Varicella (chickenpox)

CLINICAL CASE DEFINITION

An illness with acute onset of diffuse (generalized) macular-papular-vesicular rash without other apparent cause. Varicella rash is itchy and the lesions progress from fluid-filled vesicles to dried crusts and scabs.

CASE CLASSIFICATION

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

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

Acceptable laboratory confirmation is any of the following:

- Detection of varicella-specific nucleic acid by polymerase chain reaction test (PCR), OR
- Isolation of varicella virus (positive virus culture) from a clinical specimen, OR
- Positive direct fluorescent antibody (DFA) test, OR
- Positive serologic test for varicella-zoster immunoglobulin M (IgM) antibody when varicella-like symptoms are present.
- Significant rise in serum anti-varicella immunoglobulin G (IgG) antibody level by any standard serologic assay.

PCR is the most reliable method for confirming infection

Comments:

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

❑ Occasionally, a vaccinated person does not obtain full immunity and thus may get varicella disease. This is known as “breakthrough disease.” Varicella breakthrough disease cases are usually mild, with fewer than 50 skin lesions and a shorter duration of illness. The rash may also be atypical in appearance (maculopapular with few or no vesicles).

❑ Laboratory confirmation of a chickenpox diagnosis is now strongly encouraged. Although laboratory confirmation of cases in the past was rarely sought, fewer practicing clinicians now have clinical diagnostic experience since varicella incidence has substantially declined as a result of vaccination in recent decades. PCR is the test method of choice for rapid diagnosis. See LABORATORY SPECIMENS: PROCDEDURES AND CONSIDERATIONS below for further information.

TRANSMISSION

Person-to-person via direct contact with ill person, or by droplet or airborne spread of respiratory tract secretions or vesicle fluid of patients; also, from vesicle fluid of persons with herpes zoster (shingles). Chickenpox is highly communicable.

INCUBATION PERIOD

14 – 16 days, range 10 – 21 days. See Varicella Timeline, below.

PERIOD OF COMMUNICABILITY

From 1-2 days before onset of rash until all lesions have crusted (for breakthrough cases who may develop lesions that don't crust: until lesions are fading or until no new lesions occur, whichever is later).

REPORTING/INVESTIGATION

Health care providers, schools, day care providers and camps should report cases/suspect cases of varicella to local health department serving the residence of the case.

Local health department role/responsibilities:

- Contact case/guardian and health care provider.
- Determine if case meets clinical case definition.
- If case definition is met (Probable or Confirmed cases), or if patient is otherwise suspected as a case, investigate using CDC surveillance worksheet and control guidelines below.
- Assist with coordination of specimen collection and coordination if public health lab resources (MDHHS, CDC, etc) are used
- Report/ensure reporting of case to the Michigan Disease Surveillance System (MDSS). CDC Varicella Surveillance Worksheet may be helpful in field investigation to collect and capture data. At a minimum, obtain basic demographic information, immunization history (number of doses and dates) from provider record or MI Care Improvement Registry (MCIR - state immunization registry), and an estimate of the number of lesions, which serves as a proxy for disease severity. Number of lesions can be approximated as follows:
    - **Less than 50 lesions** –the lesions can be easily counted within 30 seconds
    - **50-249 lesions** – the person's hand can be placed between the lesions without touching a lesion
    - **250-499 lesions** – the person's hand cannot be placed between the lesions without touching a lesion
    - **More than 500 lesions** – in this case, the lesions are clumped so closely together that it is difficult to see normal skin.

    NOTE: In MDSS, chickenpox cases (a.k.a varicella; i.e. primary infections with VZ virus) should be reported using Reportable Condition as "**Chickenpox (Varicella).**" Reports of shingles cases (a.k.a herpes zoster; i.e. reactivation of latent VZ infection) should be made under the Reportable Condition of **Shingles.** Cases of infection with VZ virus that are unable to be determined as either Chickenpox or Shingles should be reported as "**VZ infection, unspecified**."
- Update the MDSS record in a timely manner with new or additional info as it becomes available. Finalize MDSS record when case investigation is complete.
- In the event of death, obtain and send copies of hospital discharge summary, death certificate, and autopsy report to MDHHS Immunization Division.
- **Outbreak reporting**: Varicella outbreaks consisting of 2 or more cases in a group activity setting (school, daycare, camp, etc) should be reported to MDHHS VPD Surveillance Coordinator at 517-335-8159. When entering outbreak-related cases into the MDSS reporting system, a consistent outbreak identifier should be used in the Outbreak Name field. **It is especially important to collect and enter as a minimum** the following information to MDSS: age, sex, race, onset date, approximate number of

lesions, varicella vaccine history and number of vaccine doses, history of past varicella disease, laboratory testing information, and hospitalization status.

