

TETANUS (Lockjaw)

✓ DISEASE AND EPIDEMIOLOGY

Clinical Description:

Tetanus is an acute disease characterized by generalized rigidity and convulsive spasms of skeletal muscles. On the basis of clinical findings, three different forms of tetanus have been described.

Localized Tetanus:

Localized tetanus is an uncommon form of the disease in which patients have persistent muscle contractions in the same anatomical area as the injury. These contractions will usually occur for several weeks before subsiding. Sometimes localized tetanus will precede generalized tetanus.

Cephalic Tetanus:

Cephalic tetanus is a very rare form of the disease that involves the cranial nerves, especially in the facial area. Cephalic tetanus can result from a head injury or from the presence of *C. tetani* in the normal flora of the middle ear.

Generalized Tetanus:

Generalized tetanus accounts for roughly 80% of all reported tetanus cases. Onset is usually gradual, with muscle stiffness first affecting the jaw (trismus or lockjaw) and neck. Severe, generalized muscle spasms will follow and can continue for 3-4 weeks. Complete recovery can take several months. Neonatal tetanus is a form of generalized tetanus that is common in developing countries but extremely rare in the United States. Neonatal tetanus results from infection of the unhealed umbilical stump.

Complications associated with tetanus infection include: breathing difficulties due to spasms of the vocal cords or muscles of respiration, fractures of the spine or long bones resulting from sustained contractions and convulsions, and hypertension and/or abnormal heart rhythm resulting from hyperactivity of the autonomic nervous system. Nosocomial infections are also a problem in tetanus cases because of prolonged hospital stays.

Causative Agent:

Tetanus is caused by a potent exotoxin produced by a bacterium – *Clostridium tetani*. *C. tetani* is a gram-positive, anaerobic bacillus capable of forming spores. The exotoxin that causes the clinical manifestations of tetanus is a neurotoxin called tetanospasmin, and is one of the most potent toxins known.

Differential Diagnosis:

Differential diagnosis includes hypocalcemic tetany, phenothiazine reaction, strychnine poisoning, epilepsy, rabies, bacterial meningitis and hysteria.

Laboratory identification:

There are no laboratory findings characteristic of tetanus. *C. tetani* is recovered from the wound in only 30% of cases, and it is sometimes isolated from patients who do not have tetanus.

Treatment:

All wounds should be thoroughly cleaned with necrotic tissue and foreign material removed. Antibiotic prophylaxis against tetanus is neither practical nor useful in managing wounds; proper immunization plays the more important role. Rarely have cases of tetanus occurred in persons with a documented primary series of tetanus vaccine. If tetanic spasms are occurring, supportive therapy and maintenance of an adequate airway are critical. Tetanus immune globulin (TIG) is recommended for persons with tetanus. TIG can only help remove unbound tetanus toxin. It cannot affect toxin bound to nerve endings. A single intramuscular dose of 3,000 to 5,000 units is generally recommended for children and adults, with part of the dose infiltrated around the wound if it can be identified. Intravenous immune globulin (IVIG) contains tetanus antitoxin and may be used if TIG is not available.

Persons with wounds that are neither clean nor minor, and who have had less than 3 doses of tetanus toxoid or have an uncertain history of prior doses should receive TIG as well as Td toxoid. This is because early doses of toxoid may not induce immunity, but only prime the immune system. The TIG provides temporary immunity by directly providing antitoxin. This ensures that protective levels of antitoxin are achieved even if an immune response has not yet occurred.

Tetanus Wound Management Recommendations				
Vaccination history	Clean, minor wounds		All other wounds	
	Td	TIG	Td	TIG
Unknown or <3 doses	Yes	No	Yes	Yes
≥3 doses	No*	No	No^	No

*Yes if >10 years since last dose

^Yes if >5 years since last dose

Case fatality:

In recent years, tetanus has been fatal in roughly 11% of cases. However, persons over the age of 60 and persons that are completely unvaccinated have even higher case fatality rates.

Reservoir:

The spores of *C. tetani* are ubiquitous in nature – most often found in soil and in the intestines and feces of many animals.

Transmission:

There is no person-to-person transmission of tetanus. Transmission primarily occurs through contaminated wounds, both major and minor. In recent years, a higher proportion of cases have had minor wounds, probably because severe wounds are more likely to be properly managed. Tetanus may follow elective surgery, burns, deep puncture wounds, crush wounds, otitis media, dental infections, animal bites, abortion, and pregnancy.

Susceptibility:

Anyone can get tetanus, however the disease is now rare in the United States because of routine immunization and improved wound management. Tetanus disease does not result in immunity.

