

Local Health Department Guidelines for the Epidemiological Investigation and Control of Varicella

Maryland Department of Health
Infectious Disease Epidemiology and Outbreak Response Bureau
Center for Immunization
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Table of Contents

Revisions	3
Introduction	4
Disease Description	4
Definitions and CDC Surveillance Case Classification	6
Testing/Laboratory Diagnosis	7
Recommended Steps for Testing	8
Treatment	8
Prevention/Vaccination	9
Case/Outbreak Investigation	9
Recommended Case Investigation Procedures	10
Varicella Exposure Management Algorithm	14
Special Settings	16
Schools and Childcare Centers	16
Residential Institutions and Healthcare Settings	16
Reporting	17
Vaccine Adverse Events	18
References	19
Sample letter to parents	20
School	20
Childcare	21

Revisions (February 2018)

Disease Description

1. Clarified mode of transmission regarding inhalation of virus or direct contact with shingles rash.
2. Added information on groups at high risk for severe disease or complications.
3. Added information regarding breakthrough disease and number of vaccine doses.

Definitions and CDC Surveillance Case Classification

4. Updated outbreak definition to ≥ 5 cases.

Testing/Laboratory Diagnosis

5. Added information regarding sensitivity and reliability of viral isolation and serology.
6. Added information about how to collect and send specimens in rash kits.

Treatment

7. Updated information on acyclovir treatment recommendations.

Prevention/Vaccination

8. Added information about the shingles vaccine.
9. Added information regarding timing of giving vaccine and antivirals, or VariZIG/IGIV.

Case/Outbreak Investigation

10. Added note emphasizing which varicella cases are reportable in Maryland.
11. Added information regarding what is considered to be “exposure” to varicella.
12. Updated VariZIG timing recommendation from within 4 days to within 10 days.
13. Added an alternate source for ordering VariZIG.
14. Clarified exposure management recommendations for infants under 12 months of age.
15. Added varicella exposure management algorithm and extended footnotes.

Reporting

16. Added “Number of Lesions” to Summary of Information to Collect.
17. Updated VAERS reporting options.

References

18. Updated references.

Sample Letter to Parents

19. Updated letter to reflect current school immunization requirements.
20. Added sample letter for childcare settings.

Introduction

Chickenpox is an acute infectious disease caused by varicella zoster virus (VZV). VZV causes two distinct diseases: 1) varicella (also known as chickenpox) as the primary infection; and 2) herpes zoster (shingles), as recurrent infection which occurs when latent VZV reactivates. Acute chickenpox is generally mild and self-limited, but may be associated with complications, most commonly in adults, immunocompromised persons, and newborns of mothers with rash onset within five days before to forty-eight hours after delivery.

In 2006, the Advisory Committee on Immunization Practices (ACIP) voted to recommend routine two-dose chickenpox vaccination for children. Chickenpox vaccine should also be administered to adolescents and adults 13 years of age and older who do not have chickenpox immunity. About 15%–20% of people who have received one dose of chickenpox vaccine still get chickenpox if they are exposed, but their disease is usually mild, and may present atypically. Chickenpox developing more than 42 days after vaccination is known as breakthrough chickenpox disease.

This document was written to provide guidance to local health departments in Maryland on the investigation of and response to chickenpox cases. The recommendations in this document are intended to provide general guidance. Chickenpox incidents should be evaluated on an individual basis, with the consultation of local and state health department staff if needed, to determine the appropriate steps for chickenpox prevention and control.

Questions regarding this document can be directed to:

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Disease Description

Mode of Transmission: Chickenpox is highly contagious and spreads from person to person by direct contact, by inhaling the aerosolized vesicular fluid of skin lesions from someone with chickenpox or shingles, and possibly through infected respiratory secretions, such as a cough or sneeze. A person who comes into direct contact with vesicular fluid from a shingles rash cannot catch shingles, but may catch chickenpox if they are not already immune. *In utero* infection can also occur as a result of transplacental passage of virus during maternal chickenpox infection. The virus is believed to have a short survival time outside of the infected host.

Incubation Period: The incubation period of chickenpox is typically 14 to 16 days, but may range from 10 to 21 days. The incubation period may be up to 28 days for persons who have received Varicella-

Zoster Immune Globulin (VariZIG) or Immune Globulin Intravenous (IGIV) following an exposure. The incubation period may also be longer in persons who are immunocompromised.

Clinical Characteristics: Chickenpox is a febrile rash illness that is sometimes characterized by a *prodrome* which precedes the onset of rash. Adults may have one to two days of fever and malaise prior to rash onset, but in children, the rash is often the first sign of disease.

