



## *Varicella (Chickenpox)*

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**V**aricella, or chickenpox, is caused by the varicella-zoster virus (VZV). This same virus is also responsible for herpes zoster, or shingles. Most people in the past were infected with this virus in childhood and developed chickenpox. In 1995, the varicella vaccine became licensed in the USA and is now recommended for children at one year of age, as well as for other healthy people who have not yet been infected with chickenpox.

Chickenpox typically appears as a generalized rash with itchy, blister-like lesions. Symptoms also include fever as high as 102°F (38.9°C), tiredness, and slight body discomfort. The symptoms usually resolve over 4 to 6 days. Once the rash crusts over, a person is no longer infectious.

After infection with chickenpox, the virus lies dormant in nerve cells and can reactivate years later as herpes zoster. Shingles, the common name for herpes zoster, typically appears in one limited area of one side of the body, such as along the thoracic

spine or the ophthalmic division of the trigeminal nerve. This rash is blister-like and itchy and can be very painful as well.

VZV is highly contagious, and nearly every non-immunized person who is exposed to this virus develops chickenpox. Children usually have a mild illness, although serious complications can occur. Chickenpox is more severe in adults, who may experience fatigue, muscle aches, joint pain, and headache. Adults also have a higher risk of complications from chickenpox, primarily viral

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*Chickenpox.  
A typical vesicle  
(blister) on a red  
areola. History  
and physical  
examination can  
usually distinguish  
this rash from that of  
other herpes viruses,  
including zoster or  
simplex.  
Photo by  
Irwin Freedberg MD*

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*Chickenpox.  
Typical rash of  
varicella showing  
blisters in several  
stages. This rash  
usually begins on the  
trunk or scalp and  
spreads to the limbs  
and face.  
Photo by  
Irwin Freedberg MD*



pneumonia. Both adults and children commonly develop bacterial superinfections of the viral skin lesions.

In the late 1990's approximately 12,000 people were hospitalized for chickenpox each year in the USA, and approximately 100 people died of complications from chickenpox infection annually.

Varicella infection early in pregnancy, particularly during the first and early second trimester, can in rare cases lead to severe congenital manifestations in the child, involving the central nervous system, skin, extremities, and eyes. Children exposed to varicella in utero can develop herpes zoster at a young age without having previous chickenpox. If a mother is ill with varicella during the period from 5 days before delivery until 2 days afterwards, the newborn risks developing severe generalized chickenpox, with a mortality rate as high as 30 percent. Death is most often due to pneumonia.

Varicella infection in an adult or child with a poor immune system also can be a very serious event. The lesions can be extensive and patients may have continuous eruption of the lesions with persistently high fevers into the second week of illness. The infection may progress and involve the liver, lungs, brain and meninges.

### **Prevalence and Distribution**

Almost all adults in the USA have a history of chickenpox infection. Chickenpox occurs most

commonly in the late winter and early spring months. Most cases of chickenpox in the USA occur in children less than 10 years old. Since the introduction of the varicella vaccine in 1995, significant decreases in the incidence of chickenpox have been demonstrated in some areas of the USA. Over time it is anticipated that the prevalence of chickenpox will decrease as a result of universal vaccination.

### **Transmission**

Humans are the only source of infection with the varicella virus. The virus is transmitted from person to person through the air and through direct contact with the drainage of a rash. When an infected person coughs or sneezes, secretions from the nose and throat become airborne and may infect persons who have not previously been infected or who have not been vaccinated. Infection can also occur from contact with contaminated items, such as towels, sheets, and clothing. Additionally, contact with the drainage from zoster lesions can cause chickenpox in persons with no history of chickenpox and who have not been vaccinated. Such contact does not cause zoster or shingles, although any person who has had chickenpox can later develop herpes zoster.

People infected with chickenpox are contagious for as many as 5 days before the chickenpox rash appears, and for up to 6 days afterwards. Lesions are thought to be infectious until they crust over.

Generally, people with no prior history of exposure or immunization will show symptoms anytime from 10 days after the first day of presumed exposure until 21 days after the last day of possible exposure, or one incubation period. This latter period of 21 days can stretch to 28 days if the person has received varicella zoster immune globulin (see below). Patients with poor immune systems and generalized varicella are able to spread the virus for as long as new lesions are forming.

Persons who have been infected with chickenpox typically have lifelong immunity to the virus.

When people who have received the varicella vaccine are exposed to chickenpox, approximately 85% of them do not acquire chickenpox. Of vaccinated individuals who do develop chickenpox, the illness typically has a mild course.

Less than 8% of people develop a mild rash after vaccination with varicella. These chickenpox-like lesions do contain varicella virus, but transmission of the virus from such lesions is rare and typically leads to a mild course of chickenpox. In a shelter setting where healthy children who receive the vaccine may be in contact with people who have weak immune systems, no precautions need to be taken unless the child or recently immunized person develops a rash. Vaccinated persons who develop a rash should avoid contact with immunocompromised individuals for the duration of the rash.

