicella Death Investigation Worksheet](#)). Cases with severe complications such as invasive group-A streptococcal infections, outbreaks involving exposure of persons without [evidence of immunity](#) to varicella who are at high risk of serious complications of varicella, and outbreaks in populations with high two-dose varicella vaccine coverage (complete the [Varicella Surveillance Worksheet](#)).

*NOTE: For all reported probable and confirmed cases of varicella, the following information should be gathered on the [Disease Case Report](#) form (CD-1):*

- Name.
- Date of birth.
- Age.
- Address with zip code.
- Disease severity (based on number of lesions).
- Whether the patient was hospitalized.
- Case status.
- Whether lab testing for varicella was done.
- Type of lab testing done.
- Results of lab test.
- Is the case associated with an outbreak? (*To be recorded in the “Comments Section” of the [Disease Case Report](#) form.*)
- Was the case vaccinated with varicella-containing vaccine?
- Number of doses received.
- If not vaccinated, what was the reason for no vaccination? (*To be recorded in the “Comments Section” of the [Disease Case Report](#) form.*)

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**Establish the extent of the illness.** Varicella cases should be reported to the [local public health agency](#) (LPHA). Determine if household or other close contacts are at high risk for exposure / transmission (e.g., teachers and staff in child care, school, or institutional settings; health care workers; family members of immunocompromised persons), or are a [person at high risk for complications](#), or have been ill by contacting the health care provider, patient, or a family member.

Persons with varicella should consider contacting their health care provider if: the case is older than 12 years of age, or has a weakened immune system or is pregnant, or has a fever above 102°F, or has any areas of the rash or any part of the body that becomes very red, warm, or tender, or begins leaking pus, since these symptoms may indicate a bacterial infection.

**Provide varicella and HZ information to persons at risk of infection and the general public as needed.**<sup>5</sup> Promote varicella and HZ awareness and vaccination. See the CDCs’ website [Varicella Vaccination](#) and [Chickenpox Vaccination: What Everyone Should Know](#) and [What You Need To Know About Shingles and the Shingles Vaccine](#). Also the Immunization Coalition website: [Chickenpox \(varicella\): Questions and Answers](#) and [Shingles \(Zoster\): Questions and Answers, Information about the disease and vaccine](#).

**Varicella Surveillance.** Varicella surveillance data are needed to document and monitor the impact of the varicella vaccination program on varicella incidence, morbidity, and mortality, evaluate the effectiveness of prevention strategies, and evaluate vaccine effectiveness under conditions of routine use.

### **Notification**

Contact the [District Communicable Disease Coordinator](#), the [Senior Epidemiology Specialist](#) for the District, or the Missouri Department of Health and Senior Services (DHSS) – Bureau of Communicable Disease Control and Prevention (BCDCP), phone (573) 751-6113, Fax (573) 526-0235, or for afterhours notification contact the DHSS/Emergency Response Center (ERC) at (800) 392-0272 (24/7) upon learning of a suspect outbreak of varicella.

- If a case(s) is associated with a child care center, BCDCP or the LPHA will contact the Bureau of Environmental Health Services (BEHS), phone (573) 751-6095, Fax (573) 526-7377 and the Section for Child Care Regulation, phone (573) 751-2450, Fax (573) 526-5345.
- If a case(s) is associated with a long-term care facility, BCDCP or the LPHA will contact the Section for Long Term Care Regulation, phone (573) 526-8524, Fax (573) 751-8493.
- If a case is associated with a hospital, hospital-based long-term care facility, or ambulatory surgical center BCDCP or the LPHA will contact the Bureau of Health Services Regulation phone (573) 751-6303, Fax (573) 526-3621.

