Tetanus Prophylaxis and Treatment - Full Clinical Guideline

Reference no: CG-EMD/2015/004 V4.0.1

The aim of this guideline is to assist in the management of tetanus-prone wounds, and in the diagnosis, treatment and microbiological management of cases of tetanus.

1. Background

Tetanus is caused by a neurotoxin produced by *Clostridium tetani*, an anaerobic spore-forming bacillus. The spores are widespread in the environment, including in soil, and can survive hostile conditions for long periods of time. Human infection is acquired when tetanus spores are introduced into wounds. Classically this is through contaminated trauma, however tetanus may also follow injecting drug use or abdominal surgery. In some cases no exposure is reported and it is assumed that unnoticed minor wounds were the route of entry. The incubation period of the disease is usually between 3 and 21 days, although it may range from one day to several months, depending on the character, extent and localisation of the wound.

The incidence of tetanus decreased substantially following the introduction of national tetanus immunisation in 1961. On average, over the last 3 decades, there have been less than 10 cases of tetanus per year reported in England and Wales3. The highest incidence has been observed among individuals aged over 64 years old who are at highest risk of being under-immunised, with very few cases of tetanus reported amongst children. The over-all case-fatality rate among all reported cases of tetanus in England and Wales reduced from 29% between 1984 and 2000 to 11% in the following 14 years.

2. Prevention of tetanus

2.1. Primary prevention

Effective protection against tetanus can be achieved through active immunisation with tetanus vaccine, which is a toxoid preparation. Recovery from tetanus may not result in immunity and vaccination following tetanus is indicated. A full course of tetanus vaccines consists of 5 doses as follows:

SCHEDULE	CHILDREN	ADULTS
Primary course	3 doses of vaccine (usually as DTaP/IPV/Hib/HepB) at 2, 3 and 4 months of age	3 doses of vaccine (as Td/IPV) each one month apart
Fourth dose	At least 3 years after the primary course, usually pre-school entry (as DTaP/IPV)	5 years after primary course (as Td/IPV)
Fifth dose	Aged 13-18 years before leaving school (as Td/IPV)	10 years after 4th dose (as Td/IPV)

Table 1 – vaccination schedule for tetanus

DTaP/IPV/Hib/HepB = diphtheria/tetanus/3-component acellular pertussis/inactivated polio vaccine/ *Haemophilus influenzae* type b/Hepatitis B

DTaP/IPV = diphtheria/tetanus/5-component acellular pertussis/inactivated polio

Td/IPV = tetanus/low dose diphtheria/inactivated polio vaccine (Revaxis)

2.2 Management of tetanus prone wounds

- Thorough cleaning of wounds is essential
- Surgical debridement of devitalised tissue in high risk tetanus–prone wounds is crucial for prevention of tetanus.
- A reinforcing dose of tetanus-containing vaccine +/- tetanus immunoglobulin (see algorithm below)
- Consider treating tetanus-prone wounds with antibiotics with a view to preventing tetanus (see antibiotic guidelines on lacerations, bites - cat or dog, bites - human and open fractures).
- Suspected cases of localised tetanus (where there is rigidity and/or spasms around the wound) should be treated as clinical cases as described in the management of clinical cases of tetanus below, and not as a tetanus-prone injury.
- Further doses of vaccine should be administered as required to complete the recommended schedule to provide long term protection.

Dose of IM tetanus immunoglobulin (TIG) for post – exposure prophylaxis in tetanus prone wounds

If TIG is unavailable, Human Normal Immunoglobulin (HNIG) in the form of Subgam can be used instead. PHE guidelines recommend that this is given IM, although the license is for SC. If Subgam is also out of stock, see the PHE guidance for further options.

