

# Diphtheria & tetanus vaccination

by Sherri [Tenpenny](#) DO

Original publisher: [www.mercola.com](http://www.mercola.com)

---

## U.S. Adults Need Booster Shot of Diphtheria, Tetanus

A recent journal article states that only 60% of American adults have adequate antibody protection to ward off diphtheria infections and only 72% are protected against tetanus.

Tetanus, a sometimes-fatal illness, is caused by toxin-producing bacteria that usually starts after acquiring a dirty cut or wound. The disease is characterized by painful muscle spasms or contractions.

Diphtheria is caused by another type of bacteria that primarily attack the larynx, tonsils and throat. The toxin produced by the bug can damage the nerves and heart.

While most US children receive immunization for diphtheria and tetanus, many adults may not realize that over time the protection provided by the shots can wane.

In the study, 18,045 people aged 6 years and older were tested for the presence of diphtheria and tetanus antibodies in their blood between 1988 and 1994.

The researchers found that **91% of children aged 6 to 11 years were found to have protective levels of diphtheria and tetanus antibodies.** However, the number of adults found to have protective levels was another story altogether.

Overall, **only about 50% of adults had protective antibodies to both diseases,** and among those 70 years and older, only about 30% had protective levels against either of the two illnesses.

Although diphtheria and tetanus occur only rarely in the US, a recent outbreak of diphtheria in the former Soviet Union is a reminder that even a well-controlled infection can re-emerge when population immunity is not maintained.

Since immunity to diphtheria and tetanus decreases with age, doctors should re-immunize patients at 11 to 12 years of age and every 10 years thereafter, as recommended by the US Advisory Committee on Immunization Practices.

[Annals of Internal Medicine](#) **May 7, 2002;136:660-666**

## **COMMENT BY DR. SHERRI TENPENNY:**

Over the last two years, I have invested more than 2000+ hours investigating the truth about vaccines and I have had some "eye-opening" experiences. Some of my biggest revelations came when I began analyzing the CDC's information about the tetanus and diphtheria vaccines. Here is some of what I have learned.

### **Tetanus – the disease and the vaccine**

Tetanus is a disease caused by the Gram-positive bacterium *Clostridium tetani* that exists in soil as a spore. High concentrations can be present if the soil has been contaminated with animal or human feces. In the presence of anaerobic (low oxygen) conditions, the spores can germinate and release a potent neurotoxin, called tetanospasmin, into the bloodstream. Dirty, deep puncture wounds that are contaminated with soil are at greatest risk for infection. Wounds that are gangrenous, or injuries caused by frostbite, crush injuries, and burns are also at increased risk.

The incubation period prior to the onset of tetanus symptoms can take several days to several months, depending on the location of the inoculation. Once the spores germinate, the toxin is released into the bloodstream and travels to peripheral nerves, eventually attaching to receptor sites at the nerve endplates. The result is unrelenting, painful muscle spasm.

The four clinical types of tetanus are generalized, local, cephalic, and neonatal, with generalized tetanus being the most common. This form manifests as the classic spasms which can last from seconds to minutes. Death from tetanus is due to spasm of the vocal cords and spasm of the respiratory muscles, leading to respiratory failure. The highest mortality rate for tetanus is seen in the very old and the very young, but on average, it is generally reported in most literature that the mortality rate is approximately 30%. Recovery can take months **but is usually complete**, unless unforeseen complications occur (1).

Yes, you read it right, **complete recovery**.

It is an article of faith, widely accepted by doctors and patients alike, that tetanus is almost invariably fatal, especially if the person is not vaccinated. This fear is so deeply entrenched that I have personally seen patients dutifully wait in a busy emergency department for hours to get a tetanus shot because they had sustained a superficial cut while washing dishes. Before I knew better, and because the "standard of care" dictates that every cut gets a tetanus shot, I handed these shots out like candy, believing it was better to "over protect" than to risk the development of a "fatal" case of tetanus.

Discovering that most people recover from an acute bout of tetanus was unexpected, but it was disconcerting to find that many of the reported cases of tetanus were in "fully vaccinated" people. A review of the Morbidity and Mortality Weekly Report (MMWR) from the CDC called "Tetanus Surveillance—United States, 1995-1997" (2) revealed unexpected information and facts. However, because this report is bogged down with complicated statistics that must be methodically disentangled, it is no wonder that few are aware of its contents.

