

# Tetanus experience in a public hospital in Western Saudi Arabia

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## ABSTRACT

**Objective:** Tetanus although rare, has not been eradicated and continues to present from time to time. Early diagnosis and management may be life saving. This study aims to evaluate all patients admitted with the clinical diagnosis of tetanus in King Abdul-Aziz Hospital Jeddah, Kingdom of Saudi Arabia over the last 3 years.

**Methods:** All patients admitted with the clinical diagnosis of Tetanus in King Abdul-Aziz Hospital and Oncology Center from January 2000 through to December 2002 were retrospectively reviewed and data was analyzed to determine the demographic features, clinical details, management, and outcome of treatment.

**Results:** A total of 11 patients were admitted during this period. All patients were diagnosed in the emergency room by clinical examination. Their ages ranged from 22-68 years. The immunization status of these patients was unknown. All of them were males with 4 of them being injection-drug users. Eight patients had a definite history of injury mainly involving the lower limbs. The

incubation period ranged from 5-30 days. Nine patients required mechanical ventilation for a period varying from 2-4 weeks. All patients received Tetanus Immunoglobulin with a dose ranging from 500-3000 unit. The spasms were mainly controlled by diazepam infusion with a maximum dose of 480mg/day. Magnesium sulphate was used in 6 patients to control spasms and autonomic dysfunction. Metronidazole was used in addition to Benzyl Penicillin in 9 patients. Out of the 11 cases 10 were discharged home and only one patient died 6 days after admission.

**Conclusion:** Tetanus is still a problem in developing countries. It is a potentially fatal disease, without early medical intervention. Primary immunization and scheduled booster immunization are important preventive measures that have greatly reduced the incidence of tetanus.

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The word tetanus comes from the Greek word tetanus, derived from the word teinein, meaning stretch.<sup>1</sup> Nicolaier discovered the anaerobic bacillus *Clostridium tetani* in 1885.<sup>2</sup> In 1889 Koch's Kitastato obtained the bacillus of tetanus in pure culture. He also associated the disease to animals.<sup>1,2</sup> Since 1947 when data collection regarding the incidence of tetanus began, the number of tetanus cases reduced. The principle factors for this are the implementation of immunization. The average annual incidence of tetanus in the United States of America during 1998-2000 was 25% lower than

that reported in the late 1980s and 96% lower than that reported in 1947.<sup>3-5</sup> Overall fatality for the same time period has reduced from 91% in 1947 to 15% in 1998-2000.<sup>5</sup> Globally one million cases are affected annually.<sup>6</sup> The disease is more common in developing countries especially Asia, Africa, and Middle East where immunization is not available to majority of people for various reasons.<sup>7,8</sup> In the Kingdom of Saudi Arabia (KSA), tetanus immunization has been part of expanded program of immunization (EPI) since 1981. Consequently, the disease is quite uncommon in the young Saudi

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population. There is a large expatriate population coming from various African and Asian countries employed as manual laborers exposing them to tetanus. Their immunization status to tetanus is likely to be unknown. King Abdul-Aziz Hospital and Oncology Center, Jeddah, KSA is a large public hospital. The patients with all kinds of medical problems are regularly admitted here.

The aim of this study was to retrospectively analyze all patients admitted with tetanus in this hospital from January 2000 through to December 2002 and determine the demographic and clinical profile of these patients and highlight various management strategies.

**Methods.** The study was conducted at King Abdul-Aziz Hospital and Oncology Center, Jeddah, KSA. The medical record of all patients admitted with the diagnosis of tetanus from January 2000 through to December 2002 was reviewed. Age, sex, nationality, associated medical illness, clinical presentation, prior immunization status to tetanus, treatment and outcome were all recorded. Relevant laboratory investigations were collected. All the data was analyzed.

**Results.** Eleven patients were admitted with the clinical diagnosis of tetanus during the study period, starting from January 2000 through to December 2002. All of them were males and their ages ranged from 22 to 68 years with mean age of 40.09 years (**Table 1**). There were 4 (36.4%) Saudis, while the rest were non-Saudis coming from other Middle Eastern countries, Asia and Africa. Most of the Non-Saudis were young males working in KSA as laborers. None of these patients were up-to-date with tetanus toxoid immunization. Most of the patients presented with variable combination of symptoms of spasm of the jaw, backache, neck pain and lockjaw. There was a definite history of injury in 8 (72.7%) patients mainly involving the lower limbs. The nature of injuries was mainly puncture wounds, with some patients having infected wounds on presentation. Four (36.4%) patients had history of intravenous drug abuse. Duration between injury and symptoms ranged from 5-30 days. As there is no definitive diagnostic test available for tetanus, diagnosis was based on clinical examination at presentation. Creatinine kinase (CK) was variably elevated up to many thousands in all patients. Lactate dehydrogenase (LDH) was also increased in most patients, but level above 1000 was seen only in 2 patients. All patients were admitted to intensive care unit (ICU) in an isolation room. Nine patients required intubation and mechanical ventilation with full sedation and paralysis. The other 2 patients were managed conservatively. Intubation criteria included severe respiratory distress with hypoxemia

