Varicella (Chickenpox) Investigation Guideline

Contents

- Fact Sheet (vs. 10/2015)
- Sample Letter, Parent Notification (vs. 10/2015)
- CDC Varicella Death Investigation Worksheet (vs. 10/2012)

Attachments can be accessed through the Adobe Reader's navigation panel for attachments. Throughout this document attachment links are indicated by this symbol; when the link is activated in Adobe Reader it will open the attachments navigation panel. The link may not work when using PDF readers other than Adobe Reader.

Reviewed 10/2015
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Revision History:

Date	Replaced	Comments
10/2015	08/2014	Clinical description modified with CCDM updates to better define typical and atypical rash. Modification to "susceptible contact" in Contact Investigation section to include ACIP definitions. Minor editing in Contact Management section to clarify different post-exposure strategies. Updated patient groups for whom VariZIG is recommended to agree with ACIP 2013 recommendations.
08/2014	04/2014	Added a table of contents and reformatted Standard Case Investigation and Data Management section to assist with EpiTrax System data entry. Updated laboratory analysis section, specifically in reference to the discontinuation of viral culture at KHEL. Updated fact sheet and Parent Notification Letter for school year 2014-15.
04/2014	07/2012	Clarified standard investigation of reported cases from non-physicians. Updated Parent Notification Letter. Updated Laboratory Analysis and Data Management. Added Death Investigation Worksheet.
07/2012	11/2011	Updated Parent Notification Letter and fact sheet with school immunization recommendations. Updated passive immunization strategies for VZIG administration up to 10 days post exposure. Added supplemental reporting form.
11/2011	06/2010	Added notification section. Removed reference to BSE. (02/2012) Removed references to KS-EDSS.
06/2010	01/2010	Updated Parent Notification Letter and fact sheet. Addition of VAERS statement under Contact Management.
01/2010	04/2009	Format changes to Investigation Protocol. Revised CDC Case Definition.
04/2009	11/2008	Updated Varicella Supplemental Form.

Varicella (Chickenpox)
Disease Management and Investigative Guidelines

CASE DEFINITION - Varicella (CDC 2010)

Clinical Description for Public Health Surveillance:
An illness with acute onset of diffuse (generalized) maculo-papulovesicular rash without other apparent cause.

Laboratory Criteria for Case Classification:
- Isolation of varicella virus from a clinical specimen, or
- Varicella antigen detected by direct fluorescent antibody test, or
- Varicella-specific nucleic acid detected by polymerase chain reaction (PCR), or
- Significant rise in serum anti-varicella immunoglobulin G (IgG) antibody level by any standard serologic assay.

Case Classification:
- **Confirmed:** Acute illness with diffuse (generalized) maculo-papulovesicular rash, AND
  - Epidemiologic linkage to another probable or confirmed case, OR
  - Laboratory confirmation by any of the following:
  - Isolation of varicella virus from a clinical specimen, OR
  - Varicella antigen detected by direct fluorescent antibody test, OR
  - Varicella-specific nucleic acid detected by polymerase chain reaction (PCR), OR
  - Significant rise in serum anti-varicella immunoglobulin G (IgG) antibody level by any standard serologic assay.
- **Probable:** An acute illness with:
  - Diffuse (generalized) maculo-papulovesicular rash, AND
  - Lack of laboratory confirmation, AND
  - Lack of epidemiologic linkage to another probable or confirmed case.

Comment:
- 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 not routinely recommended; laboratory confirmation is recommended for fatal cases and in other special circumstances.

CASE DEFINITION – Varicella Death (CDC 1998)

- **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.

LABORATORY ANALYSIS

Kansas Health and Environmental Laboratories (KHEL) will not provide testing for varicella (VZV) diagnosis. Testing must be obtained from commercial sources.

As fewer people get chickenpox and because VZV may be mild and atypical in vaccinated individuals, laboratory confirmation can assist medical providers with diagnosis of atypical VZV.

Laboratory testing is also recommended to:

- Confirm VZV as the cause of outbreaks
- Establish VZV as a cause of death
- Determine a person's susceptibility to VZV

While commercial assays are used to assess disease-induced immunity, they lack adequate sensitivity to reliably detect vaccine-induced immunity. False-negative results may occur when trying to determine vaccine induced immunity.