The document discusses 124 cases of tetanus reported between 1995 and 1997. Here is what was reported (3):

TABLE 1. Tetanus toxoid vaccination status and deaths among persons with reported tetanus, by vaccination status -- United States, 1995-1997

Vaccination status	No.	(%)	No deaths
Unknown	66	(53.7)	9
0 doses	27	(21.5)	4
1 dose	11	(9.1)	0
2 doses	4	(3.3)	1
3 doses	4	(3.3)	0
>=4 doses	12	(9.1)	0
Total	124*	(100.0)	14

\*Outcome was unknown for two patients.

---

Note that nearly twenty-five percent (24.8%) of those who contracted acute tetanus had at least one dose of the vaccine and *more than twelve percent (12.4%) of the patients were fully vaccinated*, with three or more doses of tetanus. Of the 66 (53.7%) people who had an "unknown vaccination status," it could reasonably be assumed that a portion of those had had one or more tetanus shots at some point in their lives. Therefore, statement made by the CDC that "the disease continues to occur almost exclusively among persons who are unvaccinated, inadequately vaccinated or whose vaccination histories are unknown or uncertain" (4) is simply not true.

The "rationale" for getting a tetanus shot is that milder cases will result among the vaccinated (5). This is an argument used with all the mandated the vaccines. Yet, given that the fatality rate (11.2%) is lower than reported and the apparently low incidence overall, the following questions should be asked:

1) What is the real risk of getting a severe case of tetanus if you are unvaccinated?

2) How many cases of serious tetanus would occur were all wounds cared for properly?

3) What antibody level actually confers protection from a serious case of tetanus?

The truth is, the antibody level required to be universally protective is unknown. The "generally accepted" protective level for tetanus antibody  $> 0.15$  IU/mL. This level was proposed by Snead in 1937, and has been the accepted "standard" since that time. However, the number is arbitrary and not guaranteed to protect from infection (6). Therefore, routinely vaccinating every 10 years, as the journal article suggests, simply to maintain "adequate antibody levels" is uncalled for and may not only provide the person with a false sense of security, it may actually cause harm.

Tetanus vaccines haven't gotten the "bad press" many of the other vaccines have recently received. In the zeal to protect from this "deadly disease," it is imagined that the risk of infection far exceeds the potential risk of the vaccine. What harm could it do? I thought the vaccine only contained inactivated tetanus toxin and sterile water. I am convinced that is the perception of nearly all physicians. It was disturbing to learn of the other ingredients that are in the tetanus toxoid vaccine: formaldehyde; sodium phosphate monobasic; sodium phosphate dibasic, [an eye and skin irritant that may be harmful if ingested]; glycine, aluminum, and 25 ug. of thimerosal (mercury). There is obviously more to the tetanus vaccine than inactivated toxoid!

In the Emergency Department, if the tetanus status of a patient is "unknown," an additional shot is routinely given, because it is thought to be harmless. However, this is simply bad medicine. If the person doesn't need the tetanus booster, the vaccine can cause a severe allergic reaction referred to as an Arthus type, Type III hypersensitivity reaction. This side effect is defined as "an acute inflammatory reaction caused by deposition of antigen-antibody complexes into the tissues (7)." The "Arthus type" variation classically causes a reaction only at the injection site, but the result is an acute necrotizing vasculitis and localized necrosis (death) of the tissues. The reaction starts 2-8 hours after a tetanus toxoid injection and occurs if the person has very high serum antitoxin antibodies *due to overly frequent injections* (8).

In addition to the local reaction, severe systemic reactions can occur. A partial list of adverse events includes headache; nausea; vomiting; arthralgias; tachycardia; syncope (fainting); cranial nerve paralysis; and a variety of neurological complications including EEG disturbances, seizures and encephalopathy; anaphylaxis and Guillain-Barre' syndrome (9). Recommending "routine" tetanus boosters based on mathematical models of antibody degradation can result in severe complications and is risky business, indeed.

## Diphtheria

But what about diphtheria? Do we need to keep our guard up about this infection?

Diphtheria is an infection caused by the gram-positive bacteria, *Corynebacterium diphtheriae*, its name derived from a Greek word meaning "leather hide." Early symptoms include sore throat, malaise, and a low-grade fever. Although cutaneous diphtheria infections occur, the most common form of the infection occurs in the tonsils and pharynx. If not treated early, a grayish-green membrane develops in the back of the throat which may lead to respiratory obstruction.

