Varicella (Chickenpox) and Varicella Mortality

PROTOCOL CHECKLIST

- ☐ Enter available information into Merlin upon receipt of initial report (section 5)
- ☐ Review background on disease, case definition, and laboratory testing (sections 2–4)
- ☐ Contact provider to collect information required for the case report and prioritization (i.e., vaccine history and known high-risk settings)
- ☐ Interview patient, family, or guardian as indicated based on local application of case prioritization (section 5)
  - ☐ Review disease facts
    - ☐ Modes of transmission (section 2)
    - ☐ Incubation period (section 2)
    - ☐ Signs, symptoms, and types of infection (section 2)
  - ☐ Ask about exposures (section 5)
    - ☐ Exposure to persons with documented disease or suspected illness
  - ☐ Determine risk factors (section 5)
    - ☐ Varicella vaccination or disease history (section 8)
    - ☐ Immunocompromised status
    - ☐ Pregnancy status
  - ☐ Identify possibly exposed contacts/family members who may be at risk (section 5)
  - ☐ Determine whether patient or symptomatic contact is in sensitive situation (section 6)
    - ☐ Recommend exclusion for infected or symptomatic contacts
    - ☐ Recommend prophylaxis for contacts as appropriate
  - ☐ Provide education on prevention through vaccination as indicated (section 8)
  - ☐ Address patient's family's questions or concerns
- ☐ Follow up on high-risk settings or potential exposure situations
- ☐ Enter additional data obtained from interview into Merlin, including extended data screen

Varicella

1. DISEASE REPORTING

A. Purpose of reporting and surveillance

1. To document varicella morbidity and mortality;
2. To provide data used to monitor varicella vaccine effectiveness;
3. To prevent and control varicella outbreaks;
4. To prevent disease among high-risk individuals, including susceptible pregnant women, newborn infants, and immunocompromised persons.

B. Legal reporting requirements (including mortality)

Laboratories and physicians are required to report varicella cases to the Florida Department of Health (DOH) in the county where the resident lives by the next business day.

C. County health department investigation responsibilities

1. Begin individual case investigations within one business day.
2. At a minimum, varicella cases should be investigated to the extent needed to complete Merlin data entry, including the extended data. For many cases, collecting this information may not require interviews.
3. Prioritize reported cases for interviews and control measures (see section 5 for more information).
4. Report all confirmed and probable cases in Merlin.
5. If case is a varicella death, obtain and enter the date of death into Merlin and complete the Death Investigation Worksheet (FloridaHealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/_documents/crf-varicella-death.pdf). This must be completed and attached to the case in Merlin along with the death certificate.
6. Submission of the available Varicella Case Report Form (FloridaHealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/_documents/crf-varicella.pdf) is not required; however, this form can be useful to collect detailed data that must be entered in Merlin for cases. The Merlin extended data screen must be completed and submitted to initiate the case review.

2. THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic agent

Varicella disease is caused by the varicella-zoster virus (VZV), a deoxyribonucleic acid (DNA) virus in the herpesvirus group.

B. Description of illness

Acquired Varicella in Children and Adults

Varicella (chickenpox) is generally a mild illness, which includes a low-grade fever, malaise, and a rash. An acute infection typically begins with a fever < 103°F with generalized malaise and anorexia. After one to two days, an itchy (pruritic) rash usually begins on the head and trunk and spreads to the arms and legs. The rash consists of maculopapules (mixture of flat and raised rash), small vesicles (fluid-filled, blister-like), and scabs in varying stages of evolution, a hallmark of varicella. The lesions initially contain clear vesicular fluid, but over a very short period, they pustulate and scab. The rash is often the first sign recognized in children. In unvaccinated persons, successive crops (usually three or more) of 200–500 lesions at varying stages of resolution are common. The superficial vesicular lesions collapse after puncturing, in contrast to deep poxvirus lesions (e.g., monkeypox, smallpox, vaccinia).

Natural VZV infection usually induces immunity for life. After primary infection, the virus enters latency in the dorsal root ganglia and can reactivate as herpes zoster (shingles) in 10–20% of cases, usually over age 50.

