30 Tetanus

30.1 Introduction

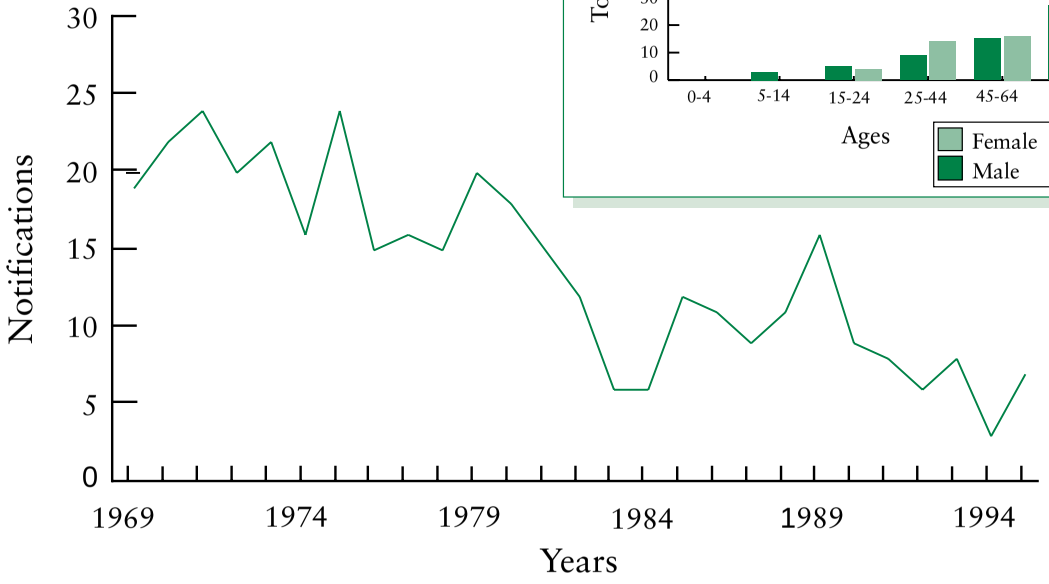
30.1.1 Tetanus is an acute disease characterised by muscular rigidity with superimposed agonising contractions. It is induced by the toxin of tetanus bacilli which grow anaerobically at the site of an injury. The incubation period is between four and 21 days, commonly about ten. Tetanus spores are present in soil and may be introduced into the body during injury, often through a puncture wound, but also through burns or trivial, unnoticed wounds. Neonatal tetanus due to infection of the baby's umbilical stump is an important cause of death in many countries in Asia and Africa. Turkey is the only remaining country reporting cases in the European region. World-wide elimination of neonatal tetanus by the year 1995 was one of the World Health Organisation targets and the number of countries is progressively increasing in which neonatal tetanus no longer occurs. Tetanus can never be eradicated. Tetanus is not spread from person to person.

30.1.2 Effective protection against tetanus is provided by active immunisation which was introduced in some localities as part of the primary immunisation of infants from the mid 1950s and nationally from 1961. Tetanus immunisation was provided by the Armed Forces from 1938. In 1970 it was recommended in the UK that active immunisation should be routinely provided in the treatment of wounds, when immunisation against tetanus should be initiated if appropriate, and subsequently completed.

30.1.3 Between 1984 and 1995 there were 145 cases of tetanus (notifications, deaths and laboratory reports) in England and Wales. 75% occurred in individuals over 45 years and of the remainder, 16% were in individuals from 25 to 44 years. 53% of all cases were in individuals over 65 years, two thirds of them being in women. Thus, the highest risk groups are the elderly with women being at greater risk than men.

Tetanus notification to ONS

England and Wales (1969-1995)



Tetanus by age and sex (all sources)

England and Wales (1985-1995)

■ 30.2 Tetanus vaccine and adsorbed tetanus vaccine

Immunisation protects by stimulating the production of antitoxin which in turn provides immunity against the effects of the toxin. The immunogen is prepared by treating a cell-free preparation of toxin with formaldehyde and thereby converting it into the innocuous tetanus toxoid. This however is a relatively poor immunogen, and for use as a vaccine it is usually adsorbed onto an adjuvant, either aluminium phosphate or aluminium hydroxide. *Bordetella pertussis* vaccine also acts as an effective adjuvant.

The recommended vaccines for immunisation are:

Adsorbed tetanus (**T**).
Adsorbed diphtheria/tetanus (**DT**).
Adsorbed tetanus /low dose diphtheria vaccine for adults (**Td**).
Adsorbed diphtheria/tetanus/pertussis (**DTP**).

