VARICELLA-ZOSTER INFECTIONS
(Chickenpox and Herpes Zoster [Shingles])

REPORTING INFORMATION
- **Class B2**: Report by the end of the business week in which the case or suspected case presents and/or a positive laboratory result to the local public health department where the patient resides. If patient residence is unknown, report to the local public health department in which the reporting health care provider or laboratory is located.
- Please note that only cases of varicella (chickenpox) are reportable and that the material presented on zoster (shingles) is for informational purposes only.
- Reporting Form(s) and/or Mechanism: [Ohio Confidential Reportable Disease form](HEA 3334, rev. 1/09), [Positive Laboratory Findings for Reportable Disease form](HEA 3333, rev. 8/05), the local health department via the Ohio Disease Reporting System (ODRS), or telephone.
- Additional reporting information with specifics regarding the key fields for the Ohio Disease Reporting System (ODRS) reporting can be located in [Section 7](#).

AGENT
Varicella-zoster virus (VZV), a member of the herpesvirus group.

CASE DEFINITION (Chickenpox)

**Clinical Case Definition**
An illness with acute onset of diffuse (generalized) papulovesicular rash without other apparent cause.

**Laboratory Criteria for Diagnosis**
- Isolation of varicella virus from a clinical specimen (vesicular fluid is best) or
- Direct fluorescent antibody (DFA) or
- Polymerase chain reaction (PCR) or
- Significant rise in serum varicella immunoglobulin G (IgG) antibody level by any standard serologic assay.

**Case Classification**
- **Probable**: A case that meets the clinical case definition, is not laboratory confirmed and is not epidemiologically linked to another probable or confirmed case.
- **Confirmed**: A case that meets the clinical case definition and is laboratory confirmed or is epidemiologically linked to a confirmed or probable case.
- **Not a Case**: This status will not generally be used when reporting a case, but may be used to reclassify a report if investigation revealed that it was not a case.

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

An outbreak of varicella is defined as the occurrence of five or more cases in a specific setting (e.g. school) that are epidemiologically linked. Cases should be considered part of an outbreak if they occur within at least one incubation period (21
days) of the previous case-patient, and surveillance should continue through two full incubation periods (42 days) after the rash onset of the last identified case-patient to ensure that the outbreak has ended.

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

Vaccinated persons who develop varicella within 7-42 days after vaccination are marked as not a case. This is due to not knowing if the illness is due to wild-type or vaccine-type virus.

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

Evidence of immunity to varicella: Cases born in the United States before 1980 should be considered immune unless there is a note stating that the case was diagnosed by a physician as varicella (and not as shingles).

Note: For healthcare workers and pregnant women, birth before 1980 should not be considered evidence of immunity.

**SIGNS AND SYMPTOMS**

Primary infection with VZV results in chickenpox (varicella). Chickenpox infection may result in mild, atypical or inapparent disease. In general, the disease causes a skin eruption which first appears maculopapular for a few hours and then becomes vesicular for 3-4 days and leaves a granular scar. Lesions are pruritic and tend to be more abundant on covered areas of the body. Lesions may also be seen on mucous membranes. A fever (up to 102°) and malaise are also typical of chickenpox and adults may also experience headache and anorexia. Complications include infection of the skin lesions, pneumonia, arthritis, aseptic meningitis, thrombocytopenia, encephalitis and Reye syndrome.

VZV persists in a latent form after the primary infection. Reactivation results in zoster (shingles), which is a local manifestation of recurrent, recrudescent or reactivated infection. Grouped vesicular lesions appear in the distribution of one to three sensory dermatomes, sometimes accompanied by pain localized to the area. Systemic symptoms are few. Zoster occasionally may become generalized in immunocompromised patients, with lesions appearing outside the dermatomes and with visceral complications.

**DIAGNOSIS**

The virus may be isolated from fresh nonpurulent vesicular lesions during the first 3-4 days of the exanthematous illness. Herpesvirus particles can generally be seen by direct electron microscopic examination.

