Interior Health
INFECTION PREVENTION & CONTROL

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Varicella (Chickenpox) and Herpes Zoster (Shingles)

Purpose	To provide guidance for the management of Varicella Zoster Virus (VZV) exposures within Interior Health (IH). The purpose of managing exposures to VZV is to minimize the risk of transmission and infection to an exposed person in the healthcare environment. This document provides staff with a reference tool which will assist in understanding the importance of VZV management in a healthcare settings, define roles and responsibilities, and provide instructions for management of exposed individuals. For detailed information refer to Provincial Infection Control Network of British Columbia (PICNET) document: Varicella Zoster Virus Management in Health Care Settings.
Scope	This document is intended to provide guidance to the Infection Prevention and Control (IPAC) team for the management of VZV exposures within IH. In this document, "staff" refers to all individuals performing activities within acute or long term care facilities. VZV staff exposure within IH is managed by Provincial Work Health Call Centre (PWCC) and Communicable Disease Unit (CDU). VZV exposure to discharged patients, outpatients and visitors is managed by the CDU and the Medical Health Officer (MHO).
Related Forms and Tools	• Varicella Zoster Virus Management in Health Care Settings.
Definitions	**Airborne Infection Isolation Room (AIIR)** A single patient room that is equipped with specialized air handling (negative pressure) and ventilation system according to Canadian standards. **Communicable Disease (CD)** An infectious disease transmissible from person to person via direct contact with an individual or their body fluids or by indirect means via airborne, vehicle borne (i.e. fomites) or vector borne (i.e. mosquitoes and ticks). **Communicable Disease Unit (CDU)** The IH department responsible for surveillance of reportable communicable diseases within the health authority. **Employee** A worker employed directly by IH. Includes union, excluded employees, and employed student nurses. **Immunization or Vaccination** The safe and appropriate administration of a vaccine by licensed professionals to stimulate the body's immune system to protect the individual against communicable diseases in the event of an exposure. **Infection Prevention and Control (IPAC)** The IH department that provides a practical, evidence-based approach which aims to minimize patients and health workers from being harmed by avoidable infections and the development of antimicrobial resistance.

	Medical Health Officers (MHO) An IH service responsible for the health and wellbeing of residents and communities living in the Interior Health Authority region. Responsibilities include disease and injury surveillance, communicable disease prevention, environmental public health, and care facility licensing. **Most Responsible Physician (MRP)** A physician or other regulated healthcare professional, who has overall responsibility for directing and coordinating the care and management of a patient at a specific point in time. **National Advisory Committee on Immunization (NACI)** An external advisory body that provides the Public Health Agency of Canada with recommendations on use of vaccines and identification of groups at risk for vaccination preventable diseases. **Non-IH Worker** A health-care worker not employed by IH but who provides patient care or works in institutions that provide patient care on behalf of IH (e.g. contracted physicians, students, volunteers, contractors, or other health authority/services employees).

Risk Assessment	
Background	VZV is a herpes virus which causes Varicella (Chickenpox), a highly contagious disease that is vaccine preventable. Following primary infection, VZV becomes latent and can reactivate later in life to cause Herpes Zoster (Shingles). Due to its transmission capabilities, VZV virus has a significant impact on IPAC and Workplace Health and Safety practices. Suspected exposure or infection with VZV necessitates rapid and careful review of patients and staff**.**
Clinical presentation	• Varicella presents with a generalized, vesicular, itchy rash usually concentrated on the chest and back. Lesions in different stages of development can be present at the same time. Crops of lesions appears over several days and rash may be preceded by fever and malaise. • Varicella is considered to be disease of the childhood occurring typically in children younger than 10 years of age, although with the implementation of standard childhood vaccination against VZV in Canada, the epidemiology has changed. Varicella can manifest in different age groups and the risk for severe infection increases with age and in those with immunocompromising conditions. • Complications of VZV infections are more frequent in adults and immunocompromised persons (although can occur in children as well). Most frequent complications include secondary bacterial skin and soft infections, neurologic (encephalitis), pneumonitis, hepatitis, and post herpetic neuralgia following herpes zoster. • In newborns, disease can manifest in two ways: congenital varicella (exposure of the fetus to VZV during 8-20 weeks of

