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Specific Learning Objectives

- At the end of session, the learner shall be able to describe:
- > Epidemiology of tetanus
- ➤ Diagnosis and treatment
- ➤ Prevention and control

Introduction

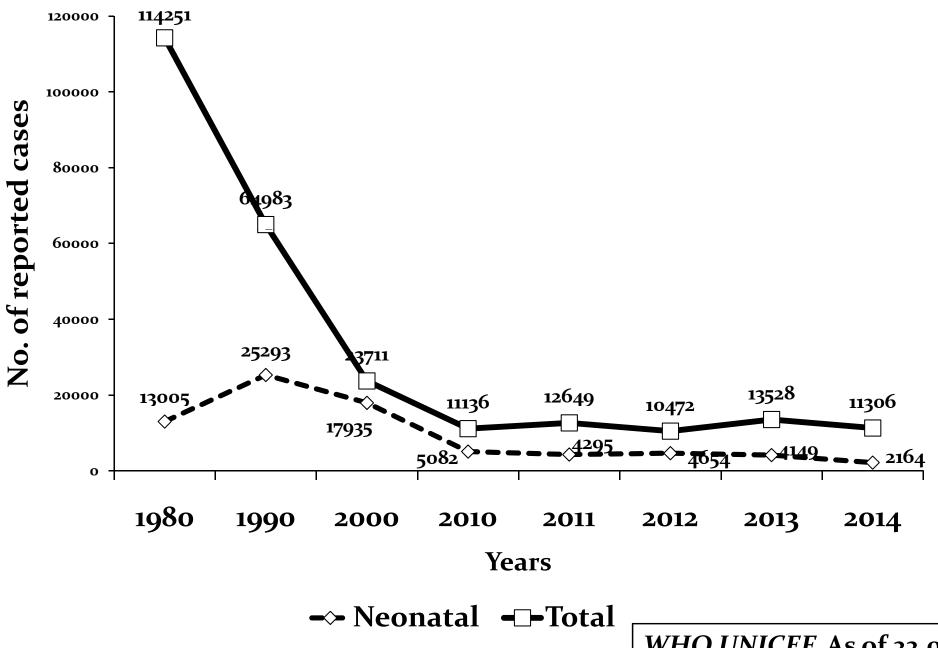
- An infectious disease
 - spores of *Clostridium tetani* which are universally present in the soil.
 - Under favourable anaerobic conditions, the pathogen produces tetanospasmin, which is a potent neurotoxin.
 - This toxin blocks inhibitory neurotransmitters in the central nervous system and causes the muscular stiffness and spasms typical of generalized tetanus.
- Vaccine preventable disease.

Magnitude of problem

• The widespread use of a safe and effective vaccine has made the disease rare in the developed world.

• In developing countries, however, tetanus remains a major public health problem.

Global scenario of Tetanus

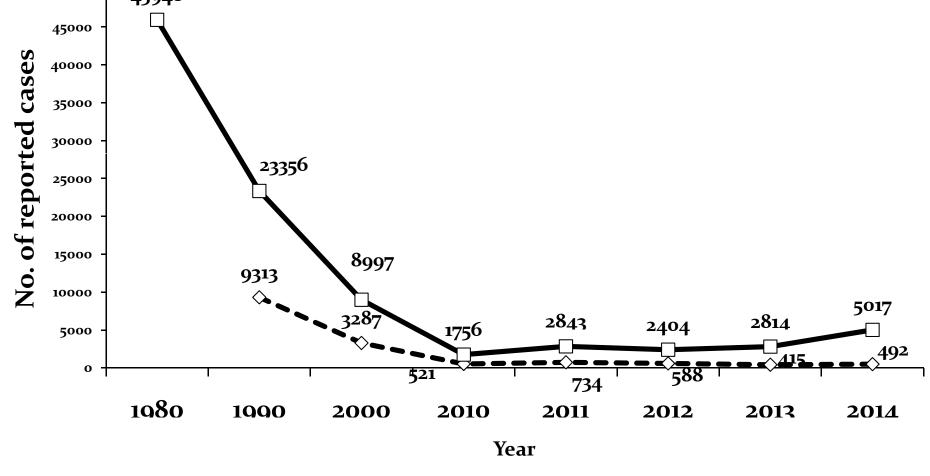


WHO UNICEF. As of 22.05.201

• A large majority of tetanus cases are birth - associated and occur in developing countries among newborn babies or in mothers following unclean deliveries and poor postnatal hygiene.

• The WHO aims to eliminate maternal and neonatal tetanus (*MNT*) defined as *less than one* neonatal tetanus case per 1000 live births at district level per year.