**Serology**

The complement fixation test (CF) is best to determine diagnostic rises in titer. A four-fold or greater rise between acute and convalescent sera denotes a recent infection. Enzyme-Linked Immunosorbent Assay (EIA) is best for assessing immune status. One serologic specimen is adequate.
EPIDEMIOLOGY

Source
Humans are the only source of infection.

Occurrence
Worldwide, most cases of chickenpox occur in children 5-10 years of age. Chickenpox is seen most often during the late winter and early spring. The vast majority of people contract the disease during childhood. Cases in adults are often severe.

Zoster occurs mainly in older adults although there is some evidence that almost 10% of children being treated for a malignant neoplasm are prone to develop zoster. Intrauterine infection with VZV or chickenpox infection acquired before two years of age is also associated with zoster at an early age. Zoster is not seasonal.

Mode of Transmission
Transmission may be either direct or indirect. Persons with chickenpox spread the disease to others via direct contact with the drainage from lesions, droplets or airborne respiratory tract secretions. Vesicle fluid of patients with zoster is infectious. Indirect transmission occurs through articles freshly soiled with discharge from vesicles and mucous membranes of infected persons. Scabs of chickenpox lesions are not infective.

While chickenpox is highly infective, patients with zoster have a much lower rate of transmission. Susceptible contacts of either develop chickenpox. Introduction of a case of VZV into a household generally results in infection for almost all susceptible persons.

Period of Communicability (chickenpox)
One or 2 days (maximum of 5 days) prior to rash onset through a maximum of 6 days after the first appearance of vesicles, or until lesions have formed crusts and dried. Immunocompromised patients with progressive chickenpox probably are contagious during the entire period that new lesions are appearing. Breakthrough cases often do not develop vesicles or have crusting and are considered contagious as long as new lesions are appearing.

Incubation Period
Incubation is generally 14-16 days, with a range of 11-21 days. The incubation period may be prolonged in Varicella Zoster Immune Globulin (VZIG) recipients and tends to be shortened in immunocompromised persons.

PUBLIC HEALTH MANAGEMENT

Case
 Treatment
Symptomatic. Aspirin should not be used to treat infants, children or teenagers with chickenpox, because of the increased risk for developing Reye syndrome. Oral acyclovir given to children with varicella within 24 hours of rash onset results in decreased duration and severity of disease and should be considered for those at risk for severe complications of varicella, such as those >14 years of age or those having chronic respiratory or skin diseases.
Isolation
The Ohio Administrative Code (OAC 3701-3-13, (C)) states that “a person with chickenpox shall be isolated, including exclusion from school, child care center, and public places until the sixth day after onset of rash, or until all lesions are dry. Contagiousness may be prolonged in patients with altered immunity. Persons with chickenpox shall avoid contact with susceptible persons.”

Exclusion of children with zoster from school or child care should be individualized. Lesions that are covered pose little risk to susceptible individuals. Children with zoster who are excluded from school or child care may return after the lesions have crusted.

Health care workers with VZV infection should not work until all lesions are dry and crusted.

Contacts
ACIP recommends the chickenpox vaccine for use in persons who do not have evidence of varicella immunity and who have no contraindications to vaccination following exposure to varicella, and they recommend varicella vaccination for outbreak control. The vaccine is 70-100% effective in preventing illness or modifying the severity of illness if used within 3 days, and possibly up to 5 days, after exposure. If illness occurs, with or without post-exposure vaccination, antiviral treatment can be considered.

Varicella Zoster Immune Globulin (VariZIG) is available under an investigational new drug protocol for high risk contacts. Please see the ODH Vaccine Manual for more information.

Prevention and Control
A live attenuated varicella vaccine was licensed in the United States in 1995. After one dose of vaccine, 97% of children 12 months to 12 years of age develop detectable antibody titers. Among healthy adolescents and adults, an average of 78% develop antibody after one dose and 99% develop antibody after a second dose given 4-8 weeks later.

Ohio School Requirement: Two doses of Varicella vaccine are required for school entry starting with the 2010-2011 school year. This will be a progressive requirement.

Present control measures are limited to vaccination as described above and isolation of cases from neonates, pregnant women and immunocompromised individuals. Drainage from lesions is infectious and should be covered by a dressing or clothing. Hand washing by those caring for patients or touching lesions should be emphasized.

