

Varicella (Chickenpox) and Varicella Mortality

PROTOCOL CHECKLIST

- Enter available information into Merlin upon receipt of initial report (page 10)
- Review background on disease, case definition, and laboratory testing (pages 3-9)
- 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 (page 9)
 - Review disease facts
 - Modes of transmission (page 4)
 - Incubation period (page 4)
 - Signs/symptoms/types of infection (pages 3)
 - Ask about exposures (page 9)
 - Exposure to persons with documented disease or suspected illness
 - Determine risk factors (page 9)
 - Varicella vaccination or disease history (page 9)
 - Immunocompromised status
 - Pregnancy status
 - Identify possibly exposed contacts/family members who may be at risk (page 10)
 - Determine whether patient or symptomatic contact is in sensitive situation (pages 11-12)
 - Recommend exclusion for infected or symptomatic contacts
 - Recommend prophylaxis for contacts as appropriate
 - Provide education on prevention through vaccination as indicated (pages 12-13)
 - Address patient family's questions or concerns
- Follow-up on high-risk settings or potential exposures 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 pregnant women, newborn infants, and immunocompromised persons.

B. Legal reporting requirements (including mortality)

Laboratories and physicians are required to report varicella cases to the FL Department of Health in the county where the resident lives by the next business day. Physicians shall also provide varicella vaccination dates for patients that meet the case definition.

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 code = 05290. (Merlin website: <http://merlin.doh.ad.state.fl.us/merlin/Start/Login.aspx>)
5. If case is a varicella death, obtain and enter the date of death into Merlin and complete the Death Investigation Worksheet (http://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/_documents/crf-varicella-death.pdf). This must be completed and sent to Division of Disease Control and Health Protection, Bureau of Communicable Diseases, Immunization Section and attached to the case in Merlin.
6. Submission of the available Varicella Case Report Form (http://www.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 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 none) maculopapular lesions and no fever. In one study, this type of infection was found to be less infectious than natural disease. It is also marked by a quicker resolution of the rash and faster overall recovery.

Varicella exhibits seasonal variation. In temperate climates, the highest incidence is between March and May and the lowest incidence is between September and November.

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:

<http://www.cdc.gov/chickenpox/about/photos.html>.

C. Reservoirs

Humans are the only reservoir for VZV. Although strains vary geographically, VZV is endemic to the United States and distributed worldwide.

D. Modes of transmission

The respiratory tract and conjunctiva are the entry location for VZV. Airborne respiratory transmission is the most common, but transmission can also occur by direct contact with or inhalation of vesicular fluid. Varicella is highly contagious, infecting 61-90% of susceptible contacts. An individual is contagious until all lesions have crusted over; scabs are not infectious. Varicella can 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 to 21 days, with an average of 14-16 days. Incubation 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: Postexposure 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. Individuals are most infectious during the 1-2 day *prodromal stage* through the first two days of rash onset.

G. Treatment

Most varicella treatment focuses on symptom relief and reduction of complications. The American Academy of Pediatrics recommends antiviral therapy for adolescents and adults as well as for high-risk groups of patients (e.g., premature infants, children with certain medical conditions) within 24 hours of onset of disease.

H. Postexposure Prophylaxis

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

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 VZV and cannot receive varicella vaccine (**see Section 5A**).

G. Varicella in FL

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. The largest numbers of cases continue to be reported in the 5-

19-year-old age group, followed by the 0–4-year-old age group. Most cases reported in Florida represent sporadic, locally acquired varicella.

3. CASE DEFINITIONS

A. Varicella disease

1. Clinical description

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

2. Laboratory criteria for diagnosis

- Isolation of varicella virus from a clinical specimen,
OR
- Direct fluorescent antibody (DFA),
OR
- Polymerase chain reaction (PCR),
OR
- Significant rise in serum varicella immunoglobulin G (IgG) antibody level by any standard serologic assay.

