

Hepatitis E vaccination in Bentiu, South Sudan

- Healthcare workers in the humanitarian response
- Morbidity and mortality of tetanus at Kenyatta National Hospital
- Factors associated with reduced foetal movements
- Characteristics of hearing loss in Dar es Salaam
- Impact of public health interventions
- Abdominoscrotal hydrocoele
- Heart failure from electrical shock

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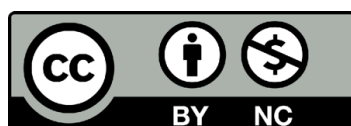
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FRONT COVER: Hepatitis viruses seen by an electron microscope (U.S. Centers for Disease Control and Prevention. Photo credit: E.H. Cook, Jr.)

World's first vaccination campaign to control hepatitis E outbreak in Bentiu, South Sudan

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Hepatitis E is the most common cause of acute viral hepatitis, causing approximately 20 million infections and 44,000 deaths every year. It is transmitted through faecal contamination of food and water. The fatality rate is up to 25% among pregnant women, as well as increasing the risk of spontaneous abortions and stillbirths.

Outbreaks of hepatitis E have occurred since 2015 in Bentiu, the largest internally displaced persons camp in South Sudan. In the most recent outbreak 759 patients were confirmed with hepatitis E, 17 of whom died.

In response to the outbreaks, the South Sudan Ministry of Health and Médecins Sans Frontières (MSF) jointly carried out a mass vaccination in Bentiu with the Hecolin Vaccine that has been developed and tested in China. The vaccination targeted a population aged 16 to 40 years that included pregnant women. Three rounds of vaccination were carried out in March, April and October 2022. A total of 39,764 doses were given as 1st dose, 26,110 as 2nd dose and 14,293 as 3rd dose. It is worthy to note that the 1st dose seems to be high compared to the rest due to the inclusion of new people who fitted the criteria, but they were not present during either the 2nd or 3rd rounds.



Nyekhan getting vaccinated against hepatitis E at Bentiu, Rubkona County, Unity State, South Sudan. (© Peter Caton)

Although the World Health Organization (WHO) recommended as early as 2015 the use of the vaccine in Hepatitis E outbreaks, the campaign in Bentiu was the first time it had been used at scale in response to a public health emergency. WHO has called the campaign a “significant milestone” in the fight against hepatitis E.^[1, 2]

Given the successful implementation and the community's enthusiastic response, I hope that this innovative vaccination campaign can serve as an example and be replicated in similar settings in other countries managing hepatitis E outbreaks. While other outbreak control measures are also necessary, including improving water and sanitation services, I believe this vaccination campaign is an important step toward reducing the impact of hepatitis E in the future.

The Ministry of Health and MSF will continue to monitor and report on the results.

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Roles of local healthcare workers in the humanitarian response in South Sudan: a literature review

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ABSTRACT

Introduction: Armed conflict is devastating to the health system, is a public health concern and recovery is an enormous challenge. The independence of South Sudan in 2011 brought much hope. However, eight years later, the country is still at conflict with itself. Although rich in resources, it is ranked among the poorest in the world and depends on donor funding for most service delivery, especially health. In an international context, promoting the localisation of humanitarian aid and the integration of health services, there is a lot to learn from the roles being played by healthcare workers (HCWs) throughout the conflict in South Sudan.

Method: A literature review was conducted to identify the roles of local HCWs in South Sudan since 2011. Four databases were searched, grey literature sourced, and snowballing done to capture additional documents for a comprehensive analysis. Questions were adapted from the Critical Appraisal Skills Programme for qualitative and systematic reviews guided appraisals of the articles. Results were systematically coded, synthesised and summarised using a priori and emergent themes.

Results: The health system in South Sudan is very fragmented with heavy dependence on humanitarian aid. There is serious shortage in health workforce with heavy reliance on unskilled workers to fill in the gaps, mainly in rural settings. Although close collaboration exists among different stakeholders to deliver integrated services, poor infrastructure, insecurity, lack of capacity and donor dependency still poses a challenge towards localisation of aid and sustainability.

Conclusions: The literature reviewed for this study indicates that the road towards localisation of health care is possible but will depend highly on continued collaboration between the different contributors, integration of services, building capacity of the nationals, increased government funding and infrastructural development. Local involvement of HCWs by international agencies is paramount in ownership and sustainability of services.

Keywords: localisation, sustainability, health system, conflict, South Sudan

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INTRODUCTION

Health care workers (HCWs) operating in conflict areas are often in danger.^[1] As noted by Jones et al, “Resurgent conflict and political tensions negatively impact all health system components and maintaining, or continuing health system strengthening becomes extremely challenging.”^[2]

As a result of an underfunded health care system, humanitarian agencies often come in to meet the needs.^[3] Donors, however, have their own priorities with little flexibility.^[4]

South Sudan has known conflict for a very long time and is classified among the world’s poorest countries with a long history of humanitarian intervention.^[5] The most recent conflicts in 2013 and 2016 resulted in more devastation by displacing over 2.3 million and putting about 3.9 million in danger of starvation.^[5]

The main objective of this study was to explore information reported on the role(s) of local HCWs and the humanitarian response in the protracted conflict in South Sudan.

The specific objectives of this study were to:

- Understand the roles of HCWs in facilitating or hindering the delivery of services.
- Identify the roles played by the local HCWs in the protracted conflict, and how they evolved across different health networks (public/private/non for profit/informal/transnational).
- Learn from this narrative synthesis to inform future humanitarian responses.

METHOD

Literature search

A scoping review of peer-reviewed published literature was done in late July 2019 in the databases EMBASE, Medline, Global Health and CINAHL (Cumulative Index for Nursing and Allied Health Literature) using terms and search strategies, to identify how much literature was available on the subject matter. This was followed by an in-depth review of published and grey literature with a focus on South Sudan and available policy documents related

to the health sector in South Sudan over the course of the conflict. Literature specific to South Sudan not available in bibliographic database searches was obtained through Google scholar, [snowballing](#) and other search engines by a combination of words around the key concepts.

The Critical Appraisal Skills Programme (CASP)^[6] tool was used as a guideline to create basic questions against which the literature was assessed. All literature considered for a full text read were appraised using the inclusion and exclusion criteria shown in table 1.

Data analysis

Citations of all studies that met the inclusion criteria were exported or added manually to [Mendeley](#) but only those with available full text were considered for analysis. Narrative in-depth case studies were built into the review to document the roles of HCWs in the humanitarian response. Reports were analysed systematically

Ethics Approval

The London School of Hygiene and Tropical Medicine’s Ethics Committee confirmed that none was required because it is a study drawing information in the literature already available publicly.

RESULTS

A total of 190 abstracts were reviewed and screened. Fifty-two articles were fully assessed, and 24 met the eligibility criteria for inclusion (Figure 1). The analysis was based on a priori themes identified in the initial stages of the project and some emergent themes that were added during the review.

Table 1. Detail of the inclusion and exclusion criteria

	Inclusion	Exclusion
Topic	Articles on the health sector that mentioned the health workforce (both skilled and unskilled)	Articles that are broadly on health but no specific mention of health care workers
Participants	Health care workers and national governmental and non-governmental organisations implementing health	Articles detailing the work of international health workers only
Setting/Study designs	All relevant study designs were included	None
Study area/region	South Sudan	Outside the boundaries of South Sudan
Timeline	From 2011 onwards (This is when South Sudan voted for and became an independent state)	Studies conducted before 2011
Language	English	Non-English