### **Control Measures**<sup>1, 2, 5, 6, 7, 11</sup>

Rapid case identification and public health action are important to prevent further spread of disease. Infectious varicella patients should be excluded from school, work, and other public places until all lesions are crusted. Wash or disinfect articles that may have been soiled by the lesion fluid or by any discharge from the nose or throat. **NOTE:** *Persons with varicella are considered infectious from one to two days before the rash appears and until all lesions are*

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*crusted over. Vaccinated persons with varicella may develop lesions that do not crust; these persons should be isolated until no new lesions appear within 24-hour period.* If it is necessary for persons suspected of having varicella to see a healthcare provider, ask that they call ahead first. There are numerous people to whom varicella can be life-threatening, including newborns, people with depressed immunity and individuals with serious illnesses like cancer, any of whom could be visiting the physician's office. If varicella case is hospitalized, caregiver's immunization status should be evaluated and appropriate precautions taken.

Define the population(s) at risk and transmission setting(s). Those at risk should be evaluated for evidence of immunity to varicella, which includes any of the following:

1. Documentation of age-appropriate vaccination
  - Preschool-aged children 12 months of age or older: one dose
  - School-aged children, adolescents, and adults: two doses
  - For children younger than 13 years of age, the minimum interval between the two doses is three months. However, if the child received the first dose before age 13 years and the interval between the two doses was at least 28 days, the second dose is considered valid.
2. Laboratory evidence of immunity or laboratory confirmation of disease
  - Commercial assays can be used to assess disease-induced immunity, but they lack sensitivity to always detect vaccine-induced immunity (i.e., they may yield false-negative results)
3. Born in the United States before 1980
  - For healthcare workers and pregnant women, birth before 1980 should not be considered evidence of immunity.
  - Persons born outside the United States should meet one of the other criteria for varicella immunity.
4. A healthcare provider diagnosis of varicella or verification of history of varicella disease
  - Verification of history or diagnosis of typical disease can be done by any healthcare provider (e.g., school or occupational clinic nurse, nurse practitioner, physician assistant, physician). For persons reporting a history of or presenting with atypical and/or mild cases, assessment by a physician or designee is recommended and either one of the following should be sought: a) an epidemiologic link to a typical varicella case or laboratory-confirmed case, or b) evidence of laboratory confirmation, if testing was performed at the time of acute disease. When such documentation is lacking, persons should not be considered as having a valid history of disease, because other diseases may mimic mild, atypical varicella.
5. History of herpes zoster based on healthcare provider diagnosis.

Persons without evidence of immunity to varicella and who do not have a contraindication to vaccination should be vaccinated.

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## Vaccination

Three VZV-containing vaccines are now licensed in the U.S.: varicella vaccine (Varivax), combination measles-mumps-rubella-varicella (MMRV) vaccine (ProQuad), and herpes zoster vaccine (Zostavax). Varicella vaccine (Varivax) is approved for persons 12 months of age and older. Measles-mumps-rubella-varicella vaccine (ProQuad) is approved for children 12 months of age through 12 years of age. Two doses of a varicella-containing vaccine are 90% effective at preventing varicella. Herpes zoster vaccine (Zostavax) is approved for persons 50 years of age and older.<sup>7</sup> Zostavax reduces the risk of developing shingles by 51% and post-herpetic neuralgia by 67%, however protection from the shingles vaccine only lasts about five years.

### Varicella Vaccine Recommendations Children

- Routine vaccination at 12 through 15 months of age.
- Routine second dose at four through six years of age.
- Minimum interval between doses of varicella vaccine is three months for children younger than 13 years of age.

*NOTE: Children who received their first varicella vaccine as MMRV have had more fevers and fever-related seizures than children who received their first dose as separate shots of varicella and MMR vaccines on the same day. Providers who are considering administering MMRV vaccine should discuss the benefits and risks of both vaccination options with the parents or guardians. Unless the parent or guardian expresses a preference for MMRV vaccine, CDC recommends that MMR vaccine and varicella vaccine should be administered as separate shots for the first dose for ages 12 through 47 months.*

### Varicella Vaccine Recommendations Adolescents and Adults

- All persons 13 years of age and older without [evidence of varicella immunity](#).
- Two doses separated by at least four weeks.
- Do not repeat first dose because of extended interval between doses.