	gestation) and neonatal varicella. Neonatal varicella is associated with increased mortality rate (especially when the mother develops symptoms between 5 days prior to delivery to 48 hours after delivery due to insufficient time for maternal immune response, and transfer of antibodies to the baby). For detailed information about varicella please see reference 2. • Breakthrough infections can occur in vaccinated persons (more than 42 days after VZV vaccination) and usually presents with milder symptoms and atypical rash making the clinical diagnosis difficult. • Herpes Zoster is an infection that results from reactivation of a latent VZV infection. Any person with history of varicella infection can develop zoster, however disease mostly occurs among older adults and immunocompromised population. Herpes zoster can manifests as localized or disseminated zoster infection. • Localized zoster refers to infection that **affects a single dermatome or two adjacent dermatomes AND does not cross body's midline.** It typically occurs in the thoracic and lumbar area but can be localized elsewhere. If the infection involves the distribution of the ophthalmic branch of the fifth cranial nerve, this condition is defined as ophthalmic herpes zoster and is a sight threating condition. • Disseminated zoster refers to infection **that affects > 2 adjacent dermatomes or multiple non-adjacent dermatomes with possible systemic complications**. For detailed information about herpes zoster please see reference 2.
Persons at high risk for severe Varicella infection	Certain populations are at higher risk for severe disease and are recommended to receive varicella specific immunoglobulin if significant exposure occurs. Consultation with an Infectious Disease specialist or Medical Microbiologist is recommended. NACI recommends prophylactic immunoglobulin for the following groups with the aim to prevent or mitigate disease: • Newborn infants of mothers who develop varicella from 5 days before until 48 hours after delivery • Neonates in intensive care settings born at less than 28 weeks of gestation or weighing 1,000g or less at birth, regardless of their mothers' evidence of immunity • Susceptible pregnant women. Refer to susceptibility and immunity for a definition of susceptible. Refer to pregnancy and breastfeeding for additional information • Susceptible immunocompromised persons, including HIV-infected persons with CD4 cell count <200 × 10^6/L or CD4 percentage <15%

	• Recipients of hematopoietic stem cell transplantation (HSCT) regardless of pre-transplant varicella immune status or post-transplant immunization history including varicella disease, vaccination or positive serologic test results
Immunocompromised person classification	• Patients with a neutrophil count < 0.5 x 10^9/ L for a duration ≥ 48 hours • Patients receiving corticosteroid therapy equivalent to prednisone ≥ 20mg/day for a duration of ≥ 2 weeks • HIV positive patients with CD4< 200 x 10^6/ L • Patients with inflammatory bowel disease, rheumatologic conditions, multiple sclerosis, or solid organ recipients receiving immunosuppressive therapy such as infliximab, etanercept, and methotrexate • Oncology patients receiving chemotherapy • Oncology patients receiving active radiation other than those receiving internal radiation (e.g. brachytherapy) or radiation therapy limited to very small focused areas (e.g. for localized skin cancers) • Patients with extensive loss of skin/mucous membrane barrier defenses e.g., graft versus host disease, Steven-Johnson syndrome, scalded skin syndrome, major burns • Patients with congenital or acquired hypogammaglobinemia or agammaglobinemia, severe combined immunodeficiency or other congenital immune deficiency syndrome • Hematopoietic stem cell transplant patients
Epidemiology	
Transmission routes	Person-to-person by • Direct contact with contagious person • Airborne spread of vesicle fluid of skin lesions of acute Varicella and Herpes zoster, or • Respiratory secretions of the respiratory tract of Varicella cases that also might be aerosolized. • Infection can be also transmitted indirectly by articles freshly contaminated with respiratory secretions or vesicle fluid of such cases.
Incubation and communicability period	**Incubation period:** 10-21 days, up to 28 days in person who received varicella zoster immunoglobulin, and may be shorter in immunocompromised persons. **Communicability period:** • Varicella: 2 days prior to onset of rash and until all lesions are crusted and dried. • Herpes zoster: until all lesions have crusted and dried • For susceptible individuals exposed to Varicella or Herpes zoster after incubation period has ended and no lesions have developed: 8 days after first contact until 21 days after last contact with person with active disease, 28 days if given varicella zoster immunoglobulin
IPAC Measures	

