Varicella Healthcare Exposure Investigation Quicksheet

January 2024

Suspect varicella cases

- Consider varicella in patients of any age or vaccination status who have symptoms compatible with varicella.

Varicella clinical case definition

In the absence of a more likely diagnosis:

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

In vaccinated persons, varicella that develops more than 42 days after vaccination (breakthrough disease) due to infection with wild- type VZV is usually mild, with fewer than 50 skin lesions and of shorter duration of illness. The rash may also be atypical in appearance (maculopapular with few or no vesicles).

Varicella infectious period

From 1 to 2 days before rash until all the lesions are crusted (usually about 5 days).

Prevent healthcare exposures

- Ensure that your facility has protocols in place to:
  - Train telephone triage staff to identify patients with symptoms of varicella, and schedule suspect cases who need care at the end of the day when other patients aren't present, if possible; and
- Promptly identify and isolate suspect varicella cases arriving at the facility who have not called ahead.
- Ensure that all staff have documentation of immunity to varicella.

Infection control measures for suspected varicella patients

1. Do not allow patient to stay in the waiting area.
2. Immediately place a surgical mask on patient suspected to have varicella and place patient in airborne infection isolation room (AIIR) if one is available.
3. The patient may remove their mask only when in an AIIR with the door closed.
4. If an AIIR is not available, place patient in a single person exam room with a closed door OR evaluate patient in an outside location away from other patients.
5. Only essential visitors and staff should be in the patient room. All staff should use an N95 or a powered air-purifying respirator (PAPR) along with standard and contact precautions (gowns, gloves, and use of hand hygiene at all times).
6. Staff known to be susceptible to varicella should not enter the room.
7. If possible, keep exam room vacant for 1 hour before using it for another patient; room can be cleaned using routine cleaning procedures.
8. If the patient is discharged home, advise patient to remain home until all lesions have crusted, which usually takes about 5 days.

Laboratory testing

- VZV-specific nucleic acid detected by polymerase chain reaction (PCR) (preferred); or
- VZV antigen detected by direct fluorescent antibody test; or
- Significant rise in serum anti-VZV immunoglobulin G (IgG) antibody level by any standard serologic
- assay; or
- Positive test for serum VZV immunoglobulin M (IgM) antibody; or
- Positive direct fluorescent antibody (DFA) for VZV DNA; or
- Isolation of VZV from a clinical specimen.
- If patient's symptoms are clinically compatible with varicella, diagnosis can be made on clinical

grounds, but if there is a question about diagnosis, laboratory testing can be done.
- 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
- 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.
  - Remove several scabs (a glass slide is useful for this purpose) and place in a clean, dry container. Swab basal cells from the unroofed lesion. Place swab in clean, dry container. 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. See more lab information in "Resources".

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 zoster (shingles) can also transmit VZV (i.e., exposure to a person with shingles can result in varicella in a susceptible person). Transmission of VZV from persons with zoster can occur via direct contact with fluid from zoster lesions or aerosolization of lesion material. There is also some evidence that VZV can be shed in the respiratory aerosols of persons with zoster. Persons with disseminated zoster are more infectious than persons with localized zoster. If contact precautions were being implemented (i.e., if lesions were completely covered), it is not considered an exposure.
- 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. It does not include transitory contact.

Varicella contact investigation
1. Contact staff responsible for facility infection control immediately.
2. Determine if the patient was masked before or immediately upon entry to facility and immediately placed in an AIIR. If not, an exposure investigation should be conducted (Steps 3-12).
3. Identify all potentially exposed patients, visitors, and staff. If staff were only in shared airspace with the patient while using appropriate respiratory protection (N95 or PAPR) then they are not considered exposed.
4. Check the varicella immunity status of exposed staff.
5. Identify exposed patients and staff who are likely to be unvaccinated or who are at high-risk for severe infection (see definition in "Resources"). Consider also identifying all children 12-18 months of age as the first dose of varicella vaccine is recommended between 12-15 months of age.
6. Ascertain whether immunization data are available for exposed patients. If no immunization data are in patient medical records, the California Immunization Registry (CAIR) or the appropriate regional immunization registry may be queried. The local health department and CDPH can help check CAIR if the facility does not have access.
7. Plan for the possibility of a need for rapid serologic testing for varicella immunity (varicella IgG) for high-risk contacts whose varicella immune status is not known.
8. Plan for the possibility of a need to obtain VariZIG or intravenous (IV) immune globulin (IG) for high-risk susceptible contacts, and/or varicella vaccine as post-exposure prophylaxis (PEP) for low-risk susceptible contacts according to recommendations.
   - Healthcare facilities typically do not stock VariZIG so it may need to be rapidly ordered (see "Resources" section).
   - Hospital pharmacies typically have

IGIV in stock if it is needed.