### Diagnosis

The itchy, blister-like rash characteristic of chickenpox is the easiest way to identify the disease. The vesicle is usually surrounded by a red circle or areola. Lesions often start on the scalp or trunk and may spread to the face and proximal limbs. Lesions can appear in the mucous membranes of the conjunctiva or oropharynx, particularly in adults. A typical infection in a child results in 100 to 300 lesions.

The lesions may continue to form over a period of 3 to 5 days; they will not all appear at the same stage of development. This is an important consideration when trying to distinguish chickenpox from impetigo, in which the lesions are uniform in appearance.

Chickenpox can also be confused with other forms of disseminated herpes viruses, including zoster and simplex.

During the first 3 to 4 days of the rash, microscopic examination of scrapings from the lesions can demonstrate the presence of multinucleated

giant cells, a finding typical for any of the herpes virus family.

### Treatment

The treatable symptoms of uncomplicated chickenpox include fever and itching. Acetaminophen (Tylenol™) should be used for fever. Aspirin and salicylate-containing products should be avoided, because aspirin (salicylate) use during varicella illness increases the risk of developing Reye syndrome, which is a progressive swelling of the brain along with liver complications.

Studies also suggest that the use of some non-steroidal anti-inflammatory agents, such as ibuprofen (Advil™), may increase the risk for a more severe course of chickenpox in healthy children.

Calamine lotion may be used to provide relief from itching. Daily cleansing of the lesions with soap and water is recommended to prevent infection of the lesions. Clipping of the nails should be encouraged to minimize damage to the skin from scratching.

Chickenpox can be treated with acyclovir (Zovirax™), an antiviral drug. However, there is a very limited time period during which acyclovir can affect the outcome of the infection. When acyclovir is started within 24 hours of onset of the chickenpox rash, a modest decrease in symptoms can be seen. Acyclovir is not recommended for routine use in children who are otherwise healthy.

Individuals with weak immune systems will need treatment with intravenous antiviral medications. Physicians may consider using oral acyclovir for otherwise healthy people who may be at risk for moderate to severe varicella: children older than 12 years of age; people with chronic skin or lung disorders; people receiving treatment with steroids; or people receiving long-term treatment with aspirin or salicylates. Pregnant women infected with chickenpox should speak with a physician immediately to see if acyclovir is indicated.

### Prevention and Control

The varicella vaccine was licensed by the US Food and Drug Administration in March of 1995 and is recommended for all healthy persons over one year of age who have no history of chickenpox infection. The decision to administer the varicella vaccine universally in the USA was based upon the effectiveness and safety of the vaccine, the financial burden incurred by chickenpox infection on society, and the risk of complications and death after chickenpox infection.



The vaccine has been shown to be approximately 85% effective for preventing infection with chickenpox. When vaccinated people do get chickenpox, it is usually very mild with fewer lesions, lower fevers, and a shorter course of illness.

*Current immunization guidelines:*

- all healthy toddlers should be given one dose of the vaccine between 12 and 18 months of age;
- all healthy children less than 13 years of age with no history of chickenpox infection should receive one dose of the vaccine;
- healthy children over 13 years of age and healthy adults with no history of chickenpox infection should receive two doses of the vaccine four to eight weeks apart;
- the vaccine should NOT be given to people with weak immune systems, people receiving steroid treatments, or pregnant women;
- there are no current recommendations for booster immunizations, though this will be reassessed in the future.

For individuals who may be unsure of prior infection with chickenpox, a blood test to check antibody titers may be performed to assess immunity. Vaccinating someone who is immune to chickenpox, however, is not harmful.

In Massachusetts, as in most states, cases of varicella must be reported to the local health department. Local health departments are a source of information and support concerning prevention and control measures.

When a case of chickenpox occurs in a shelter, all persons should be evaluated for their risk of infection. Close contacts are considered to be those who have lived in the same house or shelter as the person with chickenpox and those who have been indoors with the infected person for more than an hour. All close contacts should be interviewed concerning their chickenpox history, vaccination history, and other factors that would make them candidates for treatment with either the varicella vaccine or varicella-zoster immune globulin (VZIG).

### **Post-Exposure Immunization**

People who have not had a chickenpox infection or have not received the vaccine are considered susceptible to infection. Susceptible children and adults who are otherwise healthy should receive the

varicella vaccine within 3 days (and up to 5 days) of exposure to prevent or significantly decrease the severity of chickenpox. Vaccination after exposure may not prevent infection, particularly if the exposure has occurred earlier than realized.

### **Post-Exposure Treatment with VZIG**

VZIG (varicella zoster immune globulin) is a preparation containing high levels of antibodies to the chickenpox virus. Prepared from the plasma of normal blood donors, VZIG may not prevent disease, but it can lessen the severity of illness. VZIG must be given within 96 hours of exposure to be effective. VZIG should be given to susceptible people at a high risk for complications. VZIG can often be obtained from local chapters of the American Red Cross, as well as local and state health departments.

