Varicella

Cases of varicella occur worldwide and infection is nearly universal[1]. In temperate zones, at least 95% of the population has had varicella by young adulthood[1]. Prior to the introduction of the varicella vaccine, approximately 4 million cases of varicella were reported each year in the United States[2]. Varicella tends to be milder in young children and more severe in infants, adolescents, and adults[3]. Varicella has the ability to persist in the body after initial infection and may reactivate to cause secondary infection, herpes zoster (i.e. shingles)[3]. Complications include pneumonia, encephalitis, bacterial superinfection of skin lesions, Reye Syndrome, and death[2].

A. Agent:

Varicella Zoster Virus (VZV) is a DNA virus and is a member of the herpesvirus group. Like other herpesviruses, VZV persists in the body as a latent infection after the primary (first) infection; VZV persists in sensory nerve ganglia. Primary infection with VZV results in varicella. Latent infection can reactivate resulting in herpes zoster (shingles). The virus has a short survival time in the environment[3].

B. Clinical Description:

Primary varicella infection may begin with a mild prodrome of fever and malaise, lasting 1–2 days[2]. For children, rash is typically the first symptom[2]. The initial rash presents as generalized and pruritic (itchy), and rapidly evolves from macules to papules to vesicular lesions, and then crust over[2]. The progression of the rash is from head to trunk to extremities and the rash tends to be most concentrated on the trunk[2]. In vaccinated persons who develop varicella more than 42 days after vaccination (breakthrough disease), the disease is almost always mild without fever and fewer than 50 skin lesions and shorter duration of illness, and the rash may also be atypical in appearance (maculopapular with few vesicles)[2].

Following primary infection with varicella virus (commonly called ‘chickenpox’), the varicella virus remains in the body and may reactivate as herpes zoster (commonly called ‘shingles’) [2]. Factors associated with reactivation include older age, immunosuppression, intrauterine exposure and acquiring varicella younger than 18 months of age[2]. Herpes zoster starts with pain, itching and tingling and progression to a rash that is painful and blister-like[2]. The rash is typically on one side of the body, either the face or torso[2]. Other symptoms include fever, fatigue, loss of appetite, and headache[4].

C. Reservoirs:

The virus is only spread by humans[1].

D. Mode(s) of Transmission:

Transmission of primary varicella occurs person-to-person by secretions from the respiratory tract of primary varicella (chickenpox) cases, or by direct contact, droplet or airborne spread of vesicle fluid from patients with primary varicella (chickenpox) or herpes zoster (shingles)[1]. Varicella is thought to

be more contagious than mumps or rubella but not as contagious as measles[2]. Secondary attack rates among household contacts are as high as 90%[2].

E. Incubation Period:

The incubation period is 14 to 16 days after exposure, with a range of 10 to 21 days. The incubation period may be prolonged (e.g., up to 28 days or more) in those who have received postexposure prophylaxis with varicella specific immune globulin[2].

F. Period of Communicability:

Individuals with varicella are usually considered infectious 1–2 days before the onset of rash until all the lesions are crusted over, typically 4–5 days after rash onset [1].

G. Susceptibility and Resistance:

In most cases, infection results in long term immunity[2]. However, it is possible that a second episode of chickenpox can occur, especially in immunocompromised persons. In addition, latent viral infection can reappear years later as herpes zoster[2].

Proper immunization includes 2 doses of varicella virus vaccine with a minimum interval of at least three months between the first and second dose for children younger than 13 years of age[2]. Persons 13 years of age and older should receive two doses with a minimum interval of four weeks [2].

Two doses of varicella vaccine are recommended at 12–15 months and 4–6 years[2].

Varicella vaccine efficacy is reported to be 70–90% against any varicella disease and 95–100% against severe varicella disease[2].

Immunity is believed to be long-lasting and likely permanent in most vaccinated persons[2]. However, breakthrough varicella disease can occur which is typically mild with no fever and fewer than 50 lesions[2].

H. Treatment:

Acyclovir or valacyclovir is recommended for treatment of varicella in persons who are more likely to develop serious disease, including unvaccinated persons older than 12 years of age, persons with chronic skin or lung disease, persons receiving steroid therapy, and some groups of pregnant women[3].