3. Case classification

Confirmed: A case that is laboratory confirmed or that meets the clinical case definition and is epidemiologically-linked to a confirmed or probable case.

Probable: A case that meets the clinical case definition, is not laboratory confirmed, and is not epidemiologically-linked to another probable or confirmed case.

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

4. Comments:

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

In breakthrough varicella (disease occurring more than 42 days after varicella vaccination), the disease resolves quickly and is almost always mild. The rash may be atypical in appearance with fewer than 50 maculopapular lesions, and vesicles may be absent.

Laboratory confirmation for varicella is available through the Bureau of Public Health Laboratories (BPHL) and should be obtained for all fatal cases, during outbreaks, and in other special circumstances. Genotyping at the CDC is recommended for large outbreaks. Varicella IgM testing is not always available from commercial laboratories and is not recommended.

B. Varicella mortality

1. Case classification

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

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

2. 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.

The additional Varicella Death Investigation Worksheet must also be filled out and sent to the Immunizations Section and attached the case in Merlin (http://www.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 in order to classify a case of varicella infection that did not result in death.

Laboratory confirmation through the BPHL should be obtained for all fatal cases.

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

Questions regarding case definition follow-up should be directed to the Bureau Communicable Diseases, Immunization Section at (850) 245-4342.

4. DIAGNOSIS AND LABORATORY SERVICES

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

A. Criteria for diagnosis

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

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

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

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 immune status of persons who have not had or have an unknown history of varicella and who may be candidates for VariZIG®, vaccination, or may be isolated 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 slide for DFA
- Varicella zoster virus IgG or capture IgM antibody detection (Jacksonville only)
- Varicella zoster virus culture

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 (http://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/_documents/dh1847clinicallysubmissionform.pdf).
- c. Electronic Laboratory Ordering (ELO) 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 can be mailed by regular post unless a result is urgently required. **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 standing 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

Ship specimens by overnight mail on sufficient dry ice to keep them frozen for 3 days. Frozen specimens obtained for larger studies 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, blood, urine, bronchial washings, or CSF should be evaluated case by case based on the patient's clinical presentation.

All specimens sent to the Bureau of Public Health Laboratories should have a completed specimen submission form: http://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/_documents/dh1847clinicallabsubmissionform.pdf.

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
(<http://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*, persons in a high-risk setting*, or are part of an outbreak or laboratory-defined cluster,
 - c. A school-aged 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 timeframe allows enough time to recommend or provide varicella vaccine, or VariZIG, as appropriate.

***High-risk settings:** Exposures to persons in a setting with individuals at high risk for complications (i.e., medical group home, NICU, special needs school, OB office/unit, etc.), such as cases that are a resident, patient, or an employee (e.g. health care worker) of such settings.

High-risk persons/contacts: 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).

B. Evaluate the Diagnosis

1. Review the clinical signs/symptoms including severity of disease, exposure 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**).

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. childcare/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.

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, daycares), 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) syndromic surveillance data for rash trends (<https://www.essencefl.com/>).
4. In the absence of an outbreak, enhanced surveillance measures should remain in place until 21 days after the last case.

F. Environmental evaluation

None required, but a site visit to the childcare 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 (<http://merlin.doh.ad.state.fl.us/merlin/Start/Login.aspx>) under disease code **VARICELLA – 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 attach all relevant labs. Please attach all labs received via electronic laboratory reporting (ELR) to the case.

6. CONTROLLING FURTHER SPREAD

A. Infection control recommendations/case management

1. For hospitalized patients, in addition to standard precautions, airborne precautions are indicated for the duration of the infectious period.
 - 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 health care personnel who must have contact with patients with known or suspected varicella.
 - c. 2007 Guideline for Isolation Precautions, pages 69-71 (<http://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 childcare, school, work, public places or social activities,
 - b. prohibit 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 neonates whose mothers are not immune, should be informed of varicella symptoms and encouraged to immediately contact their health care provider for follow-up regardless of the presence/absence of symptoms to discuss the risk and complications of varicella and appropriate prophylaxis.

