

4.12 Tetanus

Etiology

Tetanus (lockjaw) is caused by a neurotoxin produced by the tetanus bacillus, *Clostridium tetani*. It exists in two forms, as an anaerobic bacterium which lives in the bowels of humans and animals and in spores which are produced by the bacteria in the intestines and are excreted in feces. The spores are in a protective pod and they do not multiply outside of the body but are hardy and may survive for many years in soil and dust.

Case Definitions

Reporting is required for confirmed cases.

Confirmed Case

Clinical illness⁹ without other apparent medical cause with or without laboratory evidence of *Clostridium (C.) tetani* or its toxin and with or without history of injury

Clinical Presentation

Tetanus is an acute neurologic disease induced by an exotoxin of the tetanus bacillus which grows anaerobically at the site of an injury. The process begins with the introduction of spores into the tissue. The spores change into bacteria in the absence of oxygen. As the bacteria multiply and die they produce a toxin that is released into the tissue. The toxin may enter the central nervous system (CNS) along peripheral motor nerves or may be bloodborne traveling to the nervous tissue. History of an injury or apparent portal of entry is not always present. The clinical manifestations of tetanus are divided into four clinical types: generalized, localized, cephalic, and neonatal. The type reflects host factors and site of inoculation.

1. Generalized type

Generalized disease is characterized by painful trismus (the most characteristic sign) and severe muscle spasms primary of the masseter and neck muscles, and secondarily of the trunk muscles. Abdominal rigidity may be present. The individual experiences severe pain during spasms which are often triggered by sensory stimuli. Typical features of generalized tetanus include the position of opisthotonus and the facial expression known as "risus sardonicus" (fixed smile and elevated eyebrows)

⁹ Clinical Illness is characterized by acute onset of hypertonia and/or painful muscular contractions (usually of the muscles of the jaw and neck), and generalized muscle spasms without other apparent medical cause.

2. Localized type

Localized tetanus involves spasticity or rigidity of muscles associated with the site of spore inoculation. It may be mild and persistent, lasting for weeks and often resolving spontaneously.

This type is often the prodrome of generalized tetanus which occurs when sufficient toxin gains entry to the CNS.

3. Cephalic type

Cephalic tetanus is a rare and unique form of localized disease that affects the cranial nerve musculature.

4. Neonatal type

Neonatal tetanus, arising from contamination of the umbilical cord, is a common cause of infant mortality in developing countries. This generally results from a lack of passive immunity, that is, mother being inadequately immunized and the non-aseptic umbilical cord-care practices. Clinical manifestations include generalized weakness and failure to nurse. Apnea is the most prominent cause of death in the first week of life and sepsis in the second week. Rigidity and spasms occur later in survivors.

Diagnosis

History of injury or portal of entry may not be apparent. Case confirmation is based on symptoms with or without laboratory results. For confirmation on laboratory specimens go to the public health laboratory web site www.publichealthlab.ca or call 709-777-6583.

Epidemiology

Occurrence

There is worldwide occurrence with approximately 50,000 deaths annually but disease is relatively uncommon in industrialized countries. An average of 50 cases per year is reported in the United States.

The disease is more common in agricultural regions and in underdeveloped areas where immunization may not be adequate and there may be contact with animal feces. Tetanus is an important cause of death in rural and tropical areas in countries of Asia, Africa, and South America. Neonatal tetanus accounts for approximately 50% of all tetanus deaths in developing countries. The worldwide tetanus mortality rate is 50% with the highest rates in young and old patients, and in persons using intravenous drug.

Tetanus is rare in Canada. The number of cases reported annually ranged from 1–7 (average five) from the years 1990 to 2000. The immunization status of most cases was unknown. Males over the age of 50 years accounted for the majority of reported cases. In Newfoundland and Labrador, one case of tetanus has been reported in the past 10 years.

Reservoir

C. tetani spores are widely distributed in soil worldwide and have also been detected in the intestines of animals and humans.

Transmission

C. tetani spores are usually introduced into the body through a wound that is contaminated with dust, soil or animal/human feces. *C. tetani* spores will germinate into bacilli in an anaerobic environment, such as necrotic tissue. The bacilli release a potent neurotoxin.

Incubation period

The incubation period is generally 3 to 21 days (range, 1 day to several months). Shorter incubation periods have been associated with heavily contaminated wounds, more severe disease, and a worse prognosis. In neonatal tetanus, symptoms usually appear from 4 to 14 days after birth, averaging 7 days.

Communicability

Since tetanus is caused by the neurotoxin, it is not transmitted person-to-person.