### Herpes Zoster Vaccine Recommendations Adults

- Anyone who has had varicella or received varicella vaccine in the past may develop HZ.
- Advisory Committee on Immunization Practices (ACIP) recommends routine vaccination of all persons aged  $\geq 60$  years with one dose of zoster vaccine. Even people who have had HZ can receive the vaccine to help prevent future occurrences of the disease.

### Some people should not get varicella vaccine or they should wait.<sup>5</sup>

- People should not get varicella vaccine if they have ever had a life-threatening allergic reaction to a previous dose of varicella vaccine or any component of the vaccine, including gelatin or the antibiotic neomycin.
- People who are moderately or severely ill at the time the shot is scheduled should usually wait until they recover before getting varicella vaccine.
- Pregnant women should not get varicella vaccine. They should wait to get varicella vaccine until after they have given birth. Women should not get pregnant for one month after getting varicella vaccine.
- People with the following conditions should check with their doctor about whether they should get varicella vaccine, including anyone who:



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- Has HIV/AIDS or another disease that affects the immune system.
- Is being treated with drugs that affect the immune system, such as steroids, for two weeks or longer.
- Has any kind of cancer.
- Is getting cancer treatment with radiation or drugs.
- People who recently had a transfusion or were given other blood products should ask their doctor when they may get varicella vaccine.
- Talk to your doctor if you have any questions about whether you should receive the varicella vaccine. **NOTE:** *You do not need to get the varicella vaccine if you have [evidence of immunity](#) against the disease.*

#### **Recommendations for persons with HZ:**

- Keep the rash covered.
- Avoid touching or scratching the rash.
- [Wash your hands often](#) to prevent the spread of varicella zoster virus.
- Until your rash has developed crusts, avoid contact with:
  - Pregnant women who have never had varicella or the varicella vaccine;
  - Premature or low birth weight infants; and
  - People with weakened immune systems, such as people receiving immunosuppressive medications or undergoing chemotherapy, organ transplant recipients, and people with human immunodeficiency virus (HIV) infection.

#### **Postexposure Prophylaxis<sup>5, 6, 7</sup>**

All contacts should be evaluated promptly to determine the need for postexposure prophylaxis. Exposed susceptibles eligible for immunization should receive vaccine as soon as possible after exposure. Varicella vaccine is 70% to 100% effective in preventing illness or modifying the severity of illness if used within three days, and possibly up to five days, after exposure. ACIP recommends the vaccine for postexposure prophylaxis in persons who do not have [evidence of immunity](#). If exposure to varicella does not cause infection, postexposure vaccination should induce protection against subsequent exposure. If the exposure results in infection, there is no evidence that administration of varicella vaccine during the incubation period or prodromal stage of illness increases the risk for vaccine-associated adverse reactions. Although postexposure use of varicella vaccine has potential applications in hospital settings, preexposure vaccination of all healthcare personnel without [evidence of immunity](#) is the recommended and preferred method for preventing varicella in healthcare settings.

#### **Prevention for susceptible persons who cannot receive varicella vaccine<sup>5</sup>**

For people exposed to varicella or herpes zoster who cannot receive varicella vaccine, varicella zoster immune globulin can prevent varicella from developing or lessen the severity of the disease. It is only recommended for people who cannot receive the vaccine and 1) who lack [evidence of immunity](#), 2) whose exposure is likely to result in infection, and 3) are at high risk for severe varicella.

Persons at risk of severe varicella include:

- Immunocompromised patients without [evidence of immunity](#) to varicella, such as:
  - Children with leukemia or lymphoma who have not been vaccinated.