The rash is generalized and pruritic (itchy) and may progress rapidly from macules to papules to vesicular lesions. The rash usually appears first on the scalp, then on the trunk, and then the extremities. The highest concentration of lesions is usually on the trunk. Lesions can also occur on the oropharynx, respiratory tract, vagina, conjunctiva, and the cornea. Lesions are usually 1 to 4 mm in diameter, and vesicles contain a clear fluid. Vesicles will eventually dry and crust. Healthy children usually have 200 to 500 lesions.

The clinical course in healthy children is generally mild characterized by malaise, itching, and fever up to 102°F for two to three days. Adults may have more severe symptoms. Those at a higher risk of developing serious disease or complications include pregnant women, immunocompromised persons, infants under 1 year of age, persons with chronic skin or lung disorders, and those receiving corticosteroids or long-term salicylate therapy. Neonates born to mothers having varicella from 5 days before delivery to 2 days after delivery are also at risk of severe and potentially fatal varicella.

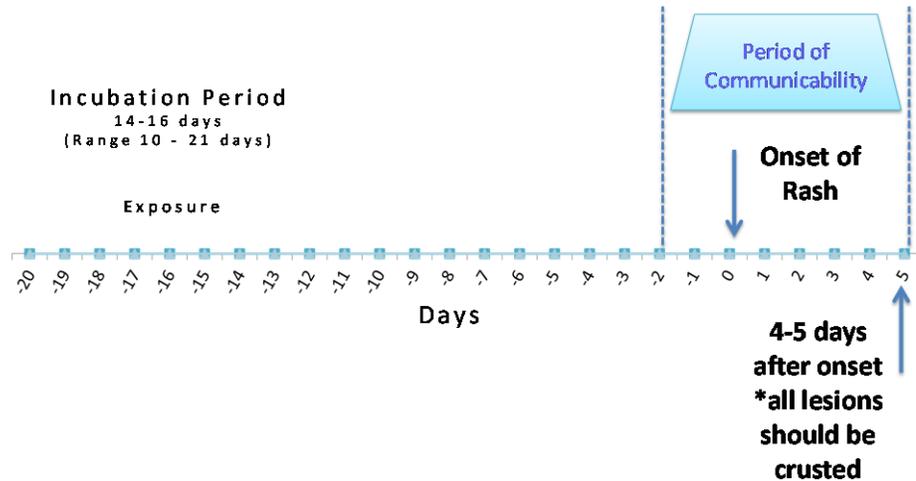
Serious complications from chickenpox include bacterial infections which can involve many sites of the body including the skin, tissues under the skin, bone, lungs (pneumonia), joints, and blood. Other serious complications are due directly to infection with the varicella-zoster virus and include viral pneumonia, bleeding problems, and infection of the brain (encephalitis).

Breakthrough disease is described as a case of wild-type chickenpox infection occurring more than 42 days after vaccination. Such disease is usually mild with shorter duration of illness, fewer symptoms, and fewer than 50 skin lesions. Breakthrough cases with fewer than 50 lesions have been found to be one third as contagious as typical chickenpox in unvaccinated persons, but breakthrough cases with ≥ 50 lesions can be just as contagious as a typical case of chickenpox in unvaccinated persons. Breakthrough disease is more common in those who have received only one dose of vaccine (occurs in 15% of those exposed), but is possible in those who have received two doses (occurs in <5% of those exposed).

Varicella- like (vaccine) rash is described as a rash in a recently vaccinated person that may be either wild- or vaccine-type virus. A rash that occurs within 2 weeks of vaccination or more than 42 days after vaccination is more likely to be wild-type virus. A rash that occurs 15-42 days post-vaccination is more likely to be vaccine-type virus.

After primary infection with chickenpox, the virus remains dormant in sensory nerve cell bodies. Reactivation of the virus results in shingles. Shingles presents as a localized, sometimes pruritic, often painful, vesicular rash that generally appears unilaterally in one or more dermatomes. Shingles only occurs in persons who have had chickenpox or the chickenpox vaccine.

Varicella Disease Progression



Communicability Period: An infected individual can be contagious from 2 days before lesions appear until all lesions are crusted over (average 4-7 days after rash onset). A person is considered no longer infectious once all of the lesions are crusted (average range 4-7 days). Secondary attack rates in susceptible household contacts are as high as 90%.

Persons with shingles are contagious during the vesicular stages of rash. The rash typically crusts over within 7-10 days but may take from 2-6 weeks to heal completely. If a susceptible person is exposed to shingles, the person MAY develop chickenpox as a result of the exposure, but they will not “catch” shingles.

Definitions and CDC Surveillance Case Classification

CDC Surveillance Case Classification of Varicella (2010)

1) Clinical Case Definition: An illness with acute onset of diffuse (generalized) maculopapulovesicular rash without other apparent cause.

