4. VARICELLA ZOSTER VIRUS (VZV)

Chickenpox/Shingles

Primary infection with Varicella-zoster virus (VZV) results in chickenpox. The virus then remains latent in the dorsal root ganglia during primary infection.

Reactivation results in herpes zoster (shingles). A second episode of chickenpox rarely occurs.

4.1 Chickenpox (Varicella)

Cause/Epidemiology

Chickenpox is caused by the human herpes virus, varicella zoster virus. It appears worldwide and infection with the virus is nearly universal. In the majority of industrialized countries, approximately 95% of individuals have had chickenpox by age 15. Epidemics are most common in late winter or early spring, with children between age 5 and 9 accounting for half of all cases.

Clinical Presentation

Chickenpox is characterized by a generalized, pruritic, vesicular rash typically consisting of 250 – 500 lesions and mild fever and systemic symptoms. Alternately, the lesions may be so few to as escape observation. Adults may have 1 to 2 days of fever and malaise prior to onset of rash. In children, the rash is often the first sign of disease. Occasionally in adults, the fever and constitutional manifestation may be severe.

The rash is itchy and maculopapular for a few hours. Subsequently it becomes vesicular and then leaves scabs. Lesions commonly occur in successive crops, with several stages of maturity present at the same time. They tend to be more abundant on covered than on exposed parts of the body. Lesions may appear on the scalp, axilla, mucous membranes or mouth, upper respiratory tract, and on the conjunctivae.

Complications include bacterial superinfection of skin lesions, thrombocytopenia, arthritis, hepatitis, cerebellar ataxia, encephalitis, meningitis, or glomerulonephritis. Invasive group A streptococcal disease has been reported increasingly as a complication.
In immunocompromised children, progressive severe varicella characterized by continuing eruptions of lesions and a high fever into the second week of the illness, as well as encephalitis, hepatitis, or pneumonia, can develop.

Pneumonia is relatively less common among immunocompromised children but is the most common complication in adults.

Severe and even fatal varicella has been reported in otherwise healthy children receiving intermittent course of corticosteroids for treatment of asthma and other illnesses. The risk is especially dangerous when corticosteroids are given during the incubation period for chickenpox.

Fetal infection after maternal varicella during the first or early second trimester of pregnancy occasionally results in varicella embryopathy, which is characterized by limb atrophy and scarring of the skin of the extremity (congenital varicella syndrome). Varicella infection can be fatal for an infant if the mother develops varicella from 5 days before to 2 days after delivery. When varicella develops in a mother more than 5 days before delivery and gestational age is 28 weeks or more, the severity of disease in the newborn is modified by transplacental transfer of varicella-zoster virus specific maternal immunoglobulin (IgG antibody).

Varicella immune globulin (VZIG) is indicated for susceptible exposed individuals whose immune systems are either too young or weak to fight the disease. When VZIG is indicated it should be given within 96 hours of exposure. VZIG does not always prevent the disease from occurring in susceptible exposed contacts.

Chickenpox may be treated with antiviral medications. The decision to use therapy and the duration and route of therapy should be determined by specific host factors, extent of infection and initial response to therapy. Antiviral drugs have a limited window of opportunity to affect outcome of infection. It should be considered for persons older than 12 years of age, persons with chronic cutaneous or pulmonary disorders, persons receiving long-term salicylate therapy, and persons receiving short, intermittent, or aerosolized courses of corticosteroids.

Varicella vaccine is a live-attenuated vaccine. The vaccine is licensed for use in healthy persons 12 months of age or older who have not had chickenpox. Chickenpox in vaccine recipients is milder than that occurring in unimmunized children with a median of 15-32 vesicles, lower rate of fever and rapid recovery. At times, the disease is so mild that it is not easily recognizable as varicella because the skin lesions resemble insect bites. Vaccine recipients with mild disease potentially may be infectious to susceptible persons.
Incubation

The incubation period is usually 14 – 16 days, occasionally as early as 10 or as late as 21 days after contact. It may be prolonged for as long as 28 days by use of Varicella-Zoster Immune Globulin (VZIG). Varicella can develop between 1 and 16 days of life in infants born to mothers with active varicella; the usual interval from onset of rash in a mother to onset in her neonate is 9 to 15 days.

Transmission

Person-to-person transmission occurs primarily by direct contact and by airborne spread. Persons are most contagious for 1 to 2 days before and shortly after the onset of the rash. Communicability, however, can persist until crusting of lesions. Crusting of lesions usually occurs in 5 days. In immunocompromised patients with progressive varicella, contagiousness probably lasts throughout the period of eruption of new lesions.

Infection Prevention and Control Practices

Chickenpox

Active
Implement Airborne and Contact Precautions for a patient with Chickenpox. Refer to the Clinical Presentation/Microorganism/Infectious Disease Table for specific disease/microorganism information. Refer to Airborne/Contact Precautions in the Additional Precautions section.

Susceptible Contact
Implement Airborne Precautions from 8 days after first contact until 21 days after last contact with rash (28 days if given VZIG) for a patient who is a susceptible contact to Chickenpox. Refer to the Clinical Presentation/Microorganism/Infectious Disease Table for specific disease/microorganisms information. Refer to Airborne Precautions in the Additional Precautions section.

Occupational Health

Definition of Occupational Exposure
A susceptible healthcare worker who has been in an enclosed airspace or had face-to-face contact with an infectious person during the period of communicability (2 days before onset of symptoms and until all lesions
have dried and crusted). Exposure can also occur through direct or indirect contact of vesicle fluid with oral or nasal membranes of healthcare workers.