Indications	IM-TIg	HNIG - Subgam 16%
For most uses	250 international units	6.4ml in divided sites
If more than 24 hours have elapsed **and** there is risk of heavy contamination or following burns.	500 international units	12.8ml in divided sites

University Hospitals of Derby and Burton NHS Foundation Trust

Wound Tetanus Risk Assessment (Adults)

Name.....
DOB.....
Hospital No.....

Is the wound tetanus prone?

Any of:

- ❑ **Puncture** wounds sustained in a contaminated environment (e.g garden or farm)
- ❑ Wounds containing foreign bodies
- ❑ Open fracture
- ❑ Wounds or burns with systemic sepsis
- ❑ Certain animal bites and scratches- not usually domestic pets unless animal has been routing in soil or lives in an agricultural setting. NOT HUMAN BITES

❑ NO

Non-tetanus prone
Clean wound thoroughly
No tetanus booster or immunoglobulin required.

Patients who are unsure of their tetanus status should follow up with GP

❑ YES

Check vaccine history (use SCR if necessary);
(If patient immunosuppressed treat as non-immune)

Has the patient received an adequate priming course of tetanus vaccine [1], with the last dose within 10 years?

❑ YES

❑ UNKNOWN or
❑ NO

Patient immune to tetanus

- Clean wound thoroughly
- No tetanus booster or immunoglobulin required

Check immunity with Protetanus Kit
What is the result? (Please circle)

Positive

Negative

High-risk tetanus prone wound
As above, with any of:

- ❑ Heavy contamination with soil or manure
- ❑ Wounds or burns showing extensive devitalised tissue
- ❑ Wound requiring surgical intervention that is delayed more than 6 hours

Patient non-immune to tetanus

- ❑ Clean wound thoroughly.
- ❑ Give tetanus vaccine **AND**
- ❑ IM Tetanus immunoglobulin in a different site. 250 units (or 500 units if wound > 24 hrs and heavy contamination or burns).

[1]At least three doses of tetanus vaccine at appropriate intervals. This definition of "adequate course" is for the risk assessment of tetanus-prone wounds only. The full UK schedule is five doses of tetanus containing vaccine.

Patients should also be advised to have further doses of tetanus vaccine as required to complete the recommended schedule (to ensure future immunity).

In areas where the pro-tetanus kit is unavailable, or in children see the table in appendix I.

3. Clinically suspected tetanus

3.1 Clinical features

The most common presentation of tetanus is generalised tetanus, characterised by trismus (lockjaw), tonic contractions and spasms. Tonic contractions and spasms may lead to dysphagia, opisthotonus and a rigid abdomen. In severe cases they may cause respiratory difficulties. Autonomic instability is typical. Consciousness is not affected.

Localised tetanus is rigidity and spasms confined to the area around the site of the infection and may be more common in partially immunised individuals. Localised symptoms can continue for weeks or may develop into generalised tetanus.

Cephalic tetanus is localised tetanus after a head or neck injury, involving primarily the musculature supplied by the cranial nerves.

3.2 Diagnosis (do not wait for laboratory results if clinical tetanus is suspected)

Tetanus is primarily a clinical diagnosis. A probable case can be defined as:
'In the absence of a more likely diagnosis, an acute illness with muscle spasms or hypertonia, ***and*** *diagnosis of tetanus by a health care provider'.*

The key clinical features of generalised tetanus include at least 2 of the following:

(i) Trismus (Painful muscular contractions primarily of the masseter and neck muscles leading to facial spasms)
(ii) Painful muscular contractions of trunk muscles and
(iii) Generalized spasms, frequently position of opisthotonus.

3.3 Laboratory testing (all cases should be discussed with a consultant microbiologist)

- **Wound samples**: Tissue is the best specimen and debridement has an additional therapeutic benefit which is crucial in the management of tetanus.
- **Serum**: A serum sample should be collected before immunoglobulin is given. At least 3ml of serum or clotted blood are required.

Although a serum sample should be taken before administering immunoglobulin, **treatment of clinical case of tetanus should never be delayed to wait for the laboratory result** and case management should proceed based on clinical review including clinical presentation, history of injury and vaccination status (see appendix 2).