2) Laboratory Criteria for Diagnosis:

- Isolation of varicella virus from a clinical specimen
- Varicella-specific nucleic acid detected by polymerase chain reaction (PCR)
- Varicella antigen detected by direct fluorescent antibody (DFA) test
- Significant rise in serum anti-varicella immunoglobulin G (IgG) antibody level by any standard serologic assay

Note: Laboratory confirmation of cases of varicella is not routinely recommended except for fatal cases and in other special circumstances.

3) CDC Case Classification:

- **Probable:** an acute illness with
 - Diffuse (generalized) maculopapulovesicular rash, AND
 - Lack of laboratory confirmation, AND
 - Lack of epidemiologic linkage to another probable or confirmed case.
- **Confirmed:** an acute illness with diffuse (generalized) maculopapulovesicular rash, AND:
 - Epidemiologic linkage to another probable or confirmed case, OR
 - Laboratory confirmation by any of the above stated laboratory criteria for diagnosis.

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

Note: The most current CDC case definitions can be found at:

<https://www.cdc.gov/nndss/conditions/varicella/case-definition/2010/>.

4) Outbreak:

The CDC currently defines an outbreak as the occurrence of ≥ 5 chickenpox cases that are related in place and epidemiologically linked within 28 days (two average incubation periods).

However, clusters involving fewer than 5 linked cases should still be reported to MDH.

Testing/Laboratory Diagnosis

Laboratory testing is not routinely required, but is useful if confirmation of the diagnosis or determination of chickenpox susceptibility is necessary. For outbreak settings lab testing for confirmation of the diagnosis should be done. Since chickenpox disease in the United States has declined due to routine chickenpox vaccination, the need for laboratory confirmation has increased as atypical cases (oftentimes, due to breakthrough chickenpox disease) become more common and as physicians have reduced experience in diagnosing chickenpox.

Skin lesions are the preferred specimen collection site for laboratory confirmation of chickenpox disease.

Blood specimens are used to test for chickenpox immunity. VZV can be isolated from scrapings of a vesicle base during the first 3 to 4 days of the eruption. Other specimen sources such as nasopharyngeal secretions, saliva, blood, urine, bronchial washings, and cerebrospinal fluid are considered less desirable sources than vesicular fluid and skin lesions since they are less likely to give positive results.

PCR: *PCR is the method of choice for rapid clinical diagnosis.* This test is sensitive, specific, and widely available. PCR is a powerful technique that permits the rapid amplification of specific sequences of viral DNA.

Virus Culture: The diagnosis of VZV infection may be confirmed by culture isolation, but this method is not as sensitive as PCR. VZV may be cultured from other sites such as blood and cerebrospinal fluid, especially in immunocompromised patients. Viable VZV cannot be recovered from crusted lesions.

Serologic testing: Serologic tests can be used to detect the presence of IgM antibody, or, a four-fold increase in IgG antibody titer between acute and convalescent serum specimens taken 2 weeks apart. However, IgM tests are not reliable for routine confirmation or ruling out acute infections, especially in vaccinated persons. Single serologic IgG tests may be used to identify the immune status of persons whose history of exposure to chickenpox is unknown. Routine testing after vaccination to confirm immunity is not recommended because of the potential for false-negative results.

Recommended steps for testing:

For PCR Testing

- 1) Obtain a low-to-moderate risk rash kit from MDH Laboratories Administration.
- 2) Gently lift the scab from the lesion.
- 3) Place the scab into a container such as a swab specimen tube. If there is more than one scab, place each scab individually in separate containers.
- 4) Use the edge of a clean slide to loosen and collect skin cells or fluid from the lesion.
- 5) Using a sterile swab, rub the lesion vigorously enough to ensure skin cells and/or fluid are collected.
 - a. You may also press the slide directly to the lesion to collect skin cells and/or fluid.
- 6) Clearly label the specimen for submission to the laboratory.
 - a. No PCR tubes should have media; in other words, they should be “dry” swabs.
 - b. When labeling specimens, include the anatomic site that the specimen came from.
- 7) Ship PCR specimen(s) on cold packs, using the low-to-moderate rash kit box and/or the specimen collection bag.

For Serology Collection

- 1) Collect at least 1mL of blood into a red top tube or serum separator vacutainer tube.
- 2) If possible, separate the serum from the cells in a centrifuge for 15 minutes.
- 3) Clearly label the specimen for submission to the laboratory.
- 4) Ship blood cold or frozen.

Note: A video demonstrating the techniques for chickenpox specimen collection may be accessed at the CDC website via the following link: <https://www.cdc.gov/chickenpox/lab-testing/collecting-specimens.html#video>

Treatment

The healthcare provider will provide various treatment options. Acyclovir is licensed to treat chickenpox, but other antiviral medications that may work include valacyclovir and famciclovir. Antiviral medications should be considered for persons who are more likely to develop serious disease, including healthy individuals older than 12 years of age, persons with chronic skin or lung disease, and persons receiving either long-term salicylate therapy or short, intermittent, or aerosolized courses of corticosteroids. Some healthcare providers may also recommend oral acyclovir treatment for secondary cases within a household, or pregnant women with chickenpox, especially during the second and third trimesters. However, oral acyclovir is not generally administered to otherwise healthy children under 12 years of age experiencing typical, uncomplicated chickenpox. Acyclovir works best when given within 24 hours of rash onset.