VariZIG is a varicella immune globulin product licensed by the FDA in March 2013 for patients who have been exposed to varicella and are at high risk for severe disease and complications[2]. For information about how to obtain, contact:
FFF Enterprises
Phone: 800.843.7477
Website: fffenterprises.com

I. Clinical Case Definition:

In the absence of a more likely alternative diagnosis:

- **An acute illness with a generalized rash with vesicles (maculopapulovesicular rash); OR**
- **An acute illness with a generalized rash without vesicles (maculopapular rash).**

J. **Laboratory Criteria for Diagnosis[4]:**

Confirmatory laboratory evidence

- Isolation of varicella-zostervirus (VZV) from a clinical specimen; OR
- Positive direct fluorescent antibody (DFA) for VZV DNA; OR
- Positive polymerase chain reaction (PCR) for VZV DNAb,c; OR
- Significant rise (i.e., at least a 4-fold rise or seroconversionc,d) in paired acute and convalescent serum VZV immunoglobulin G (lgG) antibody level.c,e

Supportive laboratory evidence

- Positive test for serum VZV immunoglobulin M (IgM) antibodyc,f

a Negative laboratory result in a person with a generalized rash with vesicles does not rule out varicella as a diagnosis.
b PCR of scabs or vesicular fluid is the preferred method for laboratory confirmation of varicella. In the absence of vesicles or scabs, scrapings of maculopapular lesions can be collected for testing.
c Not explained by varicella vaccination during the previous 6-45 days.
d Seroconversion is defined as a negative serum VZV IgG followed by a positive serum VZV IgG.
e In vaccinated persons, a 4-fold rise may not occur.
f IgM serology has limited value as a diagnostic method for VZV infection and is not recommended for laboratory confirmation of varicella. However, an IgM positive result in the presence of varicella-like symptoms can indicate a likely acute VZV infection. A positive IgM result in the absence of clinical disease is not considered indicative of active varicella.

K. Epidemiological Linkage Criteria

Confirmatory epidemiologic linkage

- **Exposure to or contact with a laboratory-confirmed varicella case; OR**
- **Can be linked to a varicella cluster or outbreak containing ≥1 laboratory-confirmed case; OR**
- **Exposure to or contact with a person with herpes zoster (regardless of laboratory confirmation)**

Presumptive epidemiologic linkage

- **Exposure to or contact with a probable varicella case that had a generalized rash with vesicles.**

Case Classification[2] *Varicella Case*	
Confirmed	● **Meets clinical evidence AND confirmatory laboratory evidence; OR** ● **Meets clinical evidence with a generalized rash with vesicles AND confirmatory epidemiologic linkage evidence.** ●
Probable	● **Meets clinical evidence with a generalized rash with vesicles; OR** ● **Meets clinical evidence with a generalized rash without vesicles AND:** o **Confirmatory or presumptive epidemiologic linkage evidence; OR** o **Supportive laboratory evidence.** **OR** ● **Provider or School reported a case of rash illness without rash description AND:** o **Confirmatory or presumptive epidemiologic linkage evidence; OR** o **Confirmatory or supportive laboratory evidence.**

Varicella Death

Case Classification[2] *Varicella Death*	
Confirmed	A confirmed case of varicella that contributes directly or indirectly to acute medical complications that result in death.
Probable	A probable case of varicella that contributes directly or indirectly to acute medical complications that result in death.

L. **Classification of Import Status:**

N/A

M. **Laboratory Testing[2, 3, 5, 6]:**

Laboratory testing for varicella is widely available through commercial laboratories. During outbreaks or complex investigations, specimens can be forwarded to CDC for typing. Please contact ADHS for more information.

Test	Specimen Type	Collection Time
PCR	Vesicular swabs or scrapings, scabs from crusted lesions, biopsy tissue, CSF	As early as possible in the course of illness
Serology	Serum	As early as possible in the course of illness
Culture	Vesicular swabs or scrapings, scabs from crusted lesions, biopsy tissue, CSF	As early as possible in the course of illness

DFA	Vesicle scraping, swab of lesion base (must include cells)	As early as possible in the course of illness

M. Assessing Laboratory Results[2]:
PCR, DFA, serology and culture are all utilized to diagnose varicella. However, PCR is the method of choice since it is the most sensitive and specific test available[2].