Patient placement and accommodation	Patients with Varicella or disseminated Herpes zoster should be placed in AIIR. Immunocompromised patients with localized herpes zoster should be placed in AIIR until disseminated infection **is ruled out**. If no AIIR is available place patient in single room with closed doors and contact IPAC.
Additional precautions	Precaution requirements for VZV infections in healthcare settings depend on clinical manifestation and immune status of patient or exposed susceptible person. Varicella infections are highly contagious and well recognized for nosocomial transmission, with delay in diagnosis and lack of immediate implementation of control measures being significant contributors to spread. Patients with herpes zoster are generally considered less infectious. Careful evaluation of IPAC measures is mandatory in patients with VZV infection and any potential exposed persons to minimize nosocomial transmission and impact on other patients and staff. Only staff with immunity (documented evidence of immunization with 2 doses of a varicella-containing vaccine OR laboratory evidence of immunity) should be assigned to care for patients with VZV infections. Non-immune pregnant staff should never be assigned to care for a patient with VZV infections. Staff working with patient is required to follow appropriate precautions depending on the type of clinical disease.
Varicella (Chickenpox)	All patients with varicella require airborne precautions plus routine and contact precautious. Patients should be placed in AIIR. If AIIR is not available, the patient should be placed in single room with closed doors. The patient should remain on these precautions during the communicability period. Susceptible persons exposed to varicella require precautions during their incubation period.
Herpes Zoster (Shingles)	Precaution requirements for patients with herpes zoster will vary depending on their immune status and whether the infection is localized or disseminated. Precautions also depend on ability to cover the affected areas . For immunocompetent patients with localized herpes zoster that can be covered routine practices are recommended. For patients with extensive localized zoster and lesions that cannot be covered (ophthalmic zoster) airborne precautions are required. Immunocompromised patients with localized herpes zoster must be under airborne precautions plus routine and contact precautions until disseminated infection is **ruled out.** All patients with disseminated zoster infections require same precautions as varicella (airborne precautions plus routine and contact precautious)

Duration of precautions	Patients with varicella and disseminated zoster should remain on additional precautions (airborne plus contact) until all skin lesions have crusted and dried. Immunocompromised patients with localized zoster should remain on additional precautions (airborne plus contact) until **DISSEMINATED INFECTION IS RULED OUT** and at least 24 h of effective therapy. Infectious disease consultation is strongly recommended for cases with suspected disseminated zoster. Exposed susceptible individuals should be placed on additional precautions from 8 days after first contact until 21 days after last contact with person with active disease (28 days if given varicella zoster immunoglobulin) For clinical scenarios not defined by the document case by case evaluation is required with IPAC, Infectious Diseases physician and the Medical Microbiologist.
Exposure Management Process	
Significant exposures Varicella (chickenpox)	The following situations are considered significant exposures to VZV as result of contact with a person with Varicella (based on NACI recommendations): • Continuous household contact (that is, living in the same dwelling with a person with Varicella) • Being indoors for more than 1 hour with a person with Varicella • Being in the same hospital room for more than 1 hour, or more than 15 minutes of face-to-face contact with a person with Varicella • Touching the lesions or articles freshly soiled by discharges from vesicles of a person with active Varicella
Significant exposures Herpes zoster (shingles)	The following situations are considered significant exposures to VZV as result of contact with a person with Herpes zoster (based on NACI recommendations): • Continuous household contact (that is, living in the same dwelling) with an immunocompromised person with HZ or a person with disseminated HZ prior to or within first 24 hours of antiviral treatment • Being indoors for more than 1 hour with an immunocompromised person with HZ or a person with disseminated HZ prior to or within first 24 hours of antiviral treatment

	• Being in the same hospital room for more than 1 hour, or more than 15 minutes of face-to-face contact with an immunocompromised person with HZ or a person with disseminated HZ prior to or within first 24 hours of antiviral treatment • Touching the lesions or articles freshly soiled by discharges from vesicles of a person with active HZ The following is NOT considered an exposure: contact with an immunocompetent person whose non-disseminated zoster lesions are well covered by clothing or dressings. Dried scabs from varicella-zoster lesions are not infective.
Case definition	Clinical evidence of illness and laboratory confirmation of infection: • direct antigen detection of varicella-zoster virus (VZV) from an appropriate clinical specimen **OR** • detection of VZV DNA from an appropriate clinical specimen **OR** • seroconversion or a significant rise (i.e. fourfold or greater) by any standard serologic assay in varicella-zoster IgG titer between acute and convalescent sera **OR** • clinically diagnosed illness in a person with an epidemiologic link to a laboratory-confirmed case of Varicella or VZV infection
Roles and responsibilities	• **Nursing team/physician** has the responsibility of notifying IPAC in cases of suspected or confirmed VZV infection in their patients. Patient with clinical suspicion for VZV infection **MUST BE placed immediately** on airborne and/or contact precautions depending on the patient characteristics and clinical presentation. Please see precaution requirements and Tables 1-3. • **Most Responsible Physician** evaluates the patient and confirms the diagnosis of varicella or herpes zoster, and evaluates number of dermatomes affected. An Infectious Diseases physician can be consulted if needed. • **IPAC** performs follow-up and evaluation of VZV exposure incidents following notification (from staff or laboratory) in patients within IH, evaluate situation, completes the CD Notification tool and if needed organizes and facilitates the meetings to discuss recommendations for VZV exposure management. • **PWHCC** performs follow-up and evaluation of VZV exposure incidents among IH employees and provides recommendations regarding further testing, post-exposure

