ISSN No:-2456-2165

Risk Factors for Neonatal Tetanus Admission at the Liberian Government Hospital, Grand Bassa County from January to December 2021

James V.T. Tuckolon [1*], Momo M. J Kollie[2], Sylvester O, Wheh[3]

Abstract:- In 2013, NT was estimated to be responsible for 49,000 deaths, mostly in rural areas of developing countries where most births occurred at home and are often attended by unskilled persons using unhygienic practices without aseptic postnatal care.

Objective: The study aimed to determine risk factors for neonatal tetanus admission at the Liberian Government Hospital, Buchanan City, Grand Bassa County.

Methods: Aretrospective studydesign consisted of 53 neonates' files checked or reviewed from January to December 2021.With this, eleven (11) %6(n=53) of neonates were admitted and diagnosed with neonatal tetanus at the hospital during the period under view.

Results: The study found that home deliveries were the most risk factors in the rural areas accounted for 67%(4) (n=6)which might likely contribute to the neonatal tetanus.District # 2 had the highest prevalence rate of 50%(3) (n=6) of neonatal tetanus admission.

Conclusion: Maternal TT uptake is very low at the rural area than urban area and more home deliveries are conducted in the rural areas which require stakeholder's intervention to mitigate the cases of NT in Grand Bassa and Liberia at large.

Keywords:- Risk *Factors,Neonatal Tetanus, AdmissionCase Study, Liberian Government Hospital.*

I. INTRODUCTION

A. Background

In 2013,Neonatal Tetanus(NT) was estimated to be responsible for 49,000 deaths (Liu L, Oza S, Hogan D, Perin J, Rudan I, et al (2014). mostly in rural areas of developing countries where most births occur at home and are often attended by unskilled persons using unhygienic practices without aseptic postnatal care (Lawn et al, J,2005).It is estimated that fewer than 5% of neonatal tetanus cases are actually reported, even from well-developed surveillance systems (Lawn et al, J,2005). It is for this reason that the deaths are greater than the numbers indicate (Thwaites, C. L et al 2015). Of the estimated 28 countries with highest numbers of MNT cases, 16 of them are in the African Region accounting for 90% global neonatal tetanus cases (Thwaites, C. L et al 2015). These are Angola, Burkina Faso, Cameroon, Chad, Cote d'Ivoire, DR Congo, Ethiopia, Ghana, Guinea Bissau, Liberia, Mali, Mauritania, Mozambique, Niger, Nigeria and Senegal (Thwaites, C. L et al 2015).The burden of maternal and neonatal tetanus (MNT) is a health equity issue affecting those who are the most disadvantaged, poor, and without access to adequate health services (WHO, 2019). MNT has often been referred to as a "silent killer" since the victims often die without being officially recorded (WHO, 2019). A case of maternal and/or neonatal tetanus represents a triple failure of the public health system – failure of the routine immunization program, failure of antenatal care, and failure of ensuring clean and safe birth practices (WHO, 2019).Maternal TT vaccine, skills delivery, and clean and safe delivery practices are important in the reduction and prevention of neonatal tetanus (LIGIS 2021).

a) Etiology and Clinical manifestations

NT is a generalized tetanus that usually occurs only in infants delivered from unimmunized or inadequately immunized mothers (Brook, 2021). Causes of this entity include infection of the umbilical stump, inadequate obstetric care, delivery away from medical facilities, poor obstetrical care following delivery, and cultural routines such as application of country herb or soiling over the umbilical stump (Brook, 2021). The incidence of NT may be reduced by the immunization of adolescent and adult women, and local use of antimicrobials on the stump (Brook, 2021). Weakness and failure to suck are the most frequent initial manifestations that usually occur in 5- 7 days (range, 3-24 days) after birth. These symptoms continue to develop from an initial trismus and sucking difficulty to risus sardonicus within hours, and subsequently to generalized tetanic spasm, rigidity, and opisthotonus (Brook, 2021).

b) Case definition

World Health Organization (2016) defines neonatal tetanus as an illness in a child who has the normal ability to suck in the first 2 days of life, but who loses the ability between 3 and 28 days of life and becomes rigid and has spasms (Dharti Rajesh Patel, 2016) .

