

# **Tetanus: information for health professionals.**

<b>1. Scope of this document</b> .....	<b>1</b>
<b>2. Causative organism</b> .....	<b>1</b>
<b>3. Epidemiology of tetanus in England and Wales</b> .....	<b>1</b>
<b>4. Clinical features</b> .....	<b>2</b>
<b>5. Diagnosis</b> .....	<b>3</b>
<b>6. Clinical management</b> .....	<b>4</b>
<b>7. Occupational Health</b> .....	<b>4</b>
<b>8. Preventative measures</b> .....	<b>5</b>
<b>8.1. Primary prevention</b> .....	<b>5</b>
<b>8.2. Secondary prevention</b> .....	<b>5</b>
<b>9. Reporting and Public Health management</b> .....	<b>5</b>

## **1. Scope of this document**

The scope of this document is to assist in the diagnosis, treatment and public health management of cases of tetanus. Detailed information on tetanus vaccine, the management of tetanus prone wounds and the national vaccination programme is available elsewhere.<sup>1,2</sup>

## **2. Causative organism<sup>3</sup>**

Tetanus is caused by a neurotoxin produced by *Clostridium tetani*, an anaerobic sporeforming bacillus. Tetanus spores can be present in the gastrointestinal tract and faeces of horses and other animals. The spores are widespread in the environment, including in soil, and can survive hostile conditions for long periods of time. Transmission occurs when spores are introduced into the body, often through a puncture wound but also through trivial, unnoticed wounds, through injecting drug use, and occasionally through abdominal surgery. 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.

## **3. Epidemiology of tetanus in England and Wales**

The incidence of tetanus in the UK decreased following the introduction of national tetanus immunisation in 1961.<sup>2</sup> On average, ten cases of tetanus per year were reported in England and Wales between 1984 and 2000.<sup>4</sup> Of these, 75% were in individuals over 45 years of age, with

the highest annual incidence in those over 64 years of age. Of cases with information on immunisation status (n=91), 63% had never been immunised with tetanus vaccine, and only 1 case (with mild clinical infection) had received the 5 recommended doses of tetanus vaccine. Most cases had a history of a recent injury, and only two cases (1.4%) reported injecting drug use. This contrasts with reports from the United States where injecting drug users (IDUs) accounted for between 15% and 18% of tetanus cases between 1995 and 2000.<sup>5</sup>

Between July 2003 and September 2004, however, 25 clinically diagnosed cases of tetanus were reported in IDUs in the UK; of which two patients died (case fatality 8%).<sup>6</sup> Potential sources of *C. tetani* in IDUs include contamination of drugs, adulterants, paraphernalia, and skin. The widespread distribution and temporal clustering of cases in the UK suggested that its cause was contamination of heroin in the UK with distribution from Liverpool.<sup>6</sup> Intramuscular and subcutaneous drug use, in particular, are associated with tetanus infections.<sup>7</sup> Seventeen of 21 patients in the UK cluster with information reported having injected heroin intramuscularly or subcutaneously (popping) or having missed veins.<sup>6</sup> Clusters of other Clostridium infections (*C. novyi*, *C. perfringens*, *C. botulinum*) have occurred among IDUs in Europe in 2000 and in 2002.<sup>8,9,10</sup>

#### **4. Clinical features<sup>3</sup>**

Tetanus can present with local fixed muscle rigidity and painful spasms confined to the area close to the site of injury or injection. Although localised tetanus can last weeks or months, it is more commonly a prodrome of generalised tetanus. The illness can progress for about two weeks.

Patients with generalised tetanus can present with local tetanus, or with symptoms of generalised tetanus ranging from mild trismus ('lockjaw'), neck stiffness and/or abdominal rigidity to full blown tetanus, including general spasticity, severe dysphagia, respiratory difficulties, severe and painful spasms, opisthotonus and autonomic dysfunction. Generalised tetanus is the most frequently recognised form. Other forms are cephalic tetanus (a special form of localised tetanus, affecting the cranial nerve musculature) and neonatal tetanus, the latter of which has been eliminated from the UK since decades.

The over-all case-fatality rate among reported cases of tetanus in England and Wales between 1984 and 2000 was 29%.<sup>4</sup> The severity of illness may be decreased by partial immunity.

## 5. Diagnosis

Most diagnoses of tetanus are made on clinical grounds only,<sup>4</sup> with clinical evidence of generalised tetanus infection defined as mild to moderate trismus, and one or more of the following: spasticity, dysphagia, respiratory embarrassment, spasms, autonomic dysfunction.

