



Tetanus Prevention, Prophylaxis and Wound/Injury Management Standard

Section 8:	Immunization of Special Populations	Standard #: 08.400
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Preamble

Alberta Health Services (AHS) Province-wide Immunization Program Standards and Quality, Population, Public and Indigenous Health Division provides Public Health and other partners who administer provincially funded vaccines with ongoing and timely information relating to province-wide immunization program standards and quality. These standards are based on currently available evidence based information, Alberta Health (AH) policy, and provincial and national guidelines. Immunizers must be knowledgeable about the specific vaccines they administer.

Background

Tetanus disease in humans is caused by a potent neurotoxin released by the gram-positive, spore-forming, anaerobic, rod-shaped bacterium, *Clostridium tetani*. The organism is sensitive to heat and cannot survive in the presence of oxygen, but the spores are very resistant to heat and antiseptics. *C. tetani* bacilli live in the bowels of humans and animals, and the spore form is excreted in feces. These spores are hardy and survive for many years in soil and dust, worldwide. When a wound is contaminated with soil, dust, or feces, the spores enter the body and begin to germinate if the environment is sufficiently anaerobic. As the bacteria in the tissues continue to multiply and die, an exotoxin is produced which travels to nervous tissue through the blood or to the central nervous system along peripheral motor nerves. Tetanus is not transmitted person to person, and therefore, herd immunity plays no role in its prevention (Centers for Disease Control and Prevention, 2012).

The incubation period for tetanus disease is generally 3 to 21 days but can range from 1 day to several months, with an average of 10 days (neonatal tetanus - average 6 days with range of 3 to 28 days). Symptoms include acute onset of severe, painful muscle spasms usually beginning in the jaw (lockjaw) and neck muscles. As the disease progresses, generalized rigidity and spasms can cause serious complications such as difficulty breathing due to spasms of the respiratory muscles, fractures, aspiration and pneumonia. The diagnosis is usually a clinical one, as laboratory confirmation of tetanus from culture of wounds is rare. The case fatality rate in unimmunized individuals varies from 10% to over 80% and is highest in infants and the elderly. Recovery from disease does not result in protection (World Health Organization, 2006).

Worldwide, tetanus disease causes hundreds of thousands of deaths annually (Heymann, 2015). It is more common in agricultural regions and in underdeveloped areas where immunization may not be adequate and there is increased contact with animal feces. Neonatal tetanus, arising from contamination of the umbilical cord, accounts for approximately 50% of all tetanus deaths in developing countries. It generally occurs when there is a lack of passive immunity due to inadequate immunization of the mother (Alberta Health, 2018).

Immunization with tetanus vaccine began in Alberta in 1947. Tetanus is rare in industrial countries now that tetanus immunization is widespread. Between 1990 and 2010, the average number of cases

in Canada was 4 per year (National Advisory Committee on Immunization, 2012). Persons 60 years and older accounted for 48% of the cases and 59% were male (National Advisory Committee on Immunization, 2012).

Purpose

The purpose of this standard is to promote tetanus prevention following a tetanus prone wound or injury through proper initial wound care accurate identification of tetanus prone wounds, assessment of immunization history and recommendations for tetanus post-exposure prophylaxis.

Applicability

This standard applies to all health care providers assessing wounds (acute or chronic) for risk of tetanus disease and to those providing, or recommending provincially funded tetanus-containing vaccines and/or tetanus immune globulin (TIG).

Definitions:

Tetanus disease (commonly referred to as “lockjaw”): Characterized by muscle spasms, usually in a descending pattern beginning in the jaw muscles. As the disease progresses, prolonged frequent spasms may occur contributing to serious complications and death unless treatment is provided.

Tetanus prone wound / injury (Alberta Health, 2015): Any wound that is significantly contaminated with material likely to contain tetanus spores and/or that demonstrates the presence of necrotic tissue.

Tetanus Immune Globulin (TIG): TIG is a blood product for IM administration prepared from pooled human plasma of screened donors immunized with tetanus toxoid. TIG provides immediate passive protection until an exposed person mounts an immune response to the tetanus toxoid administered concurrently with TIG.

Competency

In November 2008 the Public Health Agency of Canada published Immunization Competencies for Health Professionals with a goal of promoting safe and competent practices for immunization providers. The following competency is applicable to this standard:

- Administration of Immunizing Agents: Names the resources that are used to guide the immunization administration process and decision making
- Populations Requiring Special Considerations: Appropriately refer to expert professionals / resources when required to address the immunization needs of certain populations.

Section 1: Pre-Exposure Tetanus Prevention

Opportunities should be taken to educate the public about tetanus and that the disease is vaccine-preventable. It is also important to emphasize proper wound care.