A **breakthrough infection** is defined as an infection with varicella in a previously vaccinated individual, occurring more than 42 days after varicella vaccination. When compared to natural disease, breakthrough varicella is atypical in appearance in 70–80% of persons. Usually, breakthrough cases have fewer than 50 (sometimes no) maculopapular lesions and no fever. This type of infection is less infectious than natural disease. It is also marked by a quicker resolution of the rash and faster overall recovery.

Varicella severity and complications are increased among immunocompromised persons, children younger than one year of age, and adults. Rarely, healthy children and adults may develop serious complications and die from varicella infection. Severe complications include secondary bacterial infections (most notably those caused by group A, beta-hemolytic *Streptococcus* [e.g., cellulitis, necrotizing fasciitis, septicemia, and toxic shock syndrome]), pneumonia, encephalitis, cerebellar ataxia, Reye syndrome, and death. Congenital varicella syndrome, characterized by hypoplasia of an extremity, skin abnormalities, encephalitis, microcephaly, ocular abnormalities, mental retardation, and low birth weight, may occur among 0.4–2.0% of infants born to women infected with varicella during the first or second trimester of pregnancy. Infants born to women who develop varicella within the period of 5 days before delivery to 2 days after delivery are at risk of neonatal varicella, which may be severe.

Images are available at the Centers for Disease Control and Prevention (CDC) website: www.cdc.gov/chickenpox/about/photos.html.

C. Reservoirs

Humans are the only reservoir for VZV. VZV is endemic to the United States and distributed worldwide.

D. Modes of transmission

The respiratory tract and conjunctiva are the portals of entry for VZV. Airborne respiratory transmission is the most common, but transmission may also occur by direct contact with or inhalation of vesicular fluid. Varicella is highly contagious, infecting 61–90% of susceptible contacts. Varicella may be acquired by direct contact with infectious fluid from a person with varicella zoster (shingles), although it is less easily transmitted. The survival time of VZV outside of the body is estimated to be only a few hours.

E. Incubation period

The incubation period ranges from 10–21 days, with an average of 14–16 days. The incubation period may be shorter for immunocompromised individuals or may be as long as 28 days for individuals who have received passive immunization with varicella zoster immune globulin (VariZIG®) (see section 2H: Post-Exposure Prophylaxis). If maternal VZV infection is active at the time of delivery, the incubation period is from 0–16 days.

F. Period of communicability

An individual with varicella is contagious until all lesions have crusted over, usually five days, but up to seven days or longer in immunocompromised persons. Scabs are not infectious. Individuals are most infectious during the one- to two-day prodromal stage through the first two days of rash onset.

G. Treatment

Most treatment for varicella focuses on symptom relief and reduction of complications. See the American Academy of Pediatrics Red Book for recommendations for treatment of persons at higher risk for complications due to varicella.

H. Post-Exposure Prophylaxis

Varicella vaccination is recommended to be administered as soon as possible, but within five days, to susceptible contacts.

VariZIG® is recommended to be administered within 10 days of exposure for contacts at high risk for severe disease that lack evidence of immunity to VZV and cannot receive varicella vaccine (see section 5A).

G. Varicella in Florida

Varicella became a reportable disease in Florida in 2006. During the first full year of reporting in 2007, 1,321 cases were identified. Since then, varicella cases reported have slowly decreased statewide. From 2013 through 2017, an average of 669 cases per year

have been reported, with a maximum of 741 cases in 2015. The largest numbers of cases continue to be reported in those less than 18 years of age and those who are not up to date with varicella vaccinations. Most cases reported in Florida represent sporadic, locally acquired varicella.

3. CASE DEFINITIONS

A. Varicella disease

1. Clinical criteria for case classification

An illness with acute onset of diffuse (generalized) maculo-papulovesicular rash without other apparent cause.

2. Laboratory criteria for case classification

One or more of the following:
- Isolation of varicella virus from a clinical specimen, **OR**
- Detection of varicella antigen by direct fluorescent antibody (DFA), **OR**
- Detection of varicella-specific nucleic acid by polymerase chain reaction (PCR), **OR**
- Fourfold rise in serum anti-varicella IgG antibody between acute- and convalescent-phase serum specimens.

3. Epidemiological criteria for case classification

A person who is epidemiologically linked to a confirmed or probable varicella case.

