

## Tetanus

**Tetanus**, also called **lockjaw**, is a medical condition characterized by a prolonged contraction of [skeletal muscle](#) fibers. The primary symptoms are caused by [tetanospasmin](#), a [neurotoxin](#) produced by the [Gram-positive, obligate anaerobic bacterium \*Clostridium tetani\*](#). Infection generally occurs through wound contamination and often involves a cut or deep puncture wound. As the infection progresses, muscle [spasms](#) develop in the jaw (thus the name "lockjaw") and elsewhere in the body.<sup>[1]</sup> Infection can be prevented by proper immunization and by [post-exposure prophylaxis](#).<sup>[2]</sup>

Tetanus affects [skeletal muscle](#), a type of [striated muscle](#) used in voluntary movement. The other type of striated muscle, cardiac or [heart muscle](#), cannot be [tetanized](#) because of its intrinsic electrical properties. Mortality rates reported vary from 40% to 78%. In recent years, approximately 11% of reported tetanus cases have been [fatal](#). The highest [mortality rates](#) are in unvaccinated people and people over 60 years of age.<sup>[2]</sup>

Tetanus is often associated with [rust](#), especially rusty nails, but this concept is somewhat misleading. Objects that accumulate rust are often found outdoors, or in places that harbor anaerobic bacteria, but the rust itself does not cause tetanus nor does it contain more *C. tetani* bacteria. The rough surface of rusty metal merely provides a prime habitat for a *C. tetani* endospore to reside, and the nail affords a means to puncture skin and deliver endospore into the wound. An [endospore](#) is a non-metabolising survival structure that begins to metabolise and cause infection once in an adequate environment. Because *C. tetani* is an anaerobic bacterium, it and its endospores survive well in an environment that lacks [oxygen](#). Hence, stepping on a nail (rusty or not) may result in a tetanus infection, as the low-oxygen (anaerobic) environment is provided by the same object which causes a puncture [wound](#), delivering endospores to a suitable environment for growth.

Unlike many infectious diseases, recovery from naturally acquired tetanus does not usually result in [immunity](#) to tetanus. This is due to the extreme potency of the tetanospasmin toxin; even a lethal dose of tetanospasmin is insufficient to provoke an immune response.

Tetanus can be prevented by [vaccination](#) with tetanus toxoid.<sup>[1]</sup> The [CDC](#) recommends that adults receive a [booster](#) vaccine every ten years, and standard care practice in many places is to give the booster to any patient with a puncture wound who is uncertain of when he or she was last vaccinated, or if he or she has had fewer than 3 lifetime doses of the vaccine. The booster may not prevent a potentially fatal case of tetanus from the current wound, however, as it can take up to two weeks for tetanus antibodies to form.<sup>[12]</sup> In children under the age of seven, the tetanus vaccine is often administered as a combined vaccine, [DPT/DTaP vaccine](#), which also includes vaccines against [diphtheria](#) and [pertussis](#). For adults and children over seven, the Td vaccine (tetanus and diphtheria) or Tdap (tetanus, diphtheria, and acellular pertussis) is commonly used.<sup>[1]</sup>

The wound must be cleaned. Dead and infected tissue should be removed by surgical [debridement](#). Administration of the antibiotic [metronidazole](#) decreases the number of [bacteria](#) but has no effect on the bacterial toxin. [Penicillin](#) was once used to treat tetanus, but is no longer the treatment of choice, owing to a theoretical risk of increased spasms. However, its use is recommended if metronidazole is not available. [Passive immunization](#) with human anti-[tetanospasmin immunoglobulin](#) or tetanus immune globulin is crucial. If specific anti-tetanospasmin immunoglobulin is not available, then normal human immunoglobulin may be given instead. All tetanus victims should be vaccinated against the disease or offered a booster shot.

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