Commercially available laboratory testing includes:

- PCR to detect VZV in skin lesions – most reliable and sensitive method.
- IgM serology – false negatives can occur, but a positive IgM result can suggest: primary infection, re-infection, or reactivation of latent VZV. (Clinical evaluation is necessary to distinguish VZV from herpes zoster.)
- IgG serology – indicates that a person has antibodies to VZV from current/past varicella disease or from vaccination.

For further information on laboratory testing and specimen collection, refer to:

- Guidance provided by your chosen laboratory provider
- CDC: www.cdc.gov/chickenpox/lab-testing/index.html

EPIDEMIOLOGY

Chickenpox has a worldwide distribution with increased prevalence noted in temperate climates. It occurs year round with the most frequent incidence in the winter and early spring. Most U.S. cases occur in children <12 years of age. Recent changes in the distribution of disease are due to an increasing proportion of children receiving vaccination. As vaccine coverage increased and the incidence of wild-type varicella decreased, a higher proportion of cases occurred in immunized people as breakthrough disease. CDC's active surveillance sites report breakthrough disease at an increased percentage of all cases, from 4% in 1995 versus approximately 25% in 2000. Do not confuse this as an increasing rate of breakthrough disease or as evidence of vaccine failure. In areas with high vaccine coverage, the rate of disease has decreased by approximately 85% from 1995 to 2004 as a result of the varicella vaccine. Varicella is not a bioterrorism agent but is part of the differential diagnosis when investigating a potential smallpox case.

DISEASE OVERVIEW

A. Agent:

Varicella-zoster virus is a member of the herpesvirus family.

B. Clinical Description:

Mild **prodrome** may precede the onset of a rash, with adults experiencing 1 to 2 days of fever and malaise. In children, rash is often the first sign of disease.

Clinical course in healthy children is generally mild, with malaise, itching and fever up to 102°F for 2-3 days but no respiratory or gastrointestinal symptoms. Adults may experience more severe illness.

Typical rash (in susceptible individuals) is generalized and pruritic (itchy) consisting of 250-500 lesions in varying stages of development. Lesions progress from macules (flat, distinct erythema) with papules (small solid round bumps) that are present for a few hours and then develop rapidly into vesicles (fluid-filled sacs) and pustules (pus filled sacs) that are 1-4 mm diameter and last for 3-4 days before crusting and leaving granular scabs.

- Vesicles are superficial, unilocular, and collapse on puncture.
- Lesions commonly occur in successive crops for 3-7 days with several stages of maturity present at same time.
- Lesions tend to have a central distribution: more on trunk and proximal extremities.
- Lesions may appear on scalp, high in axilla, on mucous membranes of mouth and upper respiratory tract, and on conjunctivae.

Breakthrough varicella is varicella that develops more than 42 days after vaccination; most (~70%) breakthrough disease are mild with a slightly elevated to no fever and fewer than 50 lesions that are papules that do not generally progress to vesicles.

Herpes zoster rash is a reactivation of latent VZV in a person who previously had VZV. Small vesicles with the erythematous base appear and are restricted to areas supplied by the sensory nerves of a single or associated group of dorsal root ganglia. The rash is unilateral and most commonly affects thoracic (chest), cervical (neck, shoulders, arms), or ophthalmic (eyes, forehead) dermatomes. Only a small numbers of lesions will appear outside of the primary dermatome, unless the individual is immunosuppressed or has other malignancies. The lesions are similar to those of varicella, but are deeper seated and more closely aggregated with the rash lasting about 7-10 days and healing within 2-4 weeks.

Complications of varicella are most frequent in immunocompromised persons, pregnant women and adults. While infrequent among healthy children, they do occur more frequently with those $\geq$15 years of age and infants $\leq$1 year of age. The most common complications are secondary bacterial infection of skin lesions by *Staphylococcus or Streptococcus spp.*, dehydration, pneumonia and central nervous system involvement. The overall case-fatality rate in the United States is 2/100,000 but rises to 30/100,000 in adults. Neonates developing varicella between ages 5-10 days, and those whose mothers develop the disease between 5 days prior or within 2 days after delivery are at increased risk of developing severe generalized varicella with a fatality rate of up to 30%. Immunocompromised persons have a high risk of disseminated disease.