4. Case classification

Confirmed:
Either of the following:
- A clinically compatible illness in a person with laboratory evidence **OR**
- A clinically compatible illness in a person with epidemiological criteria.

Probable:
A clinically compatible illness.

5. Criteria to distinguish a new case from previous reports

Not applicable.

6. Comments:

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

In vaccinated persons who develop varicella more than 42 days after vaccination (breakthrough disease), 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 (maculopapular with few or no vesicles).

Laboratory confirmation of cases of varicella is available through the Bureau of Public Health Laboratories (BPHL); laboratory confirmation should be obtained for fatal cases, in outbreak settings, and in other special circumstances (see section 4). Genotyping at the Centers for Disease Control and Prevention is recommended for large outbreaks (see section 7). Varicella IgM testing is not always available from commercial laboratories and is not recommended.

Varicella cases should only be reported for cases of chickenpox. Herpes-zoster infections (shingles) are not reportable.

B. Varicella mortality

1. **See varicella disease for:** clinical criteria, laboratory criteria, and epidemiological criteria.

2. **Case classification**

   Confirmed: A confirmed case of varicella which contributes directly or indirectly to acute medical complications, which result in death.

   Probable: A probable case of varicella which contributes directly or indirectly to acute medical complications, which result in death.

3. **Comments**

   Cases of varicella infection that resulted in death should be reported under the reporting code for varicella (**disease code 05290**) in Merlin with the date of death listed in the case information. It should be noted in the Merlin case notes that infection due to varicella was determined as the cause of death.

   Laboratory confirmation of cases of varicella is available through BPHL; laboratory confirmation through the BPHL should be obtained for all fatal cases.

   The additional Varicella Death Investigation Worksheet must also be filled out and attached to the case in Merlin (FloridaHealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/_documents/crf-varicella-death.pdf). Please see the case definition for varicella to classify a case of varicella infection that did not result in death.

   Varicella mortality should only be reported for cases of chickenpox; herpes-zoster infections (shingles) are not reportable.

4. CLASSIFICATION AND LABORATORY SERVICES

It is recommended that county health departments facilitate laboratory testing for suspected varicella outbreaks (see section 7) or severe or unusual disease. Laboratory confirmation should be obtained for cases of varicella mortality. Laboratory testing (e.g., PCR) to confirm breakthrough disease may be useful for medical providers and can be arranged at commercial

laboratories. Please see the one page Varicella Laboratory Testing Guidelines (FloridaHealth.gov/diseases-and-conditions/vaccine-preventable-disease/varicella/_documents/varicella-lab-reporting-guidelines.pdf).

A. Criteria for diagnosis

PCR: Polymerase chain reaction, which detects VZV DNA, is the gold standard for rapid and definitive identification.

Tissue cultures: Isolation of the VZV from vesicular fluid, blood, or CSF.

DFA: Direct fluorescent antibody analysis of prepared slides is also a reliable method.

Serology: In limited circumstances, IgG and IgM antibody tests are available for confirmation of VZV infection. These tests are most reliable when the person has no history of varicella vaccination or disease. Serologic IgM antibody testing at commercial labs is not recommended because false-positive IgM results are common.

Tests to determine VZV immunity: A single IgG antibody test may be used to determine the immunity status of persons who have not had or have an unknown history of varicella and who may be candidates for VariZIG®, vaccination, or isolation following exposure. **Commercially available enzyme-linked immunosorbent assay (ELISAs) tests are recommended for this screening.**

B. Services available at the BPHL

- Varicella zoster virus PCR
- Varicella zoster virus IgG or capture IgM antibody detection (Jacksonville only)
- Varicella zoster virus culture (Tampa only)

C. Testing Requests

1. Submitting specimens to BPHL

a. Please contact the Virology Department before collecting or submitting specimens.
BPHL–Jacksonville, Virology, Valerie Mock, 904-791-1540
BPHL–Tampa, Virology, Lea Heberlein-Larson, 813-974-0134

b. All submissions should be accompanied by a Clinical Lab Submission Form 1847: FloridaHealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/_documents/dh1847clinicallabsubmissionform.pdf.

c. Electronic Laboratory Ordering may also be used by entering a request into the HMS State Laboratory System. Place a bar-coded label on the specimen container and write the date collected.

