

Epidemiology Update

Varicella (Chickenpox)

Varicella Key Points

The Minnesota Communicable Disease Reporting Rule has been updated to require reporting of all cases of varicella (chickenpox) effective January 1, 2013.

The number of school outbreaks reported has decreased dramatically from school year 2005-06 to 2011-12.

Breakthrough cases (infection among vaccinated individuals) with fewer than 50 lesions have been found to be one third as contagious as varicella in unvaccinated persons with 50 or more lesions. However, breakthrough cases with 50 or more lesions can be just as contagious as cases in unvaccinated persons.

Introduction

This [Epidemiology Update](#) highlights information about varicella. With the number of varicella cases decreasing the need to assess rash illnesses has become increasingly important in order to facilitate public health action and outbreak control in childcare settings, schools, and other group settings.

This issue of *Epidemiology Update* is one in a series of reports from Hennepin County Human Services and Public Health Department – Epidemiology.

Background

Varicella (chickenpox) is a febrile rash illness caused by the varicella-zoster virus (VZV). Varicella is highly infectious, with secondary infections occurring in up to 90% of susceptible household contacts.¹ In adults, a mild prodrome with fever and malaise may precede the rash by 1 to 2 days. In children, the rash is usually the first sign of disease. The generalized vesicular rash typically consists of 250-500 lesions that appear in 2 to 4 successive waves. Disease in children last 3 to 7 days and the clinical course is generally mild and self-limited.

Persons who are immunocompromised (e.g., those with cancer, HIV/AIDS, etc.), children younger than 1 year of age, or adults may have more severe disease and complications. However, healthy children and adults may also develop serious complications and even die from varicella. Severe complications include secondary bacterial infections (most notably those caused by group A beta-hemolytic *Streptococcus*, e.g., cellulitis, necrotizing fasciitis, septicemia, and toxic shock syndrome), pneumonia, encephalitis, cerebellar ataxia, Reye syndrome, and death.¹

Immunity following varicella infection is considered to be long-lasting. In otherwise healthy persons, clinical illness after reexposure is rare.²

Congenital varicella syndrome, characterized by hypoplasia of an extremity, skin abnormalities, encephalitis, microcephaly, ocular abnormalities, mental retardation, and low birth weight, may occur among 0.4%-2.0% of infants born to women infected with varicella during the first or second trimester of pregnancy. Infants born to women who develop varicella within 5 days before delivery to 2 days after delivery are at risk of neonatal varicella, which may be severe.¹

The epidemiology of varicella in tropical and subtropical regions differs from that in the United States. In these regions, a higher proportion of VZV infections are acquired later in life. Persons emigrating from these regions might be more likely to be susceptible to varicella compared to U.S.-born persons and, therefore, are at higher risk for developing varicella if unvaccinated and exposed.¹

Clinical Case Definition

An illness with acute onset of diffuse (generalized) maculopapulovesicular rash without other apparent cause. In vaccinated persons who develop varicella more than 42 days after vaccination (breakthrough disease), the disease is usually 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.)¹

Breakthrough cases with fewer than 50 lesions have been found to be one third as contagious as varicella in unvaccinated persons with 50 or more lesions. However, breakthrough cases with 50 or more lesions can be just as contagious as cases in unvaccinated persons.¹

A higher proportion of varicella cases are being reported among older children, adolescents, and adults who may not have had disease or vaccination. As vaccination rates have increased, the majority of varicella cases now occur among vaccinated persons (i.e., breakthrough cases) and are generally milder, often with fewer than 50 lesions and fewer vesicles compared with 300 or more lesions and many vesicles typically seen in unvaccinated persons. Persons with breakthrough disease are also less likely to have fever and more

illness. Breakthrough varicella disease can be challenging for providers and parents to recognize clinically because of the modified presentation.¹

Reservoir

Infected humans are the only known source of this infection.

Transmission

VZV is spread from person to person by direct contact with lesions of persons infected with varicella or herpes zoster or by airborne spread of respiratory secretions or lesions of persons with chickenpox.

Incubation Period

The incubation period (time between contact with the infectious agent and development of symptoms) ranges from 10 days to 21 days with an average of 14-16 days.

Infectious Period

A person can be infectious from 1 to 2 days before the rash begins until all the blisters have become scabs. This generally occurs within 5 days with a range of 4 to 7 days after the appearance of the first blisters in an otherwise healthy child. Persons with progressive varicella (development of new lesions greater than 7 days) might be contagious longer.

Herpes Zoster (Shingles)

VZV remains in a latent state in human nerve tissue and reactivates in approximately one in three persons during their lifetime, resulting in herpes zoster. Herpes zoster usually presents as a vesicular rash with pain and itching in a dermatomal distribution. Herpes zoster incidence increases with increasing age, especially after age 50. It is also more common among immunocompromised persons, and among children with a history of intrauterine varicella or varicella occurring in the first year of life; the latter have an increased risk of developing herpes zoster at an earlier age.

