Varicella Zoster Virus (VZV)

Varicella (Chickenpox) and Zoster (Shingles)

Site Applicability

All PHC Acute and Long Term Care Sites.

Practice Level

Basic: Physicians, NPs, Nursing, Clinical Nurse Leader, Clinical Site Coordinator, Bed Placement Coordinator

Standards

Varicella (Chickenpox):

- In addition to Routine Practices, Airborne and Contact Precautions will be initiated for all patients/residents who have varicella (chickenpox) infections. Precautions should be continued until all lesions are crusted and dried.

Zoster (Shingles):

- In addition to Routine Practices, Airborne and Contact Precautions will be initiated for all patients/residents who have disseminated zoster infections. Precautions should be continued until all lesions are crusted and dried.
- Airborne and Contact Precautions will be initiated for all patients/residents who have extensive, localized zoster lesions that cannot be covered (e.g., on the face). Precautions should be continued until all lesions are crusted and dried.
- Airborne and Contact Precautions will be initiated for immunocompromised patients/residents with localized zoster until they have been on antiviral therapy for 24 hours and there is no evidence of progression or no new lesions, after which point follow Routine Practices as long as lesions can be covered. If untreated, maintain precautions until lesions are crusted and dried.
- Routine Practices are adequate for other patients/residents not described above with localized zoster if the lesions can be covered or are crusted and dry.

Susceptible contacts of cases with varicella (chickenpox) infection, disseminated zoster, or immunocompromised individuals with zoster prior to initiation of antiviral therapy should be placed on Airborne and Contact Precautions from 8 days after their first exposure to 21 days (28 days if given varicella-zoster immune globulin [VZIG]) after their last exposure. IPAC will conduct hospital contact tracing in conjunction with public health.

Special Considerations in NICU

Airborne and Contact Precautions will be initiated for neonates born to mothers with onset of chickenpox less than 5 days before delivery to 48 hours after delivery. VZIG may be indicated for the neonate.

Description of the Disease

Varicella, also known as chickenpox, is an acute and highly infectious disease caused by varicella-zoster virus (VZV). Primary infection with VZV causes varicella, distinguished by fever and a generalized, itchy vesicular rash. After the primary infection, VZV stays dormant in the body in the sensory nerve ganglia as a latent infection. The most common complication from varicella in adults is pneumonia. Severe complications caused by the virus include cerebellar ataxia, encephalitis, and hemorrhagic conditions. Varicella is a vaccine-preventable infection, but in individuals with previous infection, immunity is generally lifelong.

Herpes Zoster, also referred to as shingles, is a recurrent or reactivation infection caused by dormant VZV that initially caused primary varicella (chickenpox). This is usually manifested as painful vesicular skin lesions/rash appearing over areas supplied by a single or associated group of nerves, referred to as a dermatome (see the dermatome map in Appendix A). Zoster may be localized or disseminated.

An individual can only get shingles if they have previously had chickenpox or the varicella vaccine but cannot get shingles from a patient/resident with shingles. However, if an individual has not had chickenpox and is susceptible to VZV, they can get chickenpox from a patient/resident with shingles. Immunocompromised patients are at increased risk of developing disseminated zoster. Post-herpetic neuralgia (PHN) is the most common complication of herpes zoster. PHN is pain that persists in the area where the rash once was for more than 90 days after rash onset. PHN can last for weeks or months, and occasionally, for years.

Signs & Symptoms

Varicella (Chickenpox)

- Generalized, itchy, vesicular rash with lesions in varying stages of weeping, crusting, and mild fever. The rash usually appears first on the head, chest and back before spreading to the rest of the body. Vesicular lesions are mostly concentrated on the chest and back.

Example of chickenpox vesicular rash

Herpes Zoster (Shingles)

- Painful, vesicular rash most commonly appearing on the trunk along a thoracic dermatome. The rash does not usually cross the body's midline.
    - Localized refers to 1 dermatome or 2 adjacent dermatomes not crossing the midline.

Example of shingles rash

- Disseminated is characterized by lesions in greater than 2 dermatomes or in non-adjacent dermatomes or when lesions cross the midline.

Incubation Period

Symptoms of primary infection develop between 10 to 21 days after a susceptible person is exposed to VZV. For zoster (shingles), reactivation may occur years after previous chickenpox infection.

Period of Communicability

Varicella (chickenpox) is most infectious from two days before the eruption of the vesicles until five days after the eruption of vesicles or until all lesions have scabbed over. Zoster (shingles) is infectious only while the lesions are wet.