2. Specimen collection

a. Collecting specimens for VZV PCR:
Polyester Swab Method (for vesicular lesions)
   i. A sterile needle should be used to unroof the top of the vesicle.
   ii. A sterile synthetic (i.e., polyester) swab is then used to vigorously swab the base of the lesion—applying enough pressure to collect epithelial cells without

causing bleeding—and collect vesicular fluid. It is important to collect infected epithelial cells from the base of the lesion because they usually contain a significant amount of virus.

iii. Swabs must be placed individually into separate, empty tubes to avoid contamination. Place swabs directly into tubes. **Do not place transport medium into the tube; the specimen MUST be kept dry.** Tubes must be individually labeled and must be resistant to breakage.

Crusts (Scabs)

- Crusts can be lifted off the skin (a glass slide is also useful for this purpose) and transferred directly into break-resistant, snap-cap or screw top tubes.

Glass Slide Method (for maculopapular lesions)

i. Rake the edge of the slide over the selected lesion, abrading the lesion with sufficient vigor to ensure that skin cells are gathered onto the slide. Use a sterile polyester swab to scrub the abraded lesion and, using the same swab, collect the material collected on the edge of the slide. Note: with young children, it may be less stressful if you ask them to help with this. If more than one lesion is sampled, a separate swab should be used for each one.
ii. Insert the swab into a tube and close it; many swabs are provided with a tube that includes a label for marking the specimen.
iii. Ship in a padded envelope. The swab for each sampled lesion must be placed in a separate swab tube, but multiple tubes can be shipped in the same envelope. Dry maculopapular lesion material is stable for several weeks at ambient temperature.

Handling and shipment

Dried specimens for PCR can be stored at ambient temperature indefinitely, although we prefer to receive specimens as soon after collection as possible. Do not refrigerate or freeze dry specimens intended for testing by PCR. Specimens should be sent for overnight delivery. **Do not suspend specimens in transport medium; they should be shipped dry.**

b. Blood (serum) collection for IgG or IgM serology (not recommended for acute disease):
   i. Collect whole, venous peripheral blood in serum separator vacutainer tubes.
   ii. Permit the specimen to fully clot by letting it stand at room temperature for at least 30 minutes.
   iii. After the clot has formed, tubes can be centrifuged at approximately 200 x *g* for 5 minutes.
   iv. The clot will have passed to the bottom of the tube, and the serum fraction will be at the top, with the separator plug as a barrier between the two fractions. The serum fraction can simply be aliquoted into sterile, 0-ring seal freezing tubes using a sterile pipet.

Handling and shipment

Specimens can be shipped at room temperature by overnight delivery. Frozen specimens obtained for outbreak genotyping may be kept indefinitely at −20°C, accumulated, and sent in batches to CDC, depending on preference.

c. Other Specimens:
Collection of nasopharyngeal secretions, saliva, urine, bronchial washings, or CSF should be evaluated case by case based on the patient's clinical presentation.

All specimens sent to BPHL should have a completed specimen submission form: FloridaHealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/_documents/dh1847clinicallabsubmissionform.pdf.

3. Packaging and shipping

a. Follow packaging and shipping guidelines for diagnostic specimens (Biological Substance, Category B, UN3373). All suspect diagnostic specimens must be shipped and packaged according to International Air Transport Association and Department of Transportation Packaging Instructions 650 for Biological Substance, Category B agents. Per these regulations anyone who handles, offers for transport, or transports specimens must be trained and certified to do so. Specifications state specimens must be packed in a basic triple packaging system consisting of a primary watertight container wrapped with absorbent material, secondary watertight container, and an outer shipping package. Enclose an itemized list of contents between the secondary packaging and the outer packaging.
b. Contact BPHL for packaging and shipping training dates. BPHL conducts approximately 20 face-to-face trainings per year all over Florida, free of charge. DOH employees must register for the classes in the DOH online training system, TRAIN. For shipping guidance, contact BPHL. Additional shipping trainings are also available commercially through vendors.