C. Reservoirs: Humans.

D. Mode(s) of Transmission:
By direct person-to-person contact from infected respiratory tract secretions. Transmission may also occur by respiratory contact with airborne droplets or by direct contact or inhalation of aerosols from vesicular fluid or skin lesions of acute varicella or zoster. While highly contagious, varicella is less contagious than measles, but more so than mumps and rubella. Secondary attack rates among susceptible household contacts of varicella are as high as 90%.

- Transmission of vaccine-type virus is extremely rare and has never been documented from a vaccinated person without a vaccine rash.

E. Incubation Period:
Usually 14-16 days after exposure, with a range of 10-21 days.

- Incubation period may be prolonged for as long as 28 days in those who were administered varicella zoster immune globulin (VZIG) and it may be shortened in those with immunodeficiencies.
- Infants born to mothers with active varicella can develop varicella 2 to 16 days after birth.

F. Period of Communicability:
1 to 2 days before rash onset up until lesions have formed crusts, which usually occurs within 5 days. It may also be prolonged in patients with altered immunity.

- Patients with herpes zoster are infectious while active (vesiculopustular lesions are present, usually 7-10 days.
- Susceptible individuals considered potentially infectious 8-21 days following exposure to VZV (or 28 days if they receive passive immunization).

G. Susceptibility and Resistance:
Infection confers long-term immunity and secondary attacks are rare. However, viral infection remains latent and disease may recur years later as herpes zoster in a proportion of older adults and occasionally in children. A second occurrence of chickenpox is not common but can happen particularly in immunocompromised persons.

H. Vaccination:
CDC recommends two doses of chickenpox vaccine for susceptible children, adolescents, and adults. Two doses of the vaccine are about 98% effective at preventing chickenpox.

- Current ACIP varicella vaccine recommendations can be found at: http://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/varicella.html

I. Treatment
Antiviral therapy is moderately effective in treating varicella and herpes zoster infections: acyclovir, valacyclovir or famcyclovir are considered the agents of choice for treatment of varicella. In the case of resistance, foscarnet is considered the second line drug. (Further treatment options are available through the American Academy of Pediatrics (AAP) Red Book.

NOTIFICATION TO PUBLIC HEALTH AUTHORITIES

Varicella (chickenpox) shall be designated as infectious or contagious in nature, and cases or suspect cases shall be reported within seven days:

1. Health care providers, school administrators or nurses, and hospitals: report to the local public health jurisdiction (The Special Form for Reporting Varicella (Chickenpox) is available for this purpose.)
2. Local public health jurisdiction: report to KDHE-BEPHI (see below)
3. Laboratories: report to KDHE-BEPHI (see below)

Kansas Department of Health and Environment (KDHE)
Bureau of Epidemiology and Public Health Informatics (BEPHI)
Phone: 1-877-427-7317
Fax: 1-877-427-7318

(Local public health can report cases with New CMR creation in EpiTrax.)

Further responsibilities of state and local health departments to the CDC:

As a nationally notifiable condition, Varicella (chickenpox) cases require a STANDARD report to the Center of Disease Control and Prevention (CDC).

1. STANDARD reporting requires KDHE-BEPHI to file an electronic report for cases within the next reporting cycle.
   - KDHE-BEPHI will file electronic reports weekly with CDC.
2. **Local public health jurisdiction** will :
   - Start the case investigation **within 1 day** of receiving a notification and
   - Report the information requested in the Kansas EpiTrax system, as soon as possible, ensuring that the electronic form is completed within 5 days of receiving a notification of a report.

INVESTIGATOR RESPONSIBILITIES

1) Report all confirmed and probable cases to the KDHE-BEPHI.
2) Begin the public health investigation within **1 day** of receiving a report; completing the investigation within 5 days.
3) Contact medical provider or person reporting the illness to collect additional information and confirm diagnosis using current case definition.

   Note to investigator:

   Cases do not need to be diagnosed by a physician.

   Reports are accepted from parents, nurses, school staff and others.

   In the absence of a health care provider diagnosis, the local investigator must assess the signs and symptoms elicited from the reporter to determine if the case definition is met and if follow-up is necessary.