After three doses of appropriately spaced tetanus-containing vaccine (a primary series), more than 99% of immunized individuals develop protective antibodies against the effects of the neurotoxin. Complete immunization with tetanus-containing vaccine is the key to preventing tetanus disease and is strongly recommended for all individuals in whom there is no contraindication to the vaccine. Complete protection consists of a primary series along with booster doses every 10 years, or earlier if a tetanus-prone wound has occurred (see section 3). The number of doses and type of tetanus-containing vaccine varies according to age. Complete recommendations are outlined in the *Standard for Recommended Immunization Schedules* and tetanus-containing vaccine biological pages.

Important Immunization Opportunities

Although opportunities should be taken to assess immunization status during each contact with a healthcare provider, special mention is warranted with the following groups due to an increased risk of unassessed or unrecognized tetanus-prone wounds, and/or an increased risk of incomplete immunization. Health programs targeting these groups should offer immunization with tetanus-containing vaccine and/or promote and facilitate access to provincial immunization programs.

- **Individuals born before immunization programs were implemented**
 - Includes, but is not limited to, patients and/or residents in health care institutions, including home care clients, especially those with abscesses, cellulitis, chronic ulcers, and other wounds.
- **Immigrants with uncertain or incomplete immunization histories**
- **Individuals who inject nonprescription drugs**

Section 2: Identification of a Tetanus Prone Wound

A tetanus-prone wound is any wound (other than a clean, minor wound) that is significantly contaminated with material likely to contain tetanus spores and/or demonstrates the presence of necrotic tissue; including, but not limited to:

- Wounds contaminated with dirt, feces, soil and saliva; animal bites; puncture wounds; avulsions; and wounds resulting from missiles (gunshots), crushing, burns and frostbite.
- Wounds with devitalized tissue.
- Abscesses, cellulitis, chronic ulcers and other wounds in patients with diabetes mellitus or illicit injection drug use.
- Wounds sustained more than six hours before surgical treatment of the wound / burn.
- Clinical evidence of sepsis.

Section 3: Guide To Tetanus Post-Exposure Prophylaxis

Once a tetanus-prone wound has been identified, the most important goals of tetanus post-exposure prophylaxis are:

- Remove the source of toxin production by timely, thorough cleansing of the wound
- Neutralize any toxin which may have been released with high circulating concentrations of tetanus toxin neutralizing antibody. Effective levels of neutralizing antibody concentrations are achieved by either prior completion of tetanus-containing vaccine series or the immediate administration of TIG to ensure protection during the usual incubation period of tetanus (3 to 21 days; range one day to several months).

In keeping with these goals, the following steps should be completed as soon as possible after a tetanus prone wound occurs:

1. Wound Cleansing

- Appropriate cleansing and debridement of the wound is imperative.
- In situations where a client with a tetanus prone wound presents directly to public health, the Public Health Nurse (PHN) should refer to a physician as necessary if further assessment or wound care is needed.
- Use of antibiotics for other potential organisms may be considered by the attending physician.

2. Assess History of Tetanus-Containing Vaccine

When a tetanus-prone wound occurs, it is important that an adequate assessment of the individual's immunization history is completed. This is to determine:

- Whether the individual has received at least 3 previous doses of tetanus-containing vaccine at the appropriate intervals (primary series)
- Date of last dose of tetanus-containing vaccine
- Previous reactions to tetanus-containing vaccines and/or TIG

Electronic immunization records may be accessible in Alberta Health Services (AHS) facilities and should be reviewed to ascertain whether immunization documentation is available for the client at the time of presentation with a tetanus-prone wound. The client may also have their own record of immunization. However, if documentation of immunization is not immediately available, tetanus post-exposure prophylaxis should not be delayed in order to request and wait for immunization records from another zone/province/country. The assessment should be done at the time the individual presents to the health care system with the information that is available.

Adequate documentation is the only way to be certain of immunization history and is optimal when a tetanus prone wound has occurred. For more information regarding the definition of adequate immunization documentation, refer to the *Standard for Individuals Presenting with Inadequate Immunization Documentation*.

However, documentation is not always available. In the absence of adequate documentation, the decision to consider a client previously immunized, or not, is made together with the client. Counselling about this decision should include a discussion with the client about:

- Risk of disease
- Factors that are associated with lack of immunity to tetanus (including but not limited to):
 - Increasing age
 - Birth outside Canada
 - Absence of immunization records
 - Awareness that parents refused immunizations
 - No recall of having received previous immunizations

Based on the above discussion,

- If the client is not certain that they have received at least 3 previous doses of tetanus-containing vaccine, and adequate documentation is not available, the client should be considered unimmunized or incompletely immunized and offered TIG and tetanus-containing vaccine as per Table 1 and Table 2. A referral should also be made to Public Health to complete the primary series.
- If the client is certain at least 3 previous doses of tetanus-containing vaccine were received, the discussion should be well documented and a booster dose offered if indicated as per Table 1 and Table 2.
- For infants younger than 6 months who have not received a full 3-dose primary series of tetanus toxoid-containing vaccine, decisions on the need for TIG with wound care should be based on the mother's documented tetanus toxoid immunization history at the time of delivery. Apply the guidelines in Table 1 based on the mother's immunization history for these situations.
- For infants 6 months of age and older – follow the guidelines in Table 1 based on the infant's immunization history.