	prophylaxis and/or exclusions based on guidance from Medical Microbiology. • **CDU** cooperates in exposure evaluation and performs follow up of outpatients, visitors and non-IH workers. • **Unit Manager** assists IPAC, PHWCC and CDU about details of incident exposure and assist in evaluation of patients and staff and contact tracing.
Management of exposures	Following the confirmation of VZV infection in inpatient form a multidisciplinary team for assessment of exposures, including, but not limited to: • Infection control practitioner (ICP) • Medical Microbiologist on call • Patient Care Coordinator (PCC) on unit with VZV exposure • Site administrator and/or unit manager • Workplace Health and Safety (WHS) ICP organizes meeting and team should meet as soon as possible following notification of the incident, to ensure any laboratory testing can be completed rapidly to avoid unnecessary patient isolation or healthcare worker exclusion from work • The ICP prepares a list of exposed patients, perform evaluation of exposed inpatients, recommends further steps to MRP (additional precautious, serology). In case of need Medical Microbiologist can be consulted. • All exposed patients should be evaluated using Tables 1-3 and Diagrams 1 and 2 • Discharged exposed patients also require assessment. • The ICP will fill out the Communicable Disease Notification tool and provide it to the manager. • PWHCC works with the manager to identify the list of exposed employees. The PWHCC assesses exposed employees and provides follow up recommendations based on guidance provided by the Medical Microbiologist. Guidance could include testing, post-exposure prophylaxis and/or exclusions as appropriate. • Any laboratory testing should be expedited as much as possible to avoid isolation/exclusions. • MRP notifies exposed patients and manages patient regarding further measures (additional precautions, serology, immunization or application of varicella specific immunoglobulin).
Confirmation of immunity	Individuals who have **ANY** of the following are considered immune to varicella: • Documented evidence of immunization with 2 doses of a varicella-containing vaccine • Laboratory evidence of immunity

Table 1. Summary of IPAC requirements for Varicella (Chickenpox)

Varicella (chickenpox)	Case	Exposed susceptible contact
Infectious material	Vesicular fluid, respiratory secretions, airborne particles	N/A
Mode of transmission	Airborne, direct and indirect contact	Airborne
Required precautions	Airborne, contact	Airborne
Incubation period	10-21 days	10-21 days (28 if VZIG given)
Communicability period	2 days prior to onset of the rash until all the lesions have crusted **NOTE**: In immunocompromised host with varicella pneumonia, prolong duration of precautions for duration of illness.	after incubation period has ended and no lesions have developed (8 days after first contact until 21 days after last contact with person with active disease, 28 days if given varicella zoster immunoglobulin)
Comments	Exercise care when handling dressings, clothing or other materials that may be contaminated with vesicular fluid	

