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Complications of Acute Generalized Tetanus: Prevalence and Associated Factors at the Infectious and Tropical Diseases Department of the Fann Hospital, Dakar, Senegal

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Abstract

Introduction: Tetanus is a life-threatening toxi-infection, preventable by vaccination. In developing countries, it remains a leading cause of mortality. The associated factors related to the occurrence of complications are poorly investigated. In developing countries, it remains a major cause of death. **Objective:** To identify the different complications of tetanus and to assess the factors associated with their occurrence among patients hospitalized for acute generalized tetanus in the Department of Infectious and Tropical Diseases (SMIT) at Fann Teaching Hospital, from January 2018 to December 2023. **Patients and Methods:** we conducted a prospective, descriptive, and analytical study. Factors associated with the occurrence of complications were initially investigated using bivariate analysis with Pearson's chi-square test (or Fisher's test), then multivariate analysis using logistic regression. The probabilities of complications were expressed as adjusted odds ratios (ORa) with their confidence intervals. A p-value < 0.05 was considered significant. **Results:** A total of 343 cases of acute generalized tetanus were recorded over six years, representing a hospital prevalence of 8.42%. The age group under 15 years was the most represented (30.6%), with a sex ratio of 5.47. The most common comorbidities were hypertension (7.0%) and diabetes (3.5%). A gateway was identified in the majority of patients (92.13%), mainly cutaneous (84.26%) and post-surgical (11.37%). The incubation period was ≥7 days in 54.52% of cases, with a mean of 6.23 ± 2.49 days. The invasion period was less than 48 hours in most cases

(78.13%). The average consultation time was 5.72 ± 33.25 days in 90.38% of cases. Clinical signs were dominated by contractures (100%), trismus (96.21%), dysphagia (77.55%), and paroxysms (83.7%). Patients were mostly classified as Stage II (70.3%) and IIIa (24.8%) following the Mollaret's classification. Based on the Dakar score classification, in 64.9% of cases tetanus was moderate with a score between 2 and 3. The average hospital stay was 11.30 ± 7.32 days. Complications, present in 66.18% of cases, were cardiovascular (40.52%), infectious (34.40%), respiratory (32.65%), and metabolic (29.45%). Sequelae were observed in 19 patients, with vertebral deformities and compressions found in 26.32% of cases. Hospital lethality was 25.7%. In multivariate analysis, four risk factors for complications were identified: the period 2020-2021 (OR = 0.46 [0.25 - 0.834], p = 0.010), being > 60 years of age (OR = 4.45 [1.76 - 13.7], p = 0.004), a Dakar score between 4 - 6 (OR = 2.80 [1.09 - 7.73], p = 0.038), and the presence of tonic-clonic paroxysms (OR = 1.91 [1.03 - 3.63], p = 0.043). **Conclusion:** This study highlighted the significant impact of tetanus on morbidity and mortality among hospitalized patients. Moreover, significant risk factors for complications, such as advanced age, delayed consultation, and associated comorbidities, are not integrated into prognostic tools. Hence, it is necessary to set up large-sacle multicenter prospective samples and to consider these parameters or develop new scores for a better prediction of tetanus-related prognosis.

Keywords

Tetanus, Complications, Associated Factors, Fann

1. Introduction

Tetanus is a severe inoculation-related toxico-infection caused by Clostridium tetani or Nicolaier's bacillus. It is potentially life-threatening yet preventable through vaccination. Tetanus is a non-contagious, non-immunizing, and notifiable disease. It remains a public health problem given its morbidity and mortality in developing countries, despite the existence of a vaccine that is accessible, effective, and perfectly safe [1].

In Senegal, progress has been achieved thanks to vaccination of pregnant women and the promotion of assisted deliveries, leading to the elimination of neonatal tetanus since 2012 [2]. For children, the vaccination schedule of the Expanded Program on Immunization (EPI) includes doses of tetanus vaccine at the sixth, tenth, and fourteenth weeks, with boosters at 16 months and five years, then every ten years thereafter. Since the EPI only covers children under one year of age, many miss vaccination—particularly booster doses. Consequently, tetanus remains a persistent health problem in Senegal, affecting the most vulnerable populations. It continues to be a frequent cause of hospitalization in the Department of Infectious and Tropical Diseases (SMIT) at Fann Teaching Hospital. Its prognosis can be poor due to the multiple complications it may cause. Understanding these com-

plications will improve patient management and provide a better approach in combating the disease. Many studies on tetanus have been conducted at the SMIT, but few have focused specifically on its complications. This study aimed to identify complications among patients admitted for acute generalized tetanus at the SMIT of Fann Teaching Hospital, and to investigate the factors associated with their occurrence.

