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## Tetanus

Introduced in 1930s (DT) and 1952/3 (DTP)

NOTIFIABLE

### Introduction

Tetanus is an acute neurological disease characterised by muscular rigidity with superimposed contractions. It is caused by the neurotoxin produced by *Clostridium tetani* which grows anaerobically in a contaminated wound. Effective protection is provided in 90-95% of children who are fully vaccinated. Protection declines with time; up to 50% of 20-year-olds and up to 70% of 70-year-olds who have not received boosters may be unprotected.

### Epidemiology

Tetanus spores are present in the soil, and in the gut and faeces of cattle, sheep, horses, chicken. In agricultural areas a significant number of adult humans may harbour the organism in their gut. The spores may be introduced into the body during injury, often through a puncture wound but also through burns or trivial wounds. Spores may also be found in contaminated heroin.

Worldwide, over 1 million cases occur each year. Between 1988 and 2004, 10 cases of tetanus were reported in Ireland with 2 deaths. Twenty cases occurred among injecting drug users in the UK in 2003-2004.

The incubation period is between 4 and 21 days, commonly around 10 days. The shorter the incubation period, the greater the likelihood of death. Spores germinate in anaerobic conditions, producing toxins that spread via blood and lymphatics. Tetanus is not transmissible from person to person. Those most at risk of developing tetanus are young children and people over 60, many of whom have never had active immunisation.

### Effects of tetanus

**Local tetanus** is manifested by muscle spasms in areas contiguous to the wound. The spasms may continue for several weeks. Local tetanus may precede generalised tetanus but is usually much milder, about 1% of cases being fatal.

**Generalised tetanus** is the most common type of tetanus. It usually starts with spasms of the jaw and neck muscles, and proceeds distally. Spasms may be frequent, last for minutes, and persist for 3-4 weeks. Complete recovery may take months. Complications include laryngospasm, fractures of the long bones, secondary infections, aspiration pneumonia, and hypertension due to autonomic nervous system dysfunction. Pulmonary embolism is a problem in drug users and the elderly. Mortality rates in recent years are 10-90%, being highest in infants, the elderly, and those who are unvaccinated.

### Tetanus vaccine

This is a toxoid, prepared by inactivating tetanus toxin with formaldehyde and adsorbing it onto aluminium. This acts as an adjuvant, to increase immunogenicity. *Bordetella Pertussis* also acts as an effective adjuvant.

Tetanus vaccine is not available as a single vaccine. The currently licensed tetanus vaccines are all combined vaccines. An up-to-date list of licensed vaccines is contained in Appendix 1, or can be accessed on the IMB website, [www.imb.ie](http://www.imb.ie).

Toxoids should be stored at 2-8°C.

### Dose and route of administration

The suspension may sediment during storage and should be shaken prior to administration. The dose is 0.5 ml, given by intramuscular injection into the anterolateral thigh or the deltoid area.

### Indications

#### **Immunisation of infants and children under 10 yrs**

##### *Primary immunisation*

This consists of 3 doses at 2, 4 and 6 months of age.

##### *Booster doses*

A booster dose should be given at 4-5 years of age, as DTaP/IPV, ideally at least 3 years after the third primary dose. The booster dose of DTaP/IPV at 4-5 years should be given even though a child may already have

received 4 doses of these vaccines. The risk of Arthus reactions with currently-used vaccines is very small.

A second booster as is given between the ages of 11 and 14. The aim is that each child should be given a minimum of 5 doses of tetanus and diphtheria toxoids. Whenever possible at least 5 years should be left between the first and second boosters.

If the primary schedule has been delayed, the first booster may be given at age 4-5 years, at least 6 months after the third primary dose.

Td is now recommended as a replacement for tetanus-only boosters for those aged over 10 years. For immunised persons who have received 5 doses of tetanus toxoid, booster doses may be unnecessary as they may cause considerable local reactions.

If pertussis vaccine is refused by parents, the only available diphtheria and tetanus vaccines are Td and Td/IPV, which contain insufficient tetanus and diphtheria toxoid for primary immunisation. **They are not intended for use as part of the primary vaccine schedule, may not give a sufficient immune response if so used, and are not licensed for such use.**

### ***Immunisation of persons aged 10 years or over (unimmunised or partly immunised)***

#### *Primary immunisation*

This consists of 3 doses of tetanus toxoid with intervals of at least 1 month between doses.

#### *Booster doses*

A booster dose of tetanus toxoid should be given 5 years after the primary course and again 10 years later.

#### *International travel*

Td/IPV should be considered, as it may be difficult to obtain safe and effective booster doses in some countries.

### ***HIV positivity***

HIV-positive individuals can be immunised against tetanus unless they had anaphylaxis following a previous dose.

