HERPES ZOSTER

Infection Control Guidelines for Long-Term Care Facilities

Massachusetts Department of Public Health
Division of Epidemiology and Immunization
(617) 983-6800

Herpes zoster, or shingles, is a painful blistering rash caused by reactivation of varicella zoster virus (VZV), the causative agent in chickenpox. Shingles typically presents in one area on one side of the body, in the distribution of a nerve. There are usually no fever or other systemic symptoms. Pain and itching in the area of the shingles may persist after the lesions have resolved (post-herpetic neuralgia). Shingles can be treated with several antiviral agents. It can occasionally become serious in immune-compromised persons, with generalized skin eruptions and central nervous system, pulmonary, hepatic, and pancreatic involvement.

Shingles is found worldwide and has no seasonal variation. The most striking feature of the epidemiology of shingles is the increase in incidence found with increasing age. Decreasing cell-mediated immunity (CMI) associated with aging is thought to be responsible for these increased rates. Similarly, the loss of CMI among persons with malignancies and HIV infection is thought to be responsible for higher rates of shingles among those populations. Approximately 20 percent of the general population will experience shingles during their lifetime and an estimated 500,000 episodes of shingles occur annually in the U.S. Approximately 4 percent of individuals will experience a second episode of shingles.

A vaccine to prevent shingles in those who have already had chickenpox has recently been licensed for use in adults 60 years of age and older. It is contraindicated in persons with certain immune-compromising conditions.

Infectious Agent: Varicella-zoster virus (VZV, chickenpox virus)

Reservoir: Humans

Mode of Transmission: VZV infection is transmitted to susceptible individuals (no history of chickenpox or varicella vaccine) by the following means:

1. From shingles cases:
   - direct contact with lesions

2. From disseminated shingles cases, or localized shingles cases in the immunocompromised:
   - airborne
   - direct contact with lesions

Exposure to shingles can result in chickenpox in a susceptible person but **cannot** cause shingles. Exposure to chickenpox does **not** cause shingles.

Incubation Period: Shingles has no incubation period; it is caused by reactivation of latent infection from primary chickenpox disease. Shingles is infectious until all lesions have crusted over. Infectiousness can be prolonged in immunocompromised patients.

Diagnosis: Clinical diagnosis. Laboratory confirmation is not usually indicated. However, isolation of VZV, or a positive Direct Fluorescence Antibody (DFA), Polymerase Chain Reaction (PCR), or Tzanck smear from a clinical specimen can be helpful.

Treatment: Analgesics and antiviral drugs can be used to treat shingles.

Control:
Ensure that all healthcare workers are immune to chickenpox at time of employment. (See Attachment A, Revised Proof of Immunity.) For healthcare workers who have not been immunized or do not have serologic proof of immunity, careful screening for history of disease is important. Anyone with an uncertain history (regardless of age) should be not considered immune. In healthcare institutions, serologic screening of personnel who have a negative or uncertain history of chickenpox is likely to be reliable and cost-effective. Routine testing for chickenpox immunity after two doses of vaccine is not necessary because 99 percent of adults are seropositive after the second dose. Seroconversion, however, does not always result in full protection against disease.

For vaccinated healthcare workers in long-term care facilities who are subsequently exposed to shingles (or chickenpox), most should be considered protected. However, the following measures may be considered if immunocompromised patients are present:

- Test for serologic immunity immediately after exposure. (Latex Agglutination) LA can be done quickly and may be a useful post-exposure test. However, recent evidence has shown that false positive can occur, incorrectly categorizing a susceptible person as immune. Therefore, less sensitive EIAs are recommended for screening purposes when possible

.

- Retest 5-6 days after exposure to determine if an anamnestic response (boosting of antibody titres) is present.

- Those workers who remain susceptible should be excluded.

- Alternatively, consider exclusion or reassignment of personnel who do not have detectable antibody.