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- People on medications that suppress the immune system, such as high-dose systemic steroids or chemotherapeutic agents.
- People with cellular immune-deficiencies or [other immune system problems](#).
- Newborns whose mothers have varicella from five days before to two days after delivery.
- Premature exposed babies exposed to varicella or herpes zoster, specifically:
  - Hospitalized premature infants born at  $\geq 28$  weeks of gestation whose mothers do not have [evidence of immunity](#).
  - Hospitalized premature infants born at  $< 28$  weeks of gestation or who weigh  $\leq 1,000$  grams at birth regardless of their mothers' varicella immunity status.
- Pregnant women without [evidence of immunity](#) to varicella.

The varicella zoster immune globulin product licensed for use in the U.S. is VariZIG™. VariZIG should be given as soon as possible after exposure to VZV and within 10 days of exposure. For more information, see the *Morbidity and Mortality Weekly Report* article on [Updated Recommendations for Use of VariZIG — United States, 2013](#).

### Treatment<sup>5</sup>

For varicella cases, there are several things that can be done at home to help relieve the symptoms and prevent skin infections. Calamine lotion and colloidal oatmeal baths may help relieve some of the itching. Keeping fingernails trimmed short may help prevent skin infections caused by scratching lesions.

Use non-aspirin medications, such as acetaminophen, to relieve fever from varicella. Do not use aspirin or aspirin-containing products to relieve fever from varicella. The use of aspirin in children with varicella has been associated with Reye's syndrome, a severe disease that affects the liver and brain and can cause death.

*NOTE: American Academy of Pediatrics (AAP) recommends that certain groups at increased risk for moderate to severe varicella be considered for oral acyclovir treatment. These high risk groups include:*

- Healthy, persons older than 12 years of age.
- Persons with chronic cutaneous or pulmonary disorders.
- Persons receiving long-term salicylate therapy.
- Persons receiving short, intermittent, or aerosolized courses of corticosteroids.

Some health care providers may elect to use oral acyclovir for secondary cases within a household. For maximum benefit, oral acyclovir therapy should be given within the first 24 hours after the varicella rash starts. Oral acyclovir therapy is not recommended by the ACIP or AAP for use in otherwise healthy children experiencing typical varicella without complications. Acyclovir is a category B drug based on US Food and Drug Administration (FDA) Drug Risk Classification in pregnancy.

Other antiviral medications that may also work against varicella include valacyclovir and famciclovir. Some experts recommend oral acyclovir or valacyclovir for pregnant women with varicella, especially during the second and third trimesters. Intravenous acyclovir is recommended for the pregnant patient with serious complications of varicella.

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Several antiviral medicines, acyclovir, valacyclovir, and famciclovir are available to treat HZ. These medicines will help shorten the length and severity of the illness. But to be effective, they must be started as soon as possible after the rash appears. The only way to reduce the risk of developing HZ and the long-term pain from post-herpetic neuralgia (PHN) is to get vaccinated. CDC recommends that people aged 60 years and older get one dose of HZ vaccine.

## Outbreaks

**NOTE:** *Varicella outbreaks for priority control & investigation by public health authorities*<sup>5</sup>

1. Outbreaks involving patients and staff in healthcare settings.
2. Outbreaks involving patients with complications (e.g., pneumonia, encephalitis, invasive Group A streptococcal infection, or hemorrhagic complications) and/or hospitalizations ( $\geq 1$  case).
3. Outbreaks involving persons at risk for severe varicella because of their age or an underlying condition (e.g., immunocompromised persons, cancer patients, pregnant women, neonates whose mothers are not immune).
4. Outbreaks involving cases among persons vaccinated with two doses of varicella vaccine.