Severity of generalised tetanus is classified as indicated in the box below.

Grading of severity	
Grade 1 (mild):	• mild to moderate trismus and general spasticity, little or no dysphagia, no respiratory embarrassment
Grade 2 (moderate):	• moderate trismus and general spasticity, some dysphagia and respiratory embarrassment, and fleeting spasms occur.
Grade 3a (severe):	• severe trismus and general spasticity, severe dysphagia and respiratory difficulties, and severe and prolonged spasms (both spontaneous and on stimulation).
Grade 3b (very severe):	• as for severe tetanus plus autonomic dysfunction, particularly sympathetic overdrive.

Three diagnostic laboratory tests for tetanus are available, of which the first two may provide laboratory confirmation, whereas the third can only support the diagnosis:

### (1) Tetanus toxin in a serum sample

The detection of tetanus toxin in a serum sample provides laboratory confirmation of a clinical diagnosis of tetanus. Failure to detect toxin in serum does not, however, negate a clinical diagnosis. Samples for testing for the presence of tetanus toxin must be collected before any immunoglobulin treatment, and referred to the Food Safety Microbiology Laboratory (FSML) at:

*Food Safety Microbiology Laboratory  
Specialist and Reference Microbiology Division  
HPA Colindale, 61 Colindale Avenue, London, NW9 5EQ*

For further information on this, please contact Jim McLauchlin, FSML, tel: 020 8200 4400 ext 7117

### (2) Isolation of tetanus bacillus from infection site.

*C. tetani* is only very rarely recovered from the infection site.

Suspect clinical isolates should be referred to:

*Anaerobe Reference Laboratory  
National Public Health Service Wales  
Microbiology Cardiff  
University Hospital of Wales Heath Park  
Cardiff CF14 4XW*

For further information on this, please contact Jon Brazier, ARL, tel: 029 2074 2171 or 2378

**(3) Tetanus toxin antibodies in serum.**

Demonstrating low levels or absent antibody to tetanus toxin may provide laboratory evidence in support of a clinical diagnosis. Samples must be collected before any immunoglobulin treatment. Tests for tetanus antibodies may be undertaken locally, according to availability, or referred to the Respiratory and Systemic Infection Laboratory (RSIL) at:

*Respiratory and Systemic Infection Laboratory  
Specialist and Reference Microbiology Division  
HPA Colindale, 61 Colindale Avenue, London, NW9 5EQ*

For further information on this, please contact Robert George, RSIL, tel: 020 8200 4400 ext 7222.

Testing of drug samples or drug paraphernalia for the presence of tetanus spores can be discussed with Jim McLaughlin (tel: 020 8200 4400 ext 7117).

## **6. Clinical management**

Clinical management of tetanus includes:

- Intravenous (or i.m., in multiple sites) tetanus immunoglobulin (TIG)
- Wound debridement
- Antimicrobials including agents reliably active against anaerobes such as metronidazole
- Vaccination with tetanus toxoid following recovery.

TIG is available from BPL (Bio Products Laboratory) on a named patient basis (BPL tel: 020 8258 2200 (with an out-of-hours service)). The recommended adult dose is 5,000 to 10,000 international units, given intravenously, or at multiple intramuscular sites, as described in the product information.

## **7. Occupational Health**

Tetanus is not transmitted from person-to-person, so those caring for patients with tetanus are not at risk of acquiring tetanus from the patient. However, they should be considered for immunisation with tetanus-low dose diphtheria (Td) vaccine if they have not received the recommended five doses of tetanus-containing vaccine or are unsure about their vaccination status.

## **8. Preventative measures**

### **8.1. Primary prevention**

Effective protection against tetanus can be achieved through active immunisation with tetanus vaccine, which is a toxoid preparation. A total of five doses of vaccine at the appropriate intervals are considered to give lifelong immunity.<sup>2</sup> Single antigen tetanus vaccine (T) has been replaced by the combined tetanus/low dose diphtheria vaccine (Td) for adults and adolescents for all routine uses in these age groups.<sup>1</sup> Recovery from tetanus may not result in immunity and vaccination following tetanus is indicated.

