Tetanus

All travellers should ensure they are up to date with their tetanus vaccination

Key Messages

Tetanus is known to occur worldwide.
This vaccine preventable disease is caused by the spores of a bacterium present in soil coming into contact with a wound.
The toxin produced by the bacteria cause a number of different symptoms including spasm of facial muscles e.g. “lock jaw”.
All travellers should ensure they are up to date with their tetanus vaccination.
For those travelling to a country where medical facilities may be limited, a booster dose of a tetanus-containing vaccine is recommended if the last dose was more than ten years ago, even if five doses of vaccine have been given previously.

Overview

Tetanus is a vaccine-preventable disease caused by a toxin of the bacterium *Clostridium tetani. C. tetani* is heat sensitive and cannot survive in the presence of oxygen. The bacterium develops a spore that is resistant to heat, antiseptics, phenol and other chemical agents. The spores are present in soil and faeces of some animals and are known to occur worldwide [1]. Vaccination is the sole way of preventing tetanus in humans.

Risk areas

The organism that causes tetanus, *C. tetani* is present worldwide.

The number of cases of tetanus disease in a country depends on sustained, high population vaccine coverage in both children and adults. In resource-rich countries, such as the UK, vaccine coverage is high [2] and the number of tetanus cases reported is very low. In resource-poor countries however, vaccine coverage is variable and number of cases higher.

Neonatal tetanus is an important problem in resource-poor countries where routine vaccination coverage may not be adequate and unclean procedures are practiced e.g. when the umbilical cord is cut with an unsterile instrument after childbirth. In 1999, the Maternal and Neonatal Tetanus (MNT) Elimination Initiative was launched, setting a goal to reduce maternal and neonatal tetanus

as a public health problem (defined as

In 2015, 21 countries had not reached the MNT elimination status. The initiative continues, with many likely to achieve MNT elimination in the near future [3].

Risk for travellers

Tetanus is uncommon in most resource-rich countries of the western hemisphere; the WHO Western Pacific and European regions have largely controlled clinical tetanus through universal vaccination. However, no country is free of *C. tetani* as it is an environmental contaminant, so maintaining immunity in travellers is important [4-6].

Tetanus in travellers from England and Wales

Tetanus is occasionally reported in England and Wales. Since 1991, there has been an average of seven cases reported each year; there have been no cases of neonatal tetanus in England and Wales for over 40 years [7, 8]. The majority of cases reported between 1984 and 2014 occurred in those over 45 years of age [4], many will have been born before routine vaccination schedules for tetanus were implemented in the UK in 1961.

In 2003, nine of the 12 reported cases occurred in people who inject drugs (PWID) aged between 20 and 47 years [9]. Tetanus can be caused by contamination of drugs with spores during the production, distribution, storage, cutting, reconstitution and injection of drugs [9, 10,]. Tetanus associated with foreign travel has only been reported twice in England and Wales since enhanced surveillance began in 1984 [11].

Transmission

Tetanus is not spread from person to person.

Tetanus spores are present in the intestine of most mammals including horses, sheep, cattle, dogs, cats, rats, guinea pigs and chickens. They are passed into soil via faeces. The disease is acquired when material containing tetanus spores contaminates a wound. In anaerobic (no oxygen) conditions spores germinate and a toxin (tetanospasmin) is produced which travels throughout the body via the blood, leading to the clinical symptoms of tetanus [4, 12].

Wounds with a high risk for tetanus are those that show one or more of the following:

- devitalised tissue and deep puncture wounds where there has been contact with soil or manure
- wounds containing foreign bodies
- bone fractures where the skin is broken
- wounds or burns in patients who have systemic sepsis (blood infection) [4].

In resource-rich regions of the world many cases are associated with PWID when the drugs, injecting equipment or puncture site may be contaminated [9,10].

Signs and symptoms

The incubation period of the disease is usually between 3 to 21 days [13]. Generally, the further the injury site is from the central nervous system the longer the incubation period. The risk of death from tetanus is greatest in persons who have the shortest incubation period [13].