LABORATORY CONFIRMATION

Lab confirmation of varicella cases is now encouraged since the overall disease incidence has greatly declined and clinical experience with chickenpox has become rarer. Lab testing is strongly recommended to confirm the diagnosis in severe or unusual cases and for fatal cases. Laboratory confirmation for varicella is defined as:

- Varicella-specific nucleic acid detected by polymerase chain reaction (PCR) test, (*this is the best and preferred test),* or
- Isolation of varicella virus from a clinical specimen, or
- Detection of varicella antigen or nucleic acid by direct fluorescent antibody (DFA) test, or
- Significant rise in serum varicella immunoglobulin G (IgG) antibody level by any standard serologic assay
- Note: varicella IgM antibody testing at commercial laboratories is not recommended for confirmation because the methods for these tests lack sensitivity and specificity; however, a positive varicella IgM test when varicella-like symptoms are is considered confirmatory.

Varicella lab tests are available commercially. See additional information under LABORATORY SPECIMENS: PROCDEDURES AND CONSIDERATIONS, below

IMMUNITY/SUSCEPTIBILITY

Individuals should be considered immune (protected against) varicella if they meet one or more of the following conditions:

1. Documentation of age-appropriate vaccination:
    a. Preschool-aged children ≥12 months of age: one (1) dose
    b. School-aged children, adolescents, and adults: two (2) doses[1]
2. Laboratory evidence of immunity[2] or laboratory confirmation of disease
3. Born in the US before 1980[3]
4. A healthcare provider diagnosis of varicella or healthcare provider verification of history of varicella disease[4]
5. History of herpes zoster based on healthcare provider diagnosis.

[1] The minimum interval between doses is 28 days for persons ≥13 years of age and is 3 months for children 12 months through 12 years of age; however, for children who received their first dose before age 13 years and for whom the interval between doses is at least 28 days, the second dose is considered valid and need not be repeated.

[2] Commercial assays can be used to assess disease-induced immunity, but they may lack adequate sensitivity to detect reliably vaccine-induced immunity (may yield false negative results).

[3] For healthcare providers and pregnant women, birth before 1980 should not be considered evidence of immunity.

[4] Verification of history or diagnosis of typical disease can be done by a licensed healthcare provider (e.g., physician, nurse practitioner, physician assistant, school or occupational clinic nurse,). For people reporting a history of or presenting with atypical and/or mild cases, assessment by a physician or their designee is recommended and one of the following should be sought: 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 atypical varicella.

CONTROL MEASURES

- Exclude cases or suspected cases from group activity settings (e.g. schools, day-care centers, work places, camps) until all lesions have crusted. Instruct cases/suspect cases to avoid exposing other persons.

  Note: Vaccinated persons with varicella (i.e. "breakthrough" cases) may develop lesions that do not crust (that is, they may have macules and papules only, without vesicles). These persons may be considered no longer contagious once the lesions have faded and are in the process of resolving, or once no new lesions occur, whichever is later.

- Identify exposed contacts and determine if they are immune or susceptible.

- Exposed, susceptible persons should be vaccinated as soon as possible; post-exposure vaccination with varicella vaccine given within 3 days of exposure may prevent illness or modify severity of disease (studies indicate 70% - 100% effectiveness). Post-exposure prophylactic use of vaccine up to 5 days after exposure may also be effective.

- **Outbreaks in group-activity settings** (e.g. schools, day-care centers, work place, camps): Exposed persons who cannot provide documentation of varicella immunity should be excluded until 21 days after the last identified case; this measure is advisable when 2 or more varicella (chickenpox) cases have occurred, but it may also be considered in the instance of a single case.