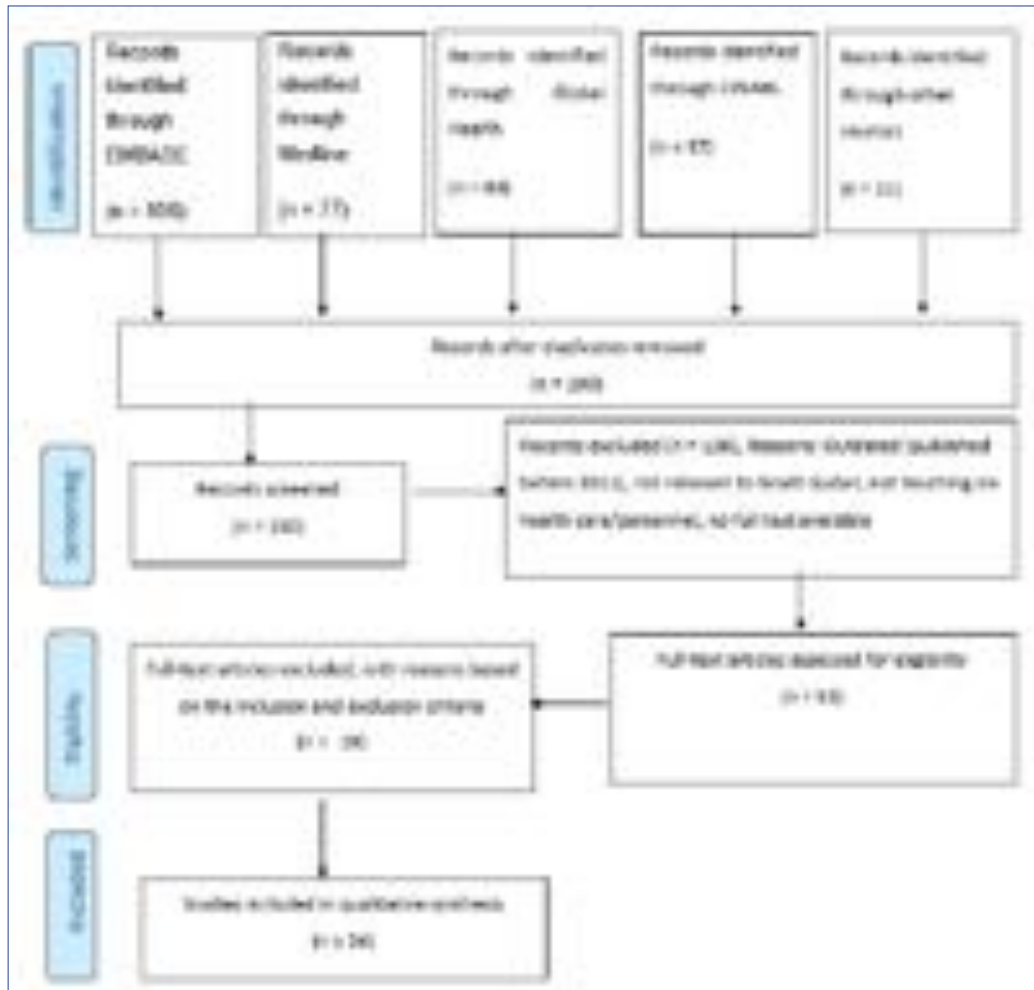


Figure 1. Summary of literature search results Adapted from: Moher D, Liberati A, Tetzlaff J, Altman DG. The PRISMA Group 2009^[7]

DISCUSSION

Key Findings

Most researchers focused on mid- or low-cadre HCWs, who are used to fill the gaps and ensure continuity of care mainly in the Internally Displaced People's camps and the rural areas. The Boma Health Initiative – a community centred health care program, was fully adopted and rolled out in 2016 with the central focus of strengthening health care delivery at the community level with the Community Health Workers (CHWs) at the forefront.^[8]

Partnership: It was found that active involvement and inclusion of the government and local authorities in the design and implementation of any project promoted harmonious working relationship with the humanitarian actors.^[9] Also international NGOs who shifted their approach from implementation to work hand in hand with authorities at all levels and communities has been lauded by many as a vital step to ensure continuity of care and smooth transition to sustainability once the NGO leaves.^[9,10,11,12]

Task Shifting: One way of tackling the shortage of skilled health workforce post conflict is through task shifting. A major bottleneck identified in implementing quality maternal and newborn care was shortage of Skilled Birth Attendants, especially midwives.^[13] Trained midwives were found exclusively in facilities within the capital city while Traditional Birth Attendants were found to be common in running the facilities in remote settings.^[13] This indicates the need for appropriate task-shifting in which low level cadres are trained to deliver unmet services in remote settings. Such an initiative will require strong commitment, investment in training institutes and development of suitable curricula.^[13]

Insider/Outsider role: Attacks or threats on health workers and health facilities were common and this deterred HCWs to go to certain areas. Some ended up as easy targets for revenge killings in some regions including in health centres.^[2] As pointed out by Sachiko et al, ethnicity can play a key role in the level of support a community may render to a programme.^[10] Buhman et al pointed out that, "The deficits of an insider may be

the strengths of an outsider and vice versa.” Hence it is important for the two to work together in order to achieve a common objective.^[14]

Localisation: Although there is a push for localisation of the health workforce to attain sustainable development post conflict, this will require commitment from all stakeholders. The new initiative being adopted by the government to focus on community health care by taking a bottom-up approach is very encouraging because CHWs are now considered core to achieving Universal Health Coverage (UHC) and the Sustainable Development Goals.^[10]

Limitations of the review

The central limitation of this review was the lack of specific studies conducted on the topic. The available literature drew from a wide scope of objectives in which maternal and child health was a major topic. There were insufficient data on specific cadres, their work, number, capacity, and responsibilities.

Strengths of the review

All the studies reviewed were recently conducted meaning that the information contained therein are still fresh and recommendations given can be worked upon as opportunities to conduct more research awaits. The hope is that the findings generated will help change the way in which aid is being delivered in conflict prone nations.

CONCLUSIONS AND RECOMMENDATIONS

South Sudan has been faced with difficult times since its independence from Sudan in 2011. The health sector has been much affected with poor services, frequent outbreaks of vaccine preventable diseases and shortage of HCWs. There are various humanitarian actors who have come to fill in the gaps and support the government deliver quality services. There is need for a proper coordinating mechanism and integration of services if the suffering of those most vulnerable are to be alleviated.

We recommend the following:

1. The government must start looking into feasible ways of financing the health system. An element of cost sharing, for example the social health insurance scheme, even on a small scale like the community-based health insurance scheme, should be adopted.
2. Develop materials on the cadres and responsibilities of the HCWs to define localisation and humanitarian responses in the context of the country.
3. The MOH and Ministry of Education should work closely to develop relevant curricula that will support the rapid development of a health workforce to cover the existing gaps.
4. On the global scale, humanitarian aid must be delivered with dignity and due consideration of the local context to increase the acceptability of the services being offered, build harmony between HCWs and organisations and therefore ensure greater impact of a given response.
5. Involvement of the local people at all levels from the planning and implementation of a given program by an international NGO will allow for easy transition and sustainability of the program once the NGO decides to withdraw its funding.

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Exploring the use of seasonal malaria chemoprevention (SMC) in South Sudan

In South Sudan, malaria accounts for 33% of all hospital admissions and is the leading cause of mortality in children under five. We recently conducted implementation research in Uganda and Mozambique, demonstrating that malaria cases were significantly less likely to occur in areas that received seasonal malaria chemoprevention (SMC) compared to those that did not, and that SMC is feasible, acceptable and safe. The study seeks to understand the feasibility, acceptability and impact of implementing SMC in Aweil South County, to determine the chemoprevention efficacy of SMC medicines, and to explore the scalability of SMC in other states in South Sudan.

<https://www.malariaconsortium.org/resources/publications/1604/exploring-the-use-of-seasonal-malaria-chemoprevention-in-south-sudan>

Morbidity and mortality of tetanus at Kenyatta National Hospital: a ten-year case audit

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ABSTRACT

Introduction: Tetanus is a major health problem in developing countries, and is associated with high a morbidity and mortality. There are no recent local data in Kenya on the impact of the disease in terms of morbidity and mortality. The objective of this study was to describe the type, severity, risk factors, immunization history and outcome of tetanus patients at Kenyatta National Hospital (KNH).

Method: This was a retrospective descriptive study of patients with a clinical diagnosis of tetanus admitted to KNH over ten years, who were aged 13 years and above. All available files with tetanus diagnosis were selected, and the patients' data were retrieved and analysed using SPSS Software version 21.0.

Results: Out of 53 patients with tetanus, 50 (94.3%) were males and 3 (5.7%) were females. The mean age at presentation was 33.2 years (SD= 15.6). Only 4 (7.5%) patients had prior tetanus immunization. The commonest risk factor was acute injury - seen in 37 (69.8%) patients. The common site of injury was the lower limb - seen in 26 (49.1%) patients. The incubation period ranged from 3 to 90 days (IQR 7-17). Generalized tetanus was the commonest form found in 50 (94.3%) patients. Only 16 (30.2%) patients were managed in the Intensive Care Unit (ICU). The overall mortality was 49.1%.

Conclusion: Tetanus mortality is still high as reported in many other studies. Most patients were males without prior immunization history. Only few patients were managed in Intensive Care Unit. We recommend advocacy on tetanus immunization and booster dosing.

Keywords: Tetanus, Kenyatta National Hospital, morbidity, mortality, audit

INTRODUCTION

Tetanus is a disease characterized by muscle rigidity and spasm. Despite the World Health Organization's (WHO) efforts to eradicate the disease by 1995, tetanus remains one of the world's major preventable causes of death, with an estimated incidence of 700,000 to 1 million cases each year, causing an estimated 213,000 deaths.^[1]

In developed countries tetanus is mainly a disease of elderly due to reduced immunity, while in the developing world it is common in the young due to low immunization rates and lack of appropriate wound management.^[2, 3]

Studies in East Africa, and most developing countries, show a case fatality between 40% to 60%, depending on the management applied and availability of ventilatory support.^[4,5,6,7]

The etiological organism is *Clostridium tetani*, which is sensitive to heat and cannot survive in the presence of oxygen. In contrast, the spores are resistant to

heat and most antiseptics.^[8]

Tetanus commonly affects more males than females. In developing countries, it usually occurs in those aged less than 40 years.^[5,6,7,9]

The incubation period of tetanus ranges from 3 to 14 days.^[8] Four types of tetanus occur: generalized, cephalic, localized and neonatal tetanus.^[3,8] The diagnosis is mostly clinically based as there is little role for laboratory diagnosis.^[3]

Management of tetanus is essentially supportive. Despite good management, tetanus is associated with a very high mortality at high cost to the health care system. Therefore, focusing on its prevention through vaccination has been proven most effective.^[1,10]

METHOD

This was a retrospective study over a ten-year period (January 2006 to December 2015). Kenyatta National Hospital (KNH) is a tertiary referral hospital in Nairobi, Kenya. There are 1,800 beds, and an Intensive Care Unit (ICU) with 20 beds.