Persons whose immune systems have been weakened from disease or medication should contact their doctor immediately if they are exposed to or develop chickenpox. Pregnant women who are exposed to or develop chickenpox should immediately discuss prevention and treatment options with their doctor.

Symptomatic treatments for chickenpox are often used. Calamine lotion and oatmeal baths may help relieve some of the itching. Do not use aspirin or aspirin-containing products to relieve a child's fever. The use of aspirin in children with chickenpox has been associated with the development of Reye's syndrome (a severe disease affecting all organs, but most seriously affecting the liver and brain and may cause death). Use of non-aspirin medications such as acetaminophen (e.g., Tylenol®) is recommended.

Prevention/Vaccination

Vaccination remains the most effective way to prevent chickenpox infection. All children, beginning at age 12 months, should be vaccinated with two doses of chickenpox vaccine, administered at least 3 months apart. Children who have evidence of immunity to chickenpox do not need the vaccine. People 13 years of age and older who do not have evidence of immunity should get two doses of the vaccine 4 to 8 weeks apart.

Shingrix (recombinant zoster vaccine) is preferentially recommended over Zostavax (live zoster vaccine) to protect against shingles. Two doses of Shingrix separated by 2 to 6 months are recommended for all immunocompetent adults age 50 years and older, regardless of whether they have previously had shingles. If a person has already received Zostavax vaccine, they may be revaccinated with Shingrix if it has been more than two months since the last Zostavax dose.

Note: Antiviral medication and VariZIG may interfere with the body's ability to build an immune response to varicella vaccine. If a person receives antivirals, they should not receive varicella vaccine for at least 24 hours. If a person receives VariZIG, they should not receive varicella vaccine for 5 months. If a person receives IGIV, they should not receive varicella vaccine for 3 – 11 months, depending on dosage. If a person receives varicella vaccine, they should avoid taking antivirals for 14 days.

Case/Outbreak Investigation:

Timely and thorough case investigation should: confirm the patient's diagnosis; ensure appropriate medical follow-up for affected persons; identify the source of infection; locate persons who may have been exposed; and isolate potentially infectious persons to prevent transmission of illness in the community.

Note: Maryland currently only requires reporting outbreaks and deaths related to chickenpox, but reporting hospitalized cases is encouraged.

Recommended case investigation procedures

(Refer to *Special Settings* Section for additional guidance on case/outbreak investigation procedures relevant to schools and hospitals.)

1) Confirm chickenpox diagnosis

Chickenpox testing is not routinely recommended in all instances. Testing is recommended for circumstances in which high risk individuals may have been infected/exposed or where there is a high risk for spread of disease or outbreak in schools, hospitals, and other settings where close contact may facilitate transmission. During an outbreak, laboratory confirmation for at least three to five cases is recommended.

- Obtain specimen for lab testing (Refer to *Testing/Laboratory Diagnosis* Section for details).

2) Interview the case-patient and make recommendations for exclusion

Interview the case-patient (or proxy) about contact with other known chickenpox or shingles cases or persons with symptoms of chickenpox in an effort to identify the source of infection.

- Assess the patient's exposure history within one previous incubation period (21 days).
- Utilize the CDC Varicella Surveillance Worksheet (attached) to guide the interview and collect other relevant information (i.e. demographics, clinical details, vaccine history, etc.).
- Confirmed cases of chickenpox should be excluded from school, work, and childcare, and minimize other activities where potentially susceptible people may be exposed, until all lesions are crusted over (usually 4-7 days after rash onset).

3) Identify exposed and susceptible persons

Initiate a contact investigation to identify persons who may have been exposed to chickenpox through contact with the case-patient during the infectious period (1-2 days before rash onset until all lesions are crusted over).

Persons can be considered **exposed to chickenpox** if they:

- 1) Had direct contact with vesicular fluid of skin lesions or respiratory secretions
- 2) Had face-to-face exposure within 3 feet
- 3) Shared close indoor contact (e.g., in the same room). Experts disagree about the duration of contact needed, ranging from >5 minutes to ≥ 1 hour, but agree that it does not include transitory contact.

Exposures can occur in various settings including: the home, workplace, school, prison, dormitory, airplane, doctor's office, etc. Contact with case-patients may vary widely in type and duration. Therefore, chickenpox exposures should be evaluated on a case-by-case basis following an interview with the case and/or contact person to determine the nature of exposure.