1. **Prevent exposure to the case**, as follows:
   Staff
   - **Staff with localized shingles** should cover lesions and should not care for high-risk patients until their skin lesions have become dry and crusted.
   - **Staff with disseminated shingles and immunocompromised staff with shingles** should be excluded for the duration of their illness.

   Patients
   - **Patients with localized shingles** should be cared for using standard precautions until all lesions are crusted:
     - Only immune staff should care for these patients.
     - Current or prospective roommates should be immune.
     - Gloves should be worn when touching infectious material and during direct patient care. Clean gloves should be used before touching mucous membranes and nonintact skin.

Gloves should be changed between tasks and procedures on the same patient after contact with material that may contain a high concentration of virus. Gloves should be promptly removed after use and before touching noncontaminated items and environmental surfaces.

- Handwashing is necessary after touching the patient **and before** contact with another patient or with noncontaminated items and environmental surfaces, whether or not gloves were used.
- Masks, gowns, and eye protection should be worn during procedures and patient care activities likely to generate splashes of blood, bodily fluids, secretions, or excretions.
- Used patient care equipment and used linen should be handled in a manner that prevents skin and mucous membrane exposure and contamination of clothing.

Patients with disseminated shingles and immunocompromised patients with shingles (either localized or disseminated) require standard, airborne, and contact precautions. In addition to the standard precautions listed above, the following precautions must also be followed:

- The room should have negative air-pressure ventilation. However, if this is not available, using a private room is acceptable. If a private room is unavailable, make sure roommates are immune and all visitors are screened for history of chickenpox or varicella vaccine.
- Gloves and gowns should be worn at <u>all</u> times.
- Susceptible staff or visitors should not enter patient room. If unavoidable, masks should be worn. Persons immune to varicella need not wear masks.

2. **Identify all exposed individuals.**
   - "Exposure" to uncomplicated shingles is defined as: contact with lesions; for example, through close patient care, touching, or hugging.
   - "Exposure" to disseminated shingles and localized or disseminated shingles in an immunocompromised person is defined as: 1) contact with lesions (for example, through close patient care, touching, or hugging); or 2) sharing indoor airspace with the infectious person (for example, occupying the same room).

3. **Identify high-risk susceptible patients/staff among the exposed.** Susceptible individuals are those without a reliable history of chickenpox or shingles, documentation of prior vaccination against chickenpox, or serologic proof of immunity. (See Attachment A, Revised Proof of Immunity.) High-risk susceptibles include those who are immunosuppressed due to underlying medical conditions (including HIV infection), treatment or medications (including steroids), or who are susceptible pregnant women. They are at greater risk for complications from varicella and should be referred promptly to their health care provider. These high-risk susceptibles should receive VZIG (varicella zoster immune globulin) as soon as possible within 96 hours of exposure. Please note, bone marrow transplant recipients should be considered susceptible *regardless* of past history of disease.

4. **Identify and vaccinate other exposed susceptibles.** Susceptible individuals are those without a reliable history of chickenpox or shingles, documentation of prior vaccination against chickenpox, or serologic proof of immunity. (See Attachment A, Revised Proof of Immunity.) If the varicella vaccine is given within 3 (and possibly up to 5) days of exposure to VZV, it can prevent disease. If 5 days have passed since exposure to the case, the vaccine should still be

given, as it will protect against possible future exposures. Chickenpox can still occur in susceptible contacts in spite of vaccination, but vaccinating someone who is incubating chickenpox or who is immune is not harmful. See attachments B and C, "Special Considerations in the Administration of Varicella Vaccine", and "Suggested Intervals Between Administration of Immunoglobulin Preparations and Measles-Containing and Varicella Vaccines", respectively, for information about groups who should **not** receive varicella vaccine.

5. **Discharge or isolate exposed susceptible patients.** Isolate on contact and airborne precautions all exposed, susceptible patients who cannot be discharged from before day 10 after exposure, from day 10 through day 21 after exposure. Those who have received VZIG must remain in isolation until day 28.