Medical records of tetanus cases were retrieved. The selection criteria were: 1. Physician made diagnosis of tetanus. 2. Age 13 years and above of both sexes. Those with doubtful diagnosis and incomplete information were excluded. The following details were retrieved from the individual case notes for analysis: demographics, immunization history, site of entry of organism, incubation period, clinical presentation, management, length of hospital stay, admission pattern, severity of tetanus and outcome.

Data analysis was done using SPSS software version 21.0 for windows. Patients' characteristics were summarized into means or medians for continuous data and categorical variables as percentages. Mortality was analysed and presented as percentages with 95% confidence interval. Chi-square (χ^2) test was used to test for significance of association between the dependent variables with the categorical exposure variables such as clinical presentation, incubation period, treatment given, duration of hospital stay and previous immunization status. The level of significance was considered as $p \leq 0.05$.

Ethical approval was obtained from the Department of Clinical Medicine and Therapeutics, University of Nairobi and the KNH/UoN Scientific and Ethical Review Committee.

RESULTS

Sixty-nine patients with tetanus were admitted during the study period. Of these 63 files were retrieved, 53 met the inclusion criteria. Thirty (56.6%) patients were referral

Table 1. Socio-demographic data (N=53)

Variable	n (%)
Sex	
Male	50 (94.3)
Female	3 (5.7)
Occupation	
Farmer	5 (9.4)
Student	14 (26.4)
Casual labourer	14 (26.4)
Industrial worker	2 (3.8)
Businessman	11 (20.8)
Unemployed	2 (3.8)
Occupation not indicated	5 (9.4)

Table 2. Risk factors and site of entry (N=53)

Variable	n (%)
Risk factors	
Acute injury	37 (69.8)
Assault	6 (11.3)
Road traffic accident (RTA)	4 (7.5)
No port of entry	3 (5.7)
Others	3 (5.7)
Anatomical site of entry	
Legs	26 (49.1)
Upper limb	16 (30.2)
Trunk	2 (3.8)
Head and neck	12 (22.6)

from other hospitals, and 23 (43.4%) patients were direct admissions.

There were 50 (94.3%) males and 3 (5.7%) females (male to female ratio of 16.7:1). Ages ranged from 13 to 69 years (mean of 33.2 years and standard deviation of 15.6). Thirty-one (58.5%) patients were aged below 40 years, while 22 (41.5%) patients were aged 40 years and above. The occupation groups of patients are shown in Table 1.

Table 2 shows that the most common site of entry was an acute injury such as a prick, puncture wounds, laceration and burns.

Figure 1 shows the prior immunization history. Out of 53 patients, only 4 (7.5%) patients had known prior immunization but there was no written proof.

The incubation period was documented in 49 (92.5%) patients and ranged from 3 to 90 days (median of 14 days and interquartile ratio of 7 – 17). Forty-two (79.2%) patients had an incubation period of more than 7 days.

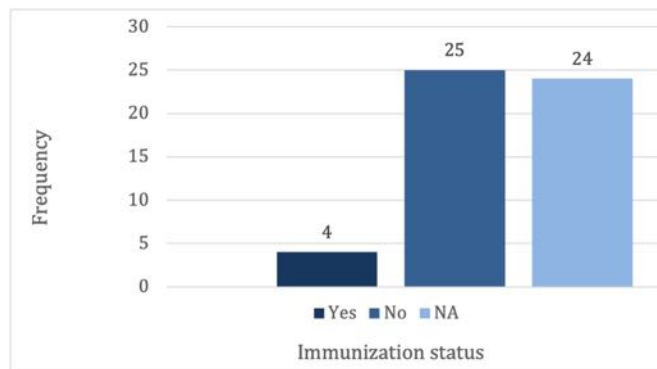


Figure 1. Prior immunization status (N=53)

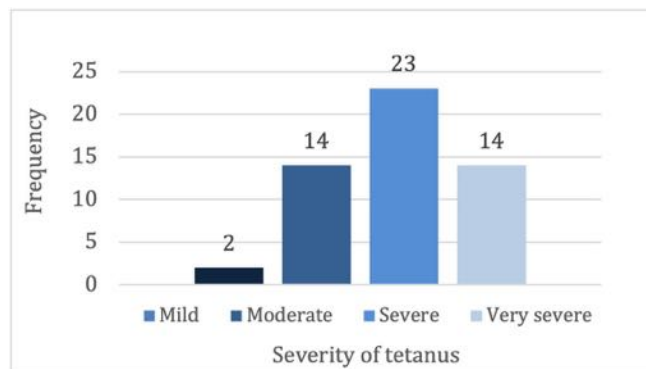


Figure 2. Severity of tetanus

Fifty (94.3%) patients had generalized tetanus, 2 (3.8%) cephalic tetanus and 1 (1.9%) localized tetanus. Two (3.8%) patients had mild tetanus, 14 (26.4%) moderate, 23 (43.4%) severe, and 14 (26.4%) had very severe tetanus. Thus, the majority (96.2%) had moderate to very severe tetanus. Figure 2.

The common presenting complaints were body stiffness/spasm in 49 (92.5%) patients, trismus in 48 (90.6%), dysphagia in 30 (56.6%) and back pain and body aches in 15 (28.3%) patients.

Thirty-seven (69.8%) patients were admitted to an isolation room in a general ward. Although 21 (56.8%) patients needed ICU care, there was no space available in the ICU. Twelve (22.6%) patients were admitted to ICU and 4 (7.6%) were transferred from the general ward to ICU.

Treatment and outcome

All patients were managed with tetanus toxoid and immunoglobulin, muscle relaxants, wound care, deep vein thrombosis (DVT) prophylaxis with low molecular weight heparin and antibiotics i.e., metronidazole and benzyl penicillin. Beta blockers were given to only 4 (7.5%) patients and respiratory support to 16 (30.2%) patients. Table 3.

There were pulmonary complications in 42 (79.2%) patients, central nervous system complications in 17 (32.1%) patients, cardiovascular system complications reported in 24 (45.3%) patients, gastrointestinal system complications in 24 (45.3%) patients, and renal complications in 9 (17%) patients.

Twenty-seven (50.9%) of the 53 patients survived. There were 26 (49.1%) deaths of which 20 (76.9%) occurred in the first 10 days. The mortality was highest among those with severe and very severe tetanus at 66.7% and 76.9% respectively compared to 0% in mild and moderate tetanus. Mortality was higher in those admitted to ICU at 62.5% than those were in general ward at 43.2% $p = 0.202$.

Table 1. Socio-demographic data (N=53)

Management	n (%)
Wound toilet and debridement	38 (71.7)
Control of spasms	53 (100)
IV antibiotics	53 (100)
Tetanus toxoid and tetanus immunoglobulin	51 (96.2)
Ventilatory support	16 (30.2)

Both direct admission and short duration of hospital stay showed a statistically significant association with tetanus mortality. Most tetanus deaths occurred within the first 5 days of admission ($p < 0.001$). Deaths were also three times more likely to occur among direct admissions (65.2%) compared to referrals (36.7%) OR = 3.24 (95% CI 1.04-10.07). Mortality among patients admitted with tetanus after logistic regression analysis, did not show significant associations with the remaining factors including age ($p = 0.501$), sex ($p = 0.305$), incubation period ($p = 0.481$), type of tetanus ($p = 0.237$) and severity of tetanus which was numerically higher but was not statistically significant ($p = 0.517$).

The average ICU stay was 23.2 days (SD of 20.9). The median hospital stay was 15 days (IQR 5 - 23). The mean duration of hospitalization for the mortalities was 7.8 days (SD 8.9). The average hospital stay for survivors was 24.4 days, (SD 14.7).

DISCUSSION

Tetanus is prevalent in developing countries, and associated with a high morbidity and mortality despite the availability of an effective vaccine.

Out of 53 patients in this study 50 (94.3%) patients were males and 3 (5.7%) females. The male preponderance is similar to that reported by other investigations in developing countries.^[5, 6, 7, 11] This is a reflection of the

fact that males are at a higher risk of sustaining wounds prone to tetanus infection by the nature of their work and spending more times outdoors. Females are protected by the TT immunization during the antenatal period and through the regular immunization campaign for school girls at reproductive age.

In this study 58.5% were aged below aged 40 years. This is similar to other studies in the region: Chalya et al in Tanzania and Amare et al in Ethiopia found that 74.5% and 63.7% respectively were below aged 40 years.^[5,6] This observation may be explained by an inadequate immunization programme and inappropriate wound management. Only 7.5% of our study population reported (unrecorded) primary immunization.