9. Contact persons at known high-risk of severe disease by phone as soon as possible.
10. Contact the parents of infants 12-18 months of age who are potentially unvaccinated.
11. Determine if the exposed person:
    - Has age-appropriate receipt of vaccination, laboratory evidence of immunity, or laboratory confirmation of prior wild-type disease; or
    - Has a plausible history of varicella or zoster as determined by the healthcare provider interviewing the contact; or
    - Has received one dose of varicella vaccine if infant is 12-18 months of age; or
    - Is immunocompromised (see "Resources"); or
    - Had anyone else with them at the time of the exposure, and whether they are high-risk (see "Resources"), unvaccinated, or a healthcare worker.
12. Contact all other potentially exposed patients.
    - If the number of patients is manageable, these patients can also be contacted by phone.
    - If the number of patients is too large for phone calls to be practical, a certified letter may be sent, or in some healthcare systems, an email.
    - A CDPH template letter is available upon request.

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:
    - Immunocompromised persons without evidence of varicella immunity;
    - Pregnant women without evidence of varicella immunity;
    - Newborn infants whose mothers had onset of chickenpox within 5 days before delivery or within 48 hours after delivery (VariZIG is not indicated for neonates whose mothers have shingles);
    - Hospitalized preterm infants born at 28 weeks gestation or later whose mothers do not have evidence of immunity; and
    - Hospitalized preterm infants born earlier than 28 weeks' gestation or who weigh 1,000 grams or less at birth, regardless of maternal history of varicella disease or vaccination.
- Antiviral PEP for healthy exposed, susceptible persons is not routinely recommended, however, acyclovir as PEP may be considered.
- If PEP is indicated, and it is within the time window for the indicated PEP, it is the healthcare facility's responsibility to arrange for PEP administration.

Varicella vaccine

- Varicella vaccine may be effective in preventing illness or modifying illness severity if given within 3-5 days, after first exposure.
- A second dose of varicella vaccine can be given to patients who have received only one dose:
    - Children <13 years of age can receive second dose ≥3 months after their first dose.
    - People ≥13 can receive second dose ≥4 weeks after their first dose.

Varicella zoster immune globulin (VariZIG)

- VariZIG should be administered as soon as possible and within 10 days of first exposure to those groups at high-risk for severe infection.
- If VariZIG is not available within the PEP window, IGIV can be given as an alternative.
- One source of VariZIG is FFF Enterprises in Temecula, California, which can be reached 24/7 at 1-800-843-7477 for rapid ordering.
- VariZIG is not indicated for neonates whose mothers have shingles.

Hospital inpatient unit exposures

If exposure occurs in a hospital inpatient unit:

- All exposed patients without evidence of immunity should be discharged as soon as possible.

- For exposed patients without evidence of immunity who cannot be discharged, airborne and contact precautions from day 8 until 21 days after exposure to the index patient are indicated.

- Patients who received VariZIG or IGIV should be isolated until through day 28.

Exposed healthcare workers (HCWs)

- HCWs who have received 2 doses of vaccine and who are exposed to VZV should be monitored daily during days 8 through 21 after exposure and should be placed on sick leave immediately if symptoms such as fever, headache, other constitutional symptoms, or any suspicious skin lesions occur.
- HCWs who have received only 1 dose of vaccine and who are exposed to VZV should receive the second dose of single-antigen varicella vaccine, preferably within 3 to 5 days of exposure. HCWs who have received only 1 dose of vaccine and who are exposed to VZV should receive the second dose with a single antigen live attenuated varicella vaccine (i.e., not given in combination as in MMRV vaccine), preferably within 3 to 5 days of exposure, provided at least 4 weeks have elapsed after the first dose. After immunization, management is similar to that of 2-dose vaccine recipients.
- HCWs who lack evidence of immunity should receive varicella vaccine as soon as possible and be restricted from work from day 8 through 21 after exposure or through day 28 if they received VariZIG.
- Immunized HCWs who develop breakthrough infection should be considered infectious until vesicular lesions have crusted or, if they had maculopapular lesions, until no new lesions appear within a 24-hour period.