6. **Conduct surveillance for chickenpox for 21 days (one incubation period) after the last exposure to shingles**. For those who received VZIG and where immunocompromised individuals are involved, surveillance should continue for 28 days.

REFERENCES

American Academy of Pediatrics. *Red Book 2006: Report of the Committee on Infectious Diseases, 27th Edition*. Illinois, Academy of Pediatrics, 2006: 711-725.

Heymann, DL. Ed. Chickenpox-herpes zoster. *Control of Communicable Diseases in Man.* 18th ed., American Public Health Association, Washington, DC, 2004: 94-100.

Centers for Disease Control and Prevention. Advisory Committee on Immunization Practices (ACIP) Provisional Recommendations for Prevention of Varicella. June 2006.

Centers for Disease Control and Prevention. *Epidemiology & Prevention of Vaccine-Preventable Diseases: The Pink Book, 9th Edition*. January 2006: 171-192.

Centers for Disease Control and Prevention. Prevention of Varicella. Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* July 12, 1996;45:RR-11.

Centers for Disease Control and Prevention. Prevention of Varicella. Update Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* May 28, 1999;48:RR-6.

Centers for Disease Control and Prevention. Immunization of Health-Care Workers. Recommendations of the Advisory Committee on Immunization Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC). *MMWR* December 26, 1997;46:RR-18.

Wharton, M. The epidemiology of varicella-zoster virus infections. *Infectious Disease Clinics of North America*. 1996;10:3.

Whitley, RJ. Varicella-zoster virus. In: Mandell GL, Bennett JE, Dolin R, eds. *Principles and Practice of Infectious Diseases*, 6th ed. Philadelphia, PA: Churchill Livingstone; 2005: 1780-1786.

Attachment A

Revised Proof of Immunity

Revised Proof of Immunity to Varicella[1] (Updated January 2007)

- Documentation of age-appropriate vaccination against chickenpox:
  - Age 1–12 years at first vaccination: 1 dose[2]
  - Age ≥13 years at first vaccination: 2 doses given ≥ 1 month[3] apart, or
- Laboratory evidence of immunity[4] or laboratory confirmation of disease, or
- Born in the US before 1980[5], or
- A healthcare provider diagnosis of varicella or healthcare provider verification of history of varicella disease[6,7], or
- History of herpes zoster based on healthcare provider diagnosis.

[1]Bone marrow transplant recipients should be considered susceptible *regardless* of past history of disease.

[2]While 1 dose given at 1–12 years of age or 2 doses given ≥ 1 month apart at ≥ 13 years of age satisfies the school immunization requirement, the ACIP now recommends a 2-dose series age groups.

[3]For children who have received their first dose before age 13 years and the interval between the two doses was at least 28 days, the second dose is considered valid.

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

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

[6]Self-reported history of chickenpox is also acceptable for adults and college students, with review by appropriate healthcare or supervisory staff.

[7]Verification of history or diagnosis of typical disease can be done by any healthcare provider (e.g., school or occupational clinic nurse, nurse practitioner, physician assistant, physician, appropriate supervisory or public health staff). 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, people should not be considered as having a valid history of disease, because other diseases may mimic mild atypical varicella.

Note: As we move forward into the post-vaccine era, the reliability of history of chickenpox will decrease. At some time in the future, a history of chickenpox will no longer be acceptable proof of immunity for those born in or after 1980, unless the illness was laboratory confirmed.

Post-Exposure Varicella Vaccine Requirements
(Updated January 2007)

Vaccination is required for persons:

- born in or after 1980[1] or born outside the U.S. (regardless of year of birth), and
- without history of chickenpox as verified by a healthcare provider, and
- without serologic proof of immunity

Number of doses received previously	Additional Doses Required			
	Born before 1980[1]		Born in or after 1980 (regardless of place of birth)	
	US-born	Non US-born	<13 years of age	≥ 13 years of age at time of first dose
0	0	1[2]	1[2]	2
1	0	0[2]	0[2]	1
2	0	0	0	0

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

[2]Two doses of varicella vaccine are recommended. [While 1 dose given at 1–12 years of age or 2 doses given ≥ 1 month apart at ≥ 13 years of age satisfies the school immunization requirement, the ACIP now recommends a 2-dose series for all persons all age groups].

