Tetanus Prevention and Vaccination

Tetanus (also called lockjaw) is rare, but neurological complications can be permanent, and the mortality rate is up to 20%.[10] Wounds at risk of tetanus require tetanus toxoid vaccine and sometimes tetanus immune globulin. Antibiotic prophylaxis for tetanus is not effective for wound management.[2] The chart below answers common questions about the appropriate management of wounds for the prevention of tetanus.

<table>
<tr><th>Question</th><th colspan="3">Answer/Pertinent Information</th></tr>
<tr><td>What is tetanus?</td><td colspan="3">• Tetanus is caused by an endotoxin that is produced by Clostridium tetani spores, which are found in contaminated soil, and sometimes animal and human feces.[3]
• Symptoms of tetanus include generalized rigidity and skeletal muscle spasms, often initiating in the jaw and neck.[2]
• Tetanus is rare due to routine immunization from infancy through adulthood.[2]
• A patient's risk of tetanus is determined by the nature of the wound and their immunization status.[2]</td></tr>
<tr><td>How long does tetanus immunity last after vaccination?</td><td colspan="3">• The routine initial three-dose tetanus toxoid vaccine series provides about 99% protection; however, immunity wanes over time.[3]
• Most patients have antitoxin levels close to the minimum protection level at ten years, therefore a tetanus toxoid booster is recommended every ten years.[2]
• A small percentage of people have a drop in antitoxin levels below the minimum protection level before ten years, which is why tetanus toxoid vaccine is recommended for all patients if they have a qualifying wound and if it has been more than five years since their last tetanus toxoid vaccine dose.[2]</td></tr>
<tr><td rowspan="5">When is the tetanus toxoid vaccine needed for a wound?</td><td colspan="3">• All wounds should be cleaned. This can remove C. tetani spores, if present.[2,3]
• Having previously had tetanus disease does not confer immunity. Active immunization with tetanus toxoid vaccine should be given as soon as possible following a qualifying wound.[2]</td></tr>
<tr><td>Tetanus toxoid immunization history</td><td>Clean, minor wound[2,3]</td><td>All other wounds[2,3,a]</td></tr>
<tr><td>Unknown or <3 doses</td><td>Tetanus toxoid vaccine needed</td><td>Tetanus toxoid vaccine needed</td></tr>
<tr><td>3 or more doses AND <5 years since last booster dose</td><td>No vaccination</td><td>No vaccination[b]</td></tr>
<tr><td>3 or more doses AND >5 years, but <10 years since last booster dose</td><td>No vaccination</td><td>Tetanus toxoid vaccine needed</td></tr>
<tr><td>3 or more doses AND >10 years since last booster dose</td><td>Tetanus toxoid vaccine needed</td><td>Tetanus toxoid vaccine needed</td></tr>
</table>

Question	Answer/Pertinent Information
Which tetanus toxoid vaccine can be used for wound management?	• Any tetanus toxoid vaccine can be given for wound management, as they all contain the same dose of tetanus toxoid. • Tetanus toxoid vaccines are only available in combination with diphtheria and are also found in combination with other vaccines (e.g., pertussis in DTaP, Tdap).[2,3] • Either Tdap or Td is appropriate for patients seven years and older. Use vaccines with a capital "D" for children under seven years (e.g., DTaP) to ensure the correct dose of the diphtheria component.[2,3] • See the chart at the end of this document for a comparison of available tetanus toxoid vaccines. Choose the vaccine based on the patient's age, other vaccine requirements, pregnancy status, etc.
What are the contraindications and adverse effects of tetanus toxoid vaccine?	• Tetanus toxoid vaccine is contraindicated in patients who have had a severe allergic reaction/anaphylaxis with a previous dose.[2,3,5] • Tetanus toxoid vaccine should be used with caution in patients who have had a moderate or severe acute reaction to tetanus toxoid vaccine. The benefit typically outweighs the risk when tetanus toxoid vaccine is indicated for wound management.[2] • Local reactions (e.g., erythema, induration, pain at site) are common but are self-limiting.[2,3] • Arthus reactions (reaction involving severe pain, swelling, edema, etc) are not common.[2,3] ▪ Typically starts two to eight hours after the injection.[2] ▪ More common in adults, particularly those who've received frequent doses of diphtheria or tetanus toxoid vaccines. Usually, patients who have Arthus reactions have high serum tetanus antitoxin levels.[2] ▪ **Do NOT give tetanus toxoid vaccine to patients with a history of an Arthus reaction more than every ten years**.[2,3,7] The risk of Arthus reactions does not appear to be increased with close administrations; however, it is still recommended that anyone (including pregnant women) with a history of Arthus reactions after a dose of Td or Tdap, should have an interval of at least ten years between doses.[6]
What is the role of tetanus immune globulin (TIG) in wound management? *Continued…*	• TIG (*HyperTET*) provides antitoxin for immediate, passive, temporary immunity until the administered vaccine produces an immune response in the patient.[2,3] TIG only helps to remove unbound tetanus toxin, it does not affect toxin that is already bound to nerve endings.[2,3] • When indicated, TIG should be **administered as soon as possible**, typically in the emergency department.[3,4] ▪ The higher the risk of infection (e.g., puncture wound, wounds contaminated with soil or fecal matter AND no history of immunization), the faster TIG and tetanus toxoid vaccination should be given.[4] ▪ There is little benefit a week or so after an injury if the patient has had some previous tetanus toxoid vaccination.[4] ▪ For completely unvaccinated patients, TIG administration up to three weeks after injury may still be beneficial.[4] • When administering both, TIG and tetanus toxoid vaccine should be given in separate syringes at different sites.[3,7] • Intravenous immune globulin (IVIG) is sometimes given (off-label) if TIG is not available.[10] Anti-tetanus antibodies vary widely from lot to lot with IVIG.[10] • For wound prophylaxis, TIG is given as a single 250 IU deep intramuscular dose.[3,8-10]