2. Patients and Methods

We conducted a retrospective, descriptive, and analytical study by exploring the medical records of patients of all age groups admitted for acute generalized tetanus at the SMIT of Fann Teaching Hospital. Data were collected over a six-year period ranging from 2018 to 2023. All patients, regardless of age or sex, hospitalized during the study period for tetanus, with available hospitalization records and for whom the final diagnosis of acute generalized tetanus was established—whether isolated or associated with another pathology—were included in this study.

3. Results

3.1. Socio-Demographic Characteristics

During the study period, 343 cases of acute generalized tetanus were recorded out of 348 cases of tetanus of all forms, representing a proportional morbidity of 98.56% and an annual average of 57.1 cases. The hospital prevalence was 8.42% (4134 patients hospitalized during the same period). The mean age was 31.08 ± 21.04 years [extremes: 0 - 92], with a median age of 27 years [extremes: 0 - 70]. The age group under 15 years was the most represented (30.6%). There was a clear male predominance (84.5%) with a sex ratio of 5.47. Regarding the occupation, tetanus cases were mainly observed among workers/artisans (30%, n = 103) and pupils/students (29.2%). In our series, 222 patients, representing more than two-thirds of the study population (66.7%), had no formal education, and only 2.9% (n = 10) had reached higher education level. Information regarding vaccination status was available for 8.45% of our patients; thus, 91.55% were either unvaccinated or had uncertain vaccination status. Details are presented in Table 1.

3.2. Clinical Characteristics

The gateway for tetanus was identified in the majority of patients (92.13%). It was mainly cutaneous (84.26%), post-surgical (11.37%), and post-circumcision (4.08%). Among the different cutaneous gateways, the presence of a recent skin wound ranked first (71.6%), followed by chronic wounds (15.90%).

At admission, trismus—the principal sign of tetanus—was found in almost all cases (96.21%), dysphagia in 77.55%, paroxysms in 83.70%, and contractures in all patients (Table 2).

The incubation period was ≥ 7 days in more than half of the cases (54.52%), with a mean of 6.23 ± 2.49 days. The invasion period was less than 48 hours in

Table 1. Distribution of cases of acute generalized tetanus according to socio-demographic characteristics, at the SMIT of Fann Teaching Hospital during the study period (n = 343).

socio-demographic characteristics	Absolute frequency (n)	Relative frequency (%)
Sex		
Male	290	84.50
Female	53	15.50
Age		
[0 - 14]	105	30.60
[15 - 29]	78	22.70
[30 - 44]	49	14.30
[45 - 59]	63	18.40
≥60	48	14.00
Level of education		
Primary	61	17.80
Secondary	43	12.50
University	10	2.90
Not schooled	229	66.80
Occupation		
Worker-artisan	103	30.00
Pupil-student	100	29.20
Unemployed	41	12.00
Trader	32	9.3
Household	23	6.7
Farmer-breeder	12	3.5
Retired	10	2.9
Security guard	6	1.7
Civil servant	5	1.5
Informal sector	6	1.7
Comorbidities and medical history		
Hypertension	24	7.00
Diabetes	12	3.5
Asthma	7,00	2.04
Sickle cell disease	4,00	1.17
Other pathologies	5	1.46
Previous antitetanus vaccination		
Yes	29	8.45
No	314	91.55

Table 2. Distribution of cases of acute generalized tetanus according to gateway and clinical signs, at the SMIT of Fann Teaching Hospital during the study period 2023 (n = 343).

Characteristics	Absolute frequency (n)	Relative frequency (%)
Gateway		
Cutaneous	289.00	84.26
Surgical	39.00	11.37
Post-circumcision	14.00	4.08
Autogenous	11.00	3.21
Dentristry	9.00	2.62
Uterine (post-abortum)	6.00	1.75
Umbilical	4.00	1.17
Intramuscular	1.00	0.29
Clinical signs		
Trismus	330.00	96.21
Dysphagia	266.00	77.55
Contracture	343	100.00
Paroxysms:	287	83.67
- Tonic	211.00	61.52
- Tonic-clonic	73.00	21.28
- Clonic	3.00	0.87
Opisthotonos	188.00	54.81
Temperature ≥ 38.4˚C	29.00	10.00
Pulse ≥ 120 beats/min	12.00	3,49

78.13% of cases, with a mean of 31.87 ± 14.88 hours. The average consultation time was 5.72 ± 33.25 days. Most of the study population had consulted either a hospital (42.57%) or a health center (39.65%) before admission to the SMIT.