Similar to tetanus, the complications from diphtheria are caused by a toxin released from the infecting bacteria. The severity of the disease is related to the amount of toxin that is absorbed systemically from the infection site. The most frequent complications caused by the toxin include cardiac arrhythmias and nerve paralysis involving the palate, eyes, limbs and diaphragm. Even with these extensive complications, **complete recovery** usually occurs within five weeks of onset (10). Death occurs without medical support for the complications.

Complete recovery? Here we go again...

There are many different species of *Corynebacterium* commonly found in soil, dust and contaminated water and most do not result in serious infection. In fact, most strains of *C. diphtheriae* do not produce the disease-causing toxin! Only when the bacteria has been infected by a specific virus, called a B phage, will the toxin be produced. The B phage contains the specific genetic information to code for the toxin, therefore, *only strains infected with the virus cause severe disease* (11). The important question, then, is, how often such an event occurs.

The article refers to a "recent outbreak" of diphtheria in the former Soviet Union as the primary reason to revaccinate. It is assumed that a decrease in vaccination rate was the most significant cause for the 1990-1995 diphtheria outbreak in the Newly Independent States (NIS). This epidemic is often cited as the reason to maintain high vaccination rates.

Let's take a closer look at what was happening in the Soviet Union at that time. In 1991, fifteen new countries had just become independent with the dissolution of the USSR and shortly thereafter, the infrastructure of the region completely collapsed. Garbage piled up in the streets of Moscow and other cities. Large refugee and migrant camps descended upon the major urban areas. Health care services, including disposable syringes and needles, were virtually non-existent.

By 1995, Russia's annual health care budget was slightly less than 1 percent, about the same as the poorest African nations. Half of the country's 21,000 hospitals had no hot water, a quarter had no sewage systems, and several thousand had no water at all. In the operating rooms, truly sterile instruments were rare and blood was being washed off the hospital floor with a garden hose (12).

More than 150,000 acute infections and nearly 5,000 deaths from diphtheria were estimated to have occurred between 1990 and 1998. However, even with the initiation of widespread immunization campaigns by the World Health Organization in 1994, more than 2,700 cases were still reported in 1998 (13).

Comparing what happened in the NIS to what might happen if antibody levels fall in the US, without taking into account the living conditions in each country, is an invalid comparison.

### **What about the vaccines?**

There are several available vaccine choices: tetanus toxoid (TT); adult diphtheria toxoid plus tetanus toxoid (dT); pediatric diphtheria toxoid plus tetanus toxoid (DT) and tetanus immune globulin (TIG). The diphtheria vaccine is not obtainable separately

Like the tetanus vaccine, the diphtheria vaccine is made from the toxin of *C. diphtheriae*. The bacteria is grown in a casein medium and the final product contains ammonium sulfate, residual formaldehyde, sodium bicarbonate, 0.3 mg aluminum phosphate and 25ug thimerosal.

The tetanus toxoid vaccine (TT) was discussed previously and is the vaccine most commonly given. There are two forms of diphtheria vaccine, pediatric (D) and adult (d) and this vaccine is always given in combination with tetanus toxoid. Therefore, the pediatric vaccine is DT and the adult vaccine is dT. The distinction is made because the DT form contains 8 times more diphtheria toxoid than the dT form.

It is contraindicated to give the pediatric vaccine, DT, to adults or to children over the age of 7 years because of the increased the likelihood of side effects. Infants are given 4 doses of the DT form (as DTP or DTaP) during the first 12 months of life. The result is that infants receive 32 times the dose of diphtheria toxin from the DT form than they would receive if the dT form was used. The reason the higher concentration is "safe" for smaller, younger children is unclear.

Tetanus Immune Globulin (TIG) is a vaccine that contains tetanus toxin antibodies derived from the plasma of donors previously vaccinated with tetanus toxoid. This

vaccine is considered to give "passive immunization," meaning that the antibodies are supplied at the time of immediate need. Peak antibody blood levels from this vaccine are obtained approximately 2 days after the injection and remain in circulation for approximately 23 days. TIG can be used following an acute injury in patients whose immunization status is unknown or incomplete.