Question	**Answer/Pertinent Information**		
Role for tetanus immune globulin (TIG), continued	**Tetanus Immunization History**	**Clean, minor wound**[2,3,c]	**All other wounds**[2,3,a-c]
	Unknown or <3 doses	TIG is **not indicated**	TIG is needed
	3 or more doses AND <5 years since last booster dose	TIG is **not indicated**	TIG is **not indicated**
	3 or more doses AND >5 years, but <10 years since last booster dose	TIG is **not indicated**	TIG is **not indicated**
	3 or more doses AND >10 years since last booster dose	TIG is **not indicated**	TIG is **not indicated**

a. All other wounds: wounds such as, but not limited to, those contaminated with dirt, feces, soil, or saliva; puncture wounds; avulsions; and those resulting from missiles, crushing, burns, and frostbite.[3]

b. **Per Canadian guidance**: patients with humoral immune deficiency (e.g., human immunodeficiency virus [HIV], agammaglobulinemia or hypogammaglobulinemia) may not adequately respond to tetanus toxoid vaccination. Therefore, patients with humoral immune deficiency with wounds that are not minor and clean should receive both TIG and tetanus toxoid vaccine, regardless of the time elapsed since the last booster.[3]

c. **Per US guidance**: patients with HIV or severe immunodeficiency who have contaminated wounds should receive TIG, regardless of their tetanus immunization status.[2]

--Continue to the next section for a Comparison of Available Tetanus Toxoid Vaccines--

Comparison of Available Tetanus Toxoid Vaccines

Tetanus toxoid vaccines are only available in combination with diphtheria, and can also be found in combination with other vaccines. Tetanus toxoid vaccines all have the same dose of tetanus toxoid. Pediatric tetanus-diphtheria vaccines contain a higher dose of diphtheria and pertussis, required for children under seven years (denoted by the capitals "D" and "P" in the descriptions [e.g., **D**T, **D**Ta**P**]).[12] Product selection will depend on the appropriateness and dose requirement of the vaccine's other components. This chart outlines routine tetanus immunization.

ROUTINE VACCINATION (Can be given at the same time as other routine vaccinations, in a different injection site.[13])