Signs and symptoms can be categorised according to the type of symptoms [13]:

Generalised tetanus

Generalised tetanus accounts for about 80 percent of cases worldwide. After a period of general malaise, trismus (also known as lockjaw) develops. This is characterised by spasm of the facial muscles and produces a characteristic grinning expression (risus sardonicus). Stiffness of the neck, difficulty in swallowing, and rigidity of muscles in the back, chest and extremities follow. The body temperature can rise between 2°C and 4°C above normal, sweating, elevated blood pressure, and episodic (occasional) rapid heart rate when the autonomic nervous systemic that controls these body functions is affected. Spasms lasting for several minutes may also occur and continue for 3 to 4 weeks.

Complications include respiratory failure, aspiration pneumonia and fractures of the spine or long bones resulting from sustained contractions/convulsions. With intensive medical support, death from tetanus occurs in 10-20 percent of cases.

Local tetanus

This is a rare and mild form of the disease. Local tetanus is characterised by persistent contraction of muscles in the same anatomic area as the injury, and may persist for several weeks before gradually subsiding. In some cases local symptoms may precede the development of generalised tetanus.

Cephalic tetanus

Cephalic tetanus is a form of generalised tetanus, occurring when the tetanus spores enter through the middle ear, following a middle ear infection or a head injury. Generalised disease may or may not develop and prognosis is often poor.

Neonatal tetanus

Neonatal tetanus is the main form of tetanus in resource-poor areas of the world. Illness begins three to 14 days after birth. Neonatal tetanus is usually fatal [1]. Death usually occurs secondary to

infection of the umbilical stump if the end is cut with unsterilised instruments. The custom in some cultures is to smear animal dung on the open end of the stump. Failure to thrive, poor sucking, grimacing and irritability are quickly followed by intense rigidity and spasms and death.

Diagnosis and treatment

Diagnosis of tetanus is based on the clinical features, and some laboratory tests are available to support the diagnosis. Individuals who have been partially immunised against tetanus (not completed age-appropriate course) may exhibit less severe symptoms than unimmunised individuals. Occasionally *C.tetani* can be isolated from a wound [12].

All wounds must be cleaned and dead or contaminated tissue should be removed to make conditions less favourable for further multiplication of the bacterium and production of tetanospasmin [13].

Tetanus vaccine and human tetanus immune globulin should be given depending upon the vaccination status of the patient and assessment of the injury [4]. If a wound, burn or injury is considered to be high risk (i.e. has heavy contamination with material likely to contain tetanus spores and/or extensive devitalised tissue), human tetanus immunoglobulin (a blood product) should be administered, irrespective of the tetanus immunisation history of the patient [4]. See management of patients with tetanus prone wounds in the Public Health England 'Green book' tetanus chapter for further details.

Intravenous antibiotics should be given to kill *C. tetani*.

For those with symptoms of tetanus, benzodiazepines can be used for sedation and to control the spasms. A neuromuscular blocker may be necessary [13]. Intensive medical and nursing care is provided in quiet, darkened conditions to minimise provoked spasms. Intubation and respiratory support may be needed [13].

Preventing tetanus

Effective vaccination is available and all persons should be immunised regardless of age. See further information about how to vaccinate those with uncertain or unknown immunisation histories .

Travellers should be up to date on their tetanus immunisation, and be aware of the risk of accidents while travelling. It is important to seek urgent medical attention in the case of a tetanus prone wound as thorough cleaning of the injury is essential [4] and further vaccine / immunoglobulin may be recommended (see diagnosis and treatment above) [4].

Vaccine information

The Summary of Product Characteristics (SmPC) for the individual vaccine should be consulted for

specific information relating to the product [15 -20]. Tetanus toxoid vaccine is now only available as a combination vaccine in the UK.

In the UK childhood immunisation programme five doses of tetanus-containing vaccine are administered at appropriate intervals (see table below). Children should be up to date with the recommended vaccinations.

Travellers to areas where medical attention may not be accessible if a tetanus prone injury occur and whose last dose of a tetanus-containing vaccine was more than 10 years previously, should receive a booster dose of tetanus, low dose diphtheria and inactivated polio vaccination (Td/IPV), even if the individual has received five doses of vaccine previously [5]. This is a precautionary measure in case tetanus immunoglobulin is not available should a tetanus-prone injury occur [5].

Details of the current tetanus-containing vaccines are found in the summary table.