  - In general, an excluded person may be re-admitted to the activity setting/institution immediately upon getting vaccinated or providing other acceptable documentation of immunity; however, such a re-admittance policy may be modified depending upon the circumstances involved.

  - Varicella immunization is a 2 dose vaccine series. If the vaccine dose given to a student in response to the outbreak situation is the first varicella vaccine dose, the person may *conditionally* return to school, group program, etc., but the second dose of vaccine should be scheduled using the age-appropriate minimal interval (for persons 12 months to 12 years of age the minimum interval is 3 months; for persons 13 years of age and older the minimum interval is 28 days).

  - *Outbreaks in settings with children between 12 months and 4 years of age*: While routinely the 2nd dose of varicella vaccine is not given until 4 – 6 years of age, in outbreak situations involving day care, pre-school, and other settings with children under 4 years of age consideration should be given to requiring the 2nd dose as a control measure, using appropriate minimum intervals between doses (for persons 12 months to 12 years of age minimum interval is 3 months; for persons 13 years of age and older minimum interval is 28 days).

- Varicella immune globulin (VZIG/VariZIG™) for postexposure prophylaxis of varicella should be considered in persons at high risk for severe disease who lack evidence of immunity to varicella and who are ineligible for varicella vaccine:

  - VariZIG™ (Cangene Corporation, Winnipeg, Canada) is the only varicella zoster immune globulin preparation available in the United States
  - VariZIG™ is available in the United States through an investigational new drug (IND) application expanded access protocol
  - VariZIG™ can be obtained by health-care providers from the sole-authorized U.S. distributor, FFF Enterprises (Temecula, California), by calling 800-843-7477 at any time or by contacting the distributor online at http://www.fffenterprises.com
  - VariZIG™ should be administered intramuscularly as directed by the manufacturer and

given as soon as possible, ideally within 4 days of exposure, but may be used up to 10 days after
- The recommended dose is 125 IU/10 kg of body weight, up to a maximum of 625 IU (five vials) (VariZIG is supplied in 125-IU vials)
- Patient groups recommended by ACIP to receive VariZIG™ include the following:
  - Immunocompromised patients without evidence of immunity.
  - Neonates 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.
- Additional information on VariZIG™ is available at http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6228a4.htm?s_cid=mm6228a4_w

- Enhance surveillance in the affected setting and community.

- Guidance for outbreak investigation and response is available from MDHHS; additional guidance is available in the CDC varicella outbreak manual (http://www.cdc.gov/chickenpox/outbreaks/control-investigation.html)

- Management of persons with herpes zoster (shingles) in school or group program:

  - Immunocompetent persons with shingles can remain at school as long as the lesions can be completely covered. Persons with shingles should be careful about personal hygiene, wash their hands after touching their lesions and also avoid close contact with others. If the lesions cannot be completely covered and close contact avoided, children and staff should be excluded from the school setting until lesions have crusted over. If a person has disseminated shingles, he or she should be excluded from school until lesions have crusted over (similar to the management of varicella case-patients).

LABORATORY PROCEDURES AND CONSIDERATIONS

Laboratory confirmation of varicella is increasingly important as incidence continues to decline and health care providers have less familiarity and clinical diagnostic experience with the disease. Moreover, breakthrough disease often involves an atypical rash and presentation (fewer lesions, vesicles absent, and milder illness than typical varicella cases). Laboratory confirmation is also encouraged for severe cases (e.g. involving hospitalization or death). Confirmation of at least one case, and preferably 3-5 cases, is recommended in outbreaks.

PCR (polymerase chain reaction) tests are the method of choice for rapid clinical diagnosis and confirmation. Specimens for VZV PCR include swabs of fluid from unroofed vesicles and/or crusts. Use synthetic swabs (e.g. polyester) and place in a sterile, empty tube (do not place transport medium in the tube). Crusts or scabs can be collected with a tweezer and placed into a sterile dry container.

DFA tests are an alternate method of confirmation; these are not as sensitive as PCR. Appropriate specimens for DFA are a scraping or swab from the base of open vesicles.

Varicella diagnostic testing is not available at MDHHS, but arrangements can be made for testing at CDC. Commercial laboratories also offer varicella-zoster virus testing.