Table 2. Summary of IPAC requirements for Herpes zoster (Shingles) cases

Herpes zoster	Localized (lesion can be covered)	Ophthalmic herpes zoster (affecting trigeminal nerve)	Localized in immunocompromised person	Disseminated Involves >2 dermatomes (OR >1 non-adjacent dermatomes) ± visceral complications*
Infectious material	Vesicular fluid	Vesicular fluid	Vesicular fluid, respiratory secretions	Vesicular fluid, respiratory secretions
Mode of transmission	direct and indirect contact	Airborne, direct and indirect contact	Airborne, direct and indirect contact	Airborne, direct and indirect contact
Required precautions	Routine practices (Contact and airborne for cases of extensive localized zoster that cannot be covered)	Airborne plus contact	Airborne plus contact until **DISSEMINATED INFECTION IS RULED OUT** plus minimum 24 hours of effective antiviral therapy then contact until all lesions have crusted and dried	Airborne plus contact
Incubation period	N/A	N/A	N/A	N/A
Communicability period	until all lesions have crusted and dried	until all lesions have crusted and dried	until all lesions have crusted and dried	until all lesions have crusted and dried
Comments	For clinical scenarios not defined by the document case by case evaluation is required. Please contact IPAC, ID or Medical Microbiologist.			
	Localized zoster may disseminate in immunocompromised host if not treated, and treatment is strongly recommended.			
	Non-immune patients cannot share rooms with patients with varicella and zoster			
	Exercise care when handling dressings, clothing or other materials that may be contaminated with vesicular fluid. If lesions cannot be covered contact precatuions are required.			
	Although patients should remain isolated until lesions have crusted, when evaluating exposures, patients who have received >24 hours of effective therapy are considered less infectious, as antivirals lessen severity of infection and duration of communicability			

*Visceral involvement, such as meningoencephalitis, pneumonitis, hepatitis, and acute retinal necrosis

Table 3. Summary of IPAC requirements for exposure to Herpes zoster (Shingles) for susceptible contacts

Herpes zoster	Exposed susceptible contact
Infectious material	Airborne particles
Mode of transmission	Airborne
Required precautions	Airborne
Incubation period	10-21 days (28 days if VZIG given)
Communicability period	after incubation period has ended and no lesions have developed (8 days after first contact until 21 days after last contact with person with active disease, 28 days if given varicella zoster immunoglobulin)
Comments	

Additional Resources

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Diagram 1: Varicella Zoster Virus (VZV) Follow up Process