About a half of our patients were students (14 (26.4%)) or casual labourers (14 (26.4%)). This is in contrast to many studies in developing countries, which reported farmers and daily wage workers as the most affected occupational groups.^[5, 6, 7, 9] Our results can be explained by the fact that the age group in our study is relatively young. KNH is a tertiary referral hospital in the urban city, access from rural villages could be a factor.

The common risk factor for tetanus in this study was acute injury, seen in 37 (69.8%) patients. Six (11.3%) patients had a history of assault: the site of entry could not be identified in 3 (5.7%) patients. Most injuries were in the lower limbs as in 26 (49.1%) patients, which is in accordance with the findings of other studies.^[6,7,13] The lower limbs are more prone to injury and contamination by the *C. tetani* which is a ubiquitous in the soil.

The incubation period was documented in 49 (92.5%) patients. The majority, 42 (79.2%), had an incubation period of over 7 days. This is in agreement with the literature that says that the greater the distance of the injury site from the central nervous system the longer the incubation period.^[8] In our study 79.3% had an injury in the lower and upper limbs.

Most of our patients (94.3%) had generalized tetanus consistent with other studies.^[5,11] Only 7.5% had a probable history of vaccination. Amare et al in Ethiopia found that none of their cases had prior immunization^[6] and Feroz et al in a similar study at a teaching hospital in Bangladesh reported that only 18.8% had prior tetanus immunization.^[11]

Over two-thirds (69.8%) of patients had severe or very severe tetanus agreeing with Chalya et al who reported 68.7% had moderate to severe disease.^[5] This may be explained by the fact that KNH is a referral hospital, so the sickest patients are more likely to be referred.

The overall median hospital stay was 15 days (IQR 5-23); the average ICU stay was 23.2 days (SD 20.9). A report^[4] from the Democratic Republic of the Congo (DRC)

states the average length of hospital stay of 11.3 ± 11.4 days. However, Chalya et al has reported a longer average length of hospital stay at 34.12 ± 38.44 days^[5] but in this study only 16 (30.2%) patients were managed in ICU, which is low in comparison to other studies in developing countries.^[5,6,7,9] Chalya et al in Tanzania^[5] reported an ICU admission rate of 82.4%.

In terms of management, although there was no uniform protocol for tetanus management, all patients received tetanus toxoid and immunoglobulin, muscle relaxants and antibiotics. Only 4 (7.5%) patients received beta blockers, because of lack of protocol for tetanus management and drugs availability. Only five patients completed the three doses of TT because of the low coverage of immunization in the country.

The mortality rate in our study was 49.1%, similar to the observation by Zziwa et al in Uganda^[13] who reported a mortality of 47%, and Muteya et al in DRC^[4] who reported a mortality of 52%. The higher mortality in our study could be explained by the fact that most of our patients, 69.8%, were managed outside the ICU where ventilatory support and tracheostomy were not readily available.

CONCLUSION

Most of our patients were young males, who had no prior immunization or did not know their immunization status. Only a minority of cases were managed in the ICU where ventilatory support was available and most deaths occurred in the first five days of admission which can point to a possible lack of respiratory support as a cause of death. It is clear that a vigorous campaign to widen immunization coverage is required and agreed guidelines are needed for management of a tetanus patient.

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Substantial misdiagnosis of severe malaria in African children



In areas of high malaria transmission (i.e., much of sub-Saharan Africa) malaria is ubiquitous. Finding malaria parasites in a blood smear or a positive rapid diagnostic test (RDT) in a sick child does not necessarily mean that malaria is the cause of the illness. Yet severe malaria is the usual diagnosis in a hospitalised febrile African child with a positive blood smear or RDT. Differentiating severe bacterial infections from severe malaria is difficult, and the two commonly coexist. For this reason, it is recommended that all children with suspected severe malaria should receive both parenteral artesunate and parenteral antibiotics.

Unfortunately, this advice is often not followed, or the antibiotics are delayed until the child deteriorates—by which time it might be too late. If children do not receive effective antibiotics immediately, and they would do so if the malaria test was negative, then the positive malaria blood test becomes, perversely, a risk factor for dying from bacterial sepsis. The magnitude of the problem is illustrated by recent analyses of data from leading severe malaria research centres.

These analyses provide strong evidence that about a third of African children diagnosed with severe malaria have another cause (probably bacterial infections) of their potentially lethal illness. Simple blood tests can help identify these misdiagnosed children, but the implication for clinical management is clear: all children with suspected severe malaria must immediately receive both parenteral artesunate and broad-spectrum antibiotics. In the community, where parenteral drug administration is not possible, pre-referral rectal artesunate should be given. Pre-referral rectal formulations of broad-spectrum antibiotics should be developed.

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Factors associated with reduced foetal movements in Iringa, Tanzania

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ABSTRACT

Introduction: Maternal perception of foetal movement ensures foetal wellbeing. Reduced foetal movement is associated with foetal hypoxia, stillbirths, and intrauterine foetal growth restriction (IUGR). This study aimed at assessing factors that are associated with maternal perception of reduced foetal movements.

Method: This was a cross-sectional study that was conducted at Iringa Regional Referral Hospital from 1st January – 30th June 2022. A purposive sampling technique was used, and SPSS version 25 software was used for data analysis.

Results: 41.3 % of study participants were aged 24 – 34 years, with a mean and SD of 29.08 ±7.53. 75% were not employed, 52.8 % of study participants delivered from 37 – 42 weeks of gestational age, 66.1% had a posterior placenta and only 24.0 % had an anterior placenta. Women who delivered at 28 – 36 weeks of gestational age were about 4 times more likely to experience reduced foetal movement compared to those who delivered at 37 – 42 weeks of gestation (AOR=4.162, 95% CI 2.174 - 7.966, p<0.0001). Those who attended the Antenatal clinic 2 – 3 times were 2 times more likely to complain of reduced foetal movement compared to those who attended 4 times and above (AOR = 2.655, 95% CI 1.311 - 5.375, p=0.0067).

Conclusion: Reduced foetal movements are associated with lower gestation age at delivery and decreased antenatal clinic attendance in Iringa, Tanzania. All pregnant women should be encouraged to make early antenatal clinic attendance and should attend adequate visits. Healthcare providers should educate and create awareness on methods of assessing foetal movements.

Keywords: foetal movement, factors associated, Tanzania

INTRODUCTION

Reduced foetal movement is becoming a common complaint among pregnant women in Tanzania. This complaint brings fear of losing a baby and necessitates a need to urgently visit a doctor at a nearby health facility for assessment. There are several ways that can be used to assess foetal movements, these include the Sadovsky and Cardiff methods.^[1] These methods involve the maternal perception of foetal movements, and they are the currently widely used method in countries with limited resources. Foetal movements can also be assessed by an obstetric ultrasound as a component of the foetal biophysical profile.

The foetal biophysical profile consists of parameters that aid in assessing foetal well-being before delivery, this consists of four areas assessed by ultrasound which are foetal breathing movements, foetal movements, foetal tone, and amniotic fluid volume. Currently in Iringa there is a modified foetal biophysical profile that consists of two parameters which are the non-stress test and amniotic fluid index.^[1,2]

Most primigravidas are observed to perceive foetal movements at the 18th – 20th week of gestation age while multigravidas perceive foetal movements at the 16th

– 18th week of gestation age. The Sadovsky and Cardiff methods are mainly used in the third trimester, the Cardiff method (which is getting the woman to count movements until she has felt 10) and the Sadovsky method (which is getting the woman to count how many movements she has in an agreed time frame) all aim at ensuring the wellbeing of the foetus in high-risk pregnancies.^[3,4]

Normally the foetus has a period of physical movement, rest, and sleep. Foetal movement increases as the gestation age advance up to 32 weeks of gestation age, when it reaches a plateau and goes at that level to term.^[3,4] Foetal movement indicates the neurological development and maturation of the foetus.^[5]

The foetus has been observed to reduce movements to compensate and conserve energy so that it can survive placental insufficiency, and this is by reserving oxygen and nutrient transfer. However, it becomes a problem when the situation is prolonged, leading to foetal compromise requiring further evaluation using a cardiograph known as a CTG which may find that an urgent delivery of the foetus is necessary. This phenomenon has been studied histopathologically and revealed that placentas from women with reduced foetal movements had greater signs of infarction and other signs that the placenta is not optimal.^[6]

This study aimed at assessing factors that are associated with reduced foetal movements in Iringa Tanzania. Some of the studied factors included parity, gestational age, overweight/obesity, the volume of amniotic fluid, foetal sleep state, maternal obesity, smoking, nulliparity and placenta location.

METHOD

This was a 6 months' cross-sectional prospective study conducted from 1st January – 30th June 2022 at a teaching tertiary - Iringa Regional Referral Hospital (IRRH) located in the southern highlands of Tanzania. The study was conducted in the Department of Obstetrics and gynaecology but also in the Neonatal Unit. Apart from other staff, these two units have 3 obstetricians and gynaecologists and 2 paediatricians who also work at the Neonatal unit.

This study included all third-trimester pregnant women who were admitted with a complaint of reduced foetal movements in the Department of Obstetrics and Gynaecology. Participants were recruited from antenatal clinics, antenatal and labour wards. Twin pregnancies, women with already intrauterine foetal demise (IUID) and women who were not able to consent were excluded from this study.