A total of 53 patients (15.45%) reportedly received a single dose of anti-tetanus serum (ATS) prior to their admission at the SMIT, and 9.62% underwent debridement of the gateway. Almost all patients (99.9%, n = 342) received antibiotic therapy.

3.3. Laboratory Results

Laboratory tests were not systematically performed in our patients. Among the 343 patients, 227 presented hematological disorders. Hyperleukocytosis was found in 109 patients (31.78%). Sixty-eight patients had thrombocytosis (19.83%), and 21 patients had thrombocytopenia (6.12%). Anemia was observed in 20.70% of patients (n = 71). Regarding hepatic function, 15 patients (4.37%) presented hepatic cytolysis with elevated ALT levels.

3.4. Therapeutic Characteristics

A total of 313 patients (89%) underwent debridement of the gateway. Hydrogen peroxide combined with Dakin's solution were the main antiseptics used. Antibiotic therapy was administered to all patients (100%), consisting mainly of metronidazole in 99.9% of cases, penicillin G in 34.4%, ceftriaxone (third-generation cephalosporin) in 9.63%, and ampicillin in 0.58%. Anti-tetanus serotherapy combined with tetanus vaccination was performed in 330 patients (96.21%) via the intrathecal route. Six patients received anti-tetanus serotherapy alone, and seven patients underwent vaccination alone. All patients benefited from sensory isolation. The main sedative drug used was diazepam (99.41%), while the most frequently administered muscle relaxant was thiocolchicoside (80.32%).

3.5. Evolutionary and Prognostic Characteristics

At admission, patients were mostly classified as Stage II and Stage IIIa following the Mollaret's classification (Table 3), representing 70.3% and 24.8% respectively. A median score (Table 4) of 2 was found in more than one-third of patients (38.6%), with extremes ranging from 0 to 6. In more than half of the cases (64.9%), tetanus was considered moderate.

During hospitalization, more than two-thirds of patients (66.18%) developed complications. These were mainly cardiovascular (40.52%), infectious (34.40%), respiratory (32.65%), and metabolic (29.45%). Respiratory complications were dominated by respiratory distress (50%) and thoracic rigidity (33.04%). Cardiac

Table 3. Mollaret classification [1].

Stage I: Mild forms	Period of onset: 4 to 5 days Trismus, sardonic facies No respiratory trouble No spasms No dysphagia No paroxysm
Stage II: Acute forms generalized	Period of onset: 2 to 3 days Trismus, spinal stiffness Abdominal rigidity Respiratory troubles Dysphagia Spontaneous or induced tonic generalized spasms
Stage III: Severe forms	Period of onset < 24 hours Generalized contracture Respiratory disorders with chest blockage Severe dysphagia Spontaneous tonic clonic generalized spasms

Table 4. Dakar score classification [1].

Criteria		0 point	1 point
Incubation		≥7 jours	<7 jours
Invasion		≥2 jours	<2 jours
Gateway		Other or not found (unknown)	• Umbilical • Uterine (childbirth, abortion) • Intramuscular • Surgical intervention • Complex open fractures • Intramuscular injection • Extensive burns
Paroxysms		Absent	Present
Rectal temperature		≤38.4˚C	>38.4˚C
Pulse	Adult	≤120/min	>120/min
	Newborn	≤150/min	>150/min

arrest was the most frequently observed cardiovascular complication (98.56%). Infectious complications were most often represented by sepsis (87.29%). A few rare cases of mechanical complications (compression fractures) were observed (n = 5). Regarding metabolic complications, electrolyte disorders were predominant, with 68 cases (73.91%). Hypersensitivity to sedative drugs leading to coma was found in 30 patients (9.04%), as shown in Table 5.

Table 5. Distribution of cases of acute generalized tetanus according to complications, at the SMIT of Fann Teaching Hospital during the study period (n = 227).