Scenario of Tetanus in India



→ Neonatal - Total

- Neonatal tetanus in India is reported more in male children.
 - this male preponderance may reflect **a male bias** for health care seeking rather than an actual male predilection.
- In India, neonatal tetanus shows distinct seasonal variation
 - largest number of cases being reported during the *monsoons and post monsoon period*.

Agent

- Clostridium tetani:
 - gram positive bacilli, obligate anaerobes.
 - drumstick appearance
- The vegetative forms produce two exotoxins:
 - **Tetanolysin:** role in the pathogenesis of tetanus is unknown.
 - **Tetanospasmin** (also called Tetanus Toxin) is a *neurotoxin* and causes the clinical manifestations of tetanus.

Tetanus spores:

- Widely distributed in nature.
 - found in the soil, human and animal faeces, and even on human skin.
- Extremely stable and can geminate into vegetative forms *even after years*.
- *Highly resistant* to heat and most chemical disinfectants including ethanol, phenol, and formalin.
- Can be destroyed by
 - iodine, glutaraldehyde, and hydrogen peroxide.
 - autoclaving at 121°C under 15 psi pressure

Reservoir:

- Intestine of herbivorous animals and excreted in their feces
 - e.g. horses, cattle, goats, sheep
- Soil and dust

Period of communicability:

- None
 - Not transmitted from person to person

Host

- Age
- Tetanus can occur at any age.
- In developed countries tetanus is now largely a disease of the elderly.
- In developing countries, however, a large proportion occur among newborn babies or in mothers
 - following unclean deliveries and poor postnatal hygiene.
- Tetanus in children and adults *following injuries* also constitutes a considerable public health

- Gender:
- Incidence: Males > Females

- Exposure to risk:
- Occupation
- Pregnancy: delivery or abortion

Environmental and Social Factors

- Soil, agriculture, animal husbandry
- Injuries: indoor and outdoor
- Unhygienic delivery practices
- Customs and habits
- Lack of primary health care

• Its occurrence does not depend upon presence or absence of infection in the population

Transmission

- Tetanus is not transmitted from person to person.
- Enter the body through any form of injury due to its ubiquitous nature.
- Neonatal tetanus results from unclean deliveries and the application of contaminated material on the umbilical stump.
- In children and adults tetanus can result from both acute wounds and chronic infections.
 - Puncture and deep wounds are more likely to result in tetanus rather than superficial abrasions.

Incubation period

- 03 to 21 days (usually between 6-8 days).
 - In neonatal tetanus, the average incubation period is about 7 days with a range of 4 14 days.
- The farther the **injury site** is from the central nervous system, the longer the incubation period.

- The **severity of disease** is inversely related to the duration of the incubation period.
 - The shorter the incubation period, the higher the chance of death.

Clinical features

- Tetanus can classified into four forms based on clinical presentation:
- **≻**Generalized Tetanus
- **►** Localized Tetanus
- > Cephalic Tetanus
- **≻**Neonatal Tetanus

Generalized Tetanus

- The **most common form** of presentation.
- Spasm of the jaw muscles (**lockjaw**) and a grimace like appearance of the face (**Risus Sardonicus**): earliest sign.
- Spasm of the muscles of the abdomen, neck, back and thorax.
- Tonic seizures (in severe cases).
- A characteristic feature is that **the patient does not loose consciousness during the spasms**.
- The spasms can be triggered by external stimuli.
- Spasms may continue for over three weeks and complete recovery may take months.
- Elevated temperature, sweating, hypertension and tachycardia.

Localized Tetanus:

- A less common form of the disease.
- Stiffness and rigidity of the muscles around the site of infection.
- Recovery is usually spontaneous.
 - Only about 1% of cases are fatal.
 - At times, it may be a prodrome of generalized tetanus.

Cephalic Tetanus:

• A rare form of the localized disease and is

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• Involvement of cranial nerves is a characteristic feature of this form of tetanus.

Neonatal Tetanus:

- A form of generalized tetanus occurring in neonates.
- Generalized weakness followed by an inability to suckle are the common manifestations.

• Any neonate with normal ability to suck and cry during the first 2 days of life and who, between 3 and 28 days of age, cannot suck normally and becomes stiff or has spasms (i.e. jerking of the muscles) as a confirmed case of neonatal tetanus.