A structured questionnaire was used to collect data by the researcher and a sample size of 269 participants was obtained. A full history was taken from all study

participants. Variables studied included maternal age, education, gravity, parity, residence, marital status, occupation, gestation age at delivery, number of antenatal clinic visits, haemoglobin level, the volume of amniotic fluid, foetal sleep state, maternal obesity, smoking, nulliparity and placenta location.

After being enrolled in this study, pregnant women complaining of reduced foetal movements were assessed, by an experienced obstetrician.

For those who were critically needing help intervention was done. Those who were not needing such help were put in an emergency room for observation. These women were told that infrequent foetal movements did not necessarily mean the foetus was inactive or in a compromised environment. Women were instructed in the Sadovsky kick count method of assessing foetal activity. In this method if the counts were less than 10 kicks over two consecutive hours when the foetus was active and the woman lying on her side after a meal and focused on counting then reduced foetal movements were suspected. Those with suspected reduced foetal movements had foetal monitoring or assessment using the CTG and obstetric ultrasound for biophysical profile. Those with a baseline foetal heart rate (110 – 160 bpm) with a variability of 5 – 25 bpm without late decelerations were put for continuous observation. For women with prolonged foetal tachycardia/bradycardia, variability of less than 5 bpm for more than 50 minutes or more than 25 bpm for more than 25 minutes or the presence of features of late decelerations an urgent intervention was done.

Maternal body mass index was not calculated because participants were recruited in the third trimester. Obstetric ultrasound was done by an experienced radiologist to assess amniotic fluid volume, foetal weight, placenta location, placenta status, and foetal presentation. Foetal biophysical profile was also assessed. Placental status like calcifications and placental abruption, breathing movements and congenital malformations of the foetus were also assessed. Uterine artery Doppler ultrasound was performed transabdominally to assess umbilical blood flow in those with placenta insufficiency.

Blood pressure was recorded on admission and factors including maternal diabetes, preeclampsia, anaemia, placenta praevia, placental abruption, premature rupture of membranes, anterior placenta, smoking, use of sedative drugs and use of glucocorticoids were checked and ruled out.

All continuous data were summarized using median with interquartile range. Categorical data were summarized using proportion. The factors associated with reduced foetal movement were determined by first cross tabulation then later unadjusted and last adjusted models. Odds ratios and a p-value of less than 0.05 was considered significant,

Table 1. Association of demographic characteristics and reduced maternal perception of foetal movements

	All n (%)	Normal n (%)	Reduced movement n (%)
Age			
12-24	88 (29.3)	55 (62.5)	33 (37.5)
25-34	124 (41.3)	92 (74.2)	32 (25.8)
35+	88 (29.3)	65 (73.9)	23 (26.1)
Marital status			
Married	213 (71.0)	153 (71.8)	60 (28.2)
Single	87 (29.0)	59 (67.8)	28 (32.2)
Education			
No formal education	29 (9.7)	15 (51.7)	14 (48.3)
Primary	111 (37.0)	81 (73.0)	30 (27.0)
Secondary	92 (30.7)	65 (70.6)	27 (29.4)
College and above	68 (22.7)	51 (75.0)	17 (25.0)
Parity			
1	81 (27.0)	49 (60.5)	32 (39.5)
2	48 (16.0)	39 (81.3)	9 (18.8)
3	69 (23.0)	51 (73.9)	18 (26.1)
4	59 (19.7)	41 (69.5)	18 (30.5)
5+	43 (14.3)	32 (74.4)	11 (25.6)
Occupation			
Employed	75 (25.0)	59 (78.7)	16 (21.3)
Unemployed	225 (75.0)	153 (68.0)	72 (32.0)
Number of antenatal clinic visits			
0	23 (7.7)	11 (47.8)	12 (52.2)
1	19 (6.3)	13 (68.4)	6 (31.6)
2-3	116 (38.7)	76 (65.5)	40 (34.5)
+4	142 (47.3)	112 (78.8)	30 (21.1)
Gestational age (in weeks) at delivery			
28-36	113 (44.5)	56 (49.6)	57 (50.4)
37-42	134 (52.76)	105 (78.4)	29 (21.6)
≥ 42	7 (2.7)	6 (85.7)	1 (14.3)
Placenta location			
Anterior	70 (24.0)	58 (82.9)	12 (17.1)
Posterior	193 (66.1)	130 (67.7)	62 (32.3)
Praevia (grade 3 and 4)	22 (7.5)	16 (72.7)	6 (27.3)
Calcification	4 (1.4)	4 (100.0)	0 (0.0)
Low lying (grade 1 and 2)	3 (1.0)	3 (100.0)	0 (0.0)

and their 95% confidence intervals were constructed.

Ethical clearance was obtained from the University of Dodoma, Research and Publication Committee, and permission to conduct the study was obtained from the regional administration of Iringa region and from the Medical Officer in charge of Iringa Regional Referral Hospital.

RESULTS

Sociodemographic characteristics of the study participants

In this study, 41.3% of study participants were aged 24 – 34 years with a mean and SD of 29.1 ±7.5 years; 27% were primipara; 47.3% had attended antenatal clinics

Table 2. Factors associated with maternal perception of reduced foetal movements

Variable	Unadjusted analysis OR [95%CI]	p-value	Adjusted analysis AOR [95%CI]	p-value
Age				
12-24	1.688 [0.870, 3.277]	0.1216	1.684 [0.569,4.981]	0.3466
25-34	1.009 [0.531, 1.917]	0.9774	1.105 [0.493,2.477]	0.8093
35+	Ref		Ref	
Education				
No formal education	2.975 [1.186, 7.462]	0.0202	2.200 [0.582, 8.317]	0.2454
Primary	1.062 [0.522, 2.163]	0.8673	0.686 [0.260, 1.811]	0.4462
Secondary	1.177 [0.567, 2.445]	0.6624	0.936 [0.377, 2.320]	0.8859
College and above	Ref		Ref	
Parity				
1	1.722 [0.755, 3.928]	0.1966	2.217 [0.616, 7.987]	0.2232
2	0.671 [0.248, 1.820]	0.4335	1.029 [0.265, 3.985]	0.9675
3	0.913 [0.376, 2.213]	0.8397	1.256 [0.387, 4.081]	0.7045
4	1.135 [0.463, 2.781]	0.7814	1.468 [0.468, 4.603]	0.5101
5+	Ref		Ref	
Occupation				
Employed	Ref		Ref	
Unemployed	1.845 [0.964,3.534]	0.0645	1.227 [0.510, 2.951]	0.6484
Number of antenatal clinic visits				
0	4.699 [1.868, 11.824]	0.0010	2.507 [1.311, 7.894]	0.1164
1	1.325 [0.400, 4.397]	0.6451	0.792 [0.171, 3.664]	0.7651
2-3	2.211 [1.243, 3.930]	0.0069	2.655 [1.311, 5.375]	0.0067
4+	Ref		Ref	
Gestation age (in weeks) at delivery				
37-42	Ref		Ref	
28-36	4.297 [2.409, 7.666]	<.0001	4.162 [2.174, 7.966]	<.0001
42 and above	0.729 [0.084, 6.342]	0.7748	0.651 [0.063, 6.733]	0.7188
Blood pressure				
120/80 or less	Ref		Ref	
140/90 and above	1.044 [0.527,2.070]	0.9008	1.449 [0.623, 3.370]	0.3895
160/110 and above	3.263 [1.508,7.062]	0.0027	1.819 [0.693, 4.772]	0.2244

four or more times; 52.8% of study participants delivered from 37 – 42 weeks of gestation age; 66.1% had a posterior placenta while 24.0 % has an anterior placenta. See table 1.

Factors associated with maternal perception of reduced foetal movements

In this study, women who attended antenatal clinic 2 – 3 times had a three times chance of complaining of reduced foetal movements compared to those who attended four times and above. Women who delivered at a gestational age of 28 – 36 weeks had a four times chance of experiencing reduced foetal movements compared to those who delivered at 37 – 42 weeks of gestation age. Maternal age, education, occupation, parity, overweight/obesity, gestation age, placenta location, amniotic fluid volume, and blood pressure were found to be not associated with the reduced foetal movements. Variables like type, duration, characteristic, and strength of the foetal movements, foetal position, maternal position, psychological factors, sedatives, and other drugs were not assessed in this study. See table 2.