N. Outbreak Definition:
An outbreak of varicella is defined as an occurrence of ≥5 varicella cases that are epidemiologically linked[7].

Investigation Guidelines

O. Time frame:
Providers must submit a report to the Local Health Department within 5 working days after a case or suspect case is diagnosed, treated, or detected.

Schools, child care establishments, and shelters must submit a report to the Local Health Department within 5 working days after detecting a case or suspect case.

Local health agencies must notify ADHS within 5 working days after receiving a report.

Local health agencies must submit an epidemiologic investigation report to ADHS only if a case or suspect case has died as a result of the communicable disease.

P. Forms:
- For varicella-related deaths: https://www.cdc.gov/surv-manual/downloads/appendix19-2-varicella-wrsh.pdf
- Varicella childcare facility or school reporting form: https://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/disease-investigation-resources/Varicella-Reporting-Form.pdf.

Q. Investigation Steps:

For a local health agency[8]:

A.A.C. R9-6-3102. 2 Varicella
A. Case control measures:
3. A local health agency shall:
a. Conduct an epidemiologic investigation of each reported case of death due to primary varicella infection; and
b. For each reported case of death due to varicella infection, submit to the Department, as specified in Table 2.4, the information required under R9-6-206(D).

B. Contact control measures:

2. A local health agency shall determine which contacts of a varicella case will be:

a. Excluded from a school or child care establishment, and

b. Advised to obtain an immunization against varicella.

1. Confirm Diagnosis[8]:

- Obtain information from reporting source that supports clinical findings in the case definition including dates of illness and rash onset, number of lesions, and other symptoms.
- Obtain information on any laboratory testing performed.
- For hospitalized cases, obtain medical records, progress notes, lab reports, information regarding complications and outcome.
- Obtain accurate and complete immunization history.

2. Conduct Case Investigation[8]:

- Interview patient or reporting source to obtain clinical information, important dates, travel history, demographic data (birth date, county, sex, race/ethnicity), and information regarding possible acquisition and transmission.
- Obtain information about any special settings of possible acquisition or transmission (school, workplace, correctional facility, etc.) or if anyone else with similar rash illness.
- If case is varicella-related death, complete the CDC Varicella Death Investigation Worksheet.

3. Conduct Contact Investigation[8]:

- Investigate contacts based on cases occupation and activities at time of illness, such as school, child care or patient care.
- Note high-risk situations or activities (e.g., daycare provider or attendee, school attendee, direct patient care provider, hospital visits, institutionalized, pregnancy, etc.).
- Record proof of immunity for all contacts.
- Determine whether there are any other suspect cases and investigate.
- Determine if additional cases represent a situation of concern (i.e. high-risk exposure, cluster, outbreak).

4. Initiate Control and Prevention Measures[8]:

- Provide education that includes basic information about the disease, treatment, complications, and ways to prevent transmission of varicella.

5. Isolation, Work and Child Care Restrictions[8]:

For a school or child care establishment[8]:

A.A.C. R9-6-3102 Varicella

A. Case control measures:

1. An administrator of a school or child care establishment, either personally or through a representative, shall exclude a varicella case from the school or child care establishment and from school- or child-care-establishment-sponsored events until lesions are dry and crusted.

B. Contact control measures:

1. When a varicella case has been at a school or child care establishment, the administrator of the school or child care establishment, either personally or through a representative, shall:

2. Consult with the local health agency to determine who shall be excluded and how long each individual shall be excluded from the school or child care establishment, and

3. Comply with the local health agency's recommendations for exclusion.

For a health care provider or an administrator of a health care institution[8]:

A.A.C. R9-6-3102 Varicella

A. Case control measures:

2) An administrator of a health care institution, either personally or through a representative, shall isolate and implement airborne precautions for a varicella case until the case is no longer infectious.

6. Case Management[8]:

- Follow up with case(s) to ensure compliance with work and/or school restrictions and isolation.
- Provide basic instructions to cases about preventing complications:

Keeping fingernails short and control scratching of lesions.