(According to WHO)

Diagnosis

- History and clinical signs & symptoms.
- 'Spatula Test': a bedside diagnostic test with very high specificity and sensitivity has been proposed from India.
- Isolation of *Clostridium tetani* from can neither confirm nor exclude the diagnosis.
 - The pathogen is often isolated from wounds among patients who do not have the disease
 - Even carefully performed anaerobic cultures are negative from contaminated wounds.
- Serology also has little value as antibody levels even in the protective range do not rule out disease.

The only condition which mimics tetanus closely is strychnine poisoning.

Treatment

• Local wound management supportive therapy

immunization are the main requirements or management of cases of tetanus.

- All wounds should be cleaned and adequate debridement carried out.
- The course of the disease, however, is not altered by wound debridement.
- Airway maintenance may require an endotracheal tube or even a tracheostomy.
- Sedation is the mainstay of symptomatic treatment.

- Clostridium tetani is sensitive to several antibiotics including Penicillin, Tetracycline and Metronidazole.
 - Metronidazole is preferred (500 mg every six hours intravenously or by mouth);
 - Penicillin G (100,000–200,000 IU/kg/day intravenously, given in 2–4 divided doses).
 - Antibiotics may eliminate the organism and consequently prevent further production of toxin.
- Intravenous Diazepam or Lorazepam may be required for control of the spasms.
- Adequate fluids and nutrition.

Immunization with Human Tetanus Immunoglobulin (HTIG)

- to neutralize unbound tetanus toxin.
- Doses: 500 units to 3000 6000 units IM/IV.
- Intrathecal HTIG was earlier used for neonatal tetanus, but has now been shown to be ineffective.
- As the amount of tetanus toxin released during infection is inadequate to produce an effective immune response, all patients of tetanus should also be given active immunization.

Prevention and Control

• **Active immunization** against tetanus is the **cornerstone** of prevention and control of tetanus.

 Mass education campaigns and training of birth attendants to ensure hygienic and safe deliveries are also important measures for prevention of neonatal tetanus.

Active Immunization:

- Tetanus toxin is inactivated by formaldehyde to form tetanus toxoid.
- The toxoid has been used as:
 - Monovalent Vaccine (TT)
 - Diphtheria Tetanus Pertussis (DTP) vaccine
 - Diphtheria Tetanus (DT) vaccine
 - Tetanus diphtheria (Td) vaccine
 - Tetanus diphtheria acellular Pertussis (TdaP) vaccine.

 Adsorption of tetanus toxoid onto aluminium salts increases its antigenicity.

• Childhood tetanus immunization schedule:

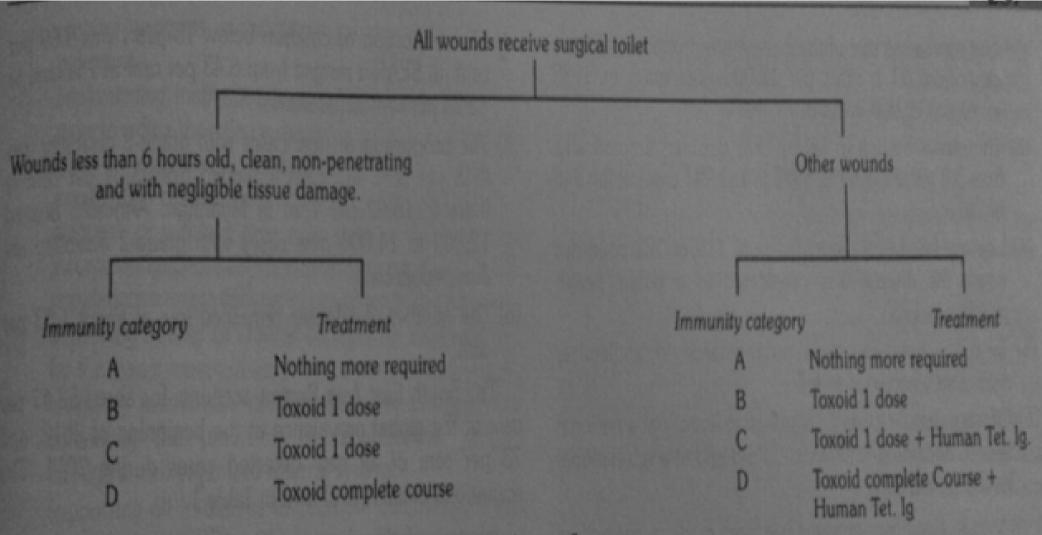
- Primary series of three doses of DTP at 6, 10 & 14 weeks
- Booster between 16 and 24 months of age.
- Another booster of the DPT vaccine at 5-6 years.
- Boosters of TT are given at 10 years and 16 years of age.