3.4 Management of cases of suspected tetanus, including localised tetanus (all cases should be discussed with a consultant microbiologist and with ICU)

This guideline focuses on halting toxin production and neutralization of the unbound toxin. A benzodiazepine such as diazepam should also be prescribed regularly to control muscle spasms, and high doses may be required (with appropriate input from ICU). Airway management, management of dysautonomia and general supportive management are important components of management, but are outside the scope of this guideline. Further information is available in the references below, and during office hours from the on call duty Consultant Microbiologist, PHE Colindale on 0208 327 6736. Out of hours please contact the PHE Duty Doctor on call 0208 200 4400 for advice.

3.4.1 Wound debridement

All patients with tetanus should undergo wound debridement to eradicate spores and necrotic tissue, which could lead to conditions ideal for germination.

STOP moment – Consider if the operation can be undertaken on- site rather than transferring the patient to an alternative site, to avoid interruption in patient care.

3.4.2 Intravenous Immunoglobulin (IVIG)

An IV tetanus immunoglobulin (TIG) product is no longer available in the UK, so human IVIG is the recommended treatment for clinically suspected tetanus. Early treatment with human IVIG to neutralise circulating toxin can be lifesaving and is recommended.

The recommended dose of anti-tetanus antibodies is based on weight:

- for individuals less than 50 kg, 5,000 IU (international units)
- for individuals over 50 kg, 10,000 IU

The volume of human IVIG required to achieve the recommended dose of anti-tetanus antibodies is shown in the table below;

IVIG product	Volume required (in mls)	
	Individuals < 50kg	Individuals > 50kg
Gammaplex 5%, Intratect 5%, Flebogamma 5%, Vigam 5%, Octagam 5%	400ml	800ml
Privigen 10%, Octagam 10%, Intratect 10%, Flebogamma 10%, Panzyga 10%, Gammunex 10%	200ml	400ml

The rate of infusion of the immunoglobulin will depend on the volume and the brand of the immunoglobulin prescribed. Pharmacy will supply an infusion rate chart with the immunoglobulin. Clinical tetanus is an approved use for IVIG, so prior approval from the immunoglobulin panel is not required, however an immunoglobulin request form should still be completed and submitted retrospectively.

3.4.3 Antimicrobials

Antibiotics are recommended, but appropriate antimicrobial therapy may fail to eradicate *C. tetani* unless adequate wound debridement is performed.

First line; Metronidazole 500mg IV 8 hourly

Second line: If metronidazole is unsuitable discuss with a consultant microbiologist.

If a mixed wound infection is suspected, broader cover may be needed. Discuss with a consultant microbiologist.

4. Vaccination with tetanus toxoid vaccine

All patients with clinical tetanus should receive active immunization with a full series of tetanus containing vaccines, commencing immediately upon diagnosis (see table 1).

5. References

PHE publications gateway number GW-589. Guidance on the management of suspected tetanus cases and on the assessment and management of tetanus-prone wounds. https://www.gov.uk/government/publications/tetanus-advice-for-health-professionals

BMJ best practice Tetanus https://bestpractice.bmj.com/topics/en-gb/220/management-approach Accessed 8/1/2021

www.uptodate.com Tetanus accessed 8/1/2021

Tetanus: the Green Book chapter 30 https://www.gov.uk/government/publications/tetanus-the-green-book-chapter-30 accessed 8/1/2021.