Tetanus prophylaxis in patients with tetanus-prone wounds is covered in the CMO letter of August 2002.<sup>1</sup>

Primary prevention of tetanus among IDUs is possible through changing drug practises: smoking heroin rather than injecting it, and - where injecting can not be avoided - to not inject into the muscle or under the skin. Advice for IDUs is available at

[http://www.hpa.org.uk/infections/topics\\_az/tetanus/advice\\_to\\_idu\\_271103.pdf](http://www.hpa.org.uk/infections/topics_az/tetanus/advice_to_idu_271103.pdf) and at

[http://www.hpa.org.uk/infections/topics\\_az/injectingdrugusers/advice.htm](http://www.hpa.org.uk/infections/topics_az/injectingdrugusers/advice.htm)

### **8.2. Secondary prevention**

Early treatment with tetanus immunoglobulin (TIG) can be life saving (see 6).

## **9. Reporting and Public Health management**

Tetanus (local and generalised) is a notifiable disease by law and all suspected cases should be notified to the proper officer, normally the local Consultant in Communicable Disease Control (CCDC). Enhanced surveillance of tetanus for England is carried out by the HPA Centre for Infections (CfI) and CsCDC are requested to inform Joanne White (tel: 020 8200 4400 ext 7446, HPA Centre for Infections, Immunisation Department, e-mail: [joanne.white@hpa.org.uk](mailto:joanne.white@hpa.org.uk)) or Karen Wagner (tel: 020 8200 4400 ext 6407, HPA Centre for Infections, Immunisation Department, e-mail: [karen.wagner@hpa.org.uk](mailto:karen.wagner@hpa.org.uk)) using the enhanced surveillance questionnaire available at

[http://www.hpa.org.uk/infections/topics\\_az/tetanus/tetanus\\_IDU\\_QUEST\\_230505.pdf](http://www.hpa.org.uk/infections/topics_az/tetanus/tetanus_IDU_QUEST_230505.pdf)

## References

1. CMO. Replacement of single antigen tetanus vaccine (T) by combined tetanus/low dose diphtheria vaccine for adults and adolescents (Td) and advice for tetanus immunisation following injuries. In: *Update on immunization issues PL/CMO/2002/4*. London Department of Health, August 2002. Available at <[http://www.dh.gov.uk/en/Publicationsandstatistics/Lettersandcirculars/Professionalletters/Chiefmedicalofficerletters/DH\\_4004831](http://www.dh.gov.uk/en/Publicationsandstatistics/Lettersandcirculars/Professionalletters/Chiefmedicalofficerletters/DH_4004831)>.
2. Salisbury DM, Begg NT. *Immunisation against infectious disease (The green book)*. London: HMSO, 1996. 2007 Green Book available at <[http://www.dh.gov.uk/en/Policyandguidance/Healthandsocialcaretopics/Greenbook/DH\\_4097254](http://www.dh.gov.uk/en/Policyandguidance/Healthandsocialcaretopics/Greenbook/DH_4097254)>.
3. Mandell G.L., Douglas R.G., Bennett J.E. Clostridium tetani. In Mandell, Bennett, Dolin, eds. *Principles and Practice of Infectious Diseases*, pp 2537-43. Philadelphia: Churchill Livingstone, 2003. p2537-43.
4. Rushdy A.A., White J.M., Ramsay M.E., Crowcroft N.S. Tetanus in England and Wales, 1984-2000. *Epidemiol.Infect.* 2003;**130**:71-7.
5. CDC. Tetanus Surveillance - United States, 1998-2000. *Morbidity and Mortality Weekly Report MMWR* 2003; **52**(SS-3): 1-12. Available at <<http://www.cdc.gov/mmwr/PDF/SS/SS5203.pdf>>.
6. Hahné SJM, White JM, Crowcroft NS, Brett MM, George RC, Beeching NJ, *et al*. Tetanus in injecting drug users, United Kingdom [letter]. *Emerg Infect Dis* [serial on the Internet]. 2006 Apr. Available from <http://www.cdc.gov/ncidod/EID/vol12no04/05-0599.htm>
7. Chin J (editor). *Control of communicable diseases manual*. Washington: American Public Health Association, 2000.
8. Jones J.A, Salmon J.E., Djuretic T., Nichols G., George R.C., Gill O.N. *et al*. An outbreak of serious illness and death among injecting drug users in England during 2000. *J Med Microbiol* 2002;**51**:978-84.
9. CDSC. Cluster of wound botulism cases in injecting drug users. *Commun Dis Rep CDR Wkly* [serial online] 2002 [cited 25 November 2003]; **12** (44): news. Available at <<http://www.hpa.org.uk/cdr/archives/2002/cdr4402.pdf>>.
10. Brett M.M, Hallas G, Mpamugo O. Wound botulism in the UK and Ireland. *J Med Microbiol* 2004;**53**:555-561.