Control Measures

Management of Case

Investigations

- Assess immunization history
- Identify and recent injury i.e., puncture wound or laceration

Treatment

- All wounds should be cleaned and debrided
- Hospitalization is required to control the muscle spasms and pain
- Routine Practices are recommended for hospitalized patients
- Antibiotic therapy
- Human tetanus immune globulin (TIG), given intramuscularly, is recommended as it may shorten the course and lessen the severity of the disease

Immunization

The case should receive tetanus vaccine to prevent tetanus in the future. For persons with incomplete or absence of immunization, a primary series or booster dose of tetanus-containing vaccine should be offered.

Exclusion

Routine practices for hospitalized patients should be followed however; exclusion from childcare, work or school is not required.

Management of Contacts

Follow-up is not required as tetanus is not transmitted from person to person.

Management of Outbreaks

An outbreak management team should be established to address infection prevention and control measures.

Education and Prevention Measures

The most effective preventive measure against tetanus is immunization. High vaccination coverage in the childhood programs and opportunistic vaccination of those with histories of incomplete vaccination are required to ensure high levels of tetanus immunity in the whole population. In Canada, and other developed countries tetanus immunization is included in our routine vaccination programs. It is estimated that those not protected in Canada are mostly among those who are elderly, those who are born outside of Canada and those with no records.

Strategies to increase vaccination for tetanus include:

- Educate the public about the hazards of tetanus infection
- Educate the public regarding proper wound care and the prevention of tetanus
- Provide primary immunization with a tetanus-containing vaccine to all individuals as per the Newfoundland and Labrador Immunization Manual
- Target vaccination programs that are easily accessible for groups such as those born before vaccination programs were implemented, immigrants with uncertain or incomplete vaccination histories, and individuals who inject nonprescription drugs
- Encourage adults to receive a booster of a tetanus-containing vaccine every 10 years
- Offer an early booster to those traveling to a developing country, if a booster dose has not been administered within the last five years
- Provide tetanus prophylaxis for wound management as per the Newfoundland and Labrador Immunization Manual at web site
http://www.health.gov.nl.ca/health/publichealth/cdc/im_section5.pdf
- A fact sheet is available at following websites:
http://immunize.ca/uploads/tetanus/tetanus_brochure_2013_e.pdf OR
<http://www.phac-aspc.gc.ca/im/iyv-ve/faq-dis-mal/tetanus-tetanos-eng.php> OR
<http://www.phac-aspc.gc.ca/im/vpd-mev/tetanus-tetanos-eng.php>

- Other educational materials available include:
 - A poster
http://immunize.ca/uploads/tetanus/tetanus_poster_2013_e.pdf
 - A video
<http://www.youtube.com/watch?v=4EeVUHA4tmQ&list=PLJH3y0duq2ZE53di80lb2VsahjUXo3UmX>

REPORTING REQUIREMENTS AND PROCEDURES

- The laboratory (hospital or public health laboratories) report case/s to the attending physician, the Chief Medical Officer of Health and the Medical Officers of Health (MOH)
- MOH office will notify, as required, local physicians, nurse practitioners, environmental health officers, community health nurses, communicable disease control nurses (CDCNs) and Infection control practitioners (ICP), in the particular region as required for follow-up and case investigation
- The CDCN in collaboration with the ICP (if necessary) will collect case details
- The CDCN will enter the case details into the electronic reporting system and utilize the Canadian Network of Public Health Intelligence (CNPHI) tool for alerts and/ or outbreak summaries

Provincial Disease Control

- Reports the aggregate case data to Public Health Agency of Canada
- Provides an analysis of the case/s in the Quarterly Communicable Disease Report (CDR), which is posted on the Public Health website
<http://www.health.gov.nl.ca/health/publichealth/cdc/informationandsurveillance.html>
- Coordinates the response to an outbreak occurring across Regional Health Authorities

REFERENCES

Alberta Health. (2011). Tetanus. Retrieved July 9, 2013, from
<http://www.health.alberta.ca/documents/Guidelines-Tetanus-2011.pdf>

Public Health Agency of Canada. *Two recent cases of severe tetanus – United Kingdom*. Ottawa: CCDR 2002; 28-24. Retrieved July 8, 2013 from
<http://www.collectionscanada.gc.ca/webarchives/20071213015022/http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/02vol28/dr2824eb.html>

Public Health Agency of Canada. (2012). *Canadian Immunization Guide* (Evergreen ed.). Ottawa, ON. Retrieved July 9, 2013 from
<http://www.phac-aspc.gc.ca/publicat/cig-gci/>

Public Health Agency of Canada. (2013). *Routine practices and additional precautions for preventing the transmission of infection in healthcare settings*. Retrieved July 9, 2013 from http://www.chica.org/pdf/2013_PHAC_RPAP-EN.pdf