Attachment B

Special Considerations in the Administration of Varicella Vaccine

1) The groups listed below should not receive varicella vaccine *except* as specified in the box. Please consult the package insert for a full list of contraindications and precautions.

- Infants less than 12 months of age.
- Pregnant women. (Women should avoid getting pregnant until ≥ 1 month after vaccination.)
- Those with anaphylactic reaction to neomycin or other vaccine component (consult package insert).
- Those on salicylate therapy, due to the risk of Reye syndrome. (If varicella vaccine has been given, salicylate therapy should be deferred for ≥ 6 weeks.)
- Those with severe illness at the time of the scheduled vaccination (temporary contraindication).
- Those with immunocompromising conditions, including malignancies, primary or acquired immunodeficiency, and immunosuppressive therapy, except as noted in box below.

Groups with Potentially Immunocompromising Conditions Eligible to Receive Varicella Vaccine
The following persons with immunocompromising conditions are eligible to be considered for routine varicella immunization. However, varicella vaccine should not be used as post-exposure prophylaxis. If exposed, they should receive VZIG as soon as possible if within 96 hours of exposure. ● Persons with impaired humoral immunity, e.g. hypogammaglobulinemia, dysgammaglobulinemia. ● HIV-infected children who are asymptomatic or mildly symptomatic and aged > 12 months with age-specific CD4+ T-lymphocyte percentages of > 15%, (If to be vaccinated, these children should receive 2 doses with a 3-month interval between doses and be monitored for adverse events. These children may have a higher risk of developing a vaccine-associated rash.) ● Children with acute lymphoblastic leukemia (ALL) in remission for at least 12 consecutive months and conforming to certain other criteria. (Vaccine available through a research protocol. Health care providers must call 484-679-2856.) ● Persons on non-suppressive topical, aerosol, or local injections of steroids.

- Persons receiving systemic steroids and who are not otherwise immunocompromised, if they are receiving < 2 mg/kg of body weight or a total of ≤ 20 mg/day of prednisone or its equivalent. (Persons on higher-dose steroid therapy cannot receive varicella vaccine—see section on steroids below.)

- Those having received blood products (except washed red blood cells), plasma, or immune globulin, including VZIG, within the previous 3-11 months (please refer to Attachment C.) The effect of administration of immune globulin on the antibody response to varicella vaccine is not known. Because of potential inhibition of the response, varicella vaccine should not be administered after receipt of an immune globulin preparation or a blood product (except washed red blood cells), as recommended for measles vaccine. In addition, varicella vaccine should be given ≥ 2 weeks before these blood products. If IG or a blood product is given during this 2-week interval, the individual should be reimmunized after the appropriate interval, as specified in Attachment C, or tested for varicella immunity at that time and reimmunized if seronegative.

2) Guidelines for administration of live virus vaccines to individuals on steroid therapy*:

Steroid Therapy	Recommendations for Deferral
High dose systemic steroids daily or on alternate days for ≥ 14 days (≥ 2mg/kg QD or ≥ 20 mg QD of prednisone)	Defer live virus vaccines for ≥ 1 month after treatment has stopped.
High dose systemic steroids daily or on alternate days for < 14 days (≥ 2 mg/kg QD or ≥ 20 mg QD prednisone)	Can give live virus vaccines immediately after treatment is discontinued. However, some experts recommend deferring until ≥ 2 weeks after treatment has stopped, if possible.
Low or moderate doses of systemic steroids given daily or on alternate days (< 2 mg/kg QD or < 20 mg QD of prednisone)	Can give live virus vaccines on treatment.
Physiologic maintenance doses of steroid (replacement therapy)	Can give live virus vaccines on treatment.
Topical, aerosol or local injections of steroids (e.g., skin, aerosol, eyes, intra-articular, bursal, tendon injections)	Can give live virus vaccines on treatment. However, if this therapy is prolonged and there is any clinical or laboratory evidence of immunosuppression, defer for ≥ 1 month after treatment has stopped.