The category "suspected case" is particularly useful for those cases based upon reports by traditional birth attendants. Reports based upon hospital examination are considered essentially confirmed (WHO, Field manual for neonatal tetanus elimination, 1999).

ISSN No:-2456-2165

a. Suspected Case
Neonatal tetanus has decreased dramatically in countries with improved maternal tetanus immunization rates; maternal antibody is transferred across the placenta and prevents tetanus in the neonate. As a result, tetanus is targeted for elimination in many African countries(WHO,1999). Incubation period is 3 to 21 days, with an average of approximately 6-days WHO,1999). Risk factors: Unclean umbilical cord care practices during delivery for neonates. Lack of antibody protection in incompletely immunized mothers (Vandelaer, J., et al 2003).

b. A confirmed case of neonatal tetanus
is defined as a child with a history of all three of the following: Normal feeding and crying during the first two days of life; Onset of illness between age 3 and 28 days; Inability to suckle (trismus), followed by stiffness (generalized muscle rigidity) The diagnosis is clinical and therefore requires a high index of suspicion and knowledge on how tetanus presents by the clinician (all, 2022). It is a clinical diagnosis, and no laboratory investigation can confirm it (10). World Health Organization (2016) defines a confirmed case of neonatal tetanus as an illness in a child who has the normal ability to suck in the first 2 days of life, but who loses the ability between 3 and 28 days of life and becomes rigid and has spasms (Dharti Rajesh Patel, 2016).

c) Discarded Case
A discarded case is one which has been investigated and does not satisfy the clinical criteria for confirmation. In these circumstances, the diagnosis should be specified. Furthermore, a summary of diagnoses for discarded cases should be made routinely (WHO, Field manual for neonatal tetanus elimination, 1999).

d) SURVEILLANCE
Simultaneously with an increase in control measures, it is critical that an epidemiologic surveillance system be established or improved (WHO, Field manual for neonatal tetanus elimination, 1999). The most basic form of surveillance can be carried out by review of death records. However, as such records (WHO, Field manual for neonatal tetanus elimination, 1999). may be incomplete, this activity should only complement more active surveillance and reporting mechanisms (WHO, Field manual for neonatal tetanus elimination, 1999).For those areas initially classified as low-risk for neonatal tetanus, improved surveillance will either confirm that status or provide additional information on disease occurrence that will lead to the area being reclassified as high-risk. For those areas already classified as high-risk, the system allows measurement of the impact of neonatal tetanus control measures (WHO, Field manual for neonatal tetanus elimination, 1999). Health care facilities that report tetanus cases should distinguish between neonatal and non-neonatal tetanus. Reports should categorize these cases separately. It may be possible to conduct sentinel surveillance in selected high-risk areas. A representative from the national EPI should inspect such areas periodically. Based on the origin of neonatal patients in a given region, service areas or hospital catchment areas can be established as well as those areas of the country that do not report cases (“silent” areas) (WHO, Field manual for neonatal tetanus elimination, 1999). In an adequately functioning surveillance system the ideal is to have both weekly positive and negative reports, that is, the presence or absence of cases should be reported each week. This is very important in helping to define high-risk areas and improve surveillance (WHO, Field manual for neonatal tetanus elimination, 1999).

e) Identification of High-Risk Areas
The primary focus for surveillance should be high-risk areas, that is, regions of the country with an annual incidence of neonatal tetanus of more than 1 case per 1,000 live births (WHO, Field manual for neonatal tetanus elimination, 1999). The classification of a municipality or district as high- or low-risk is not permanent: it is done to guide prevention and surveillance actions and may be modified in relation to the new findings. Thus, for example, if the annual national incidence is 0.5 cases per 1,000 live births, all municipalities with an incidence higher than the national rate become high-risk municipalities, even though the annual rate is lower than 1 case per 1,000 live births.

f) Active Case-Finding
An enhanced surveillance system should incorporate active or periodic case-finding of newborns with tetanus, particularly in those areas that have not been consistent in reporting or that have reported zero cases for a long period of time (WHO, Field manual for neonatal tetanus elimination, 1999). These active case-findings should preferably be carried out for several diseases, thereby using the opportunity to investigate if there are cases of flaccid paralysis, suspicions of neonatal tetanus, or cases of rash with fever. In order to find cases, community leaders, pediatric associations, churches, hospitals, and clinics should be asked to assist in identifying possible cases. Door-to-door visits might be used in areas where patients are unlikely to seek medical care and when there are rumors of a neonatal death compatible with tetanus (WHO, Field manual for neonatal tetanus elimination, 1999).

