PUBLIC HEALTH REFERENCE SHEET
Varicella (varicella-zoster virus)

Name	Chickenpox (varicella virus) Causative agent: varicella-zoster virus EXCLUDES: Shingles (zoster virus, herpes zoster virus)
Reservoir & Transmission	Humans Transmission includes several routes (see below)
Incubation Period	14–16 days after exposure to a varicella or a herpes zoster rash (range 10–21 days).
Common Symptoms	Depends on type (i.e., chickenpox or shingles)
Gold Standard Diagnostic Test	PCR testing of skin lesions (scabs and vesicular fluid)
Risk Groups	Newborns, premature infants, infants, adolescents, adults, immunocompromised persons, and pregnant women
Geographic Significance	Worldwide; more so in temperate climate

What is varicella?
Varicella, commonly called chickenpox, is an acute infectious disease that is caused by varicella-zoster virus (VZV), which is a DNA virus that is a member of the herpesvirus group. Primary infection with VZV causes varicella. After the primary infection, VZV stays in the body (in the sensory nerve ganglia) as a latent infection. Reactivation of latent infection causes herpes zoster (shingles).

What is the occurrence of varicella?
As of 2020, 39 States have been conducting case-based varicella surveillance. Varicella outbreaks continue to occur, even in settings where most children are vaccinated (e.g., schools). The incidence of varicella, as well as varicella-related hospitalizations, has decreased significantly since implementation of the national varicella vaccination program in 1995.

How is varicella transmitted?
Varicella can be spread from person-to-person by direct contact, inhalation of aerosols from vesicular fluid of skin lesions of acute varicella or zoster, and possibly through infected respiratory secretions that also may be aerosolized. Indirect transmission occurs through items that are freshly soiled by discharges from vesicles and mucous membranes of infected people. In contrast to vaccinia and variola, scabs from varicella lesions are not infective.

Varicella is communicable from 1 to 2 days before onset of rash until all lesions are crusted (usually about 5 days) after rash onset. Infectiousness may be prolonged in patients with altered immunity. Herpes zoster patients are infectious while they have active (vesiculopustular) lesions (usually 7–10 days). Susceptible exposed individuals should be considered potentially infectious for 8–21 days following exposure (or 28 days if they received passive immunization). Among household members, about 90% of susceptible close contacts will contract varicella after exposure to persons with the disease.

Who is at risk for varicella?
- Immunocompromised people without evidence of immunity to varicella, such as:
    - People with leukemia or lymphoma
    - 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 5 days before to 2 days after delivery
- Premature babies exposed to varicella or herpes zoster, specifically—
  - Hospitalized premature infants born at ≥28 weeks of gestation whose mothers do not have evidence of immunity, or
  - Hospitalized premature infants born at <28 weeks of gestation or who weigh ≤1,000 grams at birth regardless of their mothers' varicella immunity status
- Pregnant women without evidence of immunity to varicella

What are the signs and symptoms of varicella?
In healthy children, varicella is generally mild, where a generalized and pruritic rash, malaise, and temperature up to 102°F for 2 to 3 days. In children, the rash is often the first sign of disease. Adolescents and adults can have more severe symptoms. A mild prodrome of fever, malaise, anorexia, or headache may occur 1 to 2 days before rash onset. The rash progresses rapidly from macular to papular to vesicular lesions before crusting. Lesions are typically present in all stages of development at the same time; they usually appear first on the chest, back, and face; then spreads over the entire body; and typically last 4–7 days.

Unvaccinated persons: Varicella in unvaccinated persons involves a rash that is generalized and pruritic. It progresses rapidly from macular to papular to vesicular lesions before crusting. The rash usually appears first on the head, chest, and back, and then it spreads to the rest of the body. The lesions are usually most concentrated on the chest and back. Symptoms typically last 4 to 7 days. Individuals may have some residual scaring (pox marks) and/or hypopigmentation of the skin. Secondary bacterial skin infections can result in disfiguring scars. Persons with herpes zoster (shingles), will usually have a painful unilateral rash confined to a dermatome of the skin, and may experience painful long-term post-herpetic neuralgia.

Vaccinated persons: Varicella in vaccinated persons is called breakthrough varicella, which is an infection with wild-type VZV occurring more than 42 days after varicella vaccination. Breakthrough varicella is usually mild. Patients typically are afebrile or have low fever and develop fewer than 50 skin lesions. Vaccinated individuals usually have a shorter illness compared to unvaccinated people who get varicella. The rash is more likely to be predominantly maculopapular rather than vesicular. However, 25%–30% of persons vaccinated with one dose who get breakthrough varicella will have clinical features similar to those of varicella in unvaccinated people. Vaccinated people may develop lesions that do not crust and are considered contagious until there are no new lesions over a 24-hour period of time. Since the clinical features of breakthrough varicella are often mild, it can be difficult to make a diagnosis on clinical presentation alone. Laboratory testing is increasingly important for confirming varicella and appropriately managing cases and their contacts. There is limited information about breakthrough varicella in persons who have received two doses of varicella vaccine, though it appears to occur less frequently, and disease may be even milder among people vaccinated with two doses of varicella vaccine compared to persons who have received a single dose of varicella vaccine.