A Healthcare Worker Exposed to Chickenpox
- Determine healthcare workers’ immune status
- Consider immune if
  - History of varicella or herpes zoster, or
  - Physician/parent diagnosed illness, or
  - Documentation of two doses of varicella vaccine one month apart, or
  - Varicella immune titre
- Exposed susceptible healthcare workers shall contact Occupational Health for clinical management
- Pregnant or susceptible immunocompromised healthcare workers shall be referred for clinical management within 96 hours of exposure
- Exposed susceptible healthcare workers shall be excluded from work from day 8 after first exposure to day 21 after last exposure

A Healthcare Worker Symptomatic or Infected with Chickenpox
- Physician confirmed diagnosis
- Inform Infection Prevention & Control immediately if suspected or confirmed case of Chickenpox
- Healthcare workers shall be referred to Occupational Health for clinical management
- Healthcare workers shall be excluded from work until all lesions are dry and crusted with no new lesions evident

If a post-varicella immunization rash or lesions develop, Occupational Health should assess healthcare workers.
4.2. Shingles (Herpes Zoster)

Cause/Epidemiology

Following primary infection with chickenpox, varicella zoster virus remains latent in the dorsal root ganglia. Reactivation later in life results in herpes zoster (shingles). Immunocompromised persons are at increased risk of severe disease. Children exposed to chickenpox in utero during the second 20 weeks of pregnancy can develop inapparent varicella and subsequent zoster early in life without having had extrauterine chickenpox.

Immunocompromised persons with zoster infection are at increased risk of severe disease. Disseminated zoster is more likely to develop in children with congenital T-cell defects or acquired immunodeficiency syndrome than in children with B-cell abnormalities.

Children exposed to varicella in utero during the second 20 weeks of pregnancy can develop inapparent varicella and subsequent shingles early in life without having had chickenpox.

Clinical Presentation

Grouped vesicular lesions appear in the distribution of 1 to 3 sensory dermatomes, sometimes accompanied by pain localized to the area.

Postherpetic neuralgia is defined as pain that persists beyond 1 month. Systemic symptoms are few.

Localized zoster is vesicles that appear along a single or associated group of nerve roots. The lesions appear in crops in an irregular fashion along the nerve root.

Zoster occasionally can become disseminated in immunocompromised patients.

Disseminated zoster is vesicles that appear along more than one nerve pathway with lesions appearing outside the primary dermatomes and with visceral complications. Adults with cancer - especially of lymphoid tissue, with or without steroid therapy – immunodeficient patients and those on immunosuppressive therapy may have an increased frequency of severe zoster.
Zoster may be treated with antiviral medications. The decision to use therapy and the duration and route of therapy should be determined by specific host factors, extent of infection and initial response to therapy.

**Incubation Period**

The incubation period is 10 – 21 days following exposure.

**Transmission**

Non-immune persons, or those who have never had primary varicella zoster (chickenpox), may develop primary infection (chickenpox) from contact with localized zoster (shingles). In immunocompromised patients with localized or disseminated zoster and any patient with disseminated zoster, transmission occurs by airborne spread and from contact with zoster lesions.

**Infection Prevention and Control Practices**

**Disseminated**

Implement Airborne and Contact Precautions for a patient with disseminated shingles. Refer to the Clinical Presentation/Microorganism/Infectious Disease Table for specific disease/microorganism information. Refer to Airborne/Contact Precautions in the Additional Precautions section.

**Localized in the Immunocompromised Host**

Implement Airborne and Contact Precautions for a patient with shingles localized in the immunocompromised host. Refer to the Clinical Presentation/Microorganism/Infectious Disease Table for specific disease/microorganism information. Refer to Airborne/Contact Precautions in the Additional Precautions section.

**Non- Extensive Localized in the Normal Host**

Follow Routine Practices for a patient with non-extensive localized shingles.

**Occupational Health**

**Definition of Occupational Exposure**

**Herpes Zoster**

A susceptible healthcare worker who has had direct or indirect contact of oral or nasal mucous membranes with the vesicle fluid of an infectious person during the period of communicability (until the lesions are dried and have crusted).
Disseminated Herpes Zoster
A susceptible healthcare worker who has been in an enclosed airspace with an infectious person or had face-to-face contact with an infectious person during period of communicability (until the lesions have dried and have crusted).

A Healthcare Worker Exposed to Shingles
- Determine healthcare workers’ immune status
- Consider immune if
  - Physician/parent diagnosed history of illness, or
  - Documentation of varicella immune titre, or
  - Two doses of varicella-virus vaccine given one month apart
- Exposed, susceptible healthcare workers shall contact Occupational Health for clinical management
- Pregnant or susceptible immunocompromised healthcare workers shall be referred for clinical management within 96 hours of exposure
- Exposed susceptible healthcare workers shall be excluded from work from day 8 after first exposure to day 21 after last exposure

A Healthcare Worker Symptomatic or Infected Shingles
- Physician confirmed diagnosis
- Inform Infection Prevention & Control immediately if suspected or confirmed case of Shingles
- Healthcare workers shall be referred to Occupational Health for clinical management
- Healthcare workers shall be excluded from work if unable to cover lesions with occlusive dressing and clothing
- If disseminated zoster, healthcare workers shall be excluded from work until lesions have dried and crusted