A **susceptible individual** is defined as a person who has not received age appropriate vaccination or does not have documented history of disease. In general, a person can be considered immune to chickenpox if they:

- 1) Have written documentation of age-appropriate vaccination:
 - a. Pre-school aged children aged ≥ 12 months: 1 dose
 - b. School-aged children, adolescents, and adults: 2 doses (for children who received their first dose at age <13 years and for whom the interval between the 2 doses was ≥ 28 days, the second dose is considered valid)
- 2) Have laboratory evidence of immunity:
 - a. Laboratory confirmation of disease
 - b. Serologic confirmation of immunity
- 3) Were born in the United States before 1980. For healthcare personnel, pregnant women, and immunocompromised persons, birth before 1980 should not be considered evidence of immunity.
- 4) Have documentation of diagnosis or verification of a history of chickenpox disease or shingles by a healthcare provider.

Healthcare worker (HCW) evidence of immunity includes:

- 1) Documentation of two doses of chickenpox vaccine administered at least 28 days apart with the first dose being administered no earlier than the first birthday;
- 2) Laboratory evidence of immunity to chickenpox or laboratory confirmation of disease;
- 3) Diagnosis or verification of a history of chickenpox or shingles by a health care provider.

Note: Birth before 1980 is not considered evidence of immunity for HCWs because of the potential for nosocomial transmission of chickenpox to high-risk patients.

Healthcare institutions should establish protocols and recommendations for screening and vaccinating HCWs and for management of HCWs after exposure in the workplace.

- Interview the case-patient regarding contact with others during the infectious period (1-2 days before rash onset until all lesions are crusted over (usually 4-7 days after rash onset)).
- If the case-patient reports travel (e.g. via plane) during the infectious period, contact staff at Maryland Department of Health Center for Immunization for assistance in identifying passengers and persons in other jurisdictions/locations who may need to be contacted.
- Obtain and document immunization histories and susceptibility information for all contacts.
- The need to collect specimens on symptomatic contacts should be evaluated on a case-by-case basis.

4) **Initiate chickenpox control measures**

Exposed contacts should be identified promptly and evaluated for their need to receive **post-exposure prophylaxis (PEP)**.

- Airborne, contact, and standard precautions are appropriate until all lesions have crusted over (usually 4-7 days after rash onset).
- Chickenpox vaccine should be administered within 3 to 5 days (72 – 120 hours) of exposure to susceptible people 12 months of age and older if there are no contraindications to vaccine use. ACIP recommends that all persons without evidence of immunity to chickenpox be offered vaccine even if more than 5 days have passed since the first exposure in order to provide protection against subsequent exposures.
- Among those that cannot receive chickenpox vaccine, Varicella Zoster Immune Globulin (VariZIG) may be administered as soon as possible after exposure and within 10 days. The decision to administer VariZIG depends on the exposed individual's susceptibility, probability that infection will occur, and the likelihood that complications of chickenpox will develop if the exposed person is infected. Physicians can request VariZIG by calling the 24-hour telephone numbers of FFF Enterprises (800-843-7477) or ASD Healthcare (800-746-6273).
- Candidates for VariZIG generally include immunocompromised susceptible people, susceptible pregnant women, a newborn infant whose mother had onset of chickenpox within 5 days before delivery or within 48 hours of delivery, and hospitalized pre-term infants in specific situations. Consult with MDH for other situations where VariZIG might be considered.
 - Note: CDC recommends that a healthy infant under 12 months of age should not receive any specific treatment or vaccination after exposure to chickenpox. The infant may be treated with acyclovir if chickenpox occurs.
- IVIG may be used within 10 days after exposure if VariZIG is not available. If neither VariZIG nor IVIG are available, oral acyclovir may be administered beginning 7-10 days after exposure for susceptible immunosuppressed people or those for whom vaccination is contraindicated. However, data are limited on acyclovir's effectiveness as a post-exposure prophylaxis among immunocompromised persons, and it is generally not recommended as PEP for immunocompetent individuals.

Exclusion and Monitoring

- Susceptible persons who receive vaccination within 3-5 days of exposure can be immediately readmitted to childcare or school (whether it is their 1st or 2nd dose of chickenpox vaccine). Healthcare workers who have already received 2 doses of vaccine, or receive their second dose within 3-5 days after exposure, may continue working while being monitored for symptoms during the 8-21 days after exposure.
- Persons who are medically exempt from chickenpox vaccination or who decline to be vaccinated should be excluded:
 - From schools and childcare through the 21st day after the onset of rash in the last case identified.
 - From the health care facility from the 8th day after first exposure through the 21st day after last exposure.
- During this time all susceptible contacts should be monitored for the development of symptoms consistent with chickenpox. If symptoms develop, they should be excluded until all lesions have crusted over (usually 4-7 days after rash onset).
- For a summary of exposure management, see **Table 1** on page 14-15.