Presumptive evidence of immunity

The criteria below provide evidence of immunity to varicella for the purposes of a healthcare exposure:

- Documentation of age-appropriate varicella vaccination (preschool-aged children: 1 dose; school-aged children, adolescents, and adults: 2 doses); 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
- Laboratory evidence of immunity; or
- Prior laboratory confirmation of disease; or
- Healthcare provider diagnosis or verification of a history of varicella or shingles.

Contacts at high risk of severe varicella infection

- Hematopoietic stem cell transplant recipient;
- Immunocompromised persons without evidence of varicella immunity (see definition below);
- Pregnant women without evidence of varicella immunity;
- Newborn infants whose mothers had onset of chickenpox within 5 days before delivery or within 48 hours after delivery;
- Hospitalized preterm infants (28 weeks or more of gestation) whose mother lacks evidence of immunity against varicella;
- Hospitalized preterm infant less than 28 weeks gestation or birth weight 1000 g or less, regardless of maternal immunity.

Definition of immunocompromised

Per CDC and IDSA guidance, patients with high-level immunosuppression include those:

- with combined primary immunodeficiency disorder (e.g., severe combined immunodeficiency);
- who are receiving cancer chemotherapy;
- on treatment for ALL within and until at least 6 months after completion of immunosuppressive chemotherapy;
- within 2 months after solid organ transplantation;
- who have received a bone marrow transplant, until at least 12 months after finishing all immunosuppressive treatment, or longer in patients who have developed graft-versus-host disease;
- with HIV infection with a CD4 T-lymphocyte count <200 cells/mm^3 (age >5 years) and percentage <15 (all ages) (some experts include HIV-infected persons who lack recent

confirmation of immunologic status or measles immunity);
- receiving daily corticosteroid therapy with a dose ≥20 mg (or >2 mg/kg/day for patients who weigh <10 kg) of prednisone or equivalent for ≥14 days; and
- receiving certain biologic immune modulators, such as a tumor necrosis factor-alpha (TNF-α) blocker or rituximab.

After hematopoietic stem cell transplantation, duration of high-level immunosuppression is highly variable and depends on type of transplant, type of donor and stem cell source, and post-transplant complications such as graft vs. host disease and their treatments.

State reporting requirements

- Persons who were hospitalized or died due to varicella (chickenpox) infection.
- Varicella (chickenpox) clusters (3-4 cases) and outbreaks (≥5 cases).
- Single, non-hospitalized varicella (chickenpox) cases are not reportable unless a part of a cluster or outbreak.
- Herpes zoster (shingles) cases are not reportable.

Management of Exposures to Varicella-Zoster

(From 2021-2024 AAP Red Book)