**Table 1 -** Demographic and clinical details.

Clinical details	n (%)
Saudis	4 (36.4)
Non-Saudis	7 (63.6)
Males	11 (100)
Age range	22-68 years
Mean age	40.09 years
Incubation period	5-30 days
History of injury	8 (72.7)
Risk factors (injection-drug users)	4 (36.4)
Average hospital stay	40.8 days
Number requiring ventilation	9 (81.8)
Average ventilation duration	23.6 days
Number survived	10 (90.9)

in spite of being on high flow oxygen and requiring a high dose of diazepam. The duration of ventilation ranged from 2-4 weeks with an average of 23.6 days and most patients required ventilation for more than 2 weeks. Tracheotomy was carried out in 4 patients. All patients received tetanus immunoglobulin, and dose ranged from 500-3000 units. All patients were started on diazepam infusion in a dose of 10-20 mg/hour with a maximum dose of 480mg/day. All patients were commenced on benzyl penicillin on admission. Nine patients also received intravenous Metronidazole. These antibiotics were continued for a period of 10 days. Subsequently further courses of antibiotics were given in 8 patients when they developed nosocomial infection in accordance with culture and sensitivity pattern. Magnesium sulphate infusion was started in 6 patients who were having persistent spasm. The dose of infusion was adjusted according to the serum magnesium level and clinical response of patients. Out of these 11 patients, only one died, whereas all the other patients fully recovered and were discharged home in a good condition.

**Discussion.** A significant portion of population in the world is inadequately immunized and therefore is at risk of contracting tetanus. Although the incidence and mortality has fallen considerably among general population, the relative frequency of tetanus and tetanus related deaths remain high among the elderly due to decreased immune response to tetanus toxoid with age as reported to the Center for Disease Control and

Prevention (CDC).<sup>3,4,9</sup> Mortality has been reduced to 15% with the active employment of intensive care facilities for treatment of these conditions.<sup>10</sup> Tetanus has not been adequately reported in KSA. There are few studies available regarding the pattern and burden of this disease in KSA. The diagnosis of tetanus is made clinically as there is no specific laboratory test available. In 1990 the Centers for Disease Control adopted a clinical case definition for public health surveillance of tetanus which is the acute onset of hypertonia or painful muscle contraction (usually the jaw and neck muscle) and generalized muscle spasms without other apparent medical causes.<sup>4</sup> Pain and stiffness of the back and neck is the most common presenting symptoms followed by trismus and dysphagia. Spasm may be precipitated by simple stimuli such as noise, light, or touch and may last for seconds to minutes. These may be very dangerous causing apnea or severe rhabdomyolysis. There are 4 clinical types of tetanus: neonatal, localized, cephalic, and generalized. In our study most of the patients were young males, as they worked as laborers and got the infection through nail or pin prick. All our cases are of generalized form. The source of infection from an obvious source has been reported in 58% of cases.<sup>6</sup> Many of the cases were probably perceived as mild and occurred in persons inadequately immunized. In our study the source of infection was obtained in 81.8% of patients. Tetanus has been reported frequently among injection-drug users, despite the fact, that drug use preceding tetanus may be underestimated due to limited reporting by patients or clinicians.<sup>11</sup> Drug injection predisposes the patients to tetanus through several mechanisms, including the drug, its adulterants, injection equipment, unwashed skin, and altered immunity. Inoculation of *Clostridia* species at injection sites may lead to toxin generation and disease.<sup>12</sup> In our series, 4 (36.4%) patients were main line drug addicts. In this group, tetanus may be preventable by adopting recommendations to prevent human immunodeficiency virus and targeted vaccination for tetanus. Our treatment of tetanus followed the recommended guidelines. This included neutralization of the toxins, elimination of the source of infection by careful surgical excision and wound care. As soon as diagnosis of tetanus was made, human tetanus immunoglobulin (HTIG) is given to neutralize circulating toxins. This results in shortening the course of tetanus and may also lessen its severity. Although it does not affect the toxins fixed to nervous system. Dose of 500 units appears as effective as large doses.<sup>13</sup> In our study 4 patients received 500 units and other cases received more than 1000 units with no significant difference in the outcome. Antibiotics are commonly employed for the management of tetanus and are believed to destroy tetanus spores. Traditionally Penicillin is the

most commonly used drug. However, some studies have shown that metronidazole is superior to penicillin in reducing mortality.<sup>14</sup> It has been suggested that the difference in the mortality may be due to the adverse effect of penicillin on the outcome. All of our patients were initially started on Benzyl Penicillin. Nine patients were subsequently treated with metronidazole for a period of 10 days.