Managing Hospital VZV Exposure Episodes
Patients with varicella or disseminated zoster and immunocompromised patients with localized zoster should be placed in a private room with negative air pressure. Staff should wear gowns, masks and gloves to provide care. Localized or disseminated zoster in immunocompetent patients should be managed with drainage and secretion precautions until all lesions are crusted. Staff should wear gloves when contacting lesions.

No person with a negative history for chickenpox should care for a patient with either chickenpox or zoster, unless VZV antibody titer shows evidence of immunity.
Patients exposed to VZV in a room, ward or face-to-face setting within the 72 hours preceding rash onset of chickenpox or from the time of rash onset of zoster and those exposed to a case patient before all lesions are dry and crusted should be managed as follows:

- Conduct verbal screening for history of VZV infection, consider immune if positive.
- Perform serologic testing if negative history. Do not depend upon complement fixation (CF) test, which is reliable only for recent infection. Use fluorescent antibody to membrane antigen (FAMA), immune adherence assay (IAHA), enzyme immunoassay (EIA)/enzyme linked immunosorbent assay (ELISA) or neutralization test.

Susceptible patients (seronegative) should be discharged or placed on respiratory precautions from day 10 through 21 following initial exposure. If given VZIG, precautions should extend from day 7 through 28 following initial exposure.

Staff exposed to VZV should be screened in the same manner as exposed patients. Susceptible staff should not work from days 10 through 21 following initial exposure, as recommended by the Centers for Disease Control and Prevention.

All healthcare workers (HCWs) should ensure that they are immune to varicella. Varicella immunization is particularly recommended for susceptible HCWs who have close contact with persons at high risk for serious complications, including: premature infants born to susceptible mothers; infants who are born at less than 28 weeks of gestation or who weigh <1,000 g at birth (regardless of maternal immune status): pregnant women; and immunocompromised persons.

Serologic screening for varicella immunity need not be done before vaccinating unless the health care institution considers it cost-effective. Routine postvaccination testing of HCWs for antibodies to varicella is not recommended because greater than or equal to 90% of vaccinees are seropositive after the second dose of vaccine.

Hospitals should develop guidelines for management of vaccinated HCWs who are exposed to natural varicella. Seroconversion after varicella vaccination does not always result in full protection against disease. Therefore, the following measures should be considered for HCWs who are exposed to natural varicella: serologic testing for varicella antibody immediately after VZV exposure; retesting 5-6 days later to determine if an anamnestic response is present; and possible furlough or reassignment of personnel who do not have detectable varicella antibody. Whether postexposure vaccination protects adults is not known.

Hospitals also should develop guidelines for managing HCWs after varicella vaccination because of the risk for transmission of vaccine virus. Institutions may wish to consider precautions for personnel in whom a rash develops after vaccination and for other vaccinated HCWs who will have contact with susceptible persons at high risk for serious complications.
What is chickenpox?
Chickenpox is a highly contagious disease caused by the varicella-zoster virus, a member of the herpes virus family. In temperate climates, chickenpox occurs most frequently in winter and early spring.

Who gets chickenpox?
Chickenpox is common in the United States; however, cases of chickenpox are expected to decrease as more individuals are immunized with the varicella (chickenpox) vaccine.

How is chickenpox spread?
Chickenpox is transmitted to others when an infected person coughs or sneezes and sends the virus into the air. A susceptible person then inhales the virus into his or her mouth and nose and then becomes infected by the virus. Chickenpox may also be spread to a susceptible person if the susceptible person comes in contact with the infected person’s skin lesions (rash) or comes in contact with clothing or linens that have been soiled with discharges from the infected person’s skin lesions or respiratory tract (nose, mouth, lungs). When the rash of chickenpox scabs over, the scabs are not considered infectious.

What are the symptoms of chickenpox?
The main symptom of chickenpox is an itchy, blister-like rash that occurs more on the face, scalp, and trunk than on other areas of the body. The blisters eventually dry, crust over, and form scabs. Adults sometimes get one to two days of fever and tiredness before developing the rash. Children usually have the rash occur at the same time as the fever and tiredness. The disease is usually more serious in adults than in children. Mild or inapparent infections occasionally occur in children.