5) Conduct surveillance

Active surveillance should be maintained for at least 2 incubation periods (42 days) after the rash onset of the last reported confirmed case to ensure that all cases are identified.

Table 1: Varicella Exposure Management Algorithm

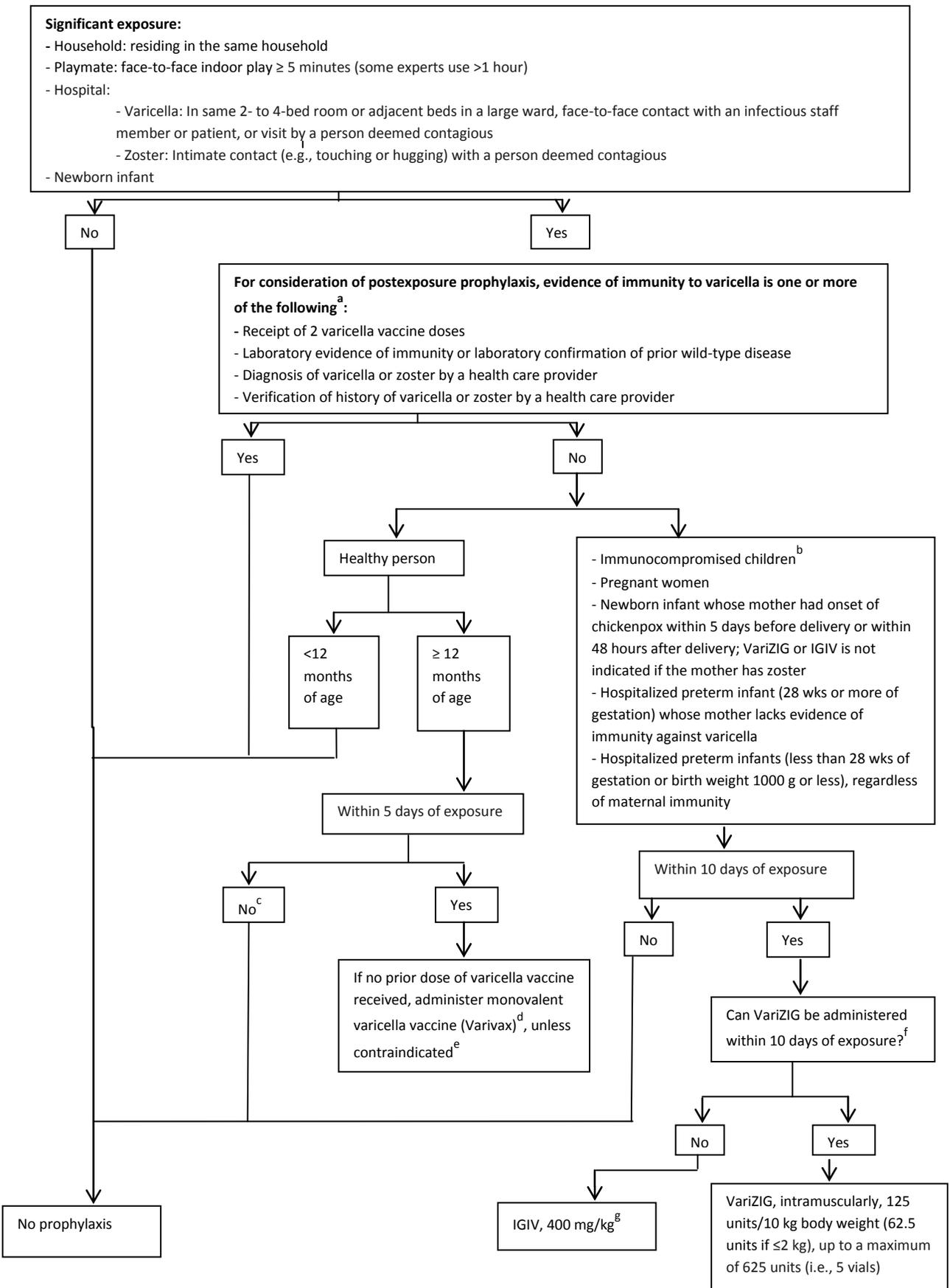


Table 1: Varicella Exposure Management Algorithm (continued)