For more information on varicella zoster virus specimen collection, storage, and handling, contact:

Bureau of Public Health Laboratories–Jacksonville
Attention: Virology
1217 Pearl Street
Jacksonville, FL 32202
Telephone: Valerie Mock or Pam Colarusso
904-791-1540

Bureau of Public Health Laboratories–Tampa
Attention: Virology
3602 Spectrum Boulevard
Tampa, FL 33612
Telephone: Lea Heberlein-Larson
813-974-0134

Source: CDC Collecting Specimens for Varicella Zoster Virus (VZV) Testing
www.cdc.gov/chickenpox/lab-testing/collecting-specimens.html

5. ROUTINE CASE INVESTIGATION

All cases of varicella that meet case definition should be investigated to the extent necessary to complete basic case information and extended data entry in Merlin.

A. Prioritize case reports for interview and control measures based on initial case report and information provided by the medical provider.

- Case interviews and control measures (i.e., contact investigation, prophylaxis, enhanced surveillance) may be prioritized for cases that fit into the following groups:
  a. A varicella mortality,
  b. People whose initial case report, or information received by a medical provider, indicates they exposed high-risk persons*, exposed persons in a high-risk setting**, or are part of an outbreak (see section 7) or laboratory-defined cluster,
  c. A child that attends a school with a large number of vaccine-exempt students (as defined locally),
  d. Cases for which a county health department (CHD) epidemiology interview will be conducted within 4 days of onset or lab collection date if onset is unknown. This time frame allows enough time to recommend or provide varicella vaccine or VariZIG, as appropriate.

  *** High-risk person/contact:** Someone at increased risk for complications from varicella because of their age or an underlying condition (e.g., immunocompromised persons, cancer patients, pregnant women, neonates whose mothers are not immune).
  ****High-risk setting**: A setting with individuals at high risk for complications such as a medical group home, neonatal intensive care unit (NICU), special needs school, or obstetrician office/unit. Cases that are residents, patients, or employees (e.g., health care workers) of high-risk settings should be prioritized.

B. Evaluate the case classification

1. Review the clinical signs/symptoms including severity of disease, risk factors during exposure period (21 days prior to rash onset), and vaccination status.

2. Coordinate the clinical specimens for laboratory confirmation (preferably scabs/vesicular fluid for PCR analysis), if appropriate (see section 4).

3. Though IgM serology is not preferred for determining acute illness, investigate reports of varicella IgM positive for clinically compatible illness in the clinical records.

C. Identify potential sources of infection (based on prioritization)

Record the household/family, travel, social, and health care exposures for the 21 days prior to rash onset. Special note should be made of any contact with known/suspected varicella or varicella zoster cases during the exposure period.

D. Identify exposed contacts and potential sites of transmission (based on prioritization)

1. Identify contacts with face-to-face exposure while indoors or that shared the same room if in a health care setting, during the infectious period (2 days prior to rash onset through crusting of rash). Special efforts should be made to trace high-risk contacts.

2. Identify locations, dates, and times where the case may have had contact with groups during the infectious period, especially:

a. household or family members,
b. child care/school,
c. congregate living facilities,
d. health care,
e. workplace.

3. Determine varicella immunity status of contacts. Immunity is defined as:
   a. US born prior to 1980 (except for health care providers, pregnant women, or immunocompromised persons),
   b. having a documented natural case of varicella,
   c. having a varicella zoster diagnosis,
   d. having a positive IgG antibody to VZV,
   e. having documented, age-appropriate varicella vaccination.
      i. Children vaccinated with one dose should receive their second dose, provided three months have elapsed since the first dose.

4. Recommend contacts see a health care provider if:
   a. fever or rash develop (health care provider should be notified before arrival so further exposures can be prevented),
   b. no immunity can be documented,
   c. they are at high risk of complications.

5. Follow up with susceptible contacts to determine final known outcome 21 days after exposure.

E. Enhance surveillance for additional cases (based on prioritization)

1. For high-risk settings or in group settings where outbreaks are common (e.g., schools, child care), establish enhanced surveillance for additional cases.

2. Provide varicella reporting reminders and encourage laboratory confirmation for any suspect cases.

3. Monitor the Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE-FL) for varicella-associated visits that indicate primary varicella disease (www.essencefl.com/).

4. In the absence of an outbreak, enhanced surveillance measures should remain in place until 21 days after the last case's infectious period.