Characteristics	Absolute frequency (n)	Relative frequency (%)
Overall complications	**227.00**	**66.18**
Respiratory complications	**112.00**	**32.65**
Thoracic blockage	37.00	33.04
Respiratory distress	56.00	50.00
Laryngospasm	17.00	15.18
Pneumothorax	2.00	1.79
Cardiovascular complications	**139.00**	**40.52**
Cardiac arrest	137.00	98.56
Arrhythmia	88.00	63.31
TED	11.00	7.91
Infectious complications	**118.00**	**34.40**
Sepsis	103.00	87.29
Septic shock	15.00	12.71

Continued

Metabolic complications	**92**	**26.82**
Hyperglycemia	8.00	8.70
Hypoglycemia	2.00	2.17
Kidney failure	3.00	3.26
Electrolyte disorders	68.00	73.91
Nutritional disorders	11.00	11.96
Iatrogenic complications	**31**	**9.04**
Sedative drug-related coma	30.00	96.77
Allergies	1.00	3.23
Musculoskeletal complications	**7.00**	**2.04**
Vertebral compression and fracture	5.00	71.43
Tendon rupture	2.00	28.57
Gastro-intestinal complications	**4.00**	**1.16**
Digestive hemorrhage	1.00	25.00
Ileus paralytic	3.00	75.00
Other complications	**8**	**2.33**

The average hospitalization stay was 11.30 ± 7.32 days, with extremes of 0 and 40 days. Nineteen patients developed sequelae, more than half of which were neurological (52.63%), followed by vertebral deformities and compressions in 26.32% of cases, and tendon contractures in 21.05% of cases.

Regarding overall outcomes, hospital lethality was 25.7%. A few cases of transfer to pediatric department were noted (3.5%).

3.6. Predictors of the Occurrence of Complications

In multivariate analysis, we investigated the factors that were significant to the occurrence of complications in case of acute generalized tetanus (Table 6).

Table 6. Factors associated with the occurrence of complications in case of acute generalized tetanus at the SMIT of Fann Teaching Hospital during the study period (n = 343).

Characteristics	OR[1]	95% CI[1]	p-value
Period			
2018-2019	—	—	
2020-2021	0.46	0.25 - 0.83	**0.010**
2022-2023	0.98	0.54 - 1.79	>0.9
Age > 60 years			
NO	—	—	
YES	4.45	1.76 - 13.7	**0.004**

Continued

Hypertension			
NO	—	—	
YES	4.27	1.06 - 28.9	0.070
Diabetes			
NO	—	—	
YES	4.15	0.65 - 81.4	0.2
Dakar score			
0 - 1	—	—	
2 - 3	1.37	0.75 - 2.50	0.3
4 - 6	2.80	1.09 - 7.73	**0.038**
Tonic-clonic paroxysms			
NO	—	—	
YES	1.91	1.03 - 3.63	**0.043**

[1]OR = odds ratios, CI = confidence interval.

Four significantly associated factors to the occurrence of complications were identified:

- The period of 2020-2021: OR = 0.46 [0.25 - 0.834], p = 0.010;
- Patients aged > 60 years: OR = 4.45 [1.76 - 13.7], p = 0.004;
- A Dakar score between 4 - 6: OR = 2.80 [1.09 - 7.73], p = 0.038;
- The presence of tonic-clonic paroxysms: OR = 1.91 [1.03 - 3.63], p = 0.043.

4. Discussion

This was a retrospective, descriptive, and analytical study aimed at identifying complications of acute generalized tetanus and evaluating the factors associated with their occurrence.

The limitations of the study: We encountered some difficulties related to the retrospective nature of this work, such as: a number of records could not be located in the archives, the illegibility of some records and the lack of documentation for certain variable keys made their use difficult or even impossible. Furthermore, it is also important to note the single-center nature of the study which may limit the generalizability of the results.

At the end of the study, 343 cases were recorded, corresponding to a hospital prevalence of tetanus of 8.42%, with a sex ratio of 5.7. This male predominance had also been observed in the same Department of Infectious Diseases [3]-[9].

Elsewhere in Africa, authors such as Wateba *et al.* [10] and Bawe *et al.* [11] reported in Togo a sex ratio of 5% and 81.2% of male patients, respectively. In Abidjan, Ivory Coast, Diallo *et al.* [12] found a sex ratio of 4.8. In Mali, Bouh's study showed that the majority of patients were male, with a frequency of 96.7%

and a sex ratio of 29.3 [13].

In Europe, however, the opposite trend has been observed, with a female predominance according to the study by Maja *et al.* [14]. This may be explained by the fact that in these countries, women are often engaged in gardening and handling sharp objects, and with age, there is a decline in immunity acquired through previous vaccination. Thus, in these countries, tetanus is considered a disease of the elderly [15].

More than two-thirds of our patients (66.18%) developed at least one complication during hospitalization. At the SMIT, a lower prevalence of complications had previously been reported by Fortes, Lakhe, and Barro [7] [9] [16].