Routes of Transmission

The main route of transmission is through aerosols carrying enveloped VZV particles. Transmission occurs from the skin vesicles of infected persons to the respiratory tract of a susceptible person. Transmission can also occur through direct contact with infectious vesicular fluid from an infected person. In utero infection can also occur as a result of transplacental passage of virus during maternal varicella infection, which can lead to congenital varicella syndrome in infants.

Populations at Risk

Susceptible persons (i.e., unvaccinated or without previous history of VZV infection) who had direct or indirect contact with an infectious individual. People at risk for severe varicella include immunocompromised people, newborns whose mothers have varicella from five days before to two days after delivery, and premature babies.

Assessment and Intervention

Infection Control Precautions

- **Additional Precautions:** In addition to Routine Practices, Airborne and Contact Precautions will be initiated for patients/residents with known or suspected varicella, disseminated zoster, and localized zoster when lesions cannot be covered until all lesions are crusted and dried. For localized and covered lesions in immunocompromised individuals, maintain Airborne and Contact Precautions until 24 hours of effective antiviral therapy has completed and there is no evidence of progression or no new lesions.

  Routine Practices are adequate for other patients/residents not described above with localized zoster if the lesions can be covered or are crusted and dry.

  The ward/unit nurse will ensure Airborne and Contact Precautions are ordered in Cerner and post the appropriate sign on the door.

  - Individuals with known immunity to VZV may wear an N95 at their own discretion when entering the room. For all others, put on a fit-tested N95 prior to entering the room.

- **Hand Hygiene:** Hands should be cleaned before and after every patient/resident contact, as well as after touching potentially contaminated items in the environment. Using an alcohol based hand rub solution is preferred if hands are not visibly soiled. Encourage and assist the patient to perform hand hygiene.
- **Patient Placement:** Patients with varicella, disseminated zoster, or who are immunocompromised with zoster should be placed in a private, negative pressure airborne isolation room. The door must remain closed. Patients with localized zoster may be roomed with other patients/residents if lesions are covered or dry and not erupted. Contact IPAC for advice on roommates.
- **Equipment:** Dedicate equipment whenever possible. Clean and disinfect shared patient equipment routinely and between different patients/residents.
- **Environment:** All high-touch surfaces in the patient's room must be cleaned and disinfected at least daily. Following discharge of the patient, the room should have a terminal clean carried out prior to the next patient being admitted.
- **Visitors:** Only family and visitors who are immune to VZV (i.e., previous chickenpox infection or fully vaccinated) should visit. If immunity is not known, assume the individual is non-immune. Education should be provided regarding hand hygiene, and visitors must perform hand hygiene before entry and on leaving the room. Assist visitors to wear PPE as well as an N95 respirator (use the 1870+ model).
- **Patient Transport:** Transport outside of the room should be limited. When the patient is required to leave the room for diagnostic purposes:
    - Notify receiving department prior to transport of the precautions in place.
    - Encourage and/or assist patient to clean their hands.
    - If the patient's condition allows for it, the patient should wear a medical mask during transport. If patient can tolerate an N95 and wishes to wear one, this can be accommodated by offering the 1870+ model (note this will not be fit tested for patient).
    - For patients with skin lesions associated with varicella, cover the affected areas to prevent aerosolization or contact with the infectious agent in skin lesions.
- **Management of Susceptible Contacts:** Contacts are individuals who have:
    - Shared the same air space (e.g. multi-bed room)**,** had face-to-face contact, or had exposure to respiratory secretions of an infectious person with varicella (chickenpox) or zoster prior to 24 hours of antiviral treatment if disseminated or in an immunocompromised host.
    - Had physical contact with wet/moist or weeping lesions (e.g., touching, hugging, or dressing change) or articles freshly soiled by discharge from vesicles from an infectious person with varicella or zoster.

  IPAC will identify contacts who are susceptible to VZV in collaboration with VCH Public Health/Medical Health Officer (MHO). Health care worker contacts will be identified and follow up by Occupational Health and Safety.

  For patients/residents identified as susceptible contacts:

- Initiate Airborne and Contact Precautions starting 8 days after first exposure and continue up to 21 days (28 days if given VZIG) after the last exposure and place in a private, negative pressure airborne isolation room with door closed during this period.
- Follow additional infection control precautions as specified above for patients/residents with confirmed VZV.
- Eligibility for post-exposure prophylaxis (i.e., varicella vaccine or VZIG) will be determined by the VCH MHO.
- For neonates in the NICU, Airborne and Contact Precautions will be initiated for those born to mothers with onset of chickenpox less than 5 days before delivery to 48 hours after delivery.