3. Administration of Immunizing Agents

Based on the immunization history, TIG and/or tetanus containing vaccine should be offered as summarized in the following table:

Table 1: Guide to Tetanus Prophylaxis in Wound Management

History of tetanus immunization	Clean minor wounds		All other wounds	
	Tetanus-containing vaccine ¹	TIG ²	Tetanus-containing vaccine ¹	TIG ²
Unknown or less than 3 doses in vaccine series	Yes ¹	No	Yes ^{1,3}	Yes ³
3 or more doses in a vaccine series and less than 5 years since last booster dose	No	No	No ^{1,4}	No ⁴
3 or more doses in a vaccine series and 5 years but less than 10 years since last booster dose	No	No	Yes ¹	No ⁴
3 or more doses in a vaccine series and 10 years or more since last booster dose	Yes ¹	No	Yes ¹	No ⁴

¹ See *Table 2: Age Appropriate Tetanus-containing Vaccine*. If the age-appropriate vaccine is not available at the location where the client presents (e.g., ED), the client should be referred to Public Health as soon as practical, ideally within 24 hrs. If it will be more than 72 hours before the client will be seen by Public Health, Td or dTap vaccine should be given, or contact with Public Health made after hours as per zone-specific processes.

² Follow zone-specific processes for accessing TIG.

³ Administer at different injection sites using separate needles/syringes.

⁴ Yes, if known to have an immune compromising condition, especially a humoral immune deficiency (e.g., HIV infection, agammaglobulinemia or hypogammaglobulinemia). Vaccine should be administered as well, regardless of the time elapsed since the last dose of tetanus-containing vaccine.

Table 2: Age Appropriate Tetanus-containing Vaccine

Age	Age Appropriate Tetanus-containing Vaccine*
2 months up to and including 6 years of age	DTaP-IPV-Hib-HB, DTaP-IPV-Hib, or dTap-IPV
7 years up to and including 17 years of age	dTap or dTap-IPV
18 years of age and older	Td or dTap
*Refer to <i>Immunization Schedules</i> for complete recommendations.	

When immunization is provided in the Emergency Department (ED), Urgent Care Centre, and physician offices, zones should work towards processes where immunization information is sent to Public Health for documentation in the Zone immunization system.

Ideally TIG should be given within 24 hours after a tetanus prone wound has occurred. In rare circumstances where TIG is not available or there is a delay in the client reporting or presenting for follow up, it can be given up to 21 days after sustaining injury, based on the incubation period of 3 to 21 days. If more than 21 days or if a tetanus-containing vaccine was given prior to TIG, consult the MOH/MOH designate.

- There are few, if any, formal recommendations available about timelines for tetanus PEP following a tetanus prone wound or injury. In general, tetanus PEP should occur as soon as possible after the injury, especially for puncture wounds. The zone MOH should be consulted about any cases

where tetanus PEP may be delayed. Considerations for delay should be based on the nature of the injury and likelihood that the injured person is susceptible to tetanus. The more likely the person is to be susceptible to tetanus (completely or partially), the more quickly that tetanus prophylaxis should be administered. For example, a person with a tetanus-prone injury and no history of tetanus immunization must be immunized and given tetanus immune globulin (TIG) as soon as possible. A person with a documented series of at least three tetanus-containing vaccine doses, with a booster dose within the last 10 years is less likely to be susceptible to tetanus, and the need for a booster dose is not as urgent, particularly if the wound is thoroughly cleaned (Immunization Action Coalition, 2015).

Whenever possible the age appropriate tetanus immunization should be given at the same time as TIG using a separate syringe/needle and a different anatomical site. Complete the primary series of tetanus containing vaccine in persons never immunized or partially immunized.

When age appropriate immunization cannot be given at the same time as TIG, or within 3 days of administration of TIG, Td/dTap vaccine may be considered at the time of the wound assessment and in consultation with the MOH/MOH designate.

Section 4: Referrals between Emergency Departments and Public Health

In Alberta, the provincially-funded tetanus-containing vaccines supplied to Emergency Departments are Td (tetanus/diphtheria) and/or dTap (diphtheria, tetanus, acellular pertussis). Because alternate vaccines or schedules are recommended for children up to and including 6 years of age, a referral to Public Health is necessary if tetanus-containing vaccine is indicated for these individuals. A referral to Public Health is also required for anyone needing follow-up doses of vaccine to complete a primary series.

Depending on the zone, TIG may be available in EDs, or consultation with the zone MOH/designate may be necessary to access it through Public Health.

In order to ensure that tetanus prophylaxis is timely, zone specific processes must be in place to ensure that the client has timely access to TIG and tetanus-containing vaccine either in the ED or through Public Health. If a referral is being made to Public Health, the client should be made aware of this in the ED.

References

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