Elsewhere in Africa, Bawé in Togo [11], Diallo Z. in Mali [12], and Chukwubike O.A. in Nigeria [17] reported complication rates of 6.25%, 43.5%, and 52.3%, respectively. In India, similar findings were reported by Renuka *et al.*, who reported 47% of patients with complications [18]. Nevertheless, our results corroborate with the work of Camacho *et al.* [19] in Spain, who observed 76.8% of patients presenting with complications.

The incidence of tetanus-related complications remains high at the SMIT of Fann Teaching Hospital. This may be attributed to several factors, including delayed access to care, inadequate management before admission, neglect of gateways such as tetanigenic wounds, deficiencies in booster vaccination policies, and insufficient communication campaigns on the importance of tetanus prophylaxis.

The main complications observed were cardiovascular (40.52%), infectious (34.40%), respiratory (32.65%), and metabolic (29.45%). These findings confirm previous studies conducted in the same department by Fortes and Lakhe [7] [9], who also identified cardiovascular, respiratory, and infectious complications as the most frequent. Similar trends are reported in the literature, where complications are predominantly infectious and respiratory in nature [11] [12] [17] [18].

Infectious complications were largely represented by sepsis. This can be explained by aspiration broncho pneumopathies, the use of urinary catheters, and the insertion of venous or intra-arterial catheters [7] [12] [20].

Cardiovascular complications (40.52%) included cardiac arrest, arrhythmia, and thromboembolic disease in 11 patients. Our results are comparable to those of Fortes, who reported 45% of patients with cardiovascular complications. Furthermore, Barro, in the same department, found a predominance of cardiovascular complications (26.08%) [16]. Respiratory complications affected 32.65% of our patients and were dominated by respiratory distress (33.04%) and thoracic rigidity (33.04%). These findings are corroborated by other studies in Africa [7] [17] [21]. In tetanus, respiratory complications are mainly mechanical (laryngeal spasm and blockage of respiratory muscles) and carry a poor prognosis, particularly in strong patients. They most often occur in severe forms of tetanus. Metabolic and nutritional disorders were exacerbated by hydro-electrolytic imbalances, which are complications linked to tetanus symptomatology (trismus and dysphagia). In our daily practice, in cases of tetanus, patients' needs for water and electrolytes are

met through intravenous infusion of ion-enriched solutions; otherwise, electrolyte disturbances may occur. Hydro-electrolytic complications are also secondary to insufficient secretion of antidiuretic hormone [22]. Parenteral nutrition could be a solution to improve patients' nutritional status, but its high cost and associated risks of infection and thromboembolism limit its use.

Other complications were observed, such as iatrogenic complications in 31 patients, mainly coma (96.77%, n = 30). The cause of iatrogenic coma is almost always an overdose of sedative drugs. Musculoskeletal and gastrointestinal complications were also noted in four patients (2.04%).

Multivariate analysis identified the following significant factors associated with complications: the period 2020-2021, patients aged over 60 years, a Dakar score between 4 - 6, and the presence of tonic-clonic paroxysms.

The period 2020-2021 was marked by an increase in tetanus cases at the SMIT and worldwide. This was reported by Sow A. *et al.* [23] in Senegal and Touré H.A. *et al.* [24] in Treichville, Côte d'Ivoire. This period was a risk factor for the occurrence of complications, as it coincided with the global COVID-19 pandemic declared on March 10, 2020 (Senegal recorded its first case on March 2, 2020). During this time, the SMIT hosted the first epidemic treatment center in Senegal, with most human resources reassigned to the management of COVID-19 patients. It should also be noted that during this period, there was delayed access to care, as the population was reluctant to visit hospitals, leading to prolonged delays in management. Chippaux, in his study, emphasizes the impact of COVID on public health in sub-Saharan Africa, with a decline in health services, a reduction in their quality, and the closure of specialized services [25].

Advanced age > 60 years predicted the occurrence of complications, as shown in other studies:

- Senegal [7] [9];
- Ivory coast [12] [26];
- Ethiopia [27].

The occurrence of complications in elderly patients can be explained by decubitus-related issues during prolonged hospitalization (thromboembolic disease and bedsores), the development of stress-induced ulcers, age-related vulnerability with comorbidities that may be decompensated by tetanus, respiratory complications such as aspiration pneumonia, and a weakened immune system that facilitates nosocomial infections.

In our study, complications were more significant when the score was higher, highlighting the prognostic value of the Dakar score. This has been demonstrated in several studies, notably in Dakar [7]. Similar findings have been reported in the literature from Ethiopia [28], Nigeria [29], and Congo [30].