Incubation period:

The incubation period ranges from 3 days to 21 days, with most cases occurring within 8 days. In neonates, the incubation period is usually 4–14 days. Shorter incubation periods are usually associated with more heavily contaminated wounds and injury sites close to the central nervous system.

Period of communicability:

Because tetanus is not transmitted from person-to-person, it has no period of communicability. Tetanus is the only vaccine-preventable disease that is not contagious.

Epidemiology:

Since 1995, 50 cases of tetanus have been reported annually in the U.S. Almost all reported cases have occurred in individuals who had never been vaccinated or who completed a primary series but had not had a booster dose in the preceding ten years. During 1998–2000, acute injuries or wounds preceded tetanus in 73% of cases for which information was available. Among the most frequent wound types were puncture wounds (50%), lacerations (33%), and abrasions (9%). The most common puncture wound was from stepping on a nail. The environment in which acute injuries occurred was indoors or at home in 45%, in the yard, garden, or farm in 31%, and other outdoor locations in 23%. Five percent of reported case-patients were intravenous drug users without other known injury. Heroin users, particularly those who inject themselves subcutaneously with quinine-cut heroin, appear to be at high risk for tetanus. Utah averages roughly one case of tetanus every 10 years. The last case occurred in 2006 and resulted in a mild case of generalized tetanus after a puncture wound.

PUBLIC HEALTH CONTROL MEASURES

Public health responsibility:

- Investigate all suspect cases of disease and fill out and submit appropriate disease investigation forms.
- Provide education to the general public and clinicians regarding disease transmission and prevention.

Prevention:

Vaccination is the best method to prevent infection.

Chemoprophylaxis:

NA

Vaccine:

Tetanus toxoid is available as a single-antigen preparation, combined with diphtheria toxoid as pediatric DT or adult Td, and with both diphtheria toxoid and acellular pertussis vaccine as DTaP or Tdap. Tetanus toxoid is included in the routine vaccinations recommended for children.

Childhood immunizations:

Children should start receiving tetanus vaccine at 2 months. The schedule for childhood vaccination is:

Dose	Age
Primary 1	2 months
Primary 2	4 months
Primary 3	6 months
Primary 4	15-18 months
First Booster*	4-6 years
Tdap Booster	11-12 years

* The second booster is not necessary before entering kindergarten or elementary school if fourth dose is administered on or after the fourth birthday.

Adolescents ages 13-18 who have not received a booster of Td should receive a dose of Tdap as their catch-up dose rather than Td. Adolescents who have already received a booster with Td at age 11-12 are encouraged to also receive a dose of Tdap also. The ACIP hasn't defined an optimal interval between Td and Tdap. A five-year interval is recommended to reduce frequency of side effects, but a shorter interval may be used when protection from pertussis is needed.

Efficacy of the toxoid has never been studied in a vaccine trial. It can be inferred from protective antitoxin levels that a complete tetanus toxoid series has a clinical efficacy of virtually 100%. Cases of tetanus occurring in fully immunized persons whose last dose was within the last 10 years are extremely rare.

Adult immunizations:

Adults who have never received tetanus and diphtheria toxoid-containing vaccine should receive a series of three vaccinations. The preferred schedule is a single dose of Tdap, followed by Td ≥ 4 weeks later, and a second dose of Td 6 to 12 months later. Tdap may substitute for Td for any one of the three doses in the series. After a primary series of vaccine, adults should receive a Td dose every 10 years throughout life. Adults 19-64 years of age should substitute a single dose of Tdap to replace a single dose of Td for booster immunization if they have not received Tdap previously.

Tdap may be given at a shorter interval than 10 years since the receipt of the last tetanus-toxoid containing vaccine to protect against pertussis. The safety of intervals as short as 2 years between administration of Td and Tdap is supported.

Pregnancy is not a contraindication to Tdap or Td vaccination. Women who received the last tetanus-toxoid containing vaccine < 10 years earlier should receive Tdap in the post-partum period. Women who received the last tetanus-toxoid containing vaccine ≥ 10 years earlier should receive Td during pregnancy in preference to Tdap. Pregnant women who

have not received the primary 3-dose series for tetanus should begin the series during pregnancy.

Isolation and quarantine requirements:

NA

✓ **CASE INVESTIGATION**

Reporting:

Tetanus should be reported within 3 working days of identification to the local health department or the Utah Department of Health.

Case definition:

Tetanus (1996):

Clinical Case Definition

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.

Case Classification

Confirmed: A clinically compatible case, as reported by a health-care professional.

Note: Attempts at laboratory confirmation are of little help. The organism is rarely recovered from the site of infection, and usually there is no detectable antibody response.

Case Investigation Process:

- Fill out morbidity form.

Outbreaks:

NA

Identification of case contacts:

NA

Case contact management:

NA

✓ **REFERENCES**

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