



# Tetanus in Area Affected by Earthquake: Risk, Prevention and Management

Masoud Mardani <sup>1,\*</sup>

<sup>1</sup>Infectious Diseases and Tropical Medicine Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

\*Corresponding author: Infectious Diseases and Tropical Medicine Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran. Tel: +98-9121132678, Email: drmasoudmardani@yahoo.com

Received 2018 December 03; Accepted 2018 December 03.

**Keywords:** Tetanus, Earthquake, Management

Following natural disasters like earthquake property, trauma-related deaths and injuries, cause huge risk of infections, especially in vulnerable population such as pregnant women, people with untreated wounds, and newborns (1). When acute phase of emergency occurred, there are great needs of a temporary post disaster surveillance, early warning, and response (1). During evacuation and clean up there are increased risk of wounds such as puncture to skin, scrubs, laceration, and other skin injuries. The cleanup worker, volunteers, and resident are in direct touch with flood water and human or animal waste; therefore, for as much as exposure to soil can cause tetanus, workers and resident should be up to date with tetanus vaccination (2).

The Aceh earthquake and tsunami in 2004 killed 12700 people and caused 500000 injuries in Indonesia. In addition, the Yogyakarta earthquake caused 5700 deaths and 3700 injuries in 2006. In both earthquakes, in rescue and evacuation, most of patients had been wounded and injured, which lead to dilation and case severity due to poor access to health care, low vaccination coverage, and lack of awareness of tetanus (3).

Tetanus, also known as lockjaw, is a toxin mediated infection that is not communicable, fatal, and severe requiring emergency action. Tetanus is caused by an infection with the bacterium *Clostridium tetani*, which is commonly found in soil, saliva, dust, and manure. Any break such as cut or puncture in the skin is the way of penetration of bacteria and cause of diseases, which is characterized by muscle spasms particularly in people who are not vaccinated completely. In fact, most of the tetanus cases are among people who never received tetanus vaccination or have not completed their childhood vaccination program (4, 5).

If the tetanus occurs, emergency treatment should be

done as soon as possible, and tetanus immune globulin (TIG) should also be given, medication to control muscle spasm, wound care, tetanus toxin booster, and antibiotics are recommended (6).

History of damage or clear gateway of passage might be needed. The average of incubation period is about 10 days, which ranges from 3 to 21 days. General health of patient, age, the amount of present toxin, and degree of prior immunity are responsible for clinical course of generalized tetanus. The generalized tetanus death rates is about 10% to 20% even with modern intensive care support (6).

Patient immune status and type of wound are important tetanus disease risk factors. Wounds that contaminated with dirt, feces, soil, saliva, as well as puncture wounds, crushing wounds, and burn tissues are at higher risk of tetanus. Proliferation of *C. tetani* is possible in prone environments such as necrotic and gangrenous wounds, avulsion fractures, burn, and frostbite. Therefore, every wound should be disinfect and cleaned up by removing dirt, foreign material, and debris (6).

As CDC currently recommended a primary series with an age-appropriate tetanus, toxoid-containing vaccine (DTaP, Tdap, or Td) should be prescribed in any unvaccinated person with any type of wound. Primary series of vaccine should be completed in patients who have an unknown or uncertain history of receiving prior dose of tetanus toxoid containing vaccine (7).

Another dose of tetanus toxoid containing vaccine is not needed in patients with simple and clean wounds and who received the last dose of tetanus toxoid containing vaccine in last three years. If the last dose of tetanus toxoid containing vaccine is from less than five years ago and they have a contaminated wound, they are considered protected against bacteria and there is no need for another

dose of vaccine. Otherwise, in both situations a booster dose should be administered (7).

Unfortunately, temporary immunity is provided by TIG and can only contribute to removing unbound tetanus toxin and cannot neutralize toxin, which is bound to be nerve ending. Prophylactic dose of TIG should be administered in patients who are not vaccinated or have less than a three dose vaccine. In order to do prophylactic prevention, 250 IU TIG should be administered intramuscularly. People with HIV and contaminated wounds, regardless of their CD4 count, immune status, and history of tetanus immunization, should receive TIG. The wound should be checked in order to observe the sign of infection, however, antibiotic therapy is not recommended and in the case of detection, infection treatment should be done promptly (7).