   - Collect all information requested in Step 1) of case investigation.
   - Ensure the case is aware of his/her diagnosis.
4) Conduct a case investigation to identify potential source of infection.
5) Conduct contact investigation to identify cases and susceptible contacts.
6) Identify whether the source of infection is major public health concern.
   - Involvement of a school or a daycare.
   - Susceptible contact who may be pregnant.
   - Varicella associated death.
   - Suspected outbreak.
7) Initiate control and prevention measures to prevent spread of disease.
   - If needed, work with administrative personnel to initiate work and/or school restrictions for high-risk cases and/or contacts.
   - Provide education that includes basic information about the disease and complications and ways to prevent transmission of illness.
   - Assure prophylactic measures were received by susceptible contacts.
   - Follow-up with case(s) and contacts to assure compliance with work and/or school restrictions.
   - Report outbreaks immediately to KDHE at 1-877-427-7317.
8) Record data, collected during the investigation, in the KS EpiTrax system under the data's associated [tab] in the case morbidity report (CMR).
9) As appropriate, use notification letter(s) and the disease fact sheet.

STANDARD CASE INVESTIGATION AND CONTROL METHODS *

Case Investigation

1) Contact the medical provider or person reporting the case and obtain the following information. (This includes medical records for hospitalized patients.)
   - Collect case's demographics and contacting information (address, birth date, gender, race/ethnicity, primary language, and phone number(s)) [Demographic]
   - Examine the laboratory testing that was done; report any testing that has not yet been reported to the state. Fax or [Add Attachment]
   - Obtain clinical information on onset date of the first symptoms, date diagnosed (with lab results), and date diagnosed-presumptive (without lab results). [Clinical]
   - Verify the patient's symptoms of chicken pox. [Investigation-Symptoms]
     - Date of rash onset; rash location, number and character of lesions
     - Note any fever, including highest measured temperature
   - Note if the patient is immunocompromised. [Investigation-Symptoms]
   - Note any complications the patient experienced: [Investigation-Complications]
     - First, did case visit a healthcare provider during illness?
     - If yes, note any complications diagnosed, including: infections, cerebilitis/ataxia, encephalitis, pneumonia, dehydration, hemorrhagic conditions, or other complications.
   - Record hospitalizations: location, admission and discharge dates [Clinical]
   - Record outcomes: recovered or date of death. [Clinical]
     - For deaths, additional data collection is required. Refer to the data management section.
   - Record pregnancy status, including expected delivery date [Clinical]
   - Record history of varicella disease or vaccine: [Investigation-Vaccination History]
     - If not vaccinated, state the reason for no vaccination.
     - If vaccinated, include vaccination dates, vaccine type, manufacturer, and lot number.
     - If >6 years old and received only one dose, but never received 2nd dose, state the reason for under-vaccination.

* Please note the red [tab] names listed in this investigation guideline are notations on the location in EpiTrax where the collected data should be recorded.

2) Interview to determine source, risk factors and transmission settings:
   - Focus on **10-21 days prior to rash onset** for determining sources and on **2 days prior to through the crusting over or 6 days after** rash onset for transmission.
   - Collect epidemiological information: [Epidemiological]
     - Examine case's contact oriented associations with/as: healthcare worker, group living, and daycare or school association, making note of case's grade and teacher or specific occupation.
     - If yes is recorded for any contact oriented associations, record place of potential exposure (where they could have acquired or transmitted illness) this includes daycare, school and group living locations.
     - Note travel dates and locations to record where the infection was most likely imported from. (Indigenous/ or out-of- county, state, or U.S.)
   - Collect information for the Contact Investigation.
3) Investigate epi-links among cases and contacts:
   - If the case had contact with person(s) who have/had VZV or VZV rash-like illnesses determine if the other "cases" have been reported to the state.
     - Obtain dates of exposure, relationship to case, transmission setting, and name with date of birth of possible sources.
     - Search EpiTrax for the possible case.
     - If found, record the previously reported record number in the record of the case you are investigating [Notes]
   - Highly suspected cases, that have not previously been reported should be investigated as a suspect case and reported to KDHE-BEPHI:
     - In EpiTrax, enter the symptomatic contact (a previously unreported case) on the [Contact] tab of the CMR you are investigating and save the entry.
     - Click 'Show' beside the symptomatic contact on the listing.
     - When View Contact Event opens in show mode, select 'Promote to CMR'
   - If an outbreak is suspected, notify KDHE immediately, 1-877-427-7317.
     - **Outbreak definitio**n: five or more cases in a specific setting that are epidemiologically linked.
     - For suspected Outbreak refer to Managing Special Situations section

Contact Investigation

The goal of contact investigation is to identify the "susceptible persons" cited in K.A.R. 28-1-6 and to ensure that effective preventive measures are taken.