- 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) Immunocompromised children include those with congenital or acquired T-lymphocyte immunodeficiency, including leukemia, lymphoma, and other malignant neoplasms affecting the bone marrow or lymphatic system; children receiving immunosuppressive therapy, including ≥ 2 mg/kg/day of systemic prednisone (or its equivalent) for ≥ 14 days; all children with HIV infection regardless of CD4+ T-lymphocyte percentage; and all hematopoietic stem cell transplant patients regardless of pretransplant immunity status.
- c) No postexposure prophylaxis, but age-appropriate vaccination still recommended for protection against subsequent exposures. If the exposure occurred during an outbreak, 2-dose vaccination is recommended for preschool-aged children younger than 4 years for outbreak control.
- d) Contraindications include patients who are allergic to a vaccine component, or who are immunocompromised (see above footnote), or pregnant. Caution should be used in patients receiving salicylates. Vaccine may not be as effective if patient has recently received Immune Globulin Intravenous, whole blood, or plasma transfusions, and for this reason, it is recommended that varicella vaccine be withheld for 3 to 11 months, depending on the dose, after administration of these products.
- e) Varicella Zoster Immune Globulin (VariZIG) was approved by the US Food and Drug Administration in December 2012. The product is manufactured by Cangene Corporation (Winnipeg, Canada), and distributed in the United States by FFF Enterprises (Temecula, California; 800-843-7477; www.fffenterprises.com) and ASD Healthcare (Frisco, TX) (telephone, 800-746-6273; online at www.asdhealthcare.com).
- f) If VariZIG and IGIV are not available, some experts recommend prophylaxis 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.

Source: American Academy of Pediatrics. Varicella. In: *Red Book: 2015 report of the committee on infectious diseases*. 30th Ed. Kimberlin DW, Brady MT, Jackson MA, Long SS, eds. Elk Grove, IL; American Academy of Pediatrics; 2015:853.

Special Settings

In addition to following the recommended steps for case investigation described above, the following chickenpox control measures should be conducted for cases and outbreaks occurring in settings where chickenpox can be transmitted easily due to crowding and/or close contact of individuals.

1) Schools and Childcare Centers

- Exclude the case-patient until no longer infectious.
- Assess immunity status of staff and students.
- Administer post-exposure vaccination to staff and students who are exposed and susceptible to chickenpox. In outbreak situations, a second dose of chickenpox vaccine is also recommended for children 1 to 4 years of age where vaccine is not contraindicated.
- Persons who receive post-exposure vaccination (whether it is their 1st or 2nd dose of chickenpox vaccine) can return to the school or childcare immediately.
- Persons who refuse post-exposure vaccination may be excluded from school or childcare through 21 days after the onset of rash in the last case of chickenpox identified in the school. Exclusions based on exposure to a single case should be made on a case-by-case basis.
- A notification letter should be sent to all parents of students attending the facility informing them about the case/outbreak. The letter should provide information about chickenpox and the recommendations for post-exposure prophylaxis.

2) Residential Institutions and Healthcare Settings

- Airborne and contact precautions are recommended for patients with chickenpox until all lesions have crusted (usually 4-7 days after rash onset). Employees with chickenpox should be placed on leave immediately.
- Assess immunization status of all exposed patients and HCW, including persons involved in direct patient care (e.g. nurses, physicians, phlebotomists) as well as persons who work in the patient care setting (e.g. clerical staff, front office staff, technicians).
- Only immune staff should care for patients with chickenpox infection.
- Exposed, susceptible patients should be placed under airborne and contact precautions from the 8th through the 21st day after exposure to the index patient (28 days for those who received VariZIG).
- Exposed HCWs who have received 2 doses of vaccine should be monitored daily during days 8-21 after exposure through the employee health program or by an infection control nurse to determine clinical status (i.e., daily screening for fever, skin lesions, and systemic symptoms).
- Exposed HCWs who have received 1 dose of vaccine and who are exposed to chickenpox should receive the second dose of vaccine within 3-5 days post exposure to rash (provided 4 weeks have elapsed after the first dose). After vaccination, management is similar to that of 2-dose vaccine recipients described above. Those who do not receive a second dose or who received a second dose >5 days after exposure should be excluded from work for 8-21 days after exposure.

- Unvaccinated HCWs who have no evidence of immunity and are exposed to natural chickenpox, disseminated shingles, or uncovered lesions of localized shingles are potentially infective from days 8-21 after exposure and should be furloughed during this period. Post-exposure vaccination should be administered as soon as possible after exposure; however vaccination is indicated even if greater than 5 days have elapsed because it will provide protection against subsequent exposures.
- In the case of an outbreak, HCW without evidence of immunity who have contraindications to vaccination should be excluded from the outbreak setting through 21 days after rash onset of the last identified case-patient because of the risk for severe disease in these groups.

Reporting

All suspected chickenpox deaths must be reported to MDH within 1 working day as stated per COMAR 10.06.01.03. Outbreaks are reportable to MDH within 24 hours of notification. All case investigations should be promptly entered into NEDSS (National Electronic Disease Surveillance System) and the information reviewed for completeness and accuracy. The table on the following page summarizes information that should be collected during case investigations and entered into NEDSS.