Vaccine Type	DOSE FREQUENCY			
	Children 6 weeks to less than 7 years	**Children 7 years to 18 years (17 years [Canada])**	**Adults**	**Pregnancy**
DTaP (*Infanrix* [US only], *Daptacel* [US only]) Combination products available in the US and Canada (**See footnote a.**)	• **Five doses** of DTaP: 2, 4, and 6 months; 15 to 18 months (12 to 23 months [Canada]), and 4 to 6 years.[3,5] • DTaP may be combined with other vaccinations in the same product. Product selection may depend on which other vaccinations are also needed.	• Not indicated for patients seven years and older.	• Not indicated for patients seven years and older.	• Not indicated for patients seven years and older.
DT (US only)	• **Alternative** to DTaP vaccines (above) when infants and children should not get a pertussis-containing vaccine.[5,e]	• Not indicated for patients seven years and older.	• Not indicated for patients seven years and older.	• Not indicated for patients seven years and older.
Td (*Td Adsorbed*, *TdVax* [US only], *Tenivac* [US only])	• Not indicated for patients less than seven years.	• **Alternative** to Tdap (below) when a pertussis-containing vaccine should not be given.[3,7]	• **Booster dose every ten years**.[5] Either Td or Tdap (below) can be used.[7,11,c]	• Tdap (below) is preferred.[7]
Tdap (*Adacel*, *Boostrix*) **Combination products** (Canada only):[d] Tdap-IPV	• Not indicated for patients less than seven years.[5] • Tdap-IPV may be used as an alternative to the DTaP dose given at 4 to 6 years of age in Canada.[3]	• **US**: one dose at 11 or 12 years.[1,5] • **Canada**: one dose at 14 to 16 years.[3]	• Adults should receive **one tetanus booster dose** containing pertussis.[3] • Possible **alternative** to Td (above) for the every-ten-year tetanus booster.[11,b,c] • *Boostrix* is preferred in the US for patients 65 years or older, but *Adacel* can also be used.[5,11]	• **One dose with every pregnancy** to immunize against pertussis, preferably between 27 and 36 weeks gestation.[3,5]

a. DTaP combination products: DTaP-IPV (*Kinrix* [US only], *Quadracel* [US only]), DTaP-IPV-Hib (*Pentacel* [US only], *Pediacel* [Canada only]), DTaP-IPV-HB (*Pediarix* [US only]), DTaP-IPV-Hib-HB (*Vaxelis* [US only], *Infanrix hexa* [Canada only]).
b. New in 2020, in order to increase flexibility in product selection, Tdap can now be used in adults for indications where previously only Td was recommended (i.e., every ten-year booster, tetanus prophylaxis for wound management, and any required catch-up vaccinations). Repeated doses of Tdap do not appear to cause increased risks of adverse effects.[1,11]
c. There do not appear to be serious safety concerns if there is an unknown or short interval between the administration of Tdap and a previous dose of Td or Tdap [Evidence Level C].[1] Observational data do suggest that there may be an increased risk of local injection site reactions (e.g., redness or swelling) when these vaccines are given at intervals of two years or less. The risk of more serious reactions (e.g., entire limb swelling, Arthus reactions [a type III hypersensitivity reaction involving severe pain, swelling, edema, etc]) does not appear to be increased with close administrations. However, it is still recommended that anyone (including pregnant women) with a history of Arthus reactions after a dose of Td or Tdap, should have an interval of at least ten years between doses.[1]
d. Tdap combination products: Tdap-IPV (*Adacel-Polio* [Canada only], *Boostrix-Polio* [Canada only]).
e. DT vaccines are no longer being manufactured in the US. Per the CDC, guidance will be coming on vaccination of patients who should not receive acellular pertussis-containing vaccines.[14]

Abbreviations: aP = high-dose acellular pertussis (for kids); ap = low-dose acellular pertussis (for adults); D = high-dose diphtheria (for kids); d = low-dose diphtheria (for adults); HB = hepatitis B; Hib = *Haemophilus influenzae* type b; IM = intramuscular; IPV = inactivated polio vaccine; T = tetanus.

Levels of Evidence

In accordance with our goal of providing Evidence-Based information, we are citing the **LEVEL OF EVIDENCE** for the clinical recommendations we publish.

Level	Definition	Study Quality
A	Good-quality patient-oriented evidence.*	1. High-quality randomized controlled trial (RCT) 2. Systematic review (SR)/Meta-analysis of RCTs with consistent findings 3. All-or-none study
B	Inconsistent or limited-quality patient-oriented evidence.*	1. Lower-quality RCT 2. SR/Meta-analysis with low-quality clinical trials or of studies with inconsistent findings 3. Cohort study 4. Case control study
C	Consensus; usual practice; expert opinion; disease-oriented evidence (e.g., physiologic or surrogate endpoints); case series for studies of diagnosis, treatment, prevention, or screening.	

***Outcomes that matter to patients** (e.g., morbidity, mortality, symptom improvement, quality of life).

[Adapted from Ebell MH, Siwek J, Weiss BD, et al. Strength of recommendation taxonomy (SORT): a patient-centered approach to grading evidence in the medical literature. Am Fam Physician. 2004 Feb 1;69(3):548-56. https://www.aafp.org/pubs/afp/issues/2004/0201/p548.html.]

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