ISSN No:-2456-2165

B. Objective

The purpose of this study was to determine risk factors associated with neonatal tetanus at the Liberian Government Hospital, Buchanan city, Grand Bassa County.

a) Methods
The study was a retrospective design and the mode of data collection was files reviewed of those 53 neonates admitted during the period under review (January to December 2021). The master treatment and diagnosis register as well as neonates' files were the sources of the data collected.

b) Design
The study was a retrospective design to review all 53 neonates' files who were admitted during the period. Data was collected from the master diagnosis and treatment ledger or register and neonates' charts from the record room, Liberian Government Hospital.

c) Sample, Sampling approach.
All 53 neonates admitted during the period files were all selected for the study purpose. Eleven (11) % of (6) (n=53) were diagnosed with neonatal tetanus.

d) Data Collection
There were two record room registrars who were trained on how to collect the data using the neonates'charts, treatment and diagnosis registers to collect the data.

e) Study population
The total population were 53 neonates who were admitted during the period with different medical conditions including neonatal tetanus. All of them files were checked to determine those admitted and diagnosed with neonatal tetanus.

a. Inclusion criteria
All 53 neonates (0- 28days) admittedduring the period under review files were checked. All neonatal diagnosed with neonatal tetanus were selected.

b. Exclusion criteria
All children admitted above the age of one monthwere not selected. Those neonates diagnosed with different medical conditions were not selected for the study.

C. Ethical consideration

Before starting with the case studies, the case investigators got permission from the hospital medical director and the hospital administration to gain access to the neonates' records. All information collected from the patients' records were all kept confidential.

D. Case Description

A. Case One:

a) Clinical history
Six (6) days of life (DOL) male neonate with birth weight of 2.6kg referred from health facility to the Liberian government hospital at 3:45pm on October 23, 2021 for the management of neonatal sepsis. According to mother, the child had been well until 2days ago whom he began to have seizure about 6 episodes that were associated with high grade fever and refused to suck the breast milk. The mother of the 6 days of life had three ANC visits, whereby she took only TT 1 vaccine. There was no history of malnutrition, but experience some infections during pregnancy. According to her mother the pregnancy was term and labor lasted about 2 hours' as well as membrane raptured 3 hours before she delivered at home. She was attended by a TTM.The amniotic fluid was observed greenish in color. The history gathered from neonate grandmother, he did not cry at birth, he passed meconium stool at 24hours of delivery. The umbilical cord was healed through the application of country herb.

b) Clinical examination
On that same October 23, 2021, the physical examination revealed with clinical features of opisthotonus position, not breast feeding and vital signs revealed 38.4 degree Celsius, with no other like respiration, heart rate and SPO2 done. Skin warm to touch with CAJCLOD with D positive and abdomen there was nothing abnormal detected. Assessment from head to toe conducted but the reflexes deferred.

c) Laboratory investigations
The diagnosis was clinically established as **neonatal tetanus**. Investigations conducted were as followed: **15.0gldl, malaria smear negative, WBC not available.**

d) Therapeutic Management
Plan: The doctor ordered to establish IV line, insert NG tube for feeding and medication. Care providers encourage for the umbilical cord care. There was no nursing diagnosis or care plan established.

- **Diazepam**1.3mg PO via NG tube at 0hr, 3hrs, 9hrs, 15hrs, and 21hrs and 24hrs thenq6hrs PRN: NB: 1.3ml (10mg/10ml).
- **Phenobarbital 15.6mg** PO via NG tube, at 0hr,6hrs and 21hrs then QD PRN.NB:1.6ml(100mg/10ml)
- **EBM** 15ml via NG tube q3hrs
- **Flagyl** 78mg iv bidx7days (15.6ml at 500mg/100ml)
- **Amoxicillin** 78mg PO via NG tube q8hrsx 7days
- **TAT** 6,450 IU in 1666.6NS IV Q8hrsx 24hrs,
- All of these medications were available and served according to doctor orders.

e) Expected outcome of child:
At 11:05pm, October 23,2021, the child had 39 degrees Celsius and was sponge bath and the nurse called the attention of physician assistant for help, CPR done but within 2minutes all v/s ceased and later expired at 11;05pm.