Individuals with a disease which in itself is considered to suppress the immune response and who are receiving systemic or locally acting steroids	Should not give live virus vaccines, except in special circumstances.

* Steroid therapy is not a contraindication for administration of killed vaccines.

Adapted from: CDC. General recommendations on immunization: recommendations of the Advisory Committee on Immunization Practices (ACIP) and the American Academy of Family Physicians (AAFP). MMWR 2002; 51 (No. RR-2):23.

Attachment updated November 2005

Attachment C

Suggested Intervals between Administration of Immunoglobulin Preparations and Measles-Containing and Varicella Vaccines

Product/Indication	Dose, including mg immunoglobulin G (IgG)/kg body weight[1]	Recommended interval before measles or varicella vaccination (months)
Respiratory syncytial virus immune globulin (IG) monoclonal antibody (Synagis™)	15 mg/kg intramuscularly (IM)	None
Tetanus IG	250 units (10 mg IgG/kg) IM	3
Hepatitis A IG		
Contact prophylaxis or international travel < 3 mos	0.02 mL/kg (3.3 mg IgG/kg) IM	3
International travel 3 – 5 mos	0.06 mL/kg (10 mg IgG/kg) IM	3
Hepatitis B IG	0.06 mL/kg (10 mg IgG/kg) IM	3
Rabies IG	20 IU/kg (22 mg IgG/kg) IM	4
Varicella IG	125 units/10 kg (20-40 mg IgG/kg) IM, maximum 625 units	5
Measles prophylaxis IG		
Standard (i.e., nonimmunocompromised) contact	0.25 mL/kg (40 mg IgG/kg) IM	5
Immunocompromised contact	0.50 mL/kg (80 mg IgG/kg) IM	6
Blood transfusion		
Red blood cells (RBCs), washed	10 mL/kg negligible IgG/kg intravenously (IV)	None
RBCs, adenine-saline added	10 mL/kg (10 mg IgG/kg) IV	3
Packed RBCs (hematocrit 65%)	10 mL/kg (60 mg IgG/kg) IV	6
Whole blood (hematocrit 35%-50%)	10 mL/kg (80-100 mg IgG/kg) IV	6
Plasma/platelet products	10 mL/kg (160 mg IgG/kg) IV	7
Cytomegalovirus intravenous immune globulin (IGIV)	150 mg/kg maximum IV	6
Respiratory syncytial virus prophylaxis IGIV	750 mg/kg IV	9
IGIV		
Replacement therapy for immune deficiencies	300-400 mg/kg IV	8
Immune thrombocytopenic purpura	400 mg/kg IV	8
Immune thrombocytopenic purpura	1,000 mg/kg IV	10

Kawasaki disease	2 grams/kg IV	11

Note on other live vaccines: Blood and other antibody-containing products (except washed red blood cells) can also diminish the response to rubella vaccine, and potentially to mumps vaccine. Therefore, after immune globulin preparations or other antibody-containing products are received, mumps and rubella vaccines should be deferred for ≥ 3 months. If RSV-IGIV is given, mumps, rubella and varicella vaccines should be deferred for ≥ 9 months. If RSV-IM is given, no deferral is needed for any live virus vaccines.

Adapted from: CDC. General recommendations on immunization: recommendations of the Advisory Committee on Immunization Practices (ACIP) and the American Academy of Family Physicians (AAFP). MMWR 2002; 51 (No. RR-2):7.