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 $\leq 1,000$ g at birth and were exposed during the neonatal period, regardless of their mothers' evidence of immunity status.
- c. VariZIG is available in the US through an investigational new drug (IND) application expanded access protocol. 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 sole-authorized US

distributor, FFF Enterprises (Temecula, CA) by calling 800-843-7477 at any time or by contacting the distributor online. As with any product used under an IND protocol, patients must give informed consent before receiving the product.

- d. When VariZIG is not available, some physicians may recommend prophylaxis with immune globulin IV (IGIV), or the antivirals acyclovir or valacyclovir. Clinical effectiveness of these approaches is not 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. 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 call their local CHD.
- d. 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 templates in **Appendices B/C** and the disease fact sheet 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. 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.

For outbreak control recommendations, refer to the CDC's Strategies for the Control and Investigation of Varicella Outbreaks 2008 document

<http://www.cdc.gov/chickenpox/outbreaks/downloads/manual.pdf>

8. ROUTINE PREVENTION

A. Immunization recommendations

The most effective method of varicella prevention is vaccination. The vaccine is 70-90% effective in preventing mild disease, and 95% effective in preventing severe disease.

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 (<http://www.cdc.gov/vaccines/vpd-vac/varicella/hcp-routine-vacc.htm>). See **Section 5C.3** for definitions of immunity. Proof of age-appropriate varicella vaccination or documentation of the disease is required for childcare and public/private school K-12 attendance in FL.

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.

Varicella zoster vaccine (Zostavax® by Merck) is licensed and recommended for use in adults aged 60 years and over.

Contraindications to varicella vaccination include:

- Anaphylaxis to any vaccine component, including 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 quadravalent 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/her provider.

***pregnancy should be avoided for 1 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*:
Children over 12 months with CD4 + T-lymphocytes are $\geq 15\%$ (≥ 200 cells/ μL) Adults with CD4 count ≥ 200 cells/ μL

Additional varicella vaccination information can be found at the Varicella Vaccination: Information for Health Care Providers (available at: <http://www.cdc.gov/vaccines/vpd-vac/varicella/default-hcp.htm>).

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.

ACKNOWLEDGMENTS

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Communicable Diseases Manual (CCDM), 17th Edition; James Chin, Ed. APHA 2000. We would like to acknowledge the Oregon Department of Human Services for developing the format and select content of this document.

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APPENDIX A: SAMPLE PROVIDER ALERT

**Advisory: Varicella in a [age] in [city]
[date: mm/dd/yyyy]**

ACTION REQUESTED:

- Increase your index of suspicion for varicella, including atypical breakthrough cases
- Offer alternate waiting area to any patient presenting with rash illness
- Take precautions to protect pregnant women and immunocompromised individuals (staff or patients) against any exposure to rash illness
- Report any probable varicella case by the next business day to the CHD, including varicella vaccination status
- Collect scab/vesicular lesion fluid (if possible) for VZV, PCR, or DFA laboratory confirmation
- Contact the Florida Department of Health, Immunization Section at: (850) 245-4342 for case definition information

BACKGROUND: A case of varicella has been reported in a [age gender] who lives in [city] and attends [school]. Travel history for the 21 days prior to rash onset includes [locations and dates of travel].

DIAGNOSIS DATE: [mm/dd/yyyy]
DIAGNOSIS TYPE: [probable, or confirmed by epidemiologic linkage or laboratory confirmation]
RASH ONSET; [mm/dd/yyyy]
CONTAGIOUS PERIOD: [mm/dd/yyyy]

Contacts have been notified, and the school and parents have been followed up with regarding vaccination status and advisement. All susceptible individuals not eligible for vaccination have been advised to remain home until the incubation period has ended.