Note: For the purposes of K.A.R. 28-1-6, ''susceptible person'' is a susceptible contact who meets both of the following conditions:

(A) Has been exposed to an infected person or a contaminated environment in a manner sufficient to provide the individual with an opportunity to acquire that particular disease; and

(B) Unable to demonstrate the varicella immunity that is determined to be acceptable by the KDHE, defined by:

- Documentation of age-appropriate vaccination, at least one dose.
- Laboratory evidence of immunity or confirmation of disease.
- Birth in the United States before 1980, with the exception of
  - Healthcare personnel and pregnant women – other evidence of immunity is required.
- A healthcare provider diagnosis or verification of varicella:
  - Verification of history or diagnosis of typical disease can be done by any healthcare provider (e.g., school or occupational clinic nurse, nurse practitioner, physician assistant, physician).
  - Verification of atypical and/or mild cases requires assessment by a physician or designee, and one of the following: a) an epidemiologic link to a typical varicella case, or b) evidence of laboratory confirmation if laboratory testing was performed at the time of acute disease. (When such documentation is lacking, a person should not be considered as having a valid history of disease, because other diseases may mimic mild or atypical varicella.)
- History of herpes zoster based on healthcare provider diagnosis.

1) Review the case's occupation and activities that were collected during the case investigation and recorded on the [Epidemiological] tab, especially dates, activities and locations during the period from illness onset till the resolution of symptoms. While evaluating potential contacts, ask these questions:
   - Was there enough exposure to provide an opportunity to acquire disease?
   - Even if the exposure risk is low, does the possibility of severe complications in the exposed individual warrant including them as a contact?

2) Consider the following types of contacts during a contact investigation:
   - Household contacts: Residing in the same household.
   - Daycare contacts: All direct caregivers and room/classmates of case.
   - School contacts: consider interaction patterns, possibility of shared airspace, face-to-face contact and saliva exchange, including:
     - Sharing same classroom (staff, students, and volunteers);
     - Sitting at same table in a lunchroom;
     - Riding the same bus/carpooling; or
     - Participating on the same sports team or extracurricular activity.

- Close personal contacts or playmates: Face-to-face* indoor activities
- Work contacts: Coworkers sharing the same workspace of a case.
- Healthcare workers: Face-to-face* contact with patient.
- Patients: In same 2- to 4- room or in adjacent beds in large wards with an infectious patient or those visited by a person deemed contagious
- Newborn infant: Mother's onset of varicella ≥5 days before delivery or <48 hours after delivery.

* **Face-to-face contact:** Experts differ in opinion about the duration for **face-to-face** contact that is considered significant exposure. However the contact should not be short lived. (i.e., some experts suggest a contact of 5 or more minutes as warranting VZIG administration; while others define close contact as >1 hour).

3) After identifying potential contacts, create a line listing of contacts considered susceptible and at risk of developing disease, note contact type. [Contact]
   - Contacts with a positive disease history can be considered immune.
   - Contacts with a single dose of varicella vaccine are considered immune, but a second dose should be recommended.
   - Contacts with negative or unknown history are assumed susceptible
4) Follow-up with susceptible contacts as indicated in Contact Management.
5) Any symptomatic contacts are considered a confirmed case; investigate and report to the state; initiate any work, school, or daycare restrictions.

Isolation, Work and Daycare Restrictions

K.A.R. 28-1-6 for Chickenpox (varicella):

- Each infected person shall remain in isolation for six days after the first crop of vesicles appears or until the lesions are crusted, whichever comes first.
- Each susceptible person in a school, child care facility, or family day care home shall be either vaccinated within 24 hours of notification to the secretary or excluded from the school, the child care facility, or the family day care home until 21 days after the onset of the last reported illness in the school, the child care facility, or the family day care home.

1) Varicella cases shall be excluded from school, daycare or work and voluntarily remain in isolation at home for 6 days after the first crop of vesicles appears or until the lesions are crusted, whichever comes first.
2) Susceptible contacts who are attendees, students or staff and who are not immunized shall be excluded from school or daycare until 21 days after the last onset of varicella illness at the facility.
3) Hospitalized cases should be placed in isolation with airborne and contact precautions and be attended by or visited only by persons who are immune to varicella until all of the case's vesicles have formed scabs.