Children with varicella should not receive aspirin or medication containing salicylate, which is associated with development of Reye syndrome.

7. Contact Management, including Susceptible Contacts[9]:

- For child care or school, advise facility to:
- Review varicella immunization/disease for children and staff
- Contacts with a single dose of varicella vaccine are considered immune, but a second dose should be recommended.
- Alert contacts that are immunocompromised, pregnant, <12 month of age, and/or unimmunized/underimmunized of exposure.
- Recommend that they follow-up with their PCP/obstetrician/ pediatrician; prophylaxis may be indicated.
- Refer to Appendix 2 for guidance on prophylaxis guidelines.
- Screen for subsequent cases for 21 days following the last case reported.

8. Environmental Measures:

- Disinfect all items that have been soiled with discharges of nose, throat and lesions of a case.

R. Special Situations[3]:

1. Healthcare Setting:

For a primary varicella or herpes zoster exposure, the following control measures are recommended:
Exposure is defined as:

- Primary Varicella: In the same 2- to 4-bed room or adjacent beds in a large ward, face-to-face contact with an infectious patient or staff member, or visit by a person considered contagious.

Herpes Zoster: Close contact (e.g., touching or hugging) a contagious individual.

- Evidence of immunity for HCW includes any of the following:
  - written documentation of vaccination with 2 doses of varicella vaccine,
  - laboratory evidence of immunity or laboratory confirmation of disease,
  - diagnosis or verification of a history of varicella disease by a healthcare provider, or
  - diagnosis or verification of a history of HZ by a health-care provider.
- Exposed healthcare workers (HCW), patients, and visitors who lack evidence of immunity to varicella should be identified.
- Varicella immunization is recommended for people without evidence of immunity, provided there are no contraindications to vaccination.
- VariZIG should be administered to appropriate candidates. If VariZIG is unavailable, IGIV is recommended.
- All exposed patients without evidence of immunity should be discharged as soon as possible.
- All exposed susceptible patients who cannot be discharged should be placed in isolation from day 8 to day 21 after exposure to the index patient. For people who received VariZIG or IGIV, continue isolation until day 28.
- All exposed HCW without evidence of immunity should be furloughed or reassigned to locations far from patient care areas from day 8 to day 21 after exposure to an infectious patient. They should be vaccinated as soon as possible after exposure.
- Serologic testing for immunity is not necessary for HCW with documentation of immunization.
- Exposed HCW who have received 2 doses of vaccine should be monitored daily during days 8 to 21 after exposure.
  - HCW should report fever, headache, or other constitutional symptoms and atypical skin lesions immediately.
  - HCW who develop breakthrough infection should be considered infectious and should be placed on sick leave immediately until all lesions have dried and crusted.
- HCW who have received 1 dose of vaccine and are exposed should receive the 2nd dose (as long as 4 weeks have elapsed since their 1st dose). After vaccination, they should be managed the same as HCW that had 2 doses of vaccine.

2. Correctional Institution, Group Home, Congregate Setting

Please see the Federal Bureau of Prisons clinical guidance.

3. Herpes zoster case-patients as potential sources of varicella:

School settings:

- Immunocompetent persons with herpes zoster can remain at school as long as the lesions are completely covered. Stress personal hygiene with the washing of hands after lesions are touched and the avoidance of close contact with others. If the lesions cannot be completely covered or close contact avoided, children and staff should be excluded from the school setting until lesions have crusted over.

- If a person has disseminated herpes zoster, they should be excluded from school until lesions have crusted over (similar to the management of primary varicella case-patients).

Residential institution and health care settings:

- For immunocompetent residents or patients with localized herpes zoster, lesions should be completely covered and contact precautions should be followed.
- For immunocompromised persons with herpes zoster or persons with disseminated herpes zoster, the management is similar to that of primary varicella case-patients.
- For HCW who develop herpes zoster, lesions should be completely covered with a taped dressing.
- In addition to standard contact precautions, HCWs should be removed from direct care of patients at high risk of severe complications from varicella.
- HCWs with disseminated herpes zoster should be excluded from work until lesions have crusted over.

References

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