Table 2: Summary of information to collect during case investigation

Type of Information	Information to be collected and reported
Demographic	Name Address Date of birth Sex Race/Ethnicity Country of birth Reporting source Jurisdiction Date reported
Clinical	Pre-existing medical conditions History of chickenpox (to document reported second infections) Medications Date of rash onset Duration of rash Number of lesions (<50, 50-249, 250-499, ≥500)* Symptoms and date of onset Hospitalizations Complications
Laboratory information	Virus isolation test dates and results, if applicable PCR test dates and results, if applicable DFA test dates and results, if applicable Serologic test dates and results, if applicable
Epidemiologic	Transmission setting Source of transmission Vaccination status of source patient
Vaccination Status	Number of doses of chickenpox vaccine Date(s) of vaccination Type and manufacturer of vaccine Vaccine lot number If not vaccinated, reason
Outcome	Case classification Date of death, if applicable

* Note: <50 lesions can be counted in 30 seconds; ≥500 is a confluence of lesions in many skin areas.

Vaccine Adverse Events

Adverse events that occur after administration of the chickenpox vaccine should be reported to the Vaccine Adverse Event Reporting System (VAERS), a passive reporting system used to monitor vaccine safety. Any clinically significant events, unexpected events following vaccination and/or events listed on the vaccine manufacturer’s package insert should be reported to VAERS. Adverse events may be reported by submitting a VAERS form online. Visit <http://vaers.hhs.gov> for detailed instructions on reporting.

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Sample letter to parents of children in a school:

Dear Parent,

Several cases of chickenpox have been reported in students attending our school. Although chickenpox is usually not a serious illness, it often causes children to miss days at school while they have a rash.

Chickenpox is a highly contagious disease that is spread by coughing and sneezing, by direct contact and by the virus from skin lesions. Symptoms of chickenpox include a skin rash of blister-like lesions, covering the body but usually more concentrated on the face, scalp, and the trunk. Most, but not all, infected individuals have fever, which develops just before or when the rash appears.

If your child does develop symptoms of chickenpox, notify your child's health care provider. Your child will be excluded from attending school until the rash has crusted over, which occurs in about a week. Please notify the school nurse to inform them if your child becomes ill within the next week, especially if your child is diagnosed with the chickenpox disease.

If your child develops chickenpox and has been around any adults or children that are pregnant, undergoing treatment for cancer, are currently taking a long term steroid medication for certain health conditions, or have been diagnosed with HIV, please have them contact their doctor for further advice.

For the 2017-2018 school year, two doses of chickenpox vaccine are required for students in Kindergarten and Grades 1-3, while students in Grades 4-12 may have one or two doses. In general it is recommended by the Centers for Disease Control and Prevention and the Maryland Department of Health that students receive two doses. The varicella (chickenpox) vaccine has been used successfully to control the spread of cases in certain settings. Please contact your child's physician if you are unsure if your child has had two chickenpox vaccines. If exposed, persons who have been vaccinated against the disease may get a milder illness, with less severe rash (sometimes only involving a few red bumps that look similar to insect bites) and mild or no fever.

If you have any questions or concerns, please contact (school nurse at ###-###-####) or the (county name) Health Department at ###-###-####.

Sincerely,

Sample letter to parents of children in childcare:

Dear Parent,

Several cases of chickenpox have been reported in students attending our daycare. Although chickenpox is usually not a serious illness, it often causes children to stay home while they have a rash.

Chickenpox is a highly contagious disease that is spread by coughing and sneezing, by direct contact and by the virus from skin lesions. Symptoms of chickenpox include a skin rash of blister-like lesions, covering the body but usually more concentrated on the face, scalp, and the trunk. Most, but not all, infected individuals have fever, which develops just before or when the rash appears.

If your child does develop symptoms of chickenpox, notify your child's health care provider. Your child will be excluded from attending daycare until the rash has crusted over, which occurs in about a week. Please notify the school nurse to inform them if your child becomes ill within the next week, especially if your child is diagnosed with the chickenpox disease.

If your child develops chickenpox and has been around any adults or children that are pregnant, undergoing treatment for cancer, are currently taking a long term steroid medication for certain health conditions, or have been diagnosed with HIV, please have them contact their doctor for further advice.

Children enrolled in childcare aged 12 months and older are required to have one dose of varicella (chickenpox) vaccine. The varicella (chickenpox) vaccine has been used successfully to control the spread of cases in certain settings. Please contact your child's physician if you are unsure if your child has received a dose of chickenpox vaccine. If exposed, persons who have been vaccinated against the disease may get a milder illness, with less severe rash (sometimes only involving a few red bumps that look similar to insect bites) and mild or no fever.

If you have any questions or concerns, please contact (school nurse at ###-###-####) or the (county name) Health Department at ###-###-####.

Sincerely,