Laboratory Testing

As varicella disease has declined with the introduction of vaccine, the need for laboratory confirmation has grown because fewer healthcare providers have direct experience with breakthrough infections. Postvaccination situations for which specimens should be tested include 1) rash with more than 50 lesions occurring 7 to 42 days after vaccination; 2) suspected secondary transmission of the vaccine virus; 3) herpes zoster in a vaccinated person; or 4) any serious adverse event.

For rapid varicella virus identification, **PCR** (polymerase chain reaction) is the method of choice. It is sensitive, specific, widely available, and results are available quickly.

PCR is a powerful technique that permits the rapid amplification of specific sequences of viral DNA that would otherwise be present in clinical specimens at concentrations well below detectable limits.

Serological testing is not recommended for diagnosing varicella because the available methods lack sensitivity and specificity; false-positive IgM results are common in the presence of high IgG levels.

Specimen Collection

Skin lesions are the preferred specimen for laboratory confirmation of varicella disease. Blood specimens are preferred to test for varicella immunity.

A video demonstrating the techniques for collecting various specimens for varicella confirmation, including specimens from breakthrough cases, can be found at: www.cdc.gov/shingles/lab-testing/collecting-specimens.html#video

Communicable Disease Reporting Rule Update: Reporting all Cases of Varicella³

Effective January 1, 2013, the Minnesota Department of Health (MDH) revised the Rule and has required that the following varicella cases should be reported:

- Clinically diagnosed cases (without laboratory confirmation) seen by a provider in a health care setting,
- Clinically diagnosed cases based on symptoms relayed by phone to the provider by the patient or parent/guardian, and
- Laboratory-confirmed cases.

It is important to report all the above cases so that MDH can adequately assess the incidence of varicella. Cases not seen by a provider but diagnoses by phone are thought to currently represent a larger proportion of total cases.

MDH will collect data on how the case was diagnosed, and differentiate phone diagnosed cases from those that are seen by a provider and/or are laboratory confirmed. Laboratory-confirmed and clinically diagnosed varicella cases -including those diagnosed by phone - will be entered into the Minnesota Immunization Information Connection (MIIC) by MDH staff, unless the provider requests to have the cases excluded from MIIC. This documentation may subsequently be used as evidence of immunity to varicella.

Information on reporting can be found at:

www.health.state.mn.us/divs/idepc/dtopics/reportable/varicella.html

The MDH has asked that:

- schools report all cases of varicella (chickenpox) in students and staff and cases of zoster (shingles) that occur in students.
- childcare providers report varicella and zoster in children and staff.

Outbreaks

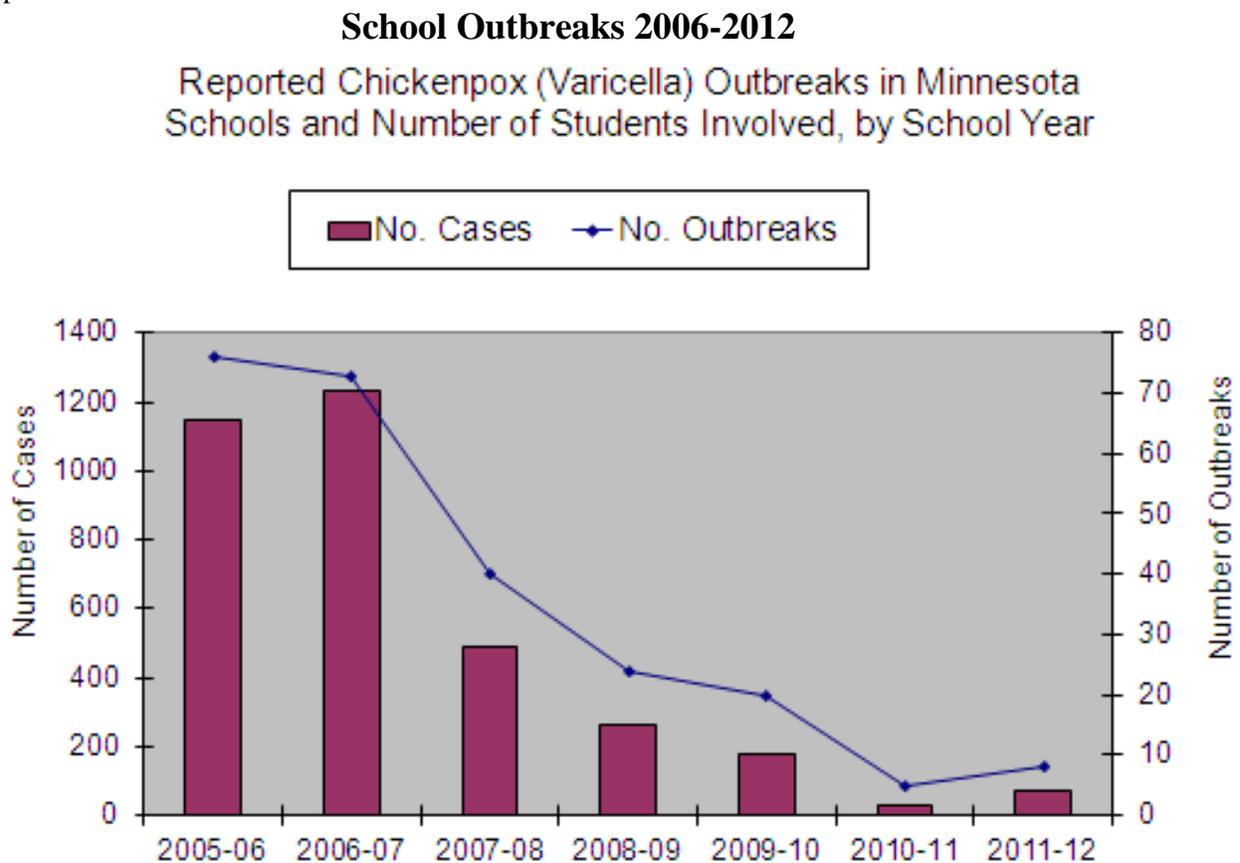
Although varicella vaccination coverage has increased and disease incidence has decreased, outbreaks of varicella continue to occur, increasingly among highly vaccinated populations.