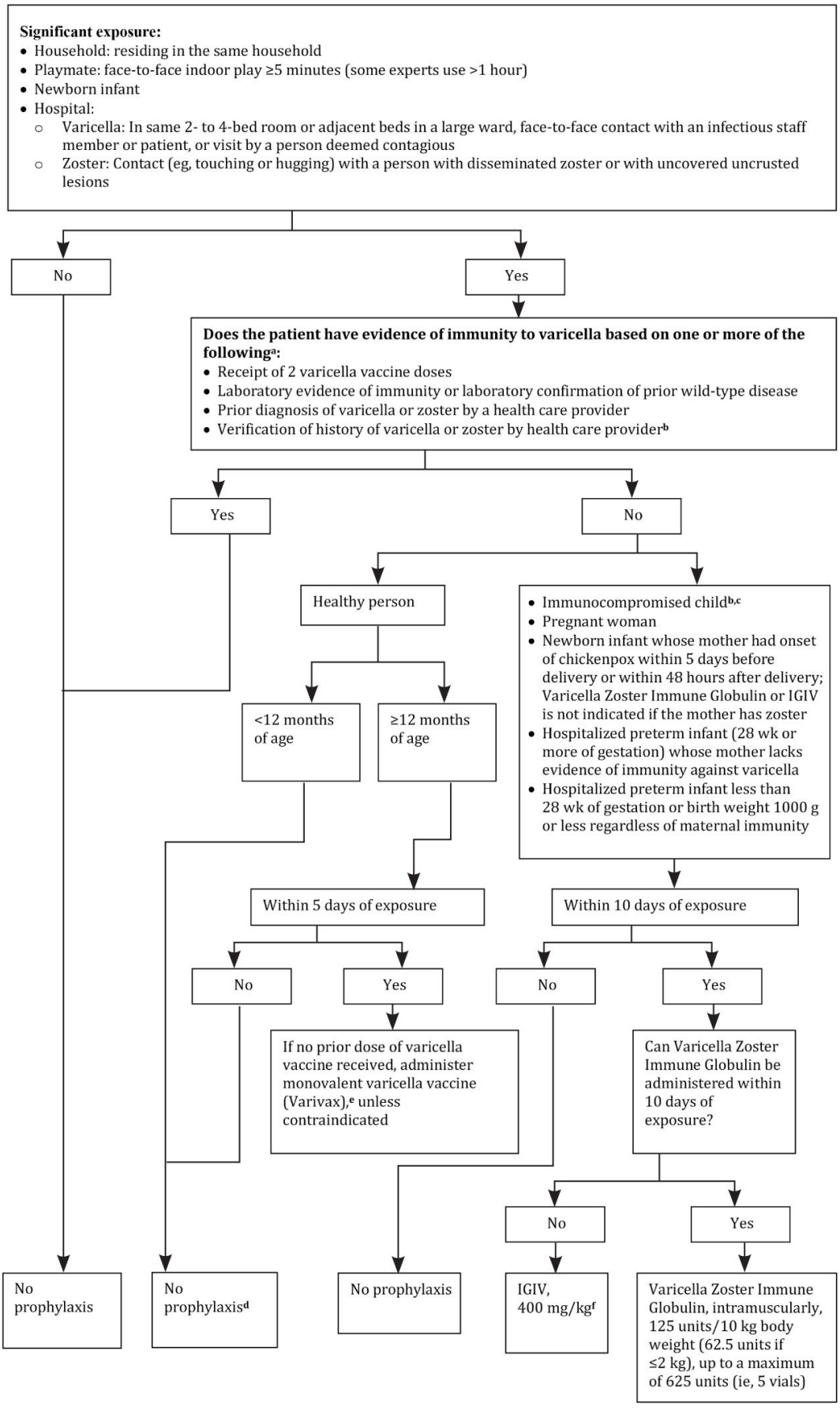

Figure Legend

IGIV indicates Immune Globulin Intravenous. VariZIG is manufactured by Cangene Corporation (Winnipeg, Canada) and distributed in the United States by FFF Enterprises (Temecula, California; 800-843-7477) and ASD Healthcare (Frisco, Texas; 800-746-6273).

[a] 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.

[b] To verify a history of varicella vaccination in an immunocompromised child, health care providers should inquire about an epidemiologic link to another typical varicella case or to a laboratory confirmed case, or evidence of laboratory confirmation. Immunocompromised children who have neither an epidemiologic link nor laboratory confirmation of varicella should not be considered as having history of disease.

[c] 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, and certain biologic response modifiers; 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.

[d] 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.

[e] 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.

[f] 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.

Resources

- Local health department contacts
- CDPH Varicella Quicksheet
- CDC manual for disease surveillance
- CDC/HICPAC Guidelines for Environmental Infection Control in Health-Care Facilities (Table B.1. ACH and time required for airborne- contaminant removal by efficiency and Table B.2. Ventilation requirements for area affecting patient care in hospitals and outpatient facilities)
- Lab specimen collection guidance
- Information on VariZIG and IGIV administration is available at:
  - AAP Redbook varicella chapter
  - Updated recommendations for the use of VariZIG – United States, 2013
  - CDC Prevention of Varicella Recommendations of the Advisory Committee on Immunization Practices