In the setting of chickenpox exposure, candidates for VZIG include:

- children or adults with immune system problems;
- pregnant women with no history of chickenpox infection or vaccination;
- infants born to mothers infected from 5 days before delivery until 2 days afterwards;
- hospitalized premature infants (28 weeks gestation or more) whose mothers lack a prior history of chickenpox infection or vaccination; and
- hospitalized premature infants (less than 28 weeks gestation or 1000 grams) regardless of the mother's history.

If a pregnant woman with an unclear chickenpox history becomes exposed close to term, obtaining varicella titers before administering VZIG is recommended. Titers can clarify whether the newborn will be at risk if born during the mother's incubation period.

The exact duration that VZIG recipients are protected against chickenpox is unknown. Another dose is indicated if a second exposure occurs to a susceptible person more than 3 weeks after receiving VZIG and the person has not yet shown symptoms.

Staff members and shelter guests with a prior history of chickenpox infection do not risk re-infection. Those staff members and guests who have received the chickenpox vaccination have a less than 15% risk of mild chickenpox infection. To reduce anxiety and confusion whenever there is a chickenpox outbreak in a shelter, we recommend

that each staff or volunteer routinely document his or her chickenpox history in the health section of the personnel file.

### **Special Considerations for Family Shelters**

When a case of chickenpox occurs in a family shelter, all new guests should be questioned about a history of chickenpox or vaccination before admission to the shelter. From the first day the rash appears on the initial case until 21 days after the last possible exposure, only individuals with a history of chickenpox infection or vaccination should be admitted to the shelter. This will protect unexposed individuals and hopefully will contain the outbreak to within one incubation period.

In some situations, admissions should be screened for 2 incubation periods, such as when the staff cannot be sure that all susceptible guests and staff have been exposed from the initial case. Screening people with unknown histories by one of the blood tests for immunity is an option if time permits. If an exposed guest has received VZIG, the incubation period should be extended to 28 days after the last possible exposure to the first case.

The incubation period also serves as a reminder not to discharge a guest who has no history of chickenpox infection or vaccination to other group settings until the time has elapsed. If a susceptible person is exposed to an active case, he or she may spread the virus to another setting during the incubation period.

Staff and guests should always wear gloves when handling linen and clothing of guests who have draining lesions of chickenpox or zoster. Everyone should be encouraged to wash his or her hands thoroughly following any contact with soiled items or draining lesions.

### **Special Considerations for Adult Shelters**

If an infected person cannot be isolated from other guests, separate accommodations should be sought. Isolation is important until the lesions crust over and form scabs. If housing with an immune relative or friend is not available, an acute care facility may be another choice. We strongly recommend that any guest sent to alternative housing be closely followed for signs of complications of chickenpox.

Close contacts may be identified through bed lists and by interviews with the infected person. Vaccination or VZIG is recommended for all close contacts without a history of chickenpox. Such a thorough investigation may be difficult or

impossible in the larger adult shelters. Those at particularly high risk should be the priority in those situations, such as people known to have HIV infection or other immune system problems.

Infected children or adults may have exposed others outside the shelter in day care, school, or work. Shelter staff and health care providers should work closely with the local board of health to help identify all other persons at risk.

### **Summary**

Chickenpox, or varicella, is caused by the varicella-zoster virus, a virus that also causes shingles (herpes zoster). Chickenpox most commonly occurs in young children. Infection with the virus results in an itchy, blister-like rash that spreads over the entire body. A fever of up to 102°F (38.9°C) is also common. Both fever and rash usually disappear over 4 to 6 days. The virus then “goes to sleep” on nerve endings. Years later, the virus may reappear as zoster or shingles.

A safe and effective vaccine is available to prevent chickenpox, which all healthy non-immune persons and toddlers over one year of age should receive. Chickenpox can spread when an infected person breathes germs into the air or an uninfected person comes into contact with the fluid from open blisters of the rash.

In most cases, the symptoms of chickenpox are easy to treat. Itching can be relieved with calamine lotion and cool baths. Fever can be controlled with acetaminophen (Tylenol™). Aspirin and aspirin containing products should be avoided because they can have dangerous side effects when used for chickenpox symptoms. Always consult a doctor or nurse for proper diagnosis and treatment.

The illness is usually mild in young children who have no other health problems. However, adults and people with other medical problems can have very serious complications from the disease, such as infections of the lung or brain. Pregnant women and their babies are at particular risk.

Shelters and other places where many people live closely together may promote the spread of chickenpox. Shelter staff should discuss the potential dangers of exposure with a health provider familiar with the shelter. The local board of health should be contacted and will help to assess the risk to guests and staff in addition to instituting control measures to prevent further spread within the shelter. ■■

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<b>Varicella Medication List</b>		
<b>Generic</b>	<b>Brand Name</b>	<b>Cost</b>
acyclovir	Zovirax	\$
ibuprofen	Advil, Motrin	\$

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