   Note: For the management of herpes zoster (shingles) case-patients as potential sources for varicella refer to the Managing Special Situations Section.

Case Management

1) Educate case on measures to prevent transmission.
2) Follow-up as needed to assure compliance with restrictions or exclusions.
   - Case isolation inside a household is not usually feasible but cases should still refrain from contact outside of the household during the isolation period.
3) If necessary, reference the Kansas Community Containment Toolbox for templates concerning isolation measures.
4) Report any changes in patient status (hospitalization or date of death). [Clinical]

Contact Management

1) Provide education to susceptible contacts on the benefits of vaccination, incubation period, symptoms and precautions to take if symptoms develop.
   - All contacts should monitor for signs and symptoms of varicella for 21 days from last exposure date or for 28 days if receiving VZIG.
2) For school and hospital settings, active surveillance should be conducted for 21 days after the last confirmed or probable case was reported in school and health care settings.
3) Assure proper prophylactic measures occur for susceptible contacts.
   - Active immunization strategies within 3-5 days post-exposure.
   - Passive immunization strategies within 10 days post-exposure
   - If more than 10 days have passed since exposure, administration of acyclovir may be an option to possibly prevent or modify varicella in exposed individuals for whom VZIG would have been recommended.
4) Follow-up with susceptible contacts listed on the [Contact] tab to determine if any became infected and to assure compliance with restrictions or exclusions.
5) A symptomatic contact is consider a case requiring investigation, possible initiation of restrictions, and additional reporting to KDHE-BEPHI [Contact]
   (On the Contact Tab of the CMR, click 'Show' beside the symptomatic contact on the listing. When View Contact Event opens in show mode, select 'Promote to CMR')

Active immunization with Varicella vaccine:

- May prevent/modify disease progression if given within 3-5 days of exposure.
- If there are a significant number of susceptible contacts, vaccination strategy discussions should occur between the local medical officer and the State Immunization Program, with coordination through the BEPHI.
- All susceptible adults and children should be considered for vaccination.
  - Administer varicella vaccine to susceptible contact(s) age ≥12 months of age, unless vaccine is contraindicated.
  - Non-immune contacts that are unable to receive varicella vaccine within 3-5 days of exposure should isolate themselves at home.
  - Recommend vaccination of non-immune childcare or school contacts even if the time since exposure is > 5 days, to provide protection from future exposure, especially if there is ongoing transmission in that setting.
- Report any adverse event that occurs after the administration of a vaccine to Vaccine Adverse Events Reporting System at http://vaers.hhs.gov/index.

Passive immunization strategies using varicella zoster immune globulin (VZIG):

- VZIG may help prevent or modify disease progression if given up to 10 days after exposure.
- If it is indicated, VZIG should be administered as soon as possible after exposure as varicella incidence (while attenuated) increases with increasing time between exposure and administration of the immune globulin.
- The use of VZIG for passive immunization should be discussed with the local medical officer and the State Immunization Program, with coordination through the KDHE-BEPHI.
- The decision to administer VZIG depends on: 1) whether the patient lacks evidence of immunity to varicella, 2) whether the exposure is likely to result in infection, 2) whether the patient is at greater risk for varicella complications than the general population. The patient groups recommended by ACIP to receive VZIG include the following:
  - Immunocompromised patients without evidence of immunity.
  - Newborn infants whose mothers have signs and symptoms of varicella around the time of delivery (i.e., 5 days before to 2 days after).
  - Hospitalized premature infants born at ≥28 weeks of gestation whose mothers do not have evidence of immunity to varicella.
  - Hospitalized premature infants born at <28 weeks of gestation or who weigh ≤1,000 g at birth, regardless of their mothers' evidence of immunity to varicella.
  - Pregnant women without evidence of immunity.
- For high-risk patients who have additional exposures to VZV >3 weeks after initial VZIG administration, another dose of VZIG should be considered.
- Since VZIG may prolong the incubation period by ≥ 1 week, persons receiving VZIG are followed-up 28 days after exposure.

  Note: The VZIG product used in U.S. is VariZIG. It can be obtained 24 hours a day from the sole authorized U.S. distributor (FFF Enterprises) at 1-800-843-7477 or at http://www.fffenterprises.com (ACIP, 2013).

Environmental Measures

Disinfect all items that have been soiled with discharges of nose, throat and lesions of a case.