B. Case Description

a) Clinical History
A 7-day-old female neonate was brought in the emergency room by her mother with the complaint of not sucking the breast milk, body stiffness since two days ago. According to mother she gave birth at home a week ago and yet to receive the first vaccine. The past medical history of mother revealed that she had been having infection, malaria during pregnancy, and no history of ANC visits and TT vaccine during pregnancy. She was gravida 1, para1.

b) Clinical Examination
The admission weight was 4kg. The general condition of a 7-day old neonate encountered with muscle rigidity and spasm, febrile to tough and seen convulsing. Vital Signs conducted: temperature 37.5 degrees Celsius, respiration 37b/min, pulse 150b/min, and no oxygen saturation or SPO2 and pain scale done with no nursing diagnosis established. Assessment from head to toe was done.

c) Laboratory Investigations
Laboratory tests requested: malaria smear, Hgb, Blood grouping. The result from malaria smear was negative, 14.5g/dl, blood group not available.

d) Management

a. Plan
- Open IV access
- Maintain Oxygen at 1.5L/min
- Keep the neonate in quiet and dark room

b. Therapeutic Management
- D10%20ml IV stat
- Flagyl infusion 60mg/12ml IV then 30mg/6ml Q12hlyX 7days
- TAT 13 ampules in 600ml in 3 divided doses(200ml)
- Diazepam 1.2mg iv for 3-5 minutes Q1-4 hours

c. Expected outcome
The one (1) week old neonate was admitted at the Liberian `Government. Pediatric ward on May 30, 2021 at 8:29pm and at 6:45 am on May 31, 2021, patient expired after applying effort to save the life.

Hospital Neonatal Tetanus Management vs. WHO standard, other empirical studies Management of neonatal tetanus

Hospital Management	WHO Standard of Management of Neonatal Tetanus
Case study one ▪ **Diazepam**1.3mg PO via NG tube at 0hr, 3hrs, 9hrs,15hrs, and 21hrs and 24hrs thenq6hrs PRN: NB: 1.3ml (10mg/10ml). ▪ **Phenobarbital 15.6mg** PO via NG tube, at 0hr,6hrs and 21hrs then QD PRN.NB:1.6ml(100mg/10ml) ▪ **EBM** 15ml via NG tube q3hrs ▪ **Flagyl** 78mg iv bidx7days (15.6ml at 500mg/100ml) ▪ **Amoxicillin** 78mg PO via NG tube q8hrsx 7days ▪ **TAT** 6,450 IU in 1666.6NS IV Q8hrsx 24hrs, **Laboratory investigations** ▪ The diagnosis was clinically established as **neonatal tetanus**. Investigations conducted were as followed: **15.0gldl, malaria smear negative, WBC not available**	**MSF Guideline 2022: metronidazole** [a] IV infusion (30 minutes; 60 minutes in neonates) for 7 days • Neonates: ○ 0 to 7 days: 15 mg/kg on D1 then, after 24 hours, 7.5 mg/kg every 12 hours ○ 8 days to < 1 month (< 2 kg): same doses ○ 8 days to < 1 month (≥ 2 kg): 15 mg/kg every 12 hours • Children 1 month and over: 10 mg/kg every 8 hours (max. 1500 mg daily) • Adults: 500 mg every 8 hours **Diazepam emulsion** for injection (10 mg ampoule, 5 mg/ml, 2 ml) • 0.1 to 0.3 mg/kg by slow IV injection (3 to 5 minutes) every 1 to 4 hours depending on the severity and the persistence of the spasms as long as the RR is ≥ 30. • If despite hourly diazepam the spasms persist, start a continuous infusion of diazepam with an electric syringe: 0.1 to 0.5 mg/kg/hour (2.4 to 12 mg/kg every 24 hours). Start with 0.1 mg/kg/hour and if symptoms persist, increase by 0.1 mg/kg/hour as long as RR is ≥ 30. • If in spite of 0.5 mg/kg/hour symptoms persist, the dose can be increased up to 0.8 mg/kg/hour as long as the RR ≥ 30. • Diluted diazepam emulsion does not keep for more than

6 hours.