How soon do symptoms appear?
Symptoms commonly appear 14 to 16 days (range of 10 to 21 days) after exposure to someone with chickenpox or herpes zoster (shingles).

When and for how long is a person able to spread chickenpox?
A person is most able to transmit chickenpox from one to two days before the onset of rash until all lesions have crusted. People who are immunocompromised may be contagious for a longer period of time.

Does past infection with chickenpox make a person immune?
Chickenpox infection generally results in lifelong immunity.

What are the complications associated with chickenpox?
The most common complications from chickenpox are bacterial infections of the skin and soft tissues in children and pneumonia in adults. These infections may be severe. Other complications from varicella include cerebellar ataxia, encephalitis and hemorrhagic complications leading to bleeding disorders including disseminated intravascular coagulation. Newborn children (less than one month old) whose mothers are not immune and patients with leukemia may suffer severe, prolonged or fatal chickenpox. Immunocompromised patients, including those on immunosuppressive drugs, may have an increased risk of developing a severe form of chickenpox or shingles. Reye syndrome has been a potentially serious complication associated with clinical chickenpox involving those children who have been treated with aspirin. Aspirin or aspirin-containing products should never be given to a child or adolescent with chickenpox.
Is there a vaccine for chickenpox?
Yes. While no vaccine is 100% effective in preventing disease, the chickenpox vaccine is very effective: about 8 to 9 of every 10 people who are vaccinated are completely protected from chickenpox. In addition, the vaccine almost always prevents severe disease. If a vaccinated person does get chickenpox, it is usually a very mild case lasting only a few days and involving fewer skin lesions (usually less than 50), mild or no fever, and few other symptoms. Children should receive two doses of vaccine: the first at 12 to 15 months of age and the second at 4 to 6 years of age. Older children and adults without evidence of immunity to chickenpox should be vaccinated as well. Older children and adults who have previously had chickenpox do not need to be vaccinated. Contact your doctor or local health department for further information about the chickenpox vaccine.

What can a person or community do to prevent the spread of chickenpox?
The best method to prevent further spread of chickenpox is for people infected with the disease to remain home and avoid exposing others who may be susceptible. Someone with chickenpox should remain home until one week after the rash began or until the lesions become dry and crusted. Individuals with chickenpox (or shingles) should pay particular attention to avoiding unnecessary exposure of non-immune newborns, pregnant women and immunocompromised people to varicella.

Is there a treatment for chickenpox?
In 1992, acyclovir was approved by the U. S. Food and Drug Administration for treatment of chickenpox in healthy children. However, because chickenpox tends to be mild in healthy children, most physicians do not feel that it is necessary to prescribe acyclovir. A shot of varicella zoster immune globulin (VZIG) may be indicated for some susceptible individuals (for example pregnant women, high-risk newborns, and immunocompromised patients) who have had exposure to a case of chickenpox (or shingles). The VZIG may modify or prevent disease in these individuals if the shot is given within 96 hours after the exposure.

What is shingles?
Shingles (herpes zoster) is caused by the chickenpox virus that remains in the nerve roots of all persons who had chickenpox and can come out in the body again years later to cause illness. Shingles is more common after the age of 50 and the risk increases with advancing age. Shingles causes numbness, itching or severe pain followed by clusters of blister-like lesions in a strip-like pattern on one side of the body. The pain can persist for weeks, months or years after the rash heals and is then known as post-herpetic neuralgia.

Is shingles contagious?
Yes, people with shingles are contagious to persons who have not had chickenpox. Therefore, people who have not had chickenpox can catch chickenpox if they have close contact with a person who has shingles. However, a person can not catch shingles itself from someone else. Shingles is caused by the chickenpox virus which has been dormant (staying quiet) in a person’s body ever since that person had chickenpox. So, a person gets shingles from his or her own chickenpox virus, not from someone else.

Is there a vaccine for shingles?
A vaccine to reduce the risk of shingles was licensed May 25, 2006. It has been recommended for persons 50 years of age and older. Contact your doctor or local health department for further information about the shingles vaccine.