DISCUSSION

Assessing maternal perception of foetal movement in resource-limited areas has been observed to decrease perinatal mortality although 75% of women who are assessed due to complaints of reduced foetal movements will have normal pregnancy outcomes.^[7,8] Four to 18 % of all pregnant women report a decrease in foetal movement at some point during the antenatal period and it has been revealed that decreased foetal movements are associated with adverse perinatal outcomes including preterm deliveries, stillbirths, and foetal growth restrictions.^[9,10]

In India, most pregnant women who reported a reduction in foetal movements were 20 – 30 years of age, 80% were primigravida, which is like findings of this study in which 41.33% were aged 25 – 34 years of age and most were primigravidas. This study in India and another in Israel revealed that these women had an anterior placenta which is contrary to the finding of this study in which an anterior placenta was not found to be associated with a reduction in foetal movement.^[11,12]

Other studied factors that might affect the maternal perception of reduced foetal movements included parity, gestational age, overweight/obesity, and placenta location. In this study, only lower gestation age and lower number of antenatal clinic visits were associated with reduced perception of foetal movements which is contrary to a study in Australia that revealed that psychological factors and duration of foetal movements may affect the perception of foetal movements. Lack of awareness/knowledge of the importance of antenatal clinic visits may explain why most of the participants in this study had

fewer antenatal clinic attendances. And this is evidenced by the education level in which a larger group (37%) had attained a primary level of education.^[2]

In Iran, 8.1% of all healthy pregnant women complaining of reduced foetal movements had a good outcome, and maternal employment was among the factors that were associated with reduced foetal movements which is contrary to the findings of this study in which maternal employment wasn't found to be associated with a reduction in foetal movement, this might be because 75% of study participants were unemployed while in Iran most of the study participants were employed.^[13]

It is important to create awareness and educate pregnant women during the antenatal period about reduced foetal movements and their adverse outcomes since maternal awareness of reduced foetal movement and an early decision to visit a nearby health facility have been observed to decrease stillbirths.^[14]

CONCLUSION AND RECOMMENDATION

This study found that fewer antenatal clinic attendance and lower gestation age are highly associated with the maternal perception of reduction of foetal movements. Awareness creation and education of pregnant women in Iringa Tanzania on the importance of Antenatal clinic attendance and evaluation of pregnancies when women are worried about reduced foetal movements will aid in decreasing preterm deliveries and also prevent stillbirths in Iringa, Tanzania.

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Hunger and malnutrition being driven by climate crisis and conflict in South Sudan

The proportion of people facing severe acute food insecurity is at the highest level ever, surpassing levels seen even during the conflicts in 2013 and 2016.

Juba – Hunger and malnutrition are on the rise across the flood, drought, and conflict-affected areas of South Sudan, with some communities likely to face starvation if humanitarian assistance is not sustained and climate adaptation measures are not scaled-up, the United Nations warned today.

The latest Integrated Food Security Phase Classification (IPC), released today, shows about two-thirds of the South Sudanese population (7.76 million people) are likely to face acute food insecurity during the April-July 2023 lean season while 1.4 million children will be malnourished.

Read the whole WFP article at <https://www.wfp.org/news/hunger-and-malnutrition-being-driven-climate-crisis-and-conflict-south-sudan>

Characteristics of hearing loss in Dar es Salaam, Tanzania

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ABSTRACT

Introduction: Hearing loss is a major public health problem in developed and developing countries. The objective of this study was to determine the causes and patterns of hearing loss at a private hospital that serves the largest number of patients with ear, nose and throat diseases in Tanzania's largest city.

Method: This was a hospital based descriptive cross-sectional study that was conducted at a private hospital in Dar es Salaam. Data were collected from January to June 2021 and analysed using Statistical Package for Social Sciences (SPSS) version 20. P-value<0.05 was considered to be statistically significant.

Results: Of the 250 patients recruited with hearing loss, there were 115 (46%) males and 135 (54%) females (F:M ratio of 1.2:1). The commonest cause of hearing loss was presbycusis 132 (52.8%) followed by ototoxicity 26 (10.4%) and chronic suppurative otitis media 26(10.4%). Based on laterality, 73.2% of the patients had unilateral hearing loss whereas 26.8% had bilateral hearing loss. Regarding the type of hearing loss, 85.6% of the patients had sensorineural hearing loss followed by conductive type (13.2%) and mixed hearing loss (1.2%). Based on severity, 40.8% of the patients had moderate hearing loss followed by both moderately severe and severe hearing loss each accounting for 18% of cases.

Conclusion: Sensorineural hearing loss was the commonest type of hearing loss in this study. Both unilateral hearing loss according to laterality and moderate hearing loss upon classifying by severity predominated. Age-related hearing loss was the most common cause of hearing loss followed by ototoxicity and chronic suppurative otitis media.

Keywords: Hearing loss, causes, patterns, characteristics, Tanzania

INTRODUCTION

Hearing loss is a common disabling disorder affecting paediatric and adult populations.^[1] Its prevalence appears to be comparable to that of chronic disorders such as diabetes mellitus, arthritis and hypertension.^[2]

Developing countries contain the largest number of people with disabling hearing loss.^[2] According to the World Health Organization (WHO), 360 million persons in the world have disabling hearing loss and 328 million of these are adults living mostly in developing countries.^[2,3] This could be attributed to poor health-care systems and limited ear and hearing health-care physicians.^[2]

Hearing loss may be associated with unpleasant consequences such as poor speech and language development during childhood and in adults it has negative social, emotional, and economic implications.^[3,4]

The pattern of hearing loss can be sub-divided into conductive, sensorineural or mixed moieties. Conductive hearing loss occurs when there is a defect in the sound conducting mechanism of the ear and the pathology could be anywhere from external auditory canal to the footplate of the stapes. The conductive type is usually easily treatable.^[5,6] Sensorineural hearing loss may be due to abnormality

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in the cochlear, auditory nerve, neural pathway or their connection with auditory cortex and may be associated with disabling consequences usually requiring rehabilitation. Mixed hearing loss is due to an abnormality causing both conductive and sensorineural hearing losses.^[7]

Causes of hearing loss can be broadly grouped into congenital or acquired with acquired causes being more common in developing countries.^[5] Congenital includes hereditary and non-hereditary genetic factors such as maternal rubella and syphilis, low birth weight, birth asphyxia, drugs such as aminoglycosides and cytotoxics as well as severe neonatal jaundice.^[3,5] Acquired hearing loss can be due to infectious diseases such as meningitis, measles, and mumps. Other causes are chronic suppurative otitis media, ototoxicity, noise induced and ageing.^[2] Audiometric testing plays a vital role in establishing the diagnosis of hearing loss in hearing acuity. Hearing function is measured in decibels and hearing loss is said to have occurred if the threshold of hearing is elevated above 25dB. Other tests are otoacoustic emissions (OAEs), auditory brainstem response measurements and tympanometry.^[8] To date there are limited studies on hearing loss among private health facilities in Dar es Salaam despite the increased burden of hearing impairment. This study aimed to address this gap.

METHOD

Study design, settings and participants

This was a hospital based descriptive cross-sectional study among patients who attended Ekenywa Specialised Hospital for hearing loss assessment in Dar es Salaam, Tanzania from January to June 2021. Patients recruited were aged 1-90 years.

Data collection

Data were collected using structured questionnaires and only those who consented to participate were recruited while those who had hearing loss though being mentally unwell were excluded.

Pure tone audiometry (PTA) was performed by a clinical audiologist in a sound-proof room using an audiometer (Amplivox 270) after a history and physical examination. Bone and air conduction thresholds were tested at frequencies range from 250HZ to 8000HZ. Hearing was graded as per WHO grades of hearing impairment whereby 0-25 dB was regarded as normal hearing, 26-40dB mild hearing loss, 41-55dB moderate hearing loss, 56-70 dB moderately severe hearing loss, 71-90dB severe hearing loss and >90dB profound hearing loss.^[9] The type and severity of hearing loss were assessed in each ear as stipulated on the audiogram charts. Patients who were found to have hearing loss were managed according to the

type and severity of hearing loss.

Data analysis

Data were analysed by using SPSS version 20. Quantitative data were summarized as frequencies and percentages and presented as tables. A variable with p-value <0.05 was considered to be statistically significant.

Ethical considerations

Ethical approval for the study was obtained on 10th December 2020 from the private hospital’s Ethics Committee. Written informed consent was obtained from all patients and the interview was conducted in a private room. Patient information was obtained on a confidential basis.

RESULTS

Age and sex distribution of patients

Two hundred and fifty patients with hearing loss were recruited; 115 (46%) were males and 135 (54%) were females with a female to male (F:M) ratio of 1.2:1. The largest group was aged 41-50 years (26%) (Table 1).

Causes of hearing loss

Age-related hearing loss (presbycusis) 132(52.8%) followed by ototoxicity 26(10.4%) and chronic suppurative otitis media 26(10.4%) were the commonest causes of hearing loss (Table 2).

Lateralization of hearing loss

The majority of patients 183 (73.2%) had unilateral hearing loss while 67 (26.8%) had bilateral hearing loss (Table 3).

