Varicella-Zoster Virus (VZV) infections
In susceptible persons VZV infection causes varicella (chickenpox). After initial infection, VZV remains latent and can reactivate at a later time causing herpes zoster (shingles).*

*Shingles (herpes zoster) can occur in people with a history of varicella infection and is caused by the reactivation of latent varicella zoster virus. Shingles is characterized by grouped vesicular lesions in the distribution of 1–3 sensory dermatomes, sometimes accompanied by pain and/or itching.

Infectious period
From 1–2 days before rash onset and continuing until all lesions are crusted (usually about 5 days).

Varicella exposure
• Varicella exposure can occur from direct contact with or aerosolization of lesion material, or through respiratory aerosols from an infectious person.
• Persons with shingles can also transmit VZV; exposure to a person with shingles can result in varicella in a susceptible person.
• The CDC definition of exposure includes close contact with an infectious person, such as close indoor contact (e.g., in the same room) or face-to-face contact. Experts differ in their opinion about the duration of contact; some suggest 5 minutes and others up to 1 hour, but do agree that it does not include transitory contact.

Incubation period
10–21 days from exposure to rash onset, most commonly 14–16 days. Incubation period may be up to 28 days in persons who have received varicella-zoster immune globulin (VariZIG) after an exposure and may be shortened in immunocompromised patients. Among neonates born to mothers with active infection, the incubation period can be as short as 2 days after birth.

Clinical case definition
An illness with acute onset of diffuse (generalized) maculo-papulovesicular rash without other apparent cause. Note: In vaccinated persons who develop “breakthrough” varicella more than 42 days after vaccination, 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 (maculo-papular with few or no vesicles).

Laboratory criteria for diagnosis
• VZV antigen detected by direct fluorescent antibody test; or

• VZV-specific nucleic acid detected by polymerase chain reaction (PCR); or
• Isolation of VZV† from a clinical specimen; or
• Significant rise in serum anti-VZV immunoglobulin G (IgG) antibody level by any standard serologic assay.

†Laboratory testing cannot differentiate between varicella and herpes zoster because they are both caused by VZV. However, laboratory testing can differentiate wild vs. vaccine-type VZV.

Specimen collection for PCR and virus isolation
• A PCR assay can detect VZV nucleic acid in vesicle swabs, scabs or lesions.
• For PCR, the ideal specimens include scabs and dry lesion swabs. In cases with neurological symptoms, cerebrospinal fluid can also be tested.
  o Remove several scabs (a glass slide is useful for this purpose) and place in a clean, dry container.
  o Swab basal cells from the unroofed lesion. Place swab in clean, dry container.
  o Swabs submitted for PCR should be sent dry rather than diluted in viral transport media (VTM).

Contact CDPH for more detailed instructions and to request testing.

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. Note: Two probable cases that are epidemiologically linked are considered confirmed cases.

Presumptive evidence of immunity
The criteria below provide evidence of immunity to varicella for the purposes of a contact investigation:
• Documentation of age appropriate varicella vaccination (preschool-aged children: 1 dose; school-aged children, adolescents and adults: 2 doses; or
• Laboratory evidence of immunity; or
• Prior laboratory confirmation of disease; or
• U.S. birth before 1980 (this should not be considered evidence of immunity for healthcare personnel, immunocompromised persons, pregnant women and persons born outside the U.S.); or
• Prior healthcare provider diagnosis or verification of a history of varicella or shingles.

Postexposure prophylaxis (PEP)
• Varicella vaccine may be effective in preventing illness or modifying illness severity if given within 3 days, and possibly up to 5 days, after first exposure.
• Varicella zoster immune globulin (VariZIG) should be administered as soon as possible and within 10 days of first exposure to:
  o Immunocompromised persons without evidence of varicella immunity;
  o Pregnant women without evidence of varicella immunity; and
  o Newborn infants whose mothers had onset of chickenpox within 5 days before delivery or within 48 hours after delivery.
• Antiviral PEP for healthy exposed, susceptible persons is not routinely recommended, however, acyclovir as PEP may be considered in for some persons.

Completion of PEP is indicated for neonates whose mothers have shingles.

Recommendations for varicella control
• Infectious persons should be isolated until all lesions are crusted (usually about 5 days).
• Vaccinated persons with breakthrough varicella may develop lesions that don’t crust (macules/papules only). Such persons should be isolated until no new lesions appear within a 24-hour period.
• Exposed unvaccinated healthcare personnel without evidence of immunity to varicella should be furloughed from day 8 after first exposure through day 21 after last exposure.
• Exposed healthcare personnel who have received two doses of varicella vaccine should be monitored daily from day 8 after first exposure through day 21 after last exposure for symptoms.
• Exposed 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 because of the risk of severe disease in these persons.

Varicella outbreaks in schools
• Local health jurisdictions should weigh the risks and benefits of school exclusion of nonimmune students in the context of a new or ongoing outbreak.
• CDPH does not generally recommend that healthy students without evidence of varicella immunity be excluded from school during an outbreak.
• Before of the high likelihood of infection, school exclusion of nonimmune siblings of cases from day 8 after sibling’s rash onset through day 21 after the last day the sibling was infectious is reasonable.

CDC recommends that students who do not have evidence of varicella immunity and whose parents refuse vaccination for them be excluded from school from the start of the outbreak through 21 days after rash onset of the last identified case.

Course of infection
In children, varicella lesions are often the first sign of disease. Adults may have 1–2 days of fever and malaise prior to rash onset. Varicella rashes are pruritic, generalized and progress from macules to papules to vesicular lesions before crusting. Two to four successive crops of lesions will appear over several days and will be in several stages of development. Lesions usually first appear on the head, then the trunk, and then the extremities; the highest concentration of lesions is on the trunk (centripetal distribution).