Education

1) As needed, inform of communicability, incubation period and symptoms.
2) Provide basic instruction to cases about preventing complications:
   - Keeping fingernails short and control scratching of lesions.
   - Possible complications: viral pneumonia, encephalitis, secondary infections, and Reye syndrome.
   - Children with varicella should not receive aspirin or medication containing salicylate, which is associated with development of Reye syndrome.
3) Use the Public Health Fact Sheet on varicella to assist with education.

MANAGING SPECIAL SITUATIONS

A. Outbreak Investigation:

- Outbreak definition: five or more cases in a specific setting that are epidemiologically linked.
- Notify KDHE immediately, 1-877-427-7317.

B. School Worker or Attendee, including daycare facilities:

- Coordinate activities with school nurse and school administration.
- Identify potential contacts and obtain information on history of varicella or vaccination status for varicella for those contacts.
- With local health officer and state Immunization Program to develop strategies for immunization of susceptible contacts.
- Initiate any work or school restrictions for case and susceptible contacts.
- Follow-up with contacts 21 days after last exposure.
- Reference K.A.R. 28-1-20 for immunization requirements for the current school year; on-line at: www.kdheks.gov/immunize/schoolInfo.htm

C. Health Care Setting:

For a hospital varicella or zoster exposure, the following control measures are recommended (The recommendations are excerpted from the 2009 Red Book):

1) Exposure is defined as:
   - Varicella: In the same 2- to 4-bed room or adjacent beds in a large ward, face-to-face contact with an infectious staff member or patient, or visit by a person considered contagious.
   - Zoster: Intimate contact (e.g., touching or hugging a person considered contagious)
2) Exposed health care workers (HCW) and patients who lack evidence of immunity to varicella should be identified.
3) Varicella immunization is recommended for people without evidence of immunity, provided there are no contraindications to vaccine use.
4) VZIG should be administered to appropriate candidates. If VZIG is not available, Immune Globulin Intravenous (IGIV) is recommended.
5) All exposed patients without evidence of immunity should be discharged as soon as possible.
6) All exposed susceptible patients who cannot be discharged should be placed in isolation from day 8 to day 21 after exposure to the index patient. For people who received VZIG or IGIV, continue isolation until day 28.
7) All exposed HCW without evidence of immunity should be furloughed or excused from patient contact from day 8 to day 21 after exposure to an infectious patient or to day 28 for people who have received VZIG or IGIV.
8) Serologic testing for immunity is not necessary for HCW who have been immunized. For more information, see the recommendations of the Advisory Committee on Immunization Practices (ACIP) of the CDC.
9) Exposed HCW who have received 2 doses of vaccine should be monitored daily during days 8-21 after exposure to determine clinical status

- HCW should report fever, headache, or other constitutional symptoms and atypical skin lesions immediately.
- Immunized workers who develop breakthrough infection should be considered infectious
- HCW should be placed on sick leave immediately if symptoms occur.

10) HCW who have received 1 dose of vaccine and are exposed should receive the 2nd dose of single-antigen varicella vaccine within 3-5 days after exposure to rash. After vaccination, management is similar to that of 2-dose vaccine recipients

D. Herpes zoster (HZ) case-patients as potential sources of varicella:

- **School settings.**
  - Immunocompetent persons with HZ can remain at school as long as the lesions are completely covered. Stress personal hygiene with the washing of hands after lesions are touched and the avoidance of close contact with others. If the lesions cannot be completely covered or close contact avoided, children and/or staff should be excluded from the school setting until lesions have crusted over.
  - If a person has disseminated HZ, he or she should be excluded from school until lesions have crusted over (similar to the management of varicella case-patients).
- **Residential institution and healthcare settings.**
  - For immunocompetent residents or patients with localized HZ, lesions should be completely covered and contact precautions should be followed.
  - For immunocompromised persons with HZ or persons with disseminated HZ, the management is similar to that of varicella case-patients.
  - For healthcare personnel who develop HZ, lesions should be completely covered with a taped dressing and, in addition to standard contact precautions, the healthcare worker should be removed from direct care of patients at high risk of severe complications from varicella. A healthcare worker with disseminated HZ should be excluded from work until lesions have crusted over.

DATA MANAGEMENT AND REPORTING TO THE KDHE

A. Accept the case assigned to the LHD and record the date the LHD investigation was started on the [Administrative] tab.