Plain vaccines are no longer supplied as they are less immunogenic and have no advantage in terms of reaction rates.

Vaccines should be stored at 2-8°C. Protect from light. Do not freeze.

Disposal should be by incineration at not less than 1100°C at a registered waste disposal contractor.

The dose is 0.5ml given by intramuscular or deep subcutaneous injection.

30.3 Recommendations

30.3.1 For immunisation of infants and children under ten years.

a. **Primary immunisation**

Triple vaccine, that is, vaccine containing diphtheria toxoid, tetanus toxoid, and *Bordetella pertussis* (DTP), is recommended for infants from two months of age. Adsorbed DTP vaccine is used as it has been shown to cause fewer reactions than plain vaccine. If the pertussis component is contraindicated, adsorbed diphtheria/tetanus vaccine should be given. **A primary course of immunisation consists of three doses starting at two months with an interval of one month between each dose** (see 11.1). If a course is interrupted it may be resumed; there is no need to start again, whatever the interval. The dose is 0.5ml given by intramuscular or deep subcutaneous injection.

b. **Reinforcing doses in children**

A booster dose of adsorbed diphtheria/tetanus (DT) should be given at least three years after the final dose of the primary course. If the primary course is only completed at school entry, then the booster dose should be given three years later. A further reinforcing dose of tetanus and low dose diphtheria vaccine (Td) is recommended for those aged 13-18 years or before leaving school. **Teenagers being treated for tetanus prone wounds and who had received their fourth dose of tetanus vaccine approximately ten years earlier, should be given Td vaccine and the school leaving dose omitted.**

30.3.2 Children given DTP at monthly intervals for primary immunisation, without a booster dose at 18 months, have been shown to have adequate antibody levels at school entry. A booster dose at 18 months is therefore not recommended.

30.3.3 For immunisation of adults and children over ten years

Adults most likely to be susceptible to tetanus are the elderly, especially women and men who have not served in the Armed Forces.

a. For primary immunisation the course consists of three doses of 0.5ml of adsorbed tetanus vaccine (T) by intramuscular or deep subcutaneous injection, with intervals of one month between each dose. If there is no record of diphtheria immunisation either, then three doses of Td vaccine should be given.

b. A reinforcing dose (T or Td) ten years after the primary course and again ten years later maintains satisfactory levels of protection which will probably be life-long.

c. For immunised adults who have received five doses, either in childhood, or as above, booster doses are not recommended, other than at the time of tetanus prone injury, since they have been shown to be unnecessary and can cause considerable local reactions. There are data that show that tetanus has occurred only exceptionally rarely in fully immunised individuals despite the passage of many years since the completing dose of a standard course of immunisation, and without subsequent routine boosting. Cases that have occurred were not fatal. **There is therefore little justification for boosting with tetanus vaccine beyond the recommended 5 dose regimen.**

30.3.4 Treatment of patients with tetanus-prone wounds

The following are considered tetanus-prone wounds:

a. Any wound or burn sustained more than six hours before surgical treatment of the wound or burn.

b. Any wound or burn at any interval after injury that shows one or more of the following characteristics:

(i) A significant degree of devitalised tissue.

(ii) Puncture-type wound.

(iii) Contact with soil or manure likely to harbour tetanus organisms.

(iv) Clinical evidence of sepsis.

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Thorough surgical toilet of the wound is essential whatever the tetanus immunisation history of the patient.

Specific anti-tetanus prophylaxis is as follows:

Immunisation status	Type Of Wound	Type of Wound
	Clean	Tetanus Prone
Last of 3 dose course, or reinforcing dose within last 10 years	Nil.	Nil (A dose of human tetanus immunoglobulin may be given if risk of infection is considered especially high, e.g. contamination with stable manure).
Last of 3 dose course or reinforcing dose more than 10 years previously.	A reinforcing dose of adsorbed vaccine.	A reinforcing dose of adsorbed vaccine plus a dose of human tetanus immunoglobulin.
Not immunised or immunisation status not known with certainty.	A full 3 dose course of adsorbed vaccine.	A full 3 dose course of vaccine, plus a dose of tetanus immunoglobulin in a different site.

Dosage human tetanus immunoglobulin	
Prevention 250 iu by intramuscular injection, or 500 iu, if more than 24 hours have elapsed since injury, or there is risk of heavy contamination or following burns. Available in 1ml ampoules containing 250 iu.	**Treatment** 150 iu/kg given in multiple sites.

■ 30.3.5 Routine tetanus immunisation began in 1961, thus individuals born before that year will not have been immunised in infancy. After a tetanus-prone injury such individuals will therefore require a full course of immunisation unless it has previously been given, as for instance in the armed services.