### **Adverse reactions**

**Local:** Pain, redness, and swelling around the injection site can occur and persist for several days. These reactions are less likely when a 25 mm

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needle is used, but are more common after the fourth and subsequent doses. Exaggerated local (Arthus-like) reactions occasionally occur. They begin 2-8 hours after vaccination and are more common in adults. They consist of extensive painful swelling which may involve the entire upper part of the arm. They almost always resolve completely.

**General:** Headache, malaise, myalgia and fever are uncommon. Rash and lymphadenopathy occasionally occur. Anaphylaxis is extremely rare.

### Contraindications

Anaphylaxis to a previous dose of the vaccine or to one of its constituents.

### Precautions

Acute severe febrile illness; defer until recovery.

Arthus-type reaction to a previous dose; further tetanus vaccine should be deferred for 10 years.

### Prophylaxis for tetanus-prone wounds

The following wounds are considered tetanus-prone:

- Wounds contaminated with soil, faeces, saliva or foreign bodies
- Puncture wounds, avulsions, burns or crush injuries
- Wounds or burns requiring surgical treatment which is delayed for more than 6 hours
- Compound fractures

Note: Occasionally, apparently trivial injuries can result in tetanus.

**Table 15.1** Risk assessment of wounds for use of tetanus immunoglobulin (TIG)<sup>(1)</sup>

Age	Immunisation status	Clean wound	Tetanus prone wound
<4 years	<3 doses or unknown	DTaP/IPV+/- Hib <sup>(2)</sup>	TIG, DTaP/IPV +/- Hib <sup>(3)</sup>
	3 or more doses	Nil	Nil Consider TIG <sup>(1)</sup>
>4 to 9 years	<3 doses or unknown	DTaP/IPV	TIG plus DTaP/IPV
	3 doses only, >5 years since last dose	DTaP/IPV	DTaP/IPV Consider TIG <sup>(1)</sup>
	3 or more doses, <5 years since last tetanus toxoid	Nil	Nil Consider TIG <sup>(1)</sup>
	4 or more doses, >5 years since last dose	Nil	DTaP/IPV, consider TIG <sup>(1)</sup>
10 years and over	<3 doses or unknown	Td	TIG plus Td/IPV
	3 or more doses >10 years since last dose	Td	Td, consider TIG <sup>(1)</sup>
	3 or more doses, <10 years since last dose	Nil	Consider TIG <sup>(1)</sup>

(1) Consider TIG if wound contaminated with stable manure, or extensive devitalised tissue.  
Give TIG if HIV positive, *irrespective of vaccine status*.

(2) If last tetanus containing vaccine <1 month previously, defer for 1 month.

(3) If child is >1 year, the follow-up vaccine(s) will be DTaP/IPV or DTaP/IPV/Hib (only one dose of Hib is required >1 year).

TIG  
DTaP/IPV/Hib

Tetanus Immunoglobulin.  
Diphtheria, Tetanus and acellular Pertussis vaccine/Inactivated Polio

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DTaP/IPV	Virus vaccine/ <i>Haemophilus influenzae</i> b vaccine Diphtheria, Tetanus and acellular Pertussis vaccine/Inactivated Polio Virus vaccine
Td/IPV	Tetanus, low-dose diphtheria/ Inactivated Polio Virus vaccine
Tdap	Tetanus, low-dose diphtheria and low-dose acellular pertussis vaccine

### IMPORTANT:

If both TIG plus a vaccine are to be given, administer at separate sites.

Refer to GP for follow-up vaccines.

Batch numbers and expiry dates must be recorded for all vaccines given.

This information **MUST** be communicated to the patient's GP so that:

- Duplication of vaccination does not occur.
- Full records may be passed onto the relevant agencies in order that a full nationwide database is kept of batch numbers and expiry dates of vaccines given to children.

## Specific anti-tetanus immunoglobulin

### Indications

- 1 Those with tetanus-prone wounds who have not received at least 3 doses of tetanus toxoid and their last dose within 10 years (see Table 15.1 above)
- 2 Patients with impaired immunity (see Chapter 2) who suffer a tetanus-prone wound – may in addition require anti-tetanus immunoglobulin
- 3 Patients who have suffered a high-risk wound, regardless of vaccine history

### Dose and route of administration

#### Prevention

250 IU intramuscularly into the anterolateral thigh.

The single dose of TIG is doubled to 500 IU (2ml) when any of the following situations exist:

- The injury occurred more than 24 hours previously.
- The patient weighs more than 90 kg.
- The wound is heavily contaminated.
- The wound is infected or involves a fracture.

#### Treatment

150 IU/kg given in multiple sites. Specific anti-tetanus immunoglobulin is available in 1 ml ampoules containing 250 IU.

### Bibliography

American Academy of Pediatrics (2006). Red Book: Report of the Committee on Infectious Diseases. 27<sup>th</sup> ed. Elk Grove Village, IL: American Academy of Pediatrics.

Department of Health UK (2006). Immunisation against infectious disease (the Green Book). 3<sup>rd</sup> ed. London: The Stationery Office.