The presence of tonic-clonic paroxysms and a Dakar score between 4 - 6 were associated with the occurrence of complications. These paroxysms indicate severe involvement, as shown in Mollaret's classification, where their presence places the patient at Stage III. Tonic-clonic paroxysms may be accompanied by neurovege-

tative disorders, reflecting dysautonomia, and expose patients to often fatal complications.

Other studies have reported similar results, including those of Amare *et al.* [27] in Ethiopia and Minta *et al.* [31] in Mali, who found that the occurrence of complications was statistically linked to clinical severity according to the Dakar score and Mollaret staging.

Our study reported a hospital lethality rate of 25.7%. These data show a relatively high lethality, comparable to results found in the same department by Seydi *et al.* [3] and Attinsounon *et al.* [32], who reported lethality rates of 26.7% and 26.9%, respectively.

However, this lethality remains higher than that reported by other authors in the same department. Indeed, lower results were found in the same service by Fortes, with a lethality of 21% [7], and by Seydi and Manga, with 22% and 21.1% respectively [3] [33]. In the sub-region, most studies reported high lethality rates ranging between 31% and 82%, such as those of Ibara B [30] in Congo, Okome K [34] in Gabon, and Bankole in Nigeria, who noted an increase in lethality up to 52.2% in the presence of complications of any nature [35]. Elsewhere, even higher lethality than ours has been reported in other series; for example, in India with the work of Anuradha *et al.* (37.78%) [36] and in Mali with Dao *et al.* (38.9%) [37].

5. Conclusion

The results obtained at the end of our study highlight the need to raise awareness among vulnerable populations regarding tetanus complications, particularly individuals over 60 years of age and those with comorbidities such as hypertension or diabetes. These groups must strictly adhere to tetanus booster vaccinations. Furthermore, any chronic wound or injury should be properly managed. In addition, risk factors for complications—such as advanced age, delayed consultation, and comorbidities like hypertension and diabetes—are not currently integrated into prognostic tools (Dakar score classification). It therefore seems relevant to conduct large-scale, multicenter prospective studies that take these parameters into account. This would allow the development of new scores for a more accurate evaluation of tetanus prognosis.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] CMIT (2025) Infection à clostridium tétani (tétanos). In *E. PILLY* 2025, 28th Edition, ALINEA PlusEd, 477-479.

[2] OMS-UNICEF-FNUAP. Elimination du tétanos: Stratégie permettant d'éliminer le tétanos et d'éviterse réapparition. https://www.who.int/iris/handle/10665/69619

[3] Seydi, M., Soumaré, M., Gbangba-Ngai, E., Ngadeu, J.F.M., Diop, B.M., N'diaye, B., *et al.* (2005) Aspects actuels du tétanos de l'enfant et de l'adulte à Dakar. *Médecine et Maladies Infectieuses*, **35**, 28-32. https://doi.org/10.1016/j.medmal.2004.11.003

[4] Seydi, M., Soumaré, M., Sow, P.S., *et al.* (2000) Tétanos: Aspects épidémiologiques à la clinique des maladies infectieuses du CHU de Fann. *Dakar Medical*, **45**, 5-7.

[5] Sow, P.S., Diop, A., Diop, B.M., *et al.* (1996) Les aspects épidémiologiques du tétanos néonatal à Dakar. *Médecine et Maladies Infectieuses*, **25**, 1178-1182. https://doi.org/10.1016/S0399-077X(05)81356-3

[6] Ndour, J.D., Dieng, Y., Ndiaye, M.M., *et al.* (2005) Aspects épidémiologiques, cliniques et pronostiques du tétanos juvénile à Dakar, Sénégal. *Bulletin de la Société de Pathologie Exotique*, **98**, 371-373.

[7] Fortes Déguénonvo, L., Leye, M.M.M., Dia, N.M., Ndiaye, R., *et al.* (2015) Complication of Tetanus: Report of 402 Cases at the Fann University Hospital Center of Dakar in Senegal. *Journal of Tropical Diseases*, **4**, Article ID: 1000182.

[8] Diallo Mbaye, K., Fortes Déguénonvo, L., Amona, M., Cissé Diallo, V.M.P., Ka, D., Lakhe, N., *et al.* (2014) E-08: Itinéraire thérapeutique des malades admis pour tétanos au service des maladies infectieuses du CHNU de Fann. *Médecine et Maladies Infectieuses*, **44**, 38. https://doi.org/10.1016/s0399-077x(14)70148-9

[9] Lakhe, N., Thioub, D., Badiane, A., *et al.* (2011) Étude des facteurs associés aux décès chez les patients hospitalisés pour tétanos dans un service de Maladies Infectieuses et Tropicales. *Bulletin de la Société de Pathologie Exotique*, **104**, 360-365.