Laboratory Testing

- VZV can be detected through PCR testing of vesicle swabs (collected by a physician) or in CSF. Blood can be tested for VZV antibodies to determine recent or previous infection.

Treatment

- People at higher risk of developing complications from chickenpox or shingles may be given antiviral drugs such as acyclovir or valacyclovir, which may prevent severe illness developing.

Transfer/Discharge Planning

- Notify the receiving facility, hospital, nursing home or community agency involved in the patient's care of their status.
- On discharge or transfer, keep room on Airborne Precautions with door closed until per air clearance/settle time (see Appendix B).
- Patients should wear a mask and those with lesions that are not yet crusted over or dried should have lesions covered during transport.

Documentation

- Ensure order for Airborne and Contact Precautions is in patient's Cerner chart.
- Document skin integrity, lesions and drainage, and dressings as appropriate.

Patient and Family Education

Patient Health Education Materials:

- Chickenpox
- Shingles (Herpes Zoster)

HealthLinkBC Files:

- Facts About Chickenpox

Related Documents

- B-00-07-13084 - Airborne and Contact Precautions - Infection Control
- Occupational Health and Safety guide for staff infected with or exposed to chickenpox
- Occupational Health and Safety guide for staff with or exposed to shingles

References

BC Centre for Disease Control. (2018). Communicable Disease Control: Varicella Zoster. Retrieved from http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Epid/CD%20Manual/Chapter%201%20-%20CDC/Varicella.pdf

Centers for Disease Control and Prevention. (2022). 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. Retrieved from https://www.cdc.gov/infectioncontrol/pdf/guidelines/isolation-guidelines-H.pdf

Centers for Disease Control and Prevention. (2021). Chickenpox (Varicella). Retrieved from https://www.cdc.gov/chickenpox/index.html

Centers for Disease Control and Prevention. (2022). Shingles (Herpes Zoster). Retrieved from https://www.cdc.gov/shingles/index.html

Freer, G., & Pistello, M. (2018). Varicella-zoster virus infection: natural history, clinical manifestations, immunity and current and future vaccination strategies. *The new microbiologica*, *41*(2), 95–105.

Government of Canada. (2012). Varicella (Chickenpox). Retrieved from https://www.canada.ca/en/public-health/services/immunization/vaccine-preventable-diseases/varicella-chickenpox.html

Zaia, J. (2014). Herpes Virus. In K.M. Boston et al (Eds.), *APIC Text*. Available from https://text.apic.org/toc/healthcare-associated-pathogens-and-diseases/herpes-virus

Definitions

"Disseminated Zoster" refers to shingles where the rash involves multiple dermatomes (i.e., >2 dermatomes or bilateral dermatomes that cross the midline of the body or 2 or more non-adjacent dermatomes; see the dermatome map in Appendix A).