F. Environmental evaluation

None required, but a site visit to the child care facilities or schools experiencing outbreaks may be useful to coordinate the investigation and infection control recommendations with school staff and administration.

G. Merlin Data Entry

Create a case in Merlin under disease code **Varicella (Merlin disease code=05290)** within one business day of notification. Enter the data collected into Merlin, being sure to include all required fields on the Basic Data screen, complete the Case Symptoms screen, complete

the Extended Data screen, and associate all relevant labs, including those received via electronic laboratory reporting, with the profile. In the event a varicella case entered in Merlin is determined to be a herpes-zoster infection (shingles) or other rash illness, check the appropriate box in the case definition screen to mark the case as 'Not a Case.'

6. CONTROLLING FURTHER SPREAD

A. Infection control recommendations/case management

1. For hospitalized patients, in addition to standard precautions, airborne and contact precautions are indicated for the duration of the infectious period. The infectious period for most patients is until lesions are dry and crusted. For an immunocompromised host with varicella pneumonia, maintain precautions for the duration of illness.
   a. Restrict susceptible health care personnel from entering the rooms of patients known or suspected to have varicella if other immune health care personnel are available.
   b. No recommendation is made regarding the type of personal protective equipment (i.e., surgical mask or respiratory protection with a N95 respirator or higher) to be worn by susceptible or immune health care personnel who must have contact with patients with known or suspected varicella.
   c. 2007 Guideline for Isolation Precautions, pages 69–71 (www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf)

2. Persons suspected to have varicella should be advised to do the following during their infectious period:
   a. stay home and not go to child care, school, work, public places, or social activities,
   b. avoid contact with susceptible children (particularly infants), susceptible pregnant women, and immunosuppressed individuals,
   c. avoid contact with susceptible family members and visitors,
   d. avoid exposing other people at health care facilities by calling ahead and making special arrangements to prevent contact with others.

B. Contact Management (based on prioritization)

1. Symptomatic contacts

   a. Any contact with a rash illness compatible with varicella should be referred to a health care provider for evaluation.
   b. Susceptible contacts with respiratory symptoms or fever should stay home and call their local CHD or health care provider.
   c. If a contact goes to a health care provider for evaluation of possible varicella, the patient should call ahead to ensure that facility personnel are aware of the specific reason for referral so that special arrangements can be made to keep them out of areas used by other patients.
   d. Persons with possible varicella should avoid contact with others until the diagnosis is known.

2. High-risk susceptible contacts

Susceptible contacts that are immunocompromised, have cancer, are pregnant, or are neonates whose mothers are not immune should be informed of varicella symptoms and encouraged to promptly contact their health care provider for follow-up regardless of the presence or absence of symptoms to discuss the risk and complications of varicella and

appropriate prophylaxis. (see section 6.B.4 below)

3. **Active immunization of susceptible or under-vaccinated contacts with varicella vaccine**
   a. Vaccinate susceptible contacts within 5 days of exposure to prevent or modify disease. If vaccine is contraindicated and the person is at high risk of severe disease, see section below on passive immunization.
      - Vaccination of contacts outside the 5-day window (particularly during school or other institutional outbreaks) is still recommended, as vaccination should produce protection from future exposures.
   b. Children vaccinated with one dose should receive their second dose, provided three months have elapsed since the first dose. Even though three months is the recommended minimum interval for ages 12 months–12 years, a four-week interval between doses would be valid, especially for outbreak control.
   c. Pregnant women should not receive varicella vaccination.