What are potential complications of varicella?
Severe complications caused by varicella include cerebellar ataxia, encephalitis, viral pneumonia, and hemorrhagic conditions. Other severe complications are due to bacterial infections and include septicemia, toxic shock syndrome, necrotizing fasciitis, osteomyelitis, bacterial pneumonia, or septic arthritis.

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How is varicella diagnosed?

Diagnosis includes a clinical assessment of the rash in the context of history of exposure to varicella or acute onset of diffuse (generalized) maculo-papulovesicular rash without other apparent cause. The most sensitive method for laboratory confirmation is detection of varicella nucleic acid (DNA) by PCR, sequencing, or nucleic acid amplification test (NAAT) from testing of skin lesions (scabs and vesicular fluid) or any clinical specimen. Other tests include positive antigen by direct florescent antibody (DFA) assay from any clinical specimen; or viral culture from any clinical specimen, which takes more time to result; or at least a one-fold increase of IgG antibody titer between acute and convalescent sera. Routine testing for varicella immunity after two doses of vaccine is not recommended.

How is varicella treated?

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. Varicella-zoster immune globulin is recommended for people who cannot receive the vaccine and 1) who lack evidence of immunity to varicella, 2) whose exposure is likely to result in infection, and 3) are at high risk for severe varicella.

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

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

Some healthcare providers may elect to use oral acyclovir or valacyclovir for secondary cases within a household. For maximum benefit, oral acyclovir or valacyclovir therapy should be given within the first 24 hours after the varicella rash starts. Oral acyclovir or valacyclovir therapy is not recommended by AAP for use in otherwise healthy children experiencing typical varicella without complications.

How can varicella be prevented?

- Varicella is a vaccine preventable disease. Live attenuated varicella vaccines are available throughout the world. In the U.S., there are two varicella vaccines licensed for use in healthy persons with routine doses at 12–15 months old and 4–6 years old:
    - Varivax® contains only varicella vaccine and is for people 12 months of age or older.
    - ProQuad® contains a combination of measles, mumps, rubella, and varicella (MMRV) and is licensed for use in children 12 months through 12 years of age.
- In some countries, the VARILRIX vaccine can be administered as early as 9 months of age; however, is not approved by the U.S. Food and Drug Administration (FDA), and a dose prior to 12 months will not count in the U.S. schedule.
- The Department of Defense policy is to immunize with varicella vaccine those military accessions and healthcare workers who are susceptible to infection with varicella-zoster virus as determined by serologic screening. Two doses of varicella vaccine are to be given as it produces an improved immune response that correlates with improved protection against the disease.
- A herpes zoster (shingles) vaccine (Shingrix) is licensed in the U.S. for adults ≥50 years of age, and in adults ≥19 years of age who are or will be immunodeficient or immunosuppressed because of disease or therapy.

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- Consult with the Immunization Healthcare Division for information about vaccine policies, deployment requirements, and travel recommendations. https://www.health.mil/Military-Health-Topics/Health-Readiness/Immunization-Healthcare

What are some public health considerations?

- When reporting varicella infections in the Disease Reporting System internet (DRSi) document the following:
  - Vaccination history and evidence of immunity. Evidence of immunity to varicella includes any of the following:
    - Documentation of age-appropriate varicella vaccination
    - Preschool-age children (i.e., age 12 months through 3 years): one dose
    - School-age children, adolescents, and adults: two doses
    - Laboratory evidence of immunity or laboratory confirmation of disease
    - Commercial assays can be used to assess disease-induced immunity but lack sensitivity to detect vaccine-induced immunity (i.e., might yield false-negative results)
    - Diagnosis or verification of a history of varicella or herpes zoster by a healthcare provider
  - Document if the case patient works in, lives in, or attends a high transmission setting such as food handling, daycare, school, group living, healthcare, training center, or ship.
  - Document travel history in the 5 weeks before illness onset.
- Infection prevention strategies in healthcare settings include:
  - Isolating the patient in a room with a closed door (negative pressure room if available)
  - Following standard, airborne, and contact precautions until lesions are dry and crusted
  - Ensuring only staff with evidence of varicella immunity to care for patients with varicella
- Since varicella is vaccine preventable, all deaths due to varicella should be investigated.

References:

"Chickenpox (Varicella)," Centers for Disease Control and Prevention (CDC), last reviewed October 21, 2022. https://www.cdc.gov/chickenpox/hcp/

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