Pregnant women tetanus immunization schedule:

- 2 doses of TT: the first dose as early as possible during pregnancy and the second dose at least 4 weeks later.
- TT booster in subsequent pregnancy within 3 years.

- In cases of injury a dose of tetanus toxoid vaccine may be given depending on:
 - the severity of the injury and
 - the reliability of the history of previous tetanus vaccinations.

• The vaccine should be given if the last dose was administered more than 10 years ago (or 5 years in the case of severe injuries).



A = Has had a complete course of toxoid or a booster dose within the past 5 years.

B = Has had a complete course of toxoid or a booster dose more than 5 years ago and less than 10 years ago.

C = Has had a complete course of toxoid or a booster dose more than 10 years ago.

D = Has not had a complete course of toxoid or immunity status is unknown.

FIG. 1

Recommendations for prevention of tetanus in the wounded

(MNT) Elimination

- In 1989, at the World Health Assembly to reduce neonatal tetanus as a public health problem globally.
- MNT initiative was in 1999, revitalizing the goal of MNT elimination as a public health problem.
 - Maternal tetanus was added as it is assumed to be eliminated once neonatal tetanus elimination has been achieved.

• Currently, the target year for global elimination of MNT is 2015.

- The recommended strategies for achieving MNT elimination include:
- Strengthening routine immunization of pregnant women with TT;
- ➤TT Supplementary Immunization Activities (SIAs) in selected high-risk areas, targeting women of child bearing age with 3 properly spaced doses of TT;
- ➤ Promotion of clean deliveries;
- > Reliable neonatal tetanus surveillance.

Role of partners:

- Countries:
 - implementation of recommended strategies;
- United Nations Children's Fund (UNICEF):
 - coordination of accelerated activities and strengthening routine immunization to achieve and maintain MNT elimination;
- United Nations Population Fund (UNFPA):
 - promotion of clean deliveries;
- World Health Organization (WHO):
 - monitoring and validation of elimination status, development of strategies for maintaining elimination and strengthening routine immunization.

- Once MNT elimination has been achieved, maintaining elimination will require:
- continued strengthening of routine immunization activities for both pregnant women and children,
- >maintaining and increasing access to clean deliveries,
- reliable NT surveillance, and
- introduction of school-based immunization, where feasible.

India is declared free of maternal and neonatal tetanus

Sophie Cousins

On 15th MAY 2015

New Delhi

India has reached its goal of eliminating maternal and neonatal tetanus, in what experts have heralded as a "significant public health milestone." The elimination of neonatal tetanus is defined as less than one case in 1000 live births in every district across the country, said the World Health Organization.

The disease usually occurs in newborns through infection of the unhealed umbilical stump, especially when the stump is cut with a non-sterile instrument. Maternal tetanus is considered eliminated once neonatal tetanus elimination has been achieved.

Poonam Khetrapal Singh, WHO deputy regional director for South East Asia, said that Nagaland in northeast India was the last state to achieve maternal and neonatal tetanus elimination, after a validation survey conducted in April. On 15 May WHO declared India free of maternal and neonatal tetanus.

In 1983 the Indian government introduced two doses of tetanus toxoid vaccine to all pregnant women during each pregnancy as part of its nationwide expanded programme on immunisation. But in 1990 neonatal tetanus still accounted for almost 80 000 deaths, said Unicef—in stark contrast with 2013 and 2014, in which fewer than 500 cases a year were reported, said Singh.

Vinod Paul, professor of neonatology at the All India Institute of Medical Sciences in New Delhi, said he was proud that India had eliminated a disease that was once responsible for 15% of neonatal deaths in the country. "This is truly a huge goal because at one point in time there were tens of thousands of deaths due to neonatal and maternal tetanus," he said.

He cited three reasons why he believed India had achieved the goal. "First and foremost, maternal tetanus immunisation rates have gone up," he said. "They are not universal, but they are very high. Secondly, we introduced cash incentives for institutional deliveries; and, lastly, delivery kits that reduce contamination along with safe umbilical cord practices have been important.

"In the last seven years, facility births have increased, even in rural India. We've moved from homes where deliveries are unhygienic to facility births where we're dealing with nurses and doctors where there are greater chances of better care and practices."

Singh said that the launch of the National Rural Health Mission in 2005 helped to facilitate safe deliveries by training auxiliary nurse midwives and other trained birth attendants who work at the village level.

She added that polio eradication in India, which was achieved last year, had acted as a model to follow. "Since 2012, the government of India has been applying the best practices of polio eradication for routine immunisation strengthening, focusing on areas with low routine immunisation coverage," she said.

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