**NOTE:** *Varicella outbreaks have been documented in highly vaccinated populations and vaccinated case-patients acted as the index case in several outbreaks.*

Varicella outbreaks in some settings (e.g., child care facilities and schools) can persist up to six months. Varicella vaccine has been used successfully to control these outbreaks. ACIP recommends a second dose of varicella vaccine for outbreak control. During a varicella outbreak, persons who have received one dose of varicella vaccine should receive a second dose, provided the appropriate vaccination interval has elapsed since the first dose (three months for persons aged 12 months through 12 years and at least four weeks for persons aged 13 years of age and older). **NOTE:** *Children who lack [evidence of immunity](#) and whose parents refuse vaccination should be excluded from start of the outbreak through 21 days after rash onset of the last identified case.*

Children who are vaccinated with a first or second dose during an outbreak may immediately return to school after vaccination. For outbreaks among preschool-aged children in particular, a second dose of varicella vaccine is recommended to provide optimal protection for children 1-4 years of age.<sup>8</sup>

Persons without [evidence of immunity](#) who have contraindications to vaccination (e.g., immunocompromised persons, pregnant women) should be excluded from an outbreak setting through 21 days after rash onset of the last identified case-patient because of the risk of severe disease in these groups.

Unvaccinated healthcare workers and staff without [evidence of immunity](#) to varicella who are exposed to varicella should be furloughed from days 8 to 21 after exposure because they are potentially infectious during this period. Postexposure vaccination should be given as soon as possible after exposure but vaccination is still indicated  $>5$  days postexposure because it induces protection against subsequent exposures.<sup>8</sup>

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## Herpes Zoster Vaccine

Exposure to a person with either primary varicella or herpes zoster does not cause zoster in the exposed person. Herpes zoster vaccine has no role in the postexposure management of either varicella or zoster and should not be used for this purpose.

## Laboratory Procedures<sup>5, 6, 7</sup>

The varicella rash is distinctive. Diagnosis can usually be made on the appearance of the rash and a history of exposure. However, as varicella disease has declined with the introduction of vaccine, the need for laboratory confirmation has grown because fewer physicians have direct experience with breakthrough infections, which are often atypical in appearance, result in fewer lesions, and may lack characteristic vesicles. Varicella hospitalizations and deaths, as well as other severe or unusual disease, should routinely be laboratory confirmed. Post-vaccination situations for which specimens should be tested include:

- Rash with more than 50 lesions occurring seven to 42 days after vaccination;
- Suspected secondary transmission of the vaccine virus;
- Herpes zoster in a vaccinated person; and
- Any serious adverse event.
- In an outbreak, it is recommended that three to five cases be confirmed, regardless of vaccination status.

VZV polymerase chain reaction (PCR) is the method of choice for diagnosis of varicella. Real-time PCR methods are widely available from most commercial laboratories and are the most sensitive and specific method of the available tests. Results are available within several hours after implementation of the PCR testing. Additional information regarding the various testing methods for varicella confirmation and guidelines for specimen collection are available at <https://www.cdc.gov/vaccines/pubs/surv-manual/chpt17-varicella.html> and [https://www.cdc.gov/chickenpox/downloads/vzv\\_lab\\_services.pdf](https://www.cdc.gov/chickenpox/downloads/vzv_lab_services.pdf).

The Missouri State Public Health Laboratory (MSPHL) does not routinely test for VZV. Testing by the State Public Health Laboratory Virology and Molecular Units are only available after consultation (573) 751-3334, 8:00 a.m.–5:00 p.m., Monday through Friday. Virus isolation collection and transport kits are available upon request from the [MSPHL](#).

## Reporting Requirements

Varicella and varicella deaths are a Category III reportable disease and shall be reported to the [local public health agency](#) or to DHSS within three (3) days of first knowledge or suspicion, by telephone, facsimile, or other rapid communication. DHSS may be contacted 24 hours a day, 7 days a week at 800-392-0272.

As Nationally Notifiable Conditions, all confirmed and probable case reports of varicella and all varicella deaths are transmitted to CDC by electronic case notification (WebSurv) as soon as they are entered into the system.