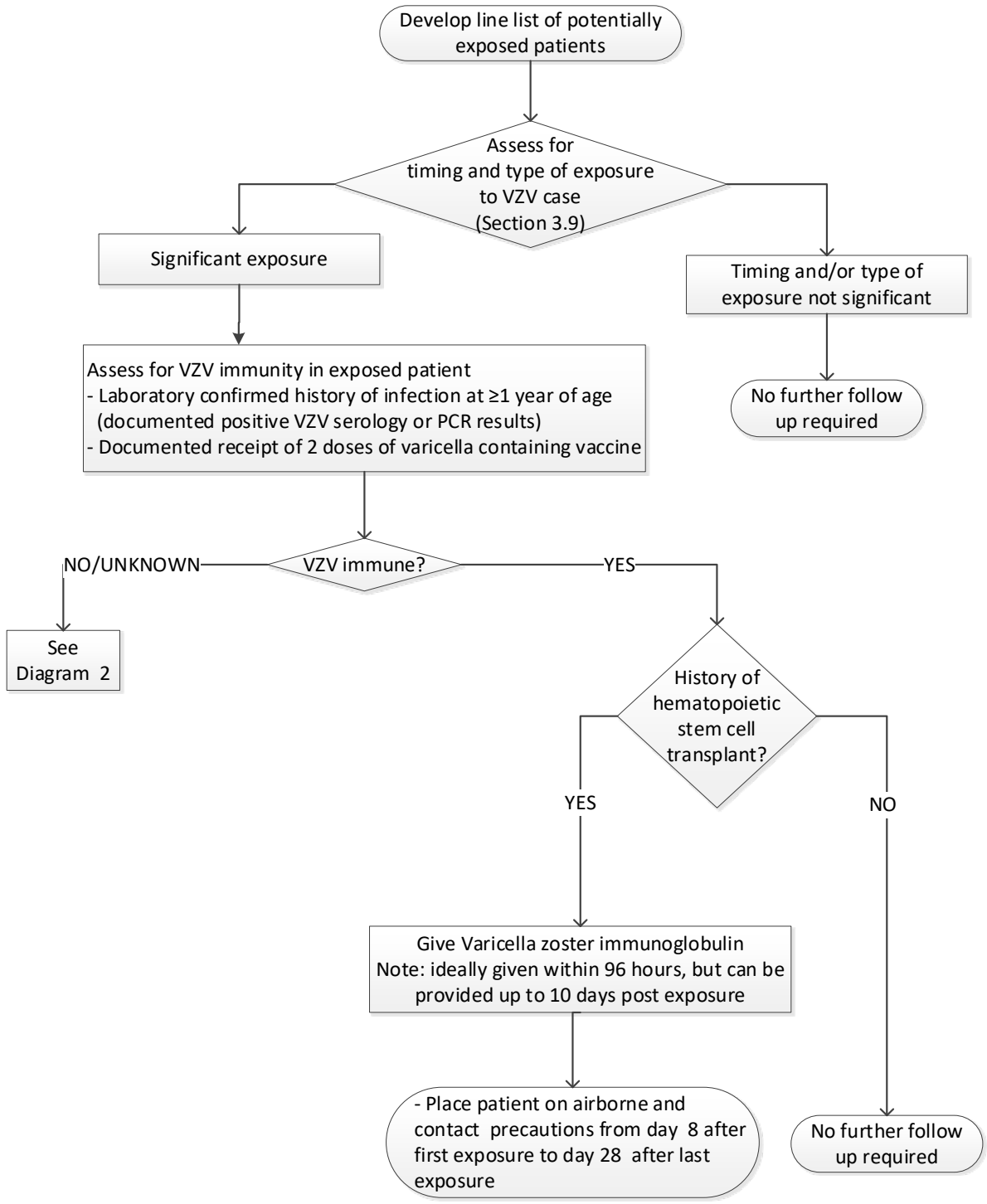

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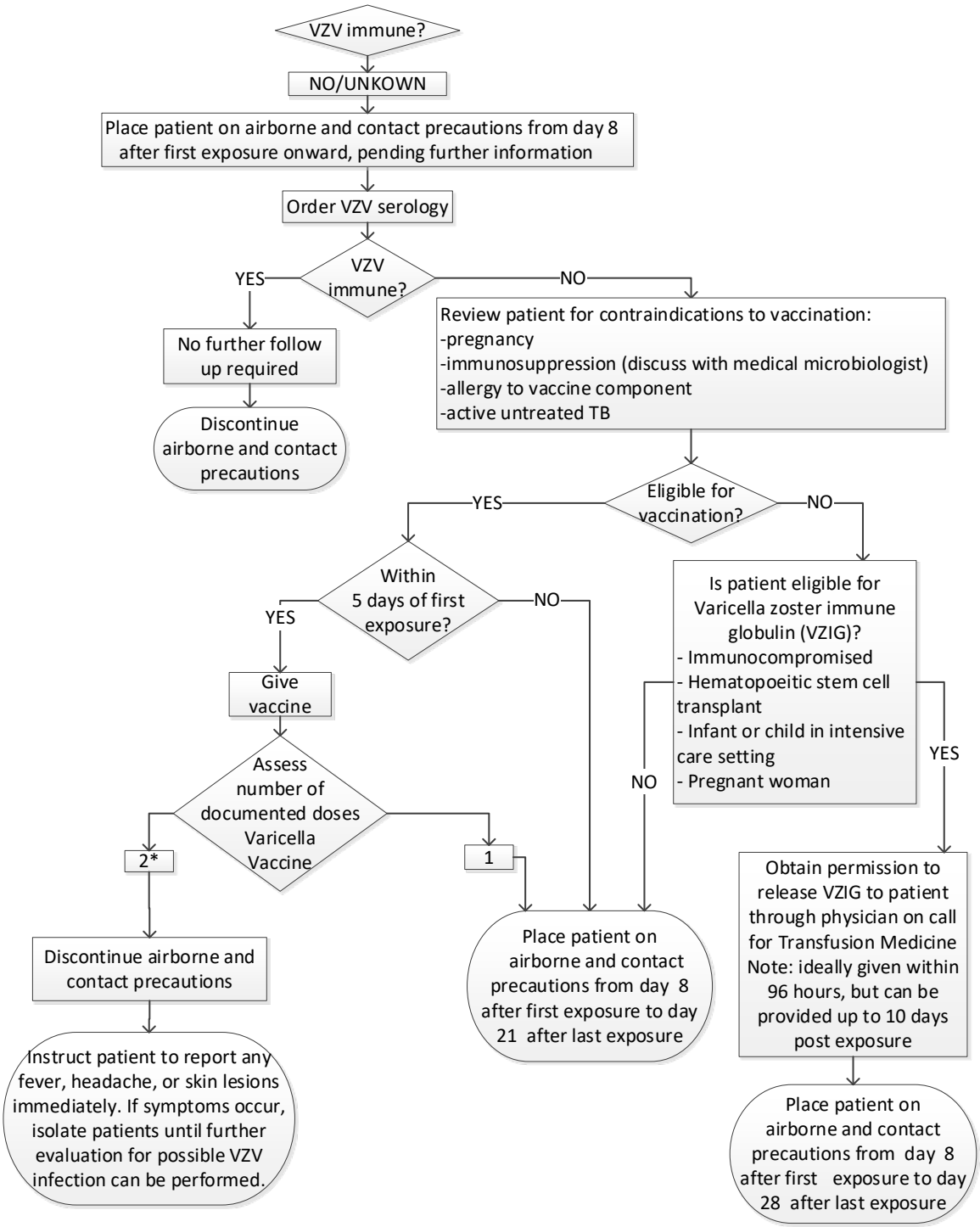
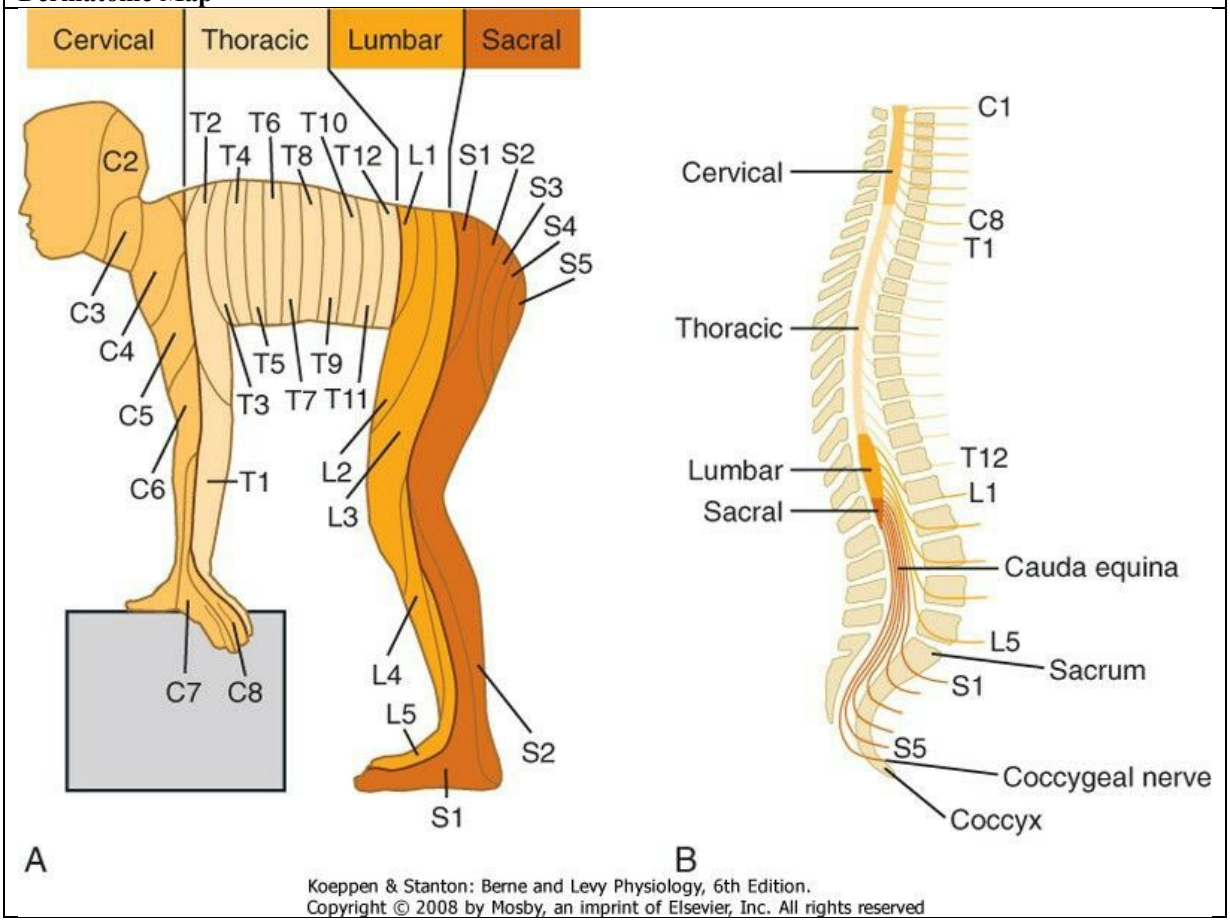
Diagram 2: Varicella Zoster Virus (VZV) Follow up Process



*Doses must be given at least 6 weeks apart

Dermatome Map



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