B. Organize and collect data, using appropriate data collection tools including:
- EpiTrax Varicella Investigation Form (A paper-based form that allows the collection of all required information without being logged into EpiTrax.)
- Alternatively, investigators can collect and enter all required information directly into EpiTrax [Investigation], [Clinical], [Demographics], and [Epidemiological] tabs.
- For deaths, additional fields will load in the EpiTrax Case Morbidity Record (CMR) when a death is indicated in the system.
  - ✓ The CDC Varicella Death Investigation Worksheet can be of assistance.
- During outbreak investigations, refer to guidance from a KDHE epidemiologist for appropriate collection tools.

C. Report data collected during the course of the investigation via EpiTrax**.**
- Verify that all data requested on the Varicella Investigation Form has been recorded on an appropriate EpiTrax [tab], or that actions are completed for a case lost to follow-up as outlined below.
- Some data that cannot be reported on an EpiTrax [tab] may need to be recorded in [Notes] or scanned and attached to the record.
- Paper report forms do not need to be sent to KDHE after the information is recorded in EpiTrax. The forms should be handled as directed by local administrative practices.

D. If a case is lost to follow-up, after the appropriate attempts to contact the case have been made:
- Indicate 'lost to follow-up' on the [Investigation] tab with the number of attempts to contact the case recorded.
- Record at least the information that was collected from the initial reporter.
- Record a reason for 'lost to follow-up' in [Notes].

E. Once the investigation is completed, the LHD investigator will record the date the investigation was completed on the [Administrative] tab and click the "Complete" button. This will trigger an alert to the LHD Administrator so they can review the case before sending to the state.
- The LHD Administrator will then "Approve" or "Reject" the CMR.
- Once a case is "Approved" by the LHD Administrator, BEPHI staff will review the case to ensure completion before closing the case. (Review the EpiTrax User Guide, Case Routing for further guidance.)

Note: Two probable cases that are epi-linked are reported as confirmed cases.

ADDITIONAL INFORMATION / REFERENCES

A. **Treatment / Differential Diagnosis:** Red Book: 2015 Report of the Committee on Infectious Diseases. 30th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2015:846-860.

B. **Epidemiology, Investigation and Control:** Heymann. D., ed., Control of Communicable Diseases Manual (CCDM), 20th Edition. Washington, DC, American Public Health Association, 2015.

C. **Case Definitions:** CDC Division of Public Health Surveillance and Informatics, Available at: wwwn.cdc.gov/nndss/

D. **Quarantine and Isolation:** Kansas Community Containment Isolation/ Quarantine Toolbox Section III, Guidelines and Sample Legal Orders www.kdheks.gov/cphp/operating_guides.htm

E. **Kansas Regulations/Statutes Related to Infectious Disease:** www.kdheks.gov/epi/regulations.htm

F. **Kansas Special Form for Reporting Varicella (Chickenpox):** www.kdheks.gov/epi/download/Varicella_Reporting_Form.pdf

G. **Prevention of Varicella**. Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR June 22, 2007 / 56(RR04); 1-40. www.cdc.gov/mmwr/preview/mmwrhtml/rr5604a1.htm

H. **Strategies for the Control and Investigation of Varicella Outbreaks 2008. (CDC):** www.cdc.gov/vaccines/vpd-vac/varicella/outbreaks/manual.htm

I. **CDC. Updated Recommendations for Use of VariZIG – United States.** MMWR 2013;62 (28); 574-576**. Available at:** www.cdc.gov/mmwr/preview/mmwrhtml/mm6228a4.htm

J. **Pink Book:** Epidemiology and Prevention of Vaccine-Preventable Diseases. Available at: www.cdc.gov/vaccines/pubs/pinkbook/default.htm

K. **Manual for the Surveillance of Vaccine-Preventable Diseases:** Available at: www.cdc.gov/vaccines/pubs/surv-manual/default.htm .

L. **Additional Information (CDC):** www.cdc.gov/health/default.htm

ATTACHMENTS

- **CDC Varicella Death Investigation Worksheet**
- **Sample Letter, Parent Notification**
- **Fact Sheet**

To view attachments in the electronic version:

1. Go to <View>; <Navigation Pane>; <Attachments> – OR – Click on the "Paper Clip"  icon at the left.
2. Double click on the document to open