The organism is rarely recovered from the afflicted site of infections, due to the fact that there is no available laboratory test to confirm tetanus; clinical symptoms is the only way of diagnosis. In a patient with recent a history of open and contaminated wound and spasm of muscles, tetanus should be suspected particularly in incompletely vaccinated or unvaccinated cases. Although rigidity is sometimes confined to the region of injury, abdominal rigidity is a common first sign suggestive of tetanus in older children and adults (8).

Therefore, vaccination coverage and awareness, wound care treatment, establishment regular surveillance system besides disaster management, and support program can successfully prevent tetanus outbreak after disaster (8).

In Iran, during half of the past century, the national extended immunization program is given for free to every person who was born. The vaccination coverage of tetanus in the first decades of life is estimated at about 98%, however, unfortunately, most of the vaccinated children do not receive a booster dose due to the lack of adult vaccination

program, which lead to reducing protective antibody level. Special attention to the prevention of tetanus should be paid due to the fact that from a geographical point of view, Iran is located in an earthquake zone region and there have recently been periodic earthquakes.

## Acknowledgments

The author of the manuscript appreciates Bitia Pourkaveh for her contribution in collecting data and manuscript editing.

## References

1. World Health Organization. *Public health risk assessment and interventions, earthquake: Haiti, January 2010*. World Health Organization; 2010. Available from: [http://www.who.int/diseasecontrol\\_emergencies/publications/haiti\\_earthquake\\_20100118.pdf](http://www.who.int/diseasecontrol_emergencies/publications/haiti_earthquake_20100118.pdf).
2. Waring SC, Brown BJ. The threat of communicable diseases following natural disasters: A public health response. *Disaster Manag Response*. 2005;3(2):41-7. doi: [10.1016/j.dmr.2005.02.003](https://doi.org/10.1016/j.dmr.2005.02.003). [PubMed: [15829908](https://pubmed.ncbi.nlm.nih.gov/15829908/)].
3. Pascapurnama DN, Murakami A, Chagan-Yasutan H, Hattori T, Sasaki H, Egawa S. Prevention of tetanus outbreak following natural disaster in Indonesia: Lessons learned from previous disasters. *Tohoku J Exp Med*. 2016;238(3):219-27. doi: [10.1620/tjem.238.219](https://doi.org/10.1620/tjem.238.219). [PubMed: [26960530](https://pubmed.ncbi.nlm.nih.gov/26960530/)].
4. Mercier A, Parant J. History of a case of traumatic tetanus, successfully treated. *Lond Med Phys J*. 1821;46(274):538-40. [PubMed: [30494362](https://pubmed.ncbi.nlm.nih.gov/30494362/)].
5. Howship J. Lock jaw and tetanus. *Med Phys J*. 1809;22(128):324-6. [PubMed: [30492761](https://pubmed.ncbi.nlm.nih.gov/30492761/)].
6. Rhinesmith E, Fu L. Tetanus disease, treatment, management. *Pediatr Rev*. 2018;39(8):430-2. doi: [10.1542/pir.2017-0238](https://doi.org/10.1542/pir.2017-0238). [PubMed: [30068747](https://pubmed.ncbi.nlm.nih.gov/30068747/)].
7. National Center for Immunization and Respiratory Diseases. *Epidemiology and prevention of vaccine-preventable diseases*. Georgia, USA: National Center for Immunization and Respiratory Diseases; 2015. Available from: <https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/tetanus.pdf>.
8. Infectious Diseases Society of America. *Tetanus in areas affected by a hurricane: Risk, prevention, and management guidelines for clinicians*. Infectious Diseases Society of America; 2018. Available from: <https://www.idsociety.org/public-health/hurricane-resources/hurricane-resources/tetanus-in-areas>.