Vaccine Schedules

Vaccine	Schedule and age range
Infanrix hexa DTaP/IPV/Hib/HepB	3 doses given 1 month apart (offered at 2,3,4 months of age)
Infanrix-IPV DTaP/IPV or Repevax (dTaP/IPV)	Pre-school: single dose (offered at 3 years and 4 months or soon after)
Revaxis Td/IPV	Single dose booster (offered at 14 years of age) Also used for adults and children from 10 years of age requiring initial course of 3 doses 1 month apart or travellers requiring a single dose booster
Boostrix-IPV dTaP/IPV	Single dose booster (for pregnant women 16 to 32 weeks gestation)*

[14-19]

*** Recommended for pregnant women between 16 to 32 weeks to protect unborn child against whooping cough (pertussis).**

Interrupted courses

It is not necessary to restart an interrupted series of a vaccine or to add extra doses; the normal schedule should be resumed as soon as possible observing a one month interval between doses [4].

Contraindications

Confirmed anaphylactic reaction to a previous dose of a tetanus containing vaccine or a confirmed anaphylactic reaction to neomycin, streptomycin or polymyxin B (which may be present in trace amounts). [4, 14-19]

If an individual is acutely unwell, immunisation may be postponed until they have fully recovered. This is to avoid wrongly attributing any new symptom or the progression of symptoms to the vaccine.

Adverse Events

Detailed information is available in the 'Green Book' and the Summary of Product Characteristics (SPC) for each vaccine. Links to the SPC for these products can be found by clicking on the vaccine name in the table above).

Resources

- Public Health England. Tetanus: information for health professionals.
- Public Health England. Tetanus: guidance, data and analysis
- Roper MH, Wassilak SGF Tiwari TSP and Orenstein WA, Tetanus Toxoid, Chapter 33 in Vaccines 6th Edition, Edited by Plotkin SA Orenstein WA and Offit PA, Elsevier Saunders, 2013
- NHS Choices: Tetanus

REFERENCES

1. World Health Organization. Fact sheet: tetanus. 7 March 2012 [Accessed 05 May 2016].
2. Public Health England. Tetanus Notifications, Deaths and Vaccine Uptake Rates, England and Wales, 1985 – 2013 [Accessed 05 May 2016].
3. World Health Organization. Maternal and Neonatal Tetanus (MNT) elimination. The initiative and challenges. 7 September 2015 [Accessed 05 May 2016].
4. Public Health England Immunisation against infectious disease. Chapter 30 Tetanus. 19 April 2013 [Accessed 05 May 2016].
5. Field VF, Ford L, Hill DR (eds). Health Information for Overseas Travel. National Travel Health Network and Centre, London, UK. 2010
6. World Health Organization. International Travel & Health. Geneva: 2015 updates.
7. Public Health England. Tetanus: epidemiological data. [Accessed 05 May 2016].

8. Galbriath NS, Forbes P, Tillett H. National surveillance of tetanus in England and Wales 1930-79. Journal of Infection, 1981; 3: 181-91.
9. Hahne SJ, White JM, Crowcroft NS, et al. Tetanus in injecting drug users, United Kingdom. Emerg Infect Dis 2006;12: 709-10.
10. Public Health England. Shooting up. Infections among people who inject drugs in the United Kingdom Update November 2014. [Accessed 05 May 2016].
11. 11 Public Health England, personal communication, 12 November 2015
12. Thwaites CL, Yen LM. Tetanus. In: Farrar J, Hotez PJ, Junghanss T et al (eds). Manson's Tropical Diseases. 23rd edition. Elsevier Saunders.2014.
13. Roper MH, Wassilak SGF Tiwari TSP and Orenstein WA, Tetanus Toxoid, Chapter 33 in Vaccines 6th Edition Edited by Plotkin SA Orenstein WA and Offit PA, Elsevier Saunders, 2013
14. Sanofi Pasteur MSD Summary of Product Characteristics: Pediacel. [Accessed 05 May 2016].
15. Glaxo Smith Kline UK. Summary of Product Characteristics. Infanrix- IPV Hib. [Accessed 05 May 2016].
16. Glaxo Smith Kline UK. Summary of Product Characteristics. Infanrix- IPV. [Accessed 05 May 2016].
17. Sanofi Pasteur MSD Summary of Product Characteristics: Repevax. [Accessed 05 May 2016].
18. Sanofi Pasteur MSD Summary of Product Characteristics: Revaxis. [Accessed 05 May 2016].
19. Glaxo Smith Kline UK. Summary of Product Characteristics. Boosterix-IPV. [Accessed 05 May 2016].

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