Typical varicella cases have about 250–500 lesions. Breakthrough varicella (infection in a vaccinated person) tends to be milder with fewer lesions (usually <50) and mild or no fever.

Complications
• Bacterial superinfection of skin lesions
• Pneumonia (viral or bacterial)
• Central nervous system manifestations
• Reye syndrome
• Hospitalization: 2–3/1,000 cases among healthy children and 8/1,000 cases among adults
• Death: 1/60,000 cases

Children with varicella should not receive salicylates or salicylate containing products due to the risk of Reye syndrome.

State reporting requirements
• Persons who were hospitalized or died due to varicella infection.
• Varicella clusters and outbreaks
• Shingles cases are not reportable.
Management of Exposures to Varicella-Zoster

Significant exposure:
- Household: residing in the same household
- Fluor: face-to-face indoor play ≥5 minutes (some experts use >1 hour)
- Hospital:
  - Varicella: in same 2- to 4-bed room or adjacent beds in a large ward, face-to-face contact with an infectious staff member or patient, or visit by a person deemed contagious
  - Zoster: Intimate contact (eg, touching or hugging) with a person deemed contagious

Does the patient have evidence of immunity to varicella based on one or more of the following?
- Receipt of 2 varicella vaccine doses
- Laboratory evidence of immunity or laboratory confirmation of prior wild-type disease
- Diagnosis of varicella or zoster by a health care provider
- Verification of history of varicella or zoster by health care provider

Healthy person

<12 months of age

≥12 months of age

Within 5 days of exposure

Within 10 days of exposure

If no prior dose of varicella vaccine received, administer a single dose of varicella vaccine (Varivax), unless contraindicated

Can VarizIG be administered within 10 days of exposure?

No

No prophylaxis

No prophylaxis

IGIV, 400 mg/kg

VARIZIG, intramuscularly, 125 units/10 kg body weight (625 units if <2 kg), up to a maximum of 625 units (ie, 5 vials)

Preventive treatment with oral acyclovir (20 mg/kg per dose administered 4 times per day, with a maximum daily dose of 3200 mg) or oral valacyclovir (if ≥3 months of age; 20 mg/kg per dose administered 3 times per day, with a maximum daily dose of 3000 mg) beginning 7 to 10 days after exposure and continuing for 7 days. If the child is ≥12 months of age, age-appropriate vaccination still is recommended for protection against subsequent exposures, but vaccine should not be administered while antiviral therapy is being administered; if the exposure occurred during an outbreak, 2-dose vaccination is recommended for preschool-aged children younger than 4 years for outbreak control.

If 1 prior dose of varicella vaccine has been received, a second dose should be administered at ≥4 years of age. If the exposure occurred during an outbreak, a second dose is recommended for preschool-aged children younger than 4 years for outbreak control if at least 3 months have passed after the first dose.

Contraindications include patients who are allergic to a vaccine component, or who are immunocompromised (see above footnote), or pregnant. Caution should be used in patients receiving salicylates. Vaccine may not be as effective if the patient has recently received Immune Globulin Intravenous, whole blood, or plasma transfusions, and for this reason, it is recommended that varicella vaccine be withheld for 3 to 11 months, depending on the dose, after administration of these products.

VarizIG is manufactured by Cangene Corporation (Winnipeg, Canada) and distributed in the United States by FFF Enterprises (Temecula, California; 800-843-7477; www.fffenterprises.com) and ASD Healthcare (Frisco, Texas; 800-746-6273; www.asdhealthcare.com).

If VarizIG and IGIV are not available, some experts recommend preemptive therapy with oral acyclovir (20 mg/kg per dose, administered 4 times per day, with a maximum daily dose of 3200 mg) or oral valacyclovir (if ≥3 months of age; 20 mg/kg per dose, administered 3 times per day, with a maximum daily dose of 3000 mg) beginning 7 to 10 days after exposure and continuing for 7 days. Preemptive oral acyclovir has only been studied in the normal host but sometimes is used in addition to VarizIG or IGIV in the immunocompromised host.

†‡From 2018-2021 AAP Red Book

**Figure Legend**

People who receive hematopoietic stem cell transplants should be considered nonimmune regardless of previous history of varicella disease or varicella vaccination in themselves or in their donors.

Immunocompromised children include those with congenital or acquired T-lymphocyte immunodeficiency, including leukemia, lymphoma, and other malignant neoplasms affecting the bone marrow or lymphatic system; children receiving immunosuppressive therapy, including ≥2 mg/kg/day of systemic prednisone (or its equivalent) for ≥14 days; all children with human immunodeficiency virus (HIV) infection regardless of CD4+ T-lymphocyte percentage; and all hematopoietic stem cell transplant patients regardless of pretransplant immunity status.

If the exposed person is an adolescent or adult, has chronic illness, or there are other compelling reasons to try to avert varicella, some experts recommend preemptive therapy with oral acyclovir (20 mg/kg per dose administered 4 times per day, with a maximum daily dose of 3200 mg) or oral valacyclovir (if ≥3 months of age; 20 mg/kg per dose administered 3 times per day, with a maximum daily dose of 3000 mg) beginning 7 to 10 days after exposure and continuing for 7 days. If the child is ≥12 months of age, age-appropriate vaccination still is recommended for protection against subsequent exposures, but vaccine should not be administered while antiviral therapy is being administered; if the exposure occurred during an outbreak, 2-dose vaccination is recommended for preschool-aged children younger than 4 years for outbreak control.

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