Nakubulwa,et, al (2022) Neonatal tetanus with good outcomes at a regional referral hospital in Eastern Uganda: a case report: Management guideline for neonatal tetanus:

1.Immediate sedation to control spasms
Loading dose IV diazepam 1mg/kg, slow bolus and IV Magnesium Sulphate 50 mg/kg intravenously if hypertensive tachycardia, fever.
Maintainace: Sedatives infusion added into maintenance fluids over 24hours
Diazepam :0.4-1.2mg/kg per hour
Magnesium Sulphate: 30-40mg/kg per hour, tapered once spasms are controlled.
2.Neutralization of the toxin
Tetanus immunoglobulin (TIG) 500 international unit (IU) intramuscularly or Equine/bovine anti-tetanus serum(ATS)-1500 IU single dose intramuscularly (watch out for serum sickness): Dose can be repeated if spasms persist.
Eradication of the source of toxins
Debride and clean the umbilical cord Using hydrogen peroxide and surgical spirit.

Antibiotics used in neonatal tetanus

Drug	**Route**	**Postnatal age**	**Dose**
Penicillin G	IV	0 to 28 days	100,000U/kg /day divided every 6 hours
Metronidazole	IV /PO	<7 days 8 to 28 days	7.5mg/kg /dose 12 hourly 15mg/kg/dose 12hourly
Cefotaxime	IV	<7 8 to 28 days	50 mg/kg/dose 12 hourly
Gentamycin	IV	Term preterm	5mg/kg/dose, once daily 3mg/kg/day, once daily
Ceftriaxone	IV	0 to28	50mg/kg/day

Ventilation: Free flow Oxygen by nasal canula 0.5- 1L/Minute to keep SPO2 >90%. Start bubble CPAP if respiratory distress Observed.

Case study two

- D10%20ml IV stat
- Flagyl infusion 60mg/12ml IV then 30mg/6ml Q12hlyX 7days
- TAT 13 ampules in 600ml in 3 divided doses(200ml)
- Diazepam 1.2mg iv for 3-5 minutes Q1-4 hours

Laboratory Investigations

Laboratory tests requested: malaria smear, Hgb, Blood grouping. The result from malaria smear was negative, and 14.5g/dl, blood group not available.

Table 1:Hospital Neonatal tetanus Management vs. WHO standard , other empirical studies Management of neonatal tetanus

II. STUDY RESULTS/FINDINGS

Risk factors for neonatal tetanus admission at the Liberian Government Hospital from January to December 2021

A. Demographic characteristics of the Neonates diagnosed with Tetanus

Age in days/weeks	**0-6 Days**	**7-14 days**	**21 – 28 days**
		1-2 weeks	**3 weeks 1/2**
Male	3	0	0
Female	2	1	0
Total	**5**	**1**	**0**

Table 2: Demographic characteristics of the Neonates diagnosed with Tetanus

The table shows that neonates' ages 0-6 days old account for 83 % (n=6) while neonate ages 7-14 days' account for 17% respectively.

Region of Delivery	**Number of delivery**	**Frequency**	**Percent**
Rural	6	6	100%
Urban	0	0	0%
Total	**6**	**6**	**100%**
Districts of Residence to the neonates		**No**	
Buchanan		**1**	
District# 1		**1**	
District 2		**3**	
District #3 AB and C		**0**	
District #4		**1**	
Owengrove		**0**	
Campwood		**0**	
Total		**6**	

Table 3: Areas of delivery

This table shows that district #2 (n=6) has the highest prevalence rate of 50%of neonatal tetanus while district Buchanan, district #1 and district #4 have the lowest prevalence rate of 17% in Grand Bassa during the period under review**.**

Place of delivery Outcomes Per Gender	**Institution Delivery**	**Home Delivery**
Male	1	1
Female	1	3
Total	**2**	**4**
Description of Delivery	**Frequency**	**Percent**
Institution delivery	2	33.3%
Home delivery	4	66.6.%
Total	**6**	**100%**
Referral pathway From files review	**Frequency**	**Percent**
Health Facility	2	33.3%
CHVs/TTMs	0	0%
Self	4	66.6%
Total	**6**	**100%**

Institution Delivery neonatal death, and Against Medical Advice	**Number**	**Frequency**	**Percent**
Institution	2	6	33%
Home delivery	4	6	67%
Death	4	6	67%
AMA (Against Medical Advice)	**2**	**6**	**33%**