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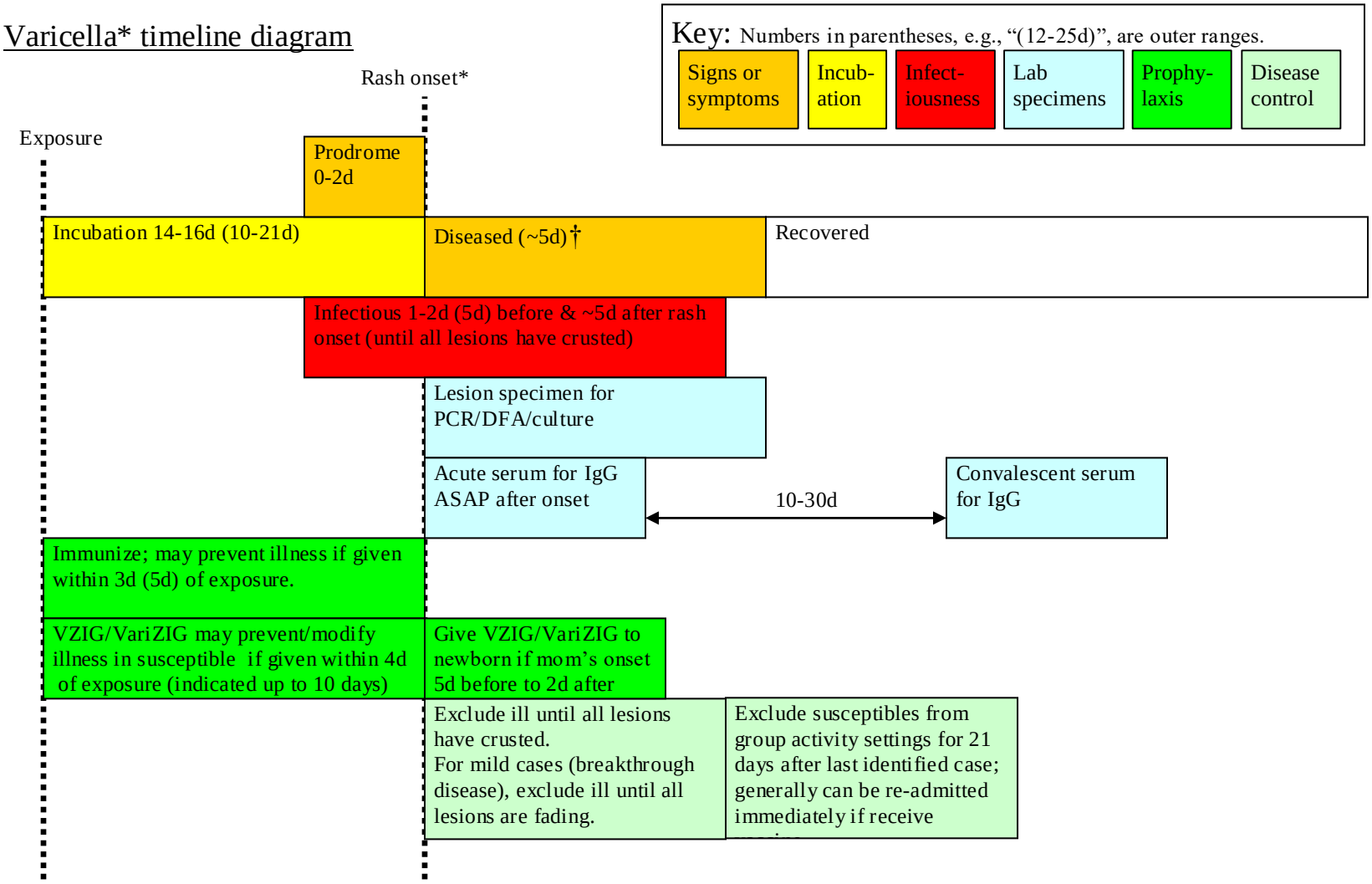
Varicella* timeline diagram



* This diagram applies only to chickenpox. Shingles is also caused by varicella zoster virus, but is much less infectious.
† Cases may be asymptomatic or very mild, especially in vaccinated individuals. Such cases can still transmit disease.

Sources: APHA Control of Communicable Diseases Manual, AAP Red Book, CDC Pink Book, CDC VPD surveillance manual