[10] Wateba, M.I., Diop, S.A., Nichols, S., Patassi, A., Adjo, S., Gbadamassi, G., *et al.* (2008) Intérêt de la thérapie intrathécale à 1 500 UI de sérum antitétanique combinée à 1,5 gramme de métronidazole en intraveineux sur le pronostic du tétanos en milieu hospitalier togolais. *Cahiers de Santé*, **18**, 125-129. https://doi.org/10.1684/san.2008.0115

[11] Bawe, L.D., Kotosso, A., Patassi, A.A., *et al.* (2023) Le tétanos, une maladie infectieuse encore d'actualité à Lomé (Togo).

[12] Diallo, Z. and Al, E. (2024) Complications infectieuses au cours du Tétanos au service des Maladies Infectieuses et Tropicales à Abidjan, Côte d'Ivoire. *Revue Malienne d'Infectiologie et de Microbiologie*, **19**, 13-19. https://doi.org/10.53597/remim.v19i1.2787

[13] Bouh, A.I. (2023) Aspects épidémiologiques, cliniques, thérapeutiques et évolutifs du tétanos chez les patients hospitalisés au Service des Maladies Infectieuses et Tropicales du CHU du Point G. Thèse de Médecine, Diplôme d'Études Spécialisées, Université des Sciences, des Techniques et des Technologies de Bamako, 120 p.

[14] Weisser, M. (2016) Le tétanos en 2016. *Forum Médical Suisse—Swiss Medical Forum*, **16**, 584-588. https://doi.org/10.4414/fms.2016.02699

[15] Tran-Van, D. (2000) Réanimation du tétanos grave de l'adulte à Dakar. Thèse Med., Bordeaux 2, N˚19.

[16] Barro, K., Badiane, A., Diallo, V.C., Fall, N., Mbaye, K.D., Ka, D., *et al.* (2023) Aspects épidémiologiques, cliniques et pronostiques du tétanos dans un service des maladies infectieuses et tropicales. *Médecine et Maladies Infectieuses Formation*, **2**, S22. https://doi.org/10.1016/j.mmifmc.2023.03.053

[17] Chukwubike, O. and God'spower, A. (2009) A 10-Year Review of Outcome of Management of Tetanus in Adults at a Nigerian Tertiary Hospital. *Annals of African Medicine*, **8**, 168-172. https://doi.org/10.4103/1596-3519.57239

[18] Renuka, M., Vamadeva, G.M., Nakul, M., *et al.* (2012) Ten Year Retrospective Study on Adult Tetanus at the Epidemic Disease (ED) Hospital, Mysore in Southern India: A Review of 512 Cases. *Journal of Clinical and Diagnostic Research*, **6**, 1377-1380.

[19] Camacho, J.A. (2010) Tétanos-stétanique de gravité dans une UCI polyvalente: Exa-

men de 13 cas. *Revue des Soins Intensifs*, **58**, 145-150.

[20] Sbai, H., Labib, S., Harandou, M., Khatouf, M. and Kanjaa, N. (2009) Tétanos grave en réanimation: Épidémiologie et prosnotic. *Revue d'Épidémiologie et de Santé Publique*, **57**, S53. https://doi.org/10.1016/j.respe.2009.02.183

[21] Tanon, A.K., Eholie, S.P., Coulibaly-Dacoury, C., *et al.* (2004) Morbidity and Mortality of Tetanus in the Infectious and Tropical Diseases Department in Abidjan 1985-1998. *Bulletin de la Societe de Pathologie Exotique*, **97**, 283-287.

[22] Debord, T. and Lapeyre, E. (1995) Tétanos. EMC (Paris France). Urgences 24-135-A-19.