The main aims of treatment are to relieve the patient distress, control the spasms, and to maintain adequate respiration. One half of mortality associated with tetanus can be due to respiratory complications of the disease.<sup>10</sup> Respiratory failure may occur as a result of muscle rigidity and reflex muscle spasms, or secondary to hypoxia following atelectasis and pneumonia. The optimal approach is early intubation, preferably with tracheotomy as endotracheal intubation may stimulate spasms.<sup>15</sup> In our review early intubation was required in 9 patients to protect them from respiratory failure and as of high dose of sedation needed. Four patients had tracheotomy only after prolonged intubation lasting more than 3 weeks. All of our patients were extubated even after prolonged intubation without any complications. Control of spasms is usually achieved by benzodiazepines that are gamma aminobutyric acid (GABA) agonist and work by indirect antagonism of the effect of toxin on inhibitory system.<sup>2</sup> Diazepam and Midazolam are usually used by continuous infusion. Most of our patients received diazepam infusion in a dose of 10-20mg/hour reaching up to 480mg/day. High dose of diazepam of 40mg/hour has occasionally been used.<sup>16</sup> The use of magnesium sulphate infusion in the management of tetanus enables to minimize and reduce the need for mechanical ventilation.<sup>17</sup> It also helps in reducing the sympathetic over activity associated with tetanus. In a prospective pilot study carried out in Sri Lanka National hospital, 8 patients admitted to ICU in 1996-1997 with tetanus, were given magnesium sulphate infusion.<sup>18</sup> It was concluded that magnesium sulphate can be used as sole agent for control of spasms in tetanus without the need for sedation and artificial ventilation. In our series, only 6 patients received magnesium sulphate. It was observed that it helped in controlling spasms and reducing the dose of diazepam. In addition, it may be useful to control autonomic dysfunction. It is well known that mortality in tetanus associated with autonomic dysfunction is as high as 50%.<sup>17,19</sup> Unexpected cardiac arrest is the most common cause of death in patients with tetanus admitted to ICU. There is no single drug or combination of drugs shown to be consistently effective to control autonomic dysfunction. Drugs like benzodiazepine, morphine, beta-blockers, and magnesium sulphate have all been used without clear benefit.<sup>20</sup> The drugs like baclofen and dantrolene have also been used to

control spasms in patients with tetanus. These drugs have their own limitations. Baclofen, a GABA B agonist has been used intrathecally either alone or in combination with sedation and paralysis.<sup>21</sup> There are technical difficulties and a high risk of respiratory depression associated with the use of this drug. Moreover there are inconsistencies seen in the beneficial effects in the different trials. Similarly dantrolene has been found to have a high incidence of hepatotoxicity.<sup>22</sup> For these reasons both drugs should be considered experimental and only be used in exceptional situations.

In our review only one patient died on the 6th day of admission as he presented with severe tetanus and aspiration pneumonia. All other patients were discharged in good condition. Physiotherapy and nursing play a major role in preventing contractures and deep venous thrombosis in ICU and intensive rehabilitation may be required after prolonged immobilization in ICU. Prevention of tetanus is the key to its elimination. Natural immunity to tetanus does not occur and tetanus may both relapse and recur. Therefore all patients must be actively immunized with a primary 3 dose series of tetanus toxoid containing vaccine and a booster after every 10 years.<sup>4</sup>

In conclusion, tetanus is a potentially preventable disease. However, it remains a frequent cause of hospitalization and may lead to death in developing countries. Early diagnosis and proper ICU management using the guidelines for treatment will reduce mortality significantly. In addition, active immunization to tetanus should be part of all immunization programs. Health planners in all countries, especially developing world, should ensure that immunization is available to most of the population. In KSA, a primary 3 dose series of tetanus toxoid containing vaccine is mandatory. However the recommended booster dose after every 10 years is not carried out. Adding this vaccine to the vaccines clinics should be encouraged. Medical education to emphasize the role of adult immunization is mandatory. The foreign laborers should be included in such programs. This is the only means to reduce the incidence of this disease associated with high morbidity and mortality.

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