Table 1. Age and sex distribution (N=250)

Age group (years)	Sex		
	Male n (%)	Female n (%)	Total n (%)
1-10	11 (61.1)	7 (38.9)	18 (7.2)
11-20	6 (42.9)	8 (57.1)	14 (5.6)
21-30	21 (60)	14 (40)	35 (14)
31-40	11 (45.8)	13 (54.2)	24 (9.6)
41-50	23 (35.4)	42 (64.6)	65 (26)
51-60	29 (64.4)	16 (35.6)	45 (18)
61-70	18 (60)	12 (40)	30 (12)
71-80	7 (43.8)	9 (56.2)	16 (6.4)
81-90	2 (66.7)	1 (33.3)	3 (1.2)
Total	115 (46)	135 (54)	250 (100)

Table 2. Causes of hearing loss (N=250)

Cause	Sex		
	Male n (%)	Female n (%)	Total n (%)
Meningitis	3 (2.6)	2 (1.5)	5 (2)
Chronic suppurative otitis media	14 (12.2)	12 (8.9)	26 (10.4)
Middle ear effusion	3 (2.6)	2 (1.5)	5 (2.0)
Noise induced	13 (11.3)	0 (0.0)	13 (5.2)
Ototoxicity	15 (13.1)	11 (8.2)	26 (10.4)
Congenital	2 (1.7)	1 (0.7)	3 (1.2)
Sudden hearing loss	17 (14.8)	5 (3.7)	22 (8.8)
Neonatal jaundice	2 (1.7)	1 (0.7)	3 (1.2)
Radiotherapy	3 (2.6)	2 (1.5)	5 (2.0)
Chemotherapy	0 (0.0)	6 (4.4)	6 (2.4)
Viruses (measles)	0 (0.0)	1 (0.7)	1 (0.4)
Presbycusis	40 (34.8)	92 (68.2)	132 (52.8)
Others e.g., temporal bone fractures	3 (2.6)	0 (0)	3 (1.2)
Total	115 (46)	135 (54)	250 (100%)

Table 3. Hearing loss by laterality of the affected ear (N=250)

Age group (years)	Sex		
	Unilateral hearing loss n (%)	Bilateral hearing loss n (%)	Total n (%)
1-10	7 (38.9)	11 (61.1)	18 (7.2)
11-20	13 (92.9)	1 (7.1)	14 (5.6)
21-30	16 (45.7)	19 (54.3)	35 (14)
31-40	17 (70.8)	7 (29.2)	24 (9.6)
41-50	56 (86.2)	9 (13.8)	65 (26)
51-60	40 (88.9)	5 (11.1)	45 (18)
61-70	18 (60)	12 (40)	30 (12)
71-80	13 (81.3)	3 (18.7)	16 (6.4)
81-90	3 (100)	0(0.0)	3 (1.2)
Total	183 (73.2)	67(26.8)	250 (100)

Type of hearing loss among the study participants

Sensorineural hearing loss was the commonest type 214 (85.6%), followed by conductive 33 (13.2%) and mixed 3 (1.2%).

Table 4. Severity of hearing loss by sex (N= 250)

Severity of hearing loss	Sex		
	Male n (%)	Female n (%)	Total n (%)
Mild (26-40dB)	16 (13.9)	12 (8.9)	28 (11.2)
Moderate (41-55dB)	37 (32.2)	65 (48.1)	102 (40.8)
Moderately severe (56-70dB)	23 (20)	22 (16.3)	45 (18)
Severe (71-90dB)	26 (22.6)	19 (14.1)	45 (18)
Profound (91+dB)	13 (11.3)	17 (12.6)	30 (12)
Total	115 (46)	135 (54)	250 (100)

Severity of hearing loss among the study participants

The majority of the patients, 102(40.8%), had moderate hearing loss followed by both moderately severe and severe hearing loss each accounting for 45(18%) cases and the least severe type was mild hearing loss accounting for 28(11.2%) cases. Females and males had predominantly moderate hearing loss (48.1% and 32.2% respectively) (Table 4).

DISCUSSION

In recent decades, hearing loss has become one of the most important public health concerns with significant social and economic implications.^[10,11] In children it causes poor intellectual and language development^[3] but in adults it tends to hamper professional engagement, social life including isolation due to stigmatisation.^[2]

The commonest cause of hearing loss in this study was presbycusis (52.8%) followed by ototoxicity (10.4%) and chronic suppurative otitis media (CSOM) (10.4%). These findings are comparable to those by Shuaibu et al, where presbycusis, ototoxicity and CSOM were the commonest causes.^[2] Dissimilar findings were reported in the study conducted by Rabbani et al, where CSOM, otitis media with effusion and idiopathic sudden sensorineural hearing loss were the commonest causes of hearing loss.^[12] Such disparity may be due to the relatively smaller sample size that we recruited compared to their population. On the other hand, the majority of the cases of ototoxicity in our study could be linked to use of gentamicin and quinine.

Our study found sensorineural hearing loss to be the commonest type of hearing loss followed by conductive and mixed types similar to other studies from different parts of the world.^[2,13] Predominance of this type of hearing loss may be attributed to some extent by shared genetic causes and similar occurrence of other comorbidities such as diabetes, hypertension, infections, vascular, neoplastic, iatrogenic, immunological and inflammatory conditions that afflict the cochlea.

Our study found moderate hearing loss to be the predominant severity subtype (40.8%) followed by moderately severe (18%) and severe (18%). Such findings correlate with those from a study by Shuaibu et al in North Western Nigeria [2] where the majority had mild-moderate hearing loss (64.3%)^[2], such similarity may be attributed to the fact that most of our patients had age-related hearing loss (52.8%) and they commonly present with mild-to-moderate hearing loss. The finding also appears to be different from what was found in a study that was conducted in Benin City, Nigeria, where mild hearing loss (44.5%) predominated.^[13]

Management of patients with hearing loss is often challenging and requires a non-limited resource environment for its perfection. Most of patients with sensorineural hearing loss were treated with hearing aids fitting and vitamins supplementation (vitamin B1, B2, B6, B12 and folic acid) in addition to counselling. Those with conductive hearing loss were treated according to the underlying causes by aural toilet, antibiotics, adenoidectomy with grommet tube insertion which resulted in marked improvement after management.

Limitations

Tympanometry was not available at the health facility. The sample size was too small from which to derive population-based conclusions. The results are also from a single institution and not multicentric and therefore not generalisable.

CONCLUSION AND RECOMMENDATION

Presbycusis was the commonest cause of hearing loss followed by ototoxicity and chronic suppurative otitis media. The majority of patients had bilateral moderate hearing loss and sensorineural hearing loss based on the pattern of hearing loss.

It is recommended that larger multicentric studies are done to increase generalizability of the findings.

Conflicts of interests: None

Sources of funding: None

Authors' contributions

ZSA contributed to study design, collected data, performed data analysis and prepared this manuscript. AAK contributed to study design, data analysis and critically reviewed this manuscript. All authors have read and approved the final manuscript.

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The impact of public health interventions in a developing nation: an overview

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ABSTRACT

Introduction: Around 80% of factors that determine population health sit outside the control of health services. It is essential we influence these factors in addition to those within the remit of health services in order to improve and protect the health of population in a developing country. Public health functions encompass working across the domains that constitute population health systems with various partners. The objective of this article is to give an overview of public health interventions that can improve the health of the population of a developing nation.

Method: A descriptive study, based on a review of the literature of key public health frameworks and interventions that are likely to have significant impacts on population health. Some selected public health interventions and case studies are highlighted to illustrate the importance of priority areas in developing countries.

Results: Various public health frameworks recognise the importance of wider determinants of health (socio-economic factors), effective healthcare, healthy behaviours, working with communities as critical to securing population health. Another framework adopts a life-course model of intervention starting from public health interventions during preconception period and childhood, adolescence, working life and older age. For many developing countries, the author identified some examples of priority areas for interventions such as stopping and preventing wars; improving child health, including free school meals; achieving universal healthcare through integrated primary health care; addressing commercial determinants of health; embracing new technologies; and measuring and monitoring population health.

Conclusion: In order to improve the health of a population in a developing country, attention needs to go beyond health services to influence the wider determinants of health, health behaviours and adopting the World Health Organisation's roadmap on essential public health functions.

Keywords: Public health interventions, socio-economic factors, effective healthcare, healthy behaviours, essential public health functions

INTRODUCTION

In the August 2022 issue of South Sudan Medical Journal, Dr David Bassiouni highlighted the need for public health articles to address the major health problems facing the population.^[1] The call for articles in this area is highly welcomed.

Public health is defined as “the science and art of promoting and protecting health and wellbeing, preventing ill-health and prolonging life through the organised efforts of society.”^[2] Context matters, as we consider addressing public health interventions in specific countries. Although public health challenges vary between countries, there are many common public health challenges. Within each country, particular attention is needed to address unacceptable and unfair variations in health outcomes, referred to as health inequalities. Health

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inequalities stem from societal inequalities (unfairness), often rooted in political policies of a government and how they are implemented. Hence, the solutions to tackling both societal and health inequalities have major bearing on the political will of the government to address the root causes of the problems. There are historical and current lessons that can be drawn from some developed and developing countries on how public health interventions have improved the health of the population.

The objective of this article is to give an overview of public health interventions that can improve the health of the population of a developing nation and South Sudan in particular. This article will give an overview of the relevant public health frameworks to guide an approach to public health interventions. It will then outline some selected public health interventions, considered to be priorities.

METHOD

Using a descriptive study approach, the author reviewed the literature on key public health frameworks and public health interventions likely to have major impacts on population health, while drawing upon his own public health experience. Some selected public health interventions and case studies were highlighted to illustrate the importance of priority areas in developing countries.