### **What are the other treatment choices?**

Although proper wound hygiene has been known since the 1940s to be the best way to prevent infection, it tends to be overlooked as the best way to prevent tetanus. Regardless of immunization status, dirty wounds should be properly cleaned and crushed tissue should be surgically removed.

Diphtheria infections can be prevented by thorough hand washing and good nutrition.

Antibiotic regimens are available for the treatment of both tetanus and diphtheria infections. The Red Book™, published by the American Academy of Pediatrics makes a suggestion for an alternative treatment for tetanus. The antibiotic, metronidazole (30 mg/kg/day) given at 6-hour intervals is effective in reducing the bacterial count in a wound. Metronidazole is the antibiotic of choice for dirty wounds. Another choice is injectible penicillin G (100 000 U/kg/day), given at 4- to 6-hour intervals. These therapies should be continued for 10 to 14 days (14). It appears that a prophylactic course of antibiotics would be prudent for dirty wounds to prevent the possibility of *C. tetani* germination and toxin production.

Additionally, there is an antibiotic treatment available for diphtheria infections. Erythromycin orally or by injection (40 mg/kg/day; maximum, 2 gm/day) or procaine penicillin G daily, intramuscularly (300,000 U/day for those weighing 10 kg or less and 600,000 U/day for those weighing more than 10 kg) can be given for 14 days. The disease is usually not contagious 48 hours after antibiotics are instituted. Elimination of the organism should be documented by two consecutive negative throat cultures after therapy is completed (15). Indeed, since nearly every sore throat is treated by conventional medicine with an antibiotic, perhaps this is the reason for the decreased incidence of diphtheria, and not the vaccine.

A third option is to use the TIG vaccine at the time of acute injury. It appears that treatment with TIG is an adequate form of treatment. The package insert states the following:

"If a contraindication to using tetanus toxoid preparations exists for a person who has not completed a primary series of tetanus toxoid immunization and that person has a

wound that is neither clean nor minor, *only* passive immunization should be given using tetanus immune globulin (16)."

With all of these options available, routinely vaccinating adults to maintain an arbitrary antibody level should be considered inappropriate healthcare. In addition, knowing the real facts about these infections and being aware of the available treatment options should be a comfort to parents who choose not to vaccinate.

1. GlaxoSmithKlein. <http://www.worldwidevaccines.com/public/diseases/dtp8.asp>
2. MMWR. Tetanus Surveillance -- United States, 1995-1997 July 3, 1998/47(SS-2);1-13. <http://www.cdc.gov/mmwr/preview/mmwrhtml/00053713.htm>
3. MMWR. Tetanus Surveillance. Ibid. Table 1, page. 13.
4. MMWR. Diphtheria, Tetanus, and Pertussis: Recommendations for Vaccine Use and Other Preventive Measures Recommendations of the (ACIP). August 08, 1991 / 40(RR10);1-28
5. MWR. Tetanus Surveillance Ibid.
6. Passen, E.L., Andersen, B. Clinical tetanus despite a protective level of toxin-neutralizing antibody. *JAMA*. 1988; (25)519:1171-3.
7. Black, C. Allen. Delayed Type Hypersensitivity: Current Theories with an Historic Perspective. *Dermatology Online Journal*5(1):7. <http://dermatology.cdlib.org/DOJvol5num1/reviews/black.html>
8. Physicians Desk Reference (PDR.) Edition 56, 2002. *Tetanus Toxioid Adsorbed*, pg. 1883.
9. PDR. Ibid. pg. 1883
10. CDC. Epidemiology and Prevention of Vaccine-Preventable Diseases (The Pink Book), 6th Edition. *Diphtheria*..Chpt. 4, pg. 46-47.
11. The Pink Book. Ibid. *Diphtheria*. Chpt. 4, pg. 45
12. Specter, Michael. The New York Times. *Russia's degenerating health: rampant illness, shorter lives* February 19,1995.
13. CDC. Diphtheria Outbreak: New Independent States of the Former Soviet Union <http://www.cdc.gov/travel/russia.htm>
14. The Red Book™: Report of the Committee on Infectious Diseases. 25th ed. Pub: Am. Acad. Ped. *Tetanus*.
15. The Pink Book. Ibid. *Diphtheria*. Chpt. 4, p. 49
16. PDR. Ibid. *Tetanus Immune Globulin (Human)*. pg. 924.