4. **Passive immunization of high-risk, susceptible contacts with VariZIG**
   a. Varicella zoster immune globulin is recommended to be administered within 10 days of exposure for contacts at high risk for severe disease that lack evidence of immunity to varicella and cannot receive the varicella vaccine.
   b. Patient groups recommended by the Advisory Committee on Immunization Practices to receive VariZIG include the following:
      i. Immunocompromised patients without evidence of immunity,
      ii. Pregnant women without evidence of immunity,
      iii. Neonates whose mothers have signs and symptoms of varicella around the time of delivery (i.e., 5 days before to 2 days after),
      iv. Premature infants born at ≥ 28 weeks of gestation who are exposed during the neonatal period and whose mothers do not have evidence of immunity,
      v. Premature infants born at < 28 weeks of gestation or who weigh ≤ 1,000 g at birth and were exposed during the neonatal period, regardless of their mothers' evidence of immunity status.
   c. VariZIG is the only varicella zoster immune globulin preparation currently available in the United States. VariZIG is a purified immune globulin preparation made from human plasma containing high levels of anti-varicella zoster virus antibodies. VariZIG can be obtained by health care providers from the US distributor FFF Enterprises (Temecula, California) by calling 800-843-7477 at any time or from ASD Healthcare (Frisco, Texas) by calling 800-746-6273. The distributors can also be contacted online.
   d. When VariZIG is not available, the CDC Guideline for Isolation Precautions recommends prophylaxis with immune globulin IV (IGIV). Some physicians may recommend the antivirals acyclovir or valcyclovir. Clinical effectiveness of these approaches has not been determined.

5. **Exclusion**
   a. Susceptible contacts should avoid high-risk settings and high-risk persons from 8 days after the first date of exposure until 21 days after the last date of exposure (or 28 days if the contact received VariZIG), regardless of post-exposure vaccination.
   b. Exposed susceptible health care workers should be excluded beginning 8 days after the first exposure until 21 days after the last exposure (or 28 days if the contact received VariZIG), regardless of post-exposure vaccination.
   c. Exposed susceptible contacts that are patients in a health care facility should be

placed on airborne precautions beginning 8 days after the first exposure until 21 days after the last exposure (or 28 days if the contact received VariZIG), regardless of post-exposure vaccination.

d. Susceptible contacts generally do not need to be excluded from public settings. However, they should be educated about symptoms of varicella and told to isolate themselves if symptoms develop and to call their local CHD.
e. For exclusion during outbreaks, see section 7**.**

6. Education

a. Susceptible contacts should be told to watch for symptoms of varicella until 21 days after the last exposure. If suggestive symptoms develop, they should isolate themselves and call their local CHD.
b. If exposures have occurred among a large group of potentially susceptible or high-risk persons, consider educating potentially exposed persons and making recommendations via letters or a press release.
c. As appropriate, use the notification letter and the disease fact sheets to notify contacts and other individuals or groups.

7. MANAGING SPECIAL SITUATIONS

A. Outbreak control

Outbreaks of varicella are defined as ≥ 5 cases linked in a single setting. Varicella outbreaks can persist up to six months in densely populated settings (e.g., nursing homes, schools, prisons, etc.), and prompt outbreak control measures are critical. Record all outbreaks of varicella in the outbreak module and link all cases. Along with the steps outlined in sections 5A–G and 6A–B, the following should be included in outbreak response:

- **Active surveillance:** Work closely with administrators, health care providers, and the exposed population to develop strategies to identify all persons with symptoms of varicella in the outbreak setting(s). Active surveillance should continue for 42 days following the last identified case.
- **Exclusion of susceptible:** Individuals without documented immunity may need to be excluded from group settings, especially if at high risk for complications. High-risk persons may need to be excluded from settings of ongoing disease transmission.
    - Students with vaccine exemptions, see Section 1003.22, *F.S.* which states;

> *(9) The presence of any of the communicable diseases for which immunization is required by the Department of Health in a Florida public or private school shall permit the county health department director or administrator or the State Health Officer to declare a communicable disease emergency. The declaration of such emergency shall mandate that all students in attendance in the school who are not in compliance with the provisions of this section be identified by the district school board or by the governing authority of the private school; and the school health and immunization records of such children shall be made available to the county health department director or administrator. Those children identified as not being immunized against the disease for which the emergency has been declared shall be temporarily excluded from school by the district school board, or the governing authority of the private school, until such time as is specified by the county health department director or administrator.*

- **Vaccination of susceptible individuals:** Varicella vaccination should be offered to all susceptible individuals who do not have contraindications. Persons who are vaccinated with a first or second dose during an outbreak may be immediately readmitted to the outbreak setting (i.e., school). However, these individuals should be monitored for sign and symptoms of varicella.