Table 4: Delivery information

ISSN No:-2456-2165

The above table shows that female neonates have the highest delivery at home which accounts for 75 %(n=4) which male neonate is the lowest which accounts for 25% respectively. The table details home delivery was at the highest which accounts for 67% (n=6) while institution delivery accounts for 33%. Also the table shows that 67 %(n=6) of the referral was self-initiative to reach at the hospital, while 33% was done by health facility**.** Furthermore, the results show that the case fatality rate is at 67 % (n=6) and home delivery the highest 67% with 33 %(n=6) institution delivery as well as 33 %(n=6) against medical advice.

B. Major findings of the case study

The study found that home deliveries were from the rural areas which contributed to most of the admission including unsafe practices contributed to neonatal tetanus (NT). The study found that all mother's immunization status was not well established. The case fatality case rate was at 67% of all 6 (six) cases admitted at the hospital. 67 %(n=6) of the referrals were done by mothers'/care givers themselves. District # 2 had the highest prevalence rate which accounted for 50% of the total neonatal tetanus admitted at the hospital during the period under review. The highest ages of the neonates diagnosed with tetanus were between 0-6 days' old which accounted for 83%. There was no specific standardized guideline for the management of neonatal tetanus. Others risk factors include: unclean umbilical cord care practices using country herbs during the delivery for the neonates. Lack of TT vaccine for unimmunized mothers.

III. DISCUSSION

According to a study conducted for Neonatal Tetanus after Home Delivery in Twain, showed the mortalities associated with neonatal tetanus at several medical centers in Taiwan were reported to be 69% (63 of the 91 cases) between 1953 and 1964, 34% (23 of the 67 cases) between 1970 and 1980, and 83% (5 of the 6 cases) between 1971 and 1990 (Shou-Chih Chang, 2010).

According to E. Ogundare et al (2021) - A ten-year review of neonatal tetanus cases managed at a tertiary health facility in a resource poor setting: the trend, management challenges and outcome found that NNT constituted 0.34% of all neonatal admissions with case fatality rate of 52.6%. Seven (36.8%) of the babies were delivered at Mission home/Traditional Birth Attendant's place while 5(26.3%) were delivered in private hospitals (Ezra Olatunde , 2021). Cord care was with hot water compress in most of these babies 16(48.5%) while only 9% of the mothers cleaned the cord with methylated spirit (Ezra Olatunde , 2021). Age at presentation of less than one week was significantly associated with mortality, same with presence of autonomic dysfunction. Low family socio-economic class 5 was significantly associated with poor outcome, so also maternal age above 24 years (Ezra Olatunde , 2021).

The burden of maternal and neonatal tetanus (MNT) is a health equity issue affecting those who are the most disadvantaged, poor, and without access to adequate health services (WHO, 2019). MNT has often been referred to as a "silent killer" since the victims often die without being officially recorded (WHO, 2019). A case of maternal and/or neonatal tetanus represents a triple failure of the public health system – failure of the routine immunization program, failure of antenatal care, and failure of ensuring clean and safe birth practices (WHO, 2019). A case of maternal and/or neonatal tetanus represents a triple failure of the public health system – failure of the routine immunization program, failure of antenatal care, and failure of ensuring clean and safe birth practices (WHO, 2019).

A study conducted by Patel, D. et al (2016) described four cases of neonatal tetanus with regard to demography, clinical profile, and outcome (Dharti Rajesh Patel, 2016). From them, 3 newborns were delivered at home by untrained birth attendants (Dharti Rajesh Patel, 2016). All the mothers were from lower socio-economic class, illiterate and were below 25 years of age (Dharti Rajesh Patel, 2016). Common symptoms were unable to feed, difficulty in respiration, episodes of spasms, and convulsions (Dharti Rajesh Patel, 2016). Mortality was 50% (Dharti Rajesh Patel, 2016).