1. For all reported cases of varicella, the local public health agency should complete a [Disease Case Report](#) with an emphasis on collecting the following information: Name? date of birth? age? address with zip code? disease severity (based on number of lesions)? whether the

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patient was hospitalized? case status? whether lab testing for varicella was done? type of lab testing done? results of lab test? is case associated with an outbreak? (*To be recorded in the “Comments Section of the Disease Case Report form.”*) was case vaccinated with varicella-containing vaccine? number of doses received? if not vaccinated, reason for no vaccination? (*To be recorded in the “Comments Section” of the Disease Case Report form.*)

2. Only *confirmed* and *probable* cases of varicella should be entered in WebSurv. The information collected on the [Disease Case Report](#) form should be entered into the WebSurv application by the local public health agency. **NOTE:** *All confirmed and probable cases of varicella are to be entered into WebSurv with the information discussed above in #1.* The entry of the Disease Case Report form into the WebSurv application negates the need for the paper form to be forwarded to the District Health Office.
3. For varicella cases with severe complications such as invasive group-A streptococcal infections, outbreaks involving exposure of persons without evidence of immunity to varicella who are at high risk of serious complications of varicella, and outbreaks in populations with high two-dose varicella vaccine coverage; in addition to the [Disease Case Report](#), complete the [Varicella Surveillance Worksheet](#). Send the complete Varicella Surveillance Worksheet to the District Health Office.
4. For all varicella deaths, in addition to the [Disease Case Report](#), complete the [Varicella Death Investigation Worksheet](#). Send the complete Varicella Death Investigation Worksheet to the District Health Office.
5. All outbreaks or “suspected” outbreaks of varicella should be reported as soon as possible (by phone, fax, or e-mail) to the [District Communicable Disease Coordinator](#) using the [Missouri Outbreak Surveillance Report](#) (CD-51).
6. Within 90 days from the conclusion of an outbreak, submit the final outbreak report to the [District Communicable Disease Coordinator](#).

## References

1. American Public Health Association. *Varicella/Herpes Zoster*. Marin M, Bialek SR In: Heymann, DL (ed), *Control of Communicable Diseases Manual*. 20<sup>th</sup> ed. Washington, DC: American Public Health Association, 2015: 669-675.
2. American Academy of Pediatrics. *Varicella-Zoster Virus Infection*. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, eds. *Red Book: 2015 Report of the Committee on Infectious Diseases*. 30<sup>th</sup> ed. Elk Grove Village, IL. American Academy of Pediatrics; 2015: 846-860.
3. Elsevier Inc. *Chickenpox and Herpes Zoster (Varicella-Zoster virus)*. Whitley RJ In: Bennett JE, Dolin R, Blaser MJ eds. *Mandell, Douglas, and Bennett’s Principles and Practices of Infectious Diseases: Vol. 2*, 8<sup>th</sup> ed. 2015: 1731-1737.
4. Centers for Disease Control and Prevention’s (CDC) National Notifiable Diseases Surveillance System (NNDSS) and Case Definitions. <http://wwwn.cdc.gov/nndss/conditions/search/varicella/> (6/17).
5. Centers for Disease Control and Prevention. *Chickenpox (Varicella)*. In: <http://www.cdc.gov/chickenpox/index.html> (6/17).
6. Centers for Disease Control and Prevention. *Chapter 17: Varicella* (Oct 2015) Lopez A, Schmid S, Bialek S In: Roush SW, Baldy LM, eds. *Manual for the Surveillance of Vaccine-*