■ 30.3.6 Immunised individuals respond rapidly to a subsequent single injection of adsorbed tetanus vaccine, even after an interval of years.

■ 30.3.7 For wounds not in the above categories, such as clean cuts, antitetanus immunoglobulin should **not** be given.

■ 30.3.8 Patients with impaired immunity who suffer a tetanus-prone wound may not respond to vaccine and may therefore require antitetanus immunoglobulin (see 7.3 and 30.7) in addition.

■ 30.3.9 HIV positive individuals **should** be immunised against tetanus in the absence of contraindications (see 7.4 and 30.7).

■ 30.4 Adverse reactions

■ 30.4.1 Local reactions, such as pain, redness and swelling round the injection site may occur and persist for several days. General reactions, which are uncommon, include headache, lethargy, malaise, myalgia and pyrexia. Acute anaphylactic reactions and urticaria may occasionally occur and, rarely, peripheral neuropathy. Persistent nodules at the injection site may arise if the injection is not given deeply enough.

■ 30.4.2 Severe or unusual reactions should be reported to the Committee on Safety of Medicines using the yellow card system.

■ 30.5 Contraindications

a. Tetanus vaccine should not be given to an individual suffering from acute febrile illness except in the presence of a tetanus-prone wound. Minor infections without fever or systemic upset are not reasons to postpone immunisation.

b. Immunisation should not proceed in individuals who have had an anaphylactic reaction to a previous dose. A large study of individuals (740) with histories of reactions after tetanus immunisation showed that tetanus immunisation could be completed and none of the patients, when challenged, suffered an adverse reaction. The authors conclude that an adverse reaction to tetanus toxoid does not preclude future immunisation with this same material. If this is to be done in patients with a history of an adverse reaction to a previous dose, then it is best preformed in a setting where there are facilities to deal with any acute allergic reactions.

30.6 Supplies - vaccine

DTP and DT vaccines manufactured by Evans Medical (Tel. 0345 451500 or 01372 364000) and Pasteur Merieux MSD Ltd (Tel 01628 773200) are available from Farillon (Tel. 01708 379000) for use in childhood immunisation programmes. In Scotland, supplies are available from Scottish Health Care Supplies Division of the Common Service Agency.

Low dose diphtheria for adults combined with tetanus vaccine (Td) is available from Pasteur Merieux MSD Ltd (Tel. 01628 773200) or from Farillon (Tel. 01708 379000) for use in childhood immunisation programmes. In Scotland, supplies are available from the Scottish Health Care Supplies Division of the Common Service Agency.

Adsorbed tetanus vaccine is available from:

Evans Medical (Tel. 0345 451500 or 01372 364000).
Pasteur Merieux MSD Ltd. (Tel. 01628 773200).

30.7 Supplies - antitetanus immunoglobulin

Bio Products Laboratory (Tel. 0181 905 1818).
Regional Blood Transfusion Centres.
Immuno (TETABULIN) (Tel. 01732 458101).

In Northern Ireland, the source of anti-tetanus immunoglobulin is the Northern Ireland Blood Transfusion Services, Lisburn Road, Belfast. Tel. 01232 321414 (issued via hospital pharmacies).

Human tetanus immunoglobulin for intravenous use is available on a named patient basis from the Scottish National Blood Transfusion Service (for telephone numbers see 18.13).

30.8 Bibliography

Prevention of tetanus in the wounded.
Smith J W G, Lawrence D R, Evans D G.
BMJ 1975: (iii) 453-455.

Immunity of children to diphtheria, tetanus and poliomyelitis.
Bainton D, Freeman M, Magrath D I, Sheffield F, Smith J W G.
BMJ 1979 (i) 854-857.

Excessive use of tetanus toxoid boosters.
Edsall G, Elliott M W, Peebles T C, Levine L, Eldred M C.
JAMA 1967 202 (i) 17-19.

Duration of immunity after active immunisation against tetanus.
White W G et al.
Lancet 1969 (ii) 95-96.

Reactions after plain and adsorbed tetanus vaccines.
White W G et al.
Lancet 1980 (i) 42.

To give or not to give; guidelines for tetanus vaccine.
Sheffield F W.
Community View (1985) 33, 8-9.

Durability of immunity to diphtheria, tetanus and poliomyelitis after a three dose schedule completed in the first eight months of life.
Jones E A, Johns A, Magrath D I, Melville-Smith M, Sheffield F.
Vaccine 1989: 7; 300-2.

Adverse Reactions to Tetanus Toxoid
Jacobs R L, Lowe R S, Lahier B Q
JAMA 1992; 247: 40-4.