[23] Sow, A., Gueye, M., Boiro, D., Ba, A., Ba, I.D., Faye, P.M., *et al.* (2020) Impact de la COVID-19 sur la vaccination de routine en milieu hospitalier au Sénégal. *Pan African Medical Journal*, **37**, Article No. 364. https://doi.org/10.11604/pamj.2020.37.364.25805

[24] Touré, H.A., Noufe, S., Oussou, K., *et al.* (2021) Effets de la pandémie de COVID-19 sur les activités vaccinales d'un centre de vaccination de référence de Treichville en côte d'ivoire. *MTSI. Médecine Tropicale et Santé Internationale*, **12**, 42-50. http://revuemtsi.societe-mtsi.fr/index.php/bspe-articles/article/view/101

[25] Chippaux, J.-P. (2023) Discussion à propos de la communication: «Impact de la COVID-19 sur la santé publique en Afrique subsaharienne». *Bulletin de l'Académie Nationale de Médecine*, **207**, 226-227. https://doi.org/10.1016/j.banm.2022.12.005

[26] Tetchi, Y., Abhé, C.M., Ouattara, A., Coulibaly, K.T., Pete, Y. and Meyo, S. (2013) Profil des affections du sujet âgé africain aux urgences médicales du CHU de Cocody-Abidjan-(Côte d'Ivoire). *Journal Européen des Urgences et de Réanimation*, **25**, 147-151. https://doi.org/10.1016/j.jeurea.2013.07.002

[27] Amare, A., Melkamu, Y. and Mekonnen, D. (2012) Tetanus in Adults: Clinical Presentation, Treatment and Predictors of Mortality in a Tertiary Hospital in Ethiopia. *Journal of the Neurological Sciences*, **317**, 62-65. https://doi.org/10.1016/j.jns.2012.02.028

[28] Derbie, A., Amdu, A., Alamneh, A., Tadege, A., Solomon, A., Elfu, B., *et al.* (2016) Clinical Profile of Tetanus Patients Attended at Felege Hiwot Referral Hospital, Northwest Ethiopia: A Retrospective Cross Sectional Study. *SpringerPlus*, **5**, Article No. 892. https://doi.org/10.1186/s40064-016-2592-8

[29] Sanya, E.O., Taiwo, S.S., Olarinoye, J.K., Aje, A., Daramola, O.O.M. and Ogunniyi, A. (2007) A 12-Year Review of Cases of Adult Tetanus Managed at the University College Hospital, Ibadan, Nigeria. *Tropical Doctor*, **37**, 170-173. https://doi.org/10.1258/004947507781524601

[30] Ibara, B.R., Babela, J.R., *et al.* (2017) Tetanus: Epidemiological and Clinical Aspects and Factors Associated with Death at the University Hospital of Brazzaville, Congo. *Médecine et Santé Tropicales*, **27**, 411-414. https://doi.org/10.1684/mst.2017.0746

[31] Minta, D.K., Traoré, A.M., Soucko, A.K., Dembélé, M., Coulibaly, Y., Dicko, M.S., *et al.* (2012) Morbidité et mortalité du tétanos dans le service de maladies infectieuses du CHU du Point G à Bamako, Mali (2004-2009). *Bulletin de la Société de Pathologie Exotique*, **105**, 58-63. https://doi.org/10.1007/s13149-011-0204-y

[32] Attinsounon, C.A., Fortes, D.L., Cissoko, Y., *et al.* (2014) Coût direct de la prise en charge hospitalière et facteurs prédictifs de mauvais pronostic du tétanos à Dakar (Sénégal). *Médecine d'Afrique Noire*, **61**, 411.

[33] Manga, N.M., Faye, A., Ndour, C.T., *et al.* (2009) Facteurs pronostiques actuels du tétanos à la Clinique des Maladies Infectieuses du CHNU de FANN, Dakar. *Revue de la CAMES - Série A*, **9**, 24-31.

[34] Okomé-Kouakou, M., Haje, A., Ngada, D., *et al.* (1997) Tetanus in Libreville: Hospital Analysis of 34 Cases. *Sante*, **7**, 251-255.

[35] Bankole, I.A., Danesi, M.A., Ojo, O.O., Okubadejo, N.U. and Ojini, F.I. (2012) Characteristics and Outcome of Tetanus in Adolescent and Adult Patients Admitted to the Lagos University Teaching Hospital between 2000 and 2009. *Journal of the Neurological Sciences*, **323**, 201-204. https://doi.org/10.1016/j.jns.2012.09.017

[36] Anuradha, S. (2006) Tetanus in Adults—A Continuing Problem: An Analysis of 217 Patients over 3 Years from Delhi, India, with Special Emphasis on Predictors of Mortality. *Medical Journal of Malaysia*, **61**, 7-14.

[37] Dao, S., *et al.* (2021) Aspects épidémiologiques et cliniques du tétanos au service des maladies infectieuses du CHU Point G. *Revue Malienne de Médecine*, **36**, 45-52.