For outbreak control recommendations, refer to the CDC's Strategies for the Control and Investigation of Varicella Outbreaks 2008 document:
www.cdc.gov/chickenpox/outbreaks/downloads/manual.pdf

8. ROUTINE PREVENTION

A. Immunization recommendations

The most effective method of varicella prevention is vaccination. The varicella zoster vaccine is 70–90% effective in preventing mild disease, and 95% effective in preventing severe disease. Post-licensure studies in the United States demonstrated 82% effectiveness of preventing disease and 100% effectiveness in preventing severe disease after one dose of varicella vaccine. One-dose vaccine efficacy was 94.4%, and 98.3% for two doses during a 10-year study period. Additional studies have determined two-dose varicella vaccine effectiveness to be 84% to 98%. The Advisory Committee on Immunization Practices first recommended a single dose of varicella vaccine when the vaccine was licensed in 1995, followed by recommendations for vaccination before child care and school entry in 1999. In 2006, these recommendations were updated to recommend a routine two-dose series and catch-up vaccination for those immunized with one or no doses.

A two-dose, live attenuated varicella vaccine series is recommended. The first dose should be administered between 12–15 months of age and the second dose between 4–6 years of age. The minimum interval between doses is 3 months (ages 12 and younger) or 4–8 weeks (ages 13 or older).

Age-appropriate vaccination is recommended for any individual of unknown immunization status (www.cdc.gov/vaccines/vpd-vac/varicella/hcp-routine-vacc.htm). See section 5.D.3 for definitions of immunity. Proof of age-appropriate varicella vaccination or documentation of the disease is required for child care and public and private school K-12 attendance in Florida.

There are two live attenuated varicella vaccines approved for use in the United States:

1. Varivax® (Merck) is a monovalent (single antigen) vaccine for ages 12 months and older.
2. ProQuad® (Merck) is quadravalent (measles, mumps, rubella, and varicella) vaccine for ages 12 months to 12 years. There should be a 30-day interval between MMR and MMRV vaccination, if applicable.

   A mild rash (disseminated or localized at the injection site) can occur in 2–4% of children and 5% of adults; however, varicella zoster development following vaccination is rare.

Herpes zoster (shingles) vaccination: The recombinant zoster vaccine Shingrix is preferred over the previously recommended Zostavax vaccine. Healthy adults age 50 years and older should get two doses of Shingrix, two to six months apart.

Contraindications to varicella vaccination include:

- Anaphylaxis to any vaccine component, including gelatin or neomycin*
- Immunosuppression/immunodeficiency**
- First degree family history of congenital hereditary immunodeficiency (unless immunocompetent)
- Pregnancy***
- Moderate/severe illness
- Receiving blood products during the previous 3–11 months (dosage dependent)
- Passive immunity from antibody-containing products (except washed RBCs) within prior 3–11 months (5 months for VariZIG)

  * Egg-derived quadrivalent vaccine is considered low risk for those with egg allergies; no egg proteins are present in monovalent vaccine.

  ** Vaccination may not be contraindicated for individuals with impaired humoral immunity or for those discontinuing immunosuppressive steroids prior to vaccination. Patient should consult with his or her provider.

  *** Pregnancy should be avoided for one month following immunization, but breastfeeding is not a contraindication for vaccination.

Immunosuppression/Immunodeficiency

- Single antigen (Varivax) vaccine may be used in individuals with impaired humoral immunity
- HIV-positive individuals with no documented varicella immunity may be vaccinated with single antigen (Varivax) vaccine if they meet the following criteria:
  - Children ≥12 months old with CD4+ T-lymphocyte percentages≥ 15%
  - People >8 years old with CD4+ T-lymphocyte counts ≥ 200 cells/μL

Additional varicella vaccination information can be found at the CDC's Varicella Vaccination: Information for Health Care Providers page (www.cdc.gov/vaccines/vpd/varicella/hcp/index.html).

B. Prevention recommendations

A standard, two-dose varicella vaccination series for all eligible individuals over the age of 1 year is the best preventative measure (70–100% effective) against individual varicella infection and contributes to herd immunity for those ineligible for immunization.

Preliminary data suggests that vaccination decreases the risk/severity of varicella zoster later in life. Antibody presence has been documented up to 10 years following vaccination in studies of children aged 12 months to 12 years, and most vaccine recipients developed long-lasting immunity.

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