Document Control

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Appendix One - Tetanus immunisation and prophylaxis following injuries

Immunisation status[1]	**Clean wound[2]**	**Tetanus prone wound[3]**	**High risk tetanus prone wound[4]**
Those aged 11 years and over, who have received an adequate priming course of tetanus vaccine with the last dose within 10 years Children aged 5-10 years who have received priming course and pre-school booster Children under 5 years who have received an adequate priming course	None required	None required	None required
Received adequate priming course of tetanus vaccine but last dose more than 10 years ago Children aged 5-10 years who have received an adequate priming course but no preschool booster	Clean wound thoroughly. Follow up with GP to complete vaccine course.	Immediate reinforcing dose of vaccine	Immediate reinforcing dose of vaccine and one dose of Tetanus immunoglobulin in a different site
Not received adequate priming course of tetanus vaccine (if born before 1961 assume not received unless documented otherwise) or Immunisation status unknown and pro-tetanus test not available. or Severely immune-supressed patients - treat as non-immune.	Clean wound thoroughly. Immediate reinforcing dose of vaccine	Immediate reinforcing dose of vaccine and one dose of Tetanus immunoglobulin in a different site	Immediate reinforcing dose of vaccine and one dose of Tetanus immunoglobulin in a different site

[1.] At least 3 doses of tetanus vaccine at appropriate intervals. This definition of "adequate course" is for the risk assessment of tetanus-prone wounds only. The full UK schedule is 5 doses at appropriate intervals

[2] Clean wound
Wounds less than 6 hours old, non-penetrating with negligible tissue damage

[3] A Tetanus prone wound is
- Puncture-type injuries acquired in a contaminated environment and likely to contain tetanus spores eg. gardening injuries.
- Wounds containing foreign bodies
- Compound fractures.
- Wounds or burns with systemic sepsis.
- Certain animal bites and scratches e.g. animal that has been rooting in soil or lives in an agricultural setting.

[4] High Risk tetanus prone wounds;
- Heavy contamination with material likely to contain tetanus spores e.g. soil or manure
- Extensive devitalised skin
- Wounds or burns that require surgical intervention that is delayed for more than 6 hours are high risk even if the contamination was not initially heavy

Patient should also be advised to have further doses of tetanus vaccine as required to complete the recommended schedule (to ensure future immunity)

Appendix Two – summary of tetanus treatment

Generalised tetanus - clinical features includes at least 2 of the following:

(i) Trismus (Painful muscular contractions primarily of the masseter and neck muscles leading to facial spasms)

(ii) Painful muscular contractions of trunk muscles and

(iii) Generalized spasms, frequently position of opisthotonus.

Airway difficulties and autonomic instability may also be present.

Localised tetanus - rigidity and spasms confined to the area around the site of the infection should also be treated as tetanus.

Consider in: injecting drug users , gardening injuries, animal bites or scratches, other contaminated trauma. However, there may be no obvious history of exposure – an unnoticed wound may be the source.

Discuss with consultant microbiologist.
Discuss with ICU.

→ Notify the health protection unit.

- Wound debridement
- Intravenous immunoglobulin
- Antibiotics
- Tetanus toxoid containing vaccine
- Supportive care – secure airway, antispasmodics.

→

- Send serum (before giving immunoglobulin) to lab
- Send tissue sample to lab

DO NOT WAIT FOR LABORATORY RESULTS BEFORE COMMENCING TREATMENT

Serum: Tetanus antibody detection

→ Tetanus IgG <0.1U/ml supports diagnosis of tetanus - levels above this threshold **do not** exclude tetanus

Wound tissues or pus: PCR or culture

→ Detection of *C. tetani* supports diagnosis of tetanus **but** a negative result does not exclude tetanus

IVIG product	Volume required (in mls)	
	Pt weight < 50kg	Pt weight > 50kg
Gammaplex 5%, Intratect 5%, Flebogamma 5%, Vigam 5%, Octagam 5%	400ml	800ml
Privigen 10%, Octagam 10%, Intratect 10%, Flebogamma 10%, Panzyga 10%, Gammunex 10%	200ml	400ml

For further advice contact the on call duty Consultant Microbiologist, PHE Colindale on 020 8327 6736. Out of hours please contact the PHE Duty Doctor on call 020 8200 4400.