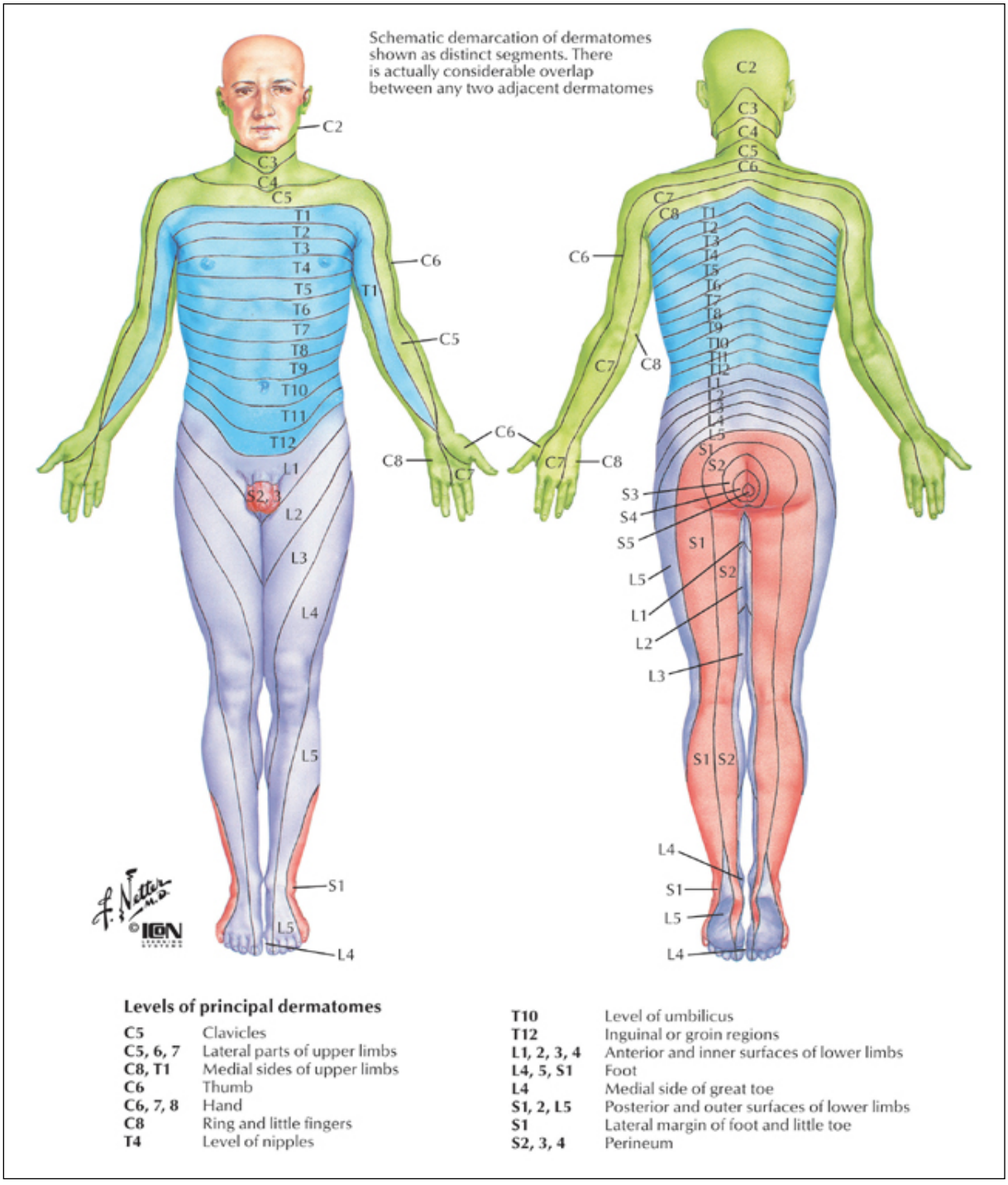
"Immunocompromised" patients/residents are those who have a medical condition or are receiving a treatment that contributes to an impaired immune system (e.g., solid organ or bone transplant recipients, HIV infection, receiving cancer treatment, taking high dose corticosteroids or other immunosuppressive medications).

"Localized Zoster" refers to shingles where the rash is localized to a single dermatome or two adjacent dermatomes, but does not cross the midline of the body (see the dermatome map in Appendix A).

"Susceptible contacts" are individuals who have any of the follow:

- History of varicella illness before the 1st birthday without subsequent immunization with 2 doses of varicella-containing vaccine
- No or uncertain history of two doses of varicella vaccine given after the 1st birthday without self-reported or physician documented history of varicella infection prior to 2004
- History of varicella or herpes zoster in/after 2004 at the time of the disease episode without laboratory confirmation
- Non-immune VZV IgG serology
- An individual within the post-haematopoietic stem cell transplant period regardless of a history of varicella or positive serologic test results pre-transplant

Appendix A: Dermatome Map



Levels of principal dermatomes

C5	Clavicles
C5, 6, 7	Lateral parts of upper limbs
C8, T1	Medial sides of upper limbs
C6	Thumb
C6, 7, 8	Hand
C8	Ring and little fingers
T4	Level of nipples
T10	Level of umbilicus
T12	Inguinal or groin regions
L1, 2, 3, 4	Anterior and inner surfaces of lower limbs
L4, 5, S1	Foot
L4	Medial side of great toe
S1, 2, L5	Posterior and outer surfaces of lower limbs
S1	Lateral margin of foot and little toe
S2, 3, 4	Perineum

Appendix B: Air Settle/Clearance Times

When room air exchanges per hour are unknown:

Acute Care:

- Do not admit a new patient into a room after a patient with an airborne infection has been discharged for 1 hour. If entering room before 1 hour, wear an N95 respirator.

Long Term Care:

- Do not admit a new resident into a room after a resident with an airborne infection has been discharged for 2 hours. If entering room before 2 hours, wear an N95 respirator.

When room air exchanges per hour are known:

Table 1*: Time in minutes needed to reduce airborne contaminants by 99% or 99.9% depending on room air exchanges per hour.

Air exchanges per hour	99% Clearance	99.9% Clearance
2	138	207
4	69	104
6	46	69
12	23	35
15	18	28
20	14	21

*This table was adapted from CDC recommendations

In general, 99% clearance is considered adequate for a room prior to allowing another patient to enter or staff to enter without an N95 respirator.

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Owners: *(optional)*	PHC
	IPAC