Outbreaks in schools are defined as 5 or more cases within a 2-month period where children are less than 13 years of age, and 3 or more cases where children are 13 years of age or older.

Graph 1 shows the number of schools reporting outbreaks fell from 76 schools in 2005-06 to 8 schools in 2011-12. The number of cases fell from 1146 cases to 69 cases in the same time period.

(Source: www.health.state.mn.us/divs/idepc/diseases/varicella/report1011.pdf)

Graph 1.



Exclusion

People with varicella should be excluded from schools, childcare, and work until lesions have crusted over and no new lesions have occurred (usually by day 6 after the rash has started).

Vaccinated persons should be excluded until lesions have faded (i.e., the skin lesions are in the process of resolving; lesions do not need to be completely resolved) or no new lesions occur, whichever is later.

Susceptible persons living in residential or healthcare settings who have been exposed to an infectious case of varicella should be considered infectious and isolated, if possible, during the infectious period (from 10 to 21 days after exposure).

Varicella Vaccine

Before the availability of varicella vaccine in the United States, almost everyone had varicella. In the early 1990s this resulted in an average of 4 million cases, 10,500-13,000 hospitalizations (range, 8,000-18,000), and 100-150 deaths each year. Varicella mainly affected children, with approximately 90% of cases occurring before the age of 15 years.²

The varicella vaccine was licensed in 1995. It is a two dose series, with the first dose given to infants at 12-15 months of age and the second dose to children 4-6 years of age. For persons 13 years of age and older without evidence of immunity to varicella two doses of vaccine are recommended 4-8 weeks apart.

Varicella-Zoster Immune Globulin (VariZIG)⁴

VariZIG is a human blood product with high titers of varicella zoster virus antibody. It is recommended to be given within 10 days after exposure. VariZIG should be given as soon as possible after exposure.

VariZIG is recommended for the following persons when exposure has occurred:

- Immunocompromised persons without evidence of immunity (i.e., no history of varicella disease or vaccination, or no lab confirmation of immunity)
- Pregnant women without evidence of immunity.
- Newborn infants whose mother had onset of chickenpox within five days before delivery to 2 days after delivery.
- Premature infants born at 28 weeks or more who are exposed during the neonatal period and whose mothers do not have evidence of immunity
- Premature infants born at < 28 weeks gestation or have a birth weight 1000g (2.2 pounds) or less and were exposed during the neonatal period, regardless of maternal evidence of immunity.

Interval Between Administration Of VariZIG and Varicella Vaccine

Any patient who receives investigational VariZIG to prevent varicella subsequently should receive varicella vaccine, provided the vaccine is not contraindicated. Varicella vaccination should be delayed until 5 months after VariZIG administration. Varicella vaccine is not needed if the patient has varicella after administration of VariZIG.

Reporting

Report suspect or lab-confirmed varicella cases to MDH at 651-201-5414.

References

1. Vaccine Preventable Disease Surveillance Manual, 5th edition; 2011. Varicella. Chapter 17, 1-15.
2. Prevention of Varicella. MMWR 2007; 56:(RR-4): 1-40.
3. Communicable Disease Reporting Rule Update: Reporting All Cases of Varicella. December 2012. Minnesota Department of Health.
4. FDA Approval of an Extended Period of Administering VariZIG for Postexposure Prophylaxis of Varicella. MMWR 2012; 61(12):212.