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- Preventable Diseases*. 5<sup>th</sup> ed. 2013. Centers for Disease Control and Prevention, Atlanta, GA, 2008. <http://www.cdc.gov/vaccines/pubs/surv-manual/chpt17-varicella.html> (6/17).
7. Centers for Disease Control and Prevention. *Chapter 22: Varicella*. In: Hamborsky J, Kroger A, Wolfe C, eds. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. 13<sup>th</sup> ed. Washington, D.C. Public Health Foundation; 2015: 353-376 and A-2, A-8, A-13. <http://www.cdc.gov/vaccines/pubs/pinkbook/varicella.html> (6/17).
  8. Centers for Disease Control and Prevention. *Strategies for the Control and Investigation of Varicella Outbreaks Manual, 2008*. Lopez A, Marin M, eds. National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention, Atlanta, GA. <http://www.cdc.gov/chickenpox/outbreaks/manual.html> (6/17).
  9. Immunization Action Coalition. 2550 University Avenue West, Suite 415 North, Saint Paul Minnesota, 55114. In: *IAC Home, Diseases & Vaccines, Chickenpox (varicella)*. <http://www.immunize.org/varicella/> (6/17).
  10. The Merck Manual. Merck Sharp & Dohme Corp., a subsidiary of Merck & Co., Inc., Whitehouse Station, NJ. *Chickenpox (Varicella)*. Kaye KM In: *The Merck Manual Professional Edition; Merck Manual; Health Care Professionals; Professional / Infectious Diseases / Herpesviruses*.
  11. U.S. National Library of Medicine, Bethesda, MD, U.S. Department of Health and Human Services, National Institutes of Health. *Chickenpox (Varicella)*. In: MedlinePlus. <https://www.nlm.nih.gov/medlineplus/chickenpox.html> (6/17).

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## Sample Letter to Parents Regarding Possible Varicella Outbreak at School

*(Insert date)*

Dear parents/guardians,

This letter is to notify you that some children attending \_\_\_\_\_ *(insert name of school)* have contracted varicella (chickenpox). Chickenpox is an acute illness characterized by an itchy rash of blisters, fever, headache, and feeling tired. Most children are vaccinated with at least one dose of varicella vaccine, but because one dose of the vaccine is only 80-85% effective for preventing chickenpox, two doses of varicella vaccine are routinely recommended for children.

### **Background**

Chickenpox is a very contagious infection caused by a virus. It is spread from person to person by direct contact through touching an infected person's blisters or through the air from an infected person's coughing or sneezing. It causes a blister-like rash, itching, tiredness, and fever lasting an average of 4-6 days. Most children recover without any problems. Chickenpox can be spread for 1-2 days before the rash starts and until all blisters are crusted or no new lesions appear within a 24-hour period. It takes between 10-21 days after contact with an infected person for someone to develop chickenpox. Chickenpox in vaccinated persons is generally mild, with a shorter duration of illness and fewer than 50 lesions. The rash may be atypical with red bumps and few or no blisters. To learn more about chickenpox, see the attached fact sheet or visit <http://www.cdc.gov/chickenpox/index.html>.

### **What should you do?**

\_\_\_\_\_ *(insert name of health department)* strongly encourages you to have your child receive their first or second dose of varicella vaccine if your child has not been vaccinated and has never had chickenpox. For children who have received one dose, a second dose is recommended.

If your child or anyone in your household currently has symptoms that look like chickenpox:

1. Contact your regular health care provider to discuss your child's symptoms and to see if anyone in the home needs to be vaccinated.
2. Contact the school nurse to report your child's chickenpox.
3. Anyone who has chickenpox should avoid contact with others who have not had chickenpox or who are not vaccinated against chickenpox. They should not attend school, day care, work, parties and/or other gatherings until the blisters become crusted (about four to six days after rash appears), or no new lesions appear within a 24-hour period. Keep all chickenpox spots and blisters and other wounds clean and watch for possible signs of infection; including increasing redness, swelling, drainage and pain at the wound site.
4. If you or anyone else in your household has a weakened immune system or is pregnant and has never had chickenpox or the vaccine, talk with your doctor immediately.

### **Controlling the Outbreak**

\_\_\_\_\_ *(insert name of health department)* is working with the school to implement prevention strategies. It is now recommended that children with one dose of varicella vaccine receive a second dose routinely. If your child does develop chickenpox, he/she should be kept from attending school until the rash has crusted over.

If you have any further questions or concerns, you can contact *(insert name of contact person)* or call *(insert contact phone number)*.