For this current study, therewere 53 neonate admitted while 6 of the neonates diagnosed with neonatal tetanus at the Liberia Government Hospital, Buchanan City Grand Bassa County. During the period under review, health facility deliveries were minimum prevalence of 33% whereas home deliveries accounted for 67% respectively. All of the cases diagnosed were from the rural areas. District #2 had the highest of neonatal tetanus cases which accounted for 50 %(n=6). The case fatality rate was at 67% during the period under review. Two of the neonates' health outcomes were unknown, all mothers signed against medical advice (AMA). As for the treatment, there is no specific treatment guideline in the management of neonatal tetanus according to WHO standard of treatment. Maternal TT status is not fully reflected on the treatment charts of the neonates. Others risk factors include: unclean umbilical cord care practices using country herbs during the delivery for the neonates. Lack of TT vaccine for unimmunized mothers.

IV. CONCLUSION

NT is one of the most common life-threatening consequences of unhygienic deliveries and umbilical cord management. This entity is an indicator of inadequate availability of immunization and other maternal and neonatal care Mortality can be averted easily by practicing sanitary delivery and adequate cord care or by vaccinating children and women with tetanus toxoid-containing vaccines. Neonatal tetanus surveillance needs to be improved so as to reduce NT. Maternal TT uptake is very low at the rural areas which require stakeholder's intervention to mitigate the cases of NT in Grand Bassa. The gaps in this research case study were the following: maternal age, educational levels, socio economic status due to unavailability to gather information about mothers of the neonates from their files.

ISSN No:-2456-2165

ACKNOWLEDGEMENT

We acknowledged these following contributors for reviewing and editing this article:

- Dr. UHAWENIMANA Thierry Claudien
- Gahzi Emmanuel

REFERENCES

[1.] all, C. N. (2022). Neonatal tetanus with good outcomes at a regional referral hospital in Eastern Uganda: a case report. Medical Case Reports.
[2.] Brook, I. (2021). Neonatal tetanus. Pediatr Emerg Med J.
[3.] Clare Nakubulwa and all. (2022). Neonatal tetanus with good outcomes at a regional referral hospital in Eastern Uganda: a case report. Journal of Medical Case Reports.
[4.] Dharti Rajesh Patel, H. S. (2016). Neonatal tetanus: Case series. J Clin Neonatol.
[5.] Ezra Olatunde , O. (2021). A ten-year review of neonatal tetanus cases A ten-year review of neonatal tetanus cases managed at a tertiary health facility in a resource poor setting: The trend, management challenges and outcome. PLOS Neglected Tropical Diseases.
[6.] H.Survey. (2019-2020). LDHS.
[7.] LISGIS. (2021, April). Liberia Demographic and Health Survey 2019-2020.
[8.] Neonatal tetanus with good outcomes at a regional referral hospital in Eastern Uganda: a case report. (2022).
[9.] Okidi, R. (2020). Neonatal tetanus in St . Mary ' s Hospital Lacor : A case report.
[10.] Ronald Okidi, V. D. (2020). Neonatal tetanus in St. Mary's Hospital Lacor: A case report. John Wiley & Sons Ltd.
[11.] Shou-Chih Chang, C.-L. W. (2010). Neonatal Tetanus After Home Delivery: Report of One Case. Pediatr Neonatol.
[12.] Liu L, Oza S, Hogan D, Perin J, Rudan I, et al. (2014) Global, regional, and national causes of child mortality in 2000–13, with projections to inform post-2015 priorities: an updated systematic analysis. Lancet.
[13.] Lawn, J. E., Cousens, S., Zupan, J., & Lancet Neonatal Survival Steering Team. (2005). 4 million neonatal deaths: when? Where? Why?. The lancet, 365(9462), 891-900.View Article
[14.] Jalal-Eddeen, A. S. (2014). Prevalence of Neonatal Tetanus in North-eastern Nigeria. Walden Dissertation and Doctoral Studies.
[15.] Field manual for neonatal tetanus elimination (No. WHO/V&B/99.14). World Health Organization.
[16.] WHO. (1999). Field manual for neonatal tetanus elimination. Geneva.
[17.] WHO. (2019). Protecting all against tetanus. Switzerland.
[18.] Vandelaer, J., Birmingham, M., Gasse, F., Kurian, M., Shaw, C., & Garnier, S. (2003). Tetanus in developing countries: an update on the Maternal and Neonatal Tetanus Elimination Initiative. *Vaccine*, *21*(24), 3442-3445.
[19.] Thwaites, C. L., Beeching, N. J., & Newton, C. R. (2015). Maternal and neonatal tetanus. *The lancet*, *385*(9965), 362-370