SYMPTOMS: Fever of 103°F or less, centripetally-distributed maculopapular or vesicular pruritic rash originating on the head and trunk. Successive crops (200-500) of lesions are common, sometimes involving mucosa. **Atypical breakthrough infections** can be afebrile and consist of less than 50 maculopapular lesions in varicella vaccinated patients or patients with a natural history of disease

INCUBATION: 10 to 21 days; average is 14 to 16 days [insert dates]

DIAGNOSTICS: Scab/vesicular lesion collection for PCR/DFA analysis (preferred over serology)

TREATMENT: Generally symptomatic

APPENDIX B: SAMPLE LETTER TO PARENT/GUARDIAN

[date]

Dear Parent or Guardian:

A student with chickenpox attended **[insert school] while he/she was sick** from **[insert dates]**. If your child attended school during these dates, he/she may have been exposed.

Chickenpox is a very contagious illness that can cause fever and rash. Fever and rash usually happen 14–16 days after being around someone with chickenpox. The rash usually starts on the head or body and is very itchy. The rash heals by scabbing over; when the last blister has scabbed over the child is no longer contagious.

Chickenpox is spread by coughing and sneezing (like a cold), or by touching items that have saliva on them. It can also be spread by contact with fluid from the rash blisters, but this is not common.

It is usually a mild disease, but some people may get a more serious type. People who have more risk of this serious form are:

- People who have not had chickenpox
- People who have weakened immune systems
- Pregnant women

These people should not wait for the rash to appear, and should contact their provider right away for advice.

There is a vaccine for chickenpox, and it can protect even 3–5 days after being around someone sick with chickenpox. Treatment is usually just making your child comfortable. **DO NOT GIVE ASPIRIN** if your child has chickenpox because Reye's syndrome is a rare but serious problem that can happen.

If your child develops fever or rash, please contact your provider.

If you need more information or have questions, please contact your health care provider or county health department.

Sincerely,

[signature]

[title, department]

[contact information]

APPENDIX C: SAMPLE LETTER FOR SCHOOL INVOKING EXCLUSIONARY RIGHT

[DATE]

RE: Order to Exclude Unvaccinated Students during the ongoing Chickenpox Outbreak

Dear Parent:

This is to inform you about the cluster of chickenpox (varicella) that has been reported in your child's school, [school contact info].

Since your child has a vaccine exemption, and because of the significant exposure to chickenpox he/she may receive at school, **your child is being temporarily excluded from school**. Your child must remain out of school until 21 days after the last case is considered non-infectious. **At this time your child may return to school on [date exclusionary rule ends]**. If there are additional cases, this return date may be extended.

If he/she receives **one dose of the chickenpox vaccine (Varivax)**, which will be provided at no cost to you by the FL Department of Health in [county name] County, he/she will be allowed to return to school immediately. The FL Department of Health in [county name] County will be available at the school on **[date available if desired]**, to provide vaccination information.

The FL Department of Health in [county name] County is granted the authority to exclude unvaccinated students under 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.

The Centers for Disease Control and Prevention also recommends that “in outbreaks involving children covered by childcare or school requirements, unvaccinated children with no history of varicella should be instructed to be vaccinated immediately or excluded from school for the duration of the period of communicability i.e., from 10–21 days post exposure or for the duration of the outbreak.”

Because your child may have already been exposed to chickenpox, the health department recommends you watch your child for the signs and symptoms of the disease. Chickenpox is contagious, please be aware of the following:

1. The incubation period for chickenpox, which is the time it takes from when a person is exposed to when they develop disease is 11–21 days.

2. Symptoms: possible mild elevation in temperature, itchy blister-like rash that will eventually crust over and form scabs. The blisters tend to be more common in covered rather than exposed parts of the body.

Your child should remain out of school until all of the chickenpox lesions have crusted over (usually about 5 days). Upon re-entry, the child must report to the school health room (if present) for clearance.

If you have additional questions, please contact [county health department contact], of the FL Department of Health in [county name] County. (###) ###-####.

Thank you.

[signature]
[title, department]
[contact information]