RESULTS

An overview: Frameworks

There is increasing realisation that despite the best efforts of delivering accessible and quality healthcare, such efforts remain limited, and contribute to only about 20% of the

health of a population, while 80% of the health of the population is determined by (1) socioeconomic factors (40%); (2) health behaviours (30%) and (3) physical environment (10%).^[3] Examples of socioeconomic factors include education, employment, income, family and social support and community safety. Health behaviours include tobacco use, diet, exercise, alcohol and drug use and sexual activities.^[3] Factors such as those related to air quality, transport, water quality, and housing are examples of determinants of physical environment.^[3]

The King's Fund (UK) on the other hand, described a population health system consisting of four key domains: (1) the wider determinants of health e.g. education, housing, transport and leisure; (2) health behaviours e.g. smoking, alcohol consumption, diet and exercise; (3) integrated health and social care system; and (4) the places and communities we live in and with.^[4] Other public health experts favour a life course model to improving population health by addressing public health challenges at all stages of life: preconception, infancy and early years; childhood and adolescence; working age and adults; and older people.^[5]

In 2022, the World Health Organisation (WHO) and partner organisations published a roadmap document, which outlined the national workforce capacity to implement essential public health functions, which are outlined in Box 1.^[6] These were developed by stakeholders from both developing and developed nations and are therefore deemed relevant to stakeholders in developing countries. The list of 12 essential public health functions provides a framework for the types of public health functions that are needed in each country. The WHO expects each country to endorse the roadmap and to bench

Box 1. A consolidated list of essential public health functions (EPHFs) developed by World Health Organisation (WHO), 2022.

1. Monitoring and evaluating the population's health status, health service utilization and surveillance of risk factors and threats to health.
2. Public health emergency management.
3. Assuring effective public health governance, regulation and legislation.
4. Supporting efficient and effective health systems and multisectoral planning, financing and management for population health.
5. Protecting populations against health threats, including environmental and occupational hazards, communicable disease threats, food safety, chemical and radiation hazards.
6. Promoting prevention and early detection of diseases, including non-communicable and communicable diseases.
7. Promoting health and well-being and actions to address the wider determinants of health and inequity.
8. Ensuring community engagement, participation and social mobilization for health and well-being.
9. Ensuring adequate quantity and quality of public health workforce.
10. Assuring quality of and access to health services.
11. Advancing public health research.
12. Ensuring equitable access to and rational use of essential medicines and other health technologies.

mark where it is with its public health workforce needed to implement the essential public health functions.^[6]

Selected public health interventions

a. Interventions to stop and prevent war

War is a major public health issue and affects all stages of life. The impact is immediate and long-term, resulting in deaths, injuries, and subsequent health problems such as traumatic experiences, diseases and lack of access to essential healthcare.^[7] A study by the London School of Hygiene and Tropical Medicine (2018) estimated that between December 2013 and April 2018, there were 383,000 excess deaths in South Sudan, a high proportion of these were attributable to violence (war).^[8] The same report also reported violence as the major cause of excess deaths in other parts of Africa, for example, Darfur in Sudan (68-93% of deaths); Democratic Republic of Congo (605,000 deaths between 2003-2004); and Chad (91% of deaths among refugees from Central African Republic).

Therefore, it is in the best interest of public health to prevent wars or stop them where they exist by addressing societal injustices and exclusions of sections of the population that give rise to negative impacts on health outcomes and health inequalities. Wars tend to undermine all human development indices, including health outcomes.

Some of the consequences of war include traumatic brain injuries, spinal injuries, limb losses and post-traumatic stress syndrome. These call for appropriate rehabilitation interventions, provision of artificial limbs to render victims independent and self-supporting, and suitable employment.

b. Interventions to improve child health

One of the greatest impacts follows interventions to protect and improve the health of children, giving them the best start in life.^[5] Evidence suggests that investment in children has the potential to yield 10:1 benefit-cost ratio in health, social and economic areas.^[5]

Among the top childhood interventions include clean water, vaccination, adequate nutrition (including free school meals), and quality housing. While vaccination falls within the remit of the health service, efforts in other areas such as the provision of clean water and adequate nutrition do not. It is the recognition of cross-governmental cooperation and partnership working that ensures the health of children is protected and improved.

Free school meals for primary school children have been implemented successfully in Botswana since 1960s, championed by its first President, Seretse Khama with the aims of (1) increasing school enrolment, attendance and retention; (2) reducing hunger and malnutrition;

and (3) boosting domestic food production.^[9] Botswana's experience showed a close partnership working, initially with the UN World Food Programme at the earlier stage and gradually the free school meal initiative moved under full government responsibility. Although the Ministry of Local Government and Rural Development had the overall responsibility, it collaborated with partners within the government (e.g., Ministries of Health, Education, Finance, etc), Partnership for Child Development, New Partnership for African Development (NEPAD). In 2014, Botswana had provided one free school meal per pupil per day to 755 primary schools, covering 331,000 learners. It has a population of 2.3 million according to 2022 population census. Botswana extended the initiative of free school meals to pre-school children. It had even managed to provide two school meals per day for children in boarding schools from rural areas.^[9]

c. Integrated Primary Health Care

In a previous edition of the South Sudan Medical Journal (2019)^[10], detail was published of an integrated primary health care (iPHC) model for a developing country, consisting of five pillars: (1) public health services (2) clinical services (3) universal registration of population in the catchment areas; (4) a standard building infrastructure; and (5) training of multi-disciplinary healthcare workforce. This proposed model remains valid.

d. Measuring and monitoring the health of the population

Improvement in population health can come about if there is a clear requirement to report on the state of health of a country, and its administrative units (e.g., states or counties). These reports should be produced annually or at regular intervals as deemed appropriate for the country, or its administrative units, which help to capture the progress or deterioration in health status, and key priorities based on health needs. In the UK, it is a legal requirement since 1847 for Directors of Public Health (formerly Medical Officer of Health) of local authorities to produce and publish an annual report of the health of the population of each local authority area.^[11] The requirement to measure and report on the health of the population is consistent with the essential public health functions produced by the WHO.^[6] It is important to incorporate both quantitative and qualitative health outcomes in measuring health.

In 2011, the UN General Assembly adopted a resolution, which gave importance to happiness and well-being to be measured and monitored by countries. It focused attention on how to achieve, and measure socio-economic development in each country. Since then, World Happiness Reports have been produced annually.^[12] It is therefore, important to incorporate a qualitative assessment of happiness and wellbeing of the citizens in population health reports.

e. Commercial determinants of health

It is now clear that there are threats to health posed by commercial industries whose sole purpose is to make profits. The products of commercial industries endanger health, especially in developing countries where regulatory systems are weak. These include industries linked to producing tobacco products, drinks and food products, alcohol, fake medical products among others. They have short- and long-term health implications. Governments in developing countries must pay attention to strengthening their legislative and enforcement measures (powers) and use them effectively to tackle these public health threats.^[13]

f. The use of health technologies

There is increasing use of new technologies, especially mobile telephones, in most developing countries. These advances provide opportunities for enhancing the delivery of a health service at a distance (telehealth). A previous edition of South Sudan Medical Journal contained an article by this author on the potential for telehealth.^[14] There are also lessons that can be drawn from research carried out on why and how new technologies fail or succeed to embed in routine health services.^[15]

DISCUSSION

Improvement in population health is closely linked to the overall welfare of a nation; its socio-economic development, state of peace in the country, in addition to access to universal health care. In countries affected by war, it is hard to see a thriving population, therefore war must be seen as a public health threat. This article provides several frameworks to help in contextualising public health interventions in a country. Most of these frameworks are inter-related and acknowledge the role of wider determinants of health, and partnership working.

The selected public health interventions described above (a)-(f), are only an overview and serve as examples. Each deserve detailed examination, as a stand-alone article, so are many other public health interventions, which other public practitioners will build upon.

CONCLUSION

The overall health of a nation is influenced by a wide range of factors, including socio-economic factors (wider determinants of health), access to quality health care, and healthy behaviours. Effective delivery of essential public health functions, as described by the WHO, help developing countries towards improving the health of their populations. Several public health priorities for interventions were identified for consideration and they include: stopping and preventing wars, offering free school meals, access to universal health care through an

integrated primary care model, addressing the threats of commercial determinants of health, embracing new technologies, and monitoring population health.

Conflict of interest: None

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Delivering a long-lasting insecticidal net campaign in South Sudan

South Sudan is among the 29 countries with the highest malaria rates in the world. Malaria remains the leading cause of illness and death in the country, accounting for 41 percent of outpatient visits at health facilities, 34 percent of inpatient admissions and 20 percent of all-cause mortality, according to the 2021 District Health Information System data analysis.

From 2022 to 2023, with funding from UNICEF through the Global Fund to Fight Aids, Tuberculosis and Malaria, and in collaboration with the State Ministry of Health and the National Malaria Control Programme, the Malaria Consortium is supporting the Ministry of Health to implement a long-lasting insecticidal net campaign in Central Equatoria and Northern Bahr El Ghazal. This campaign is applying a flexible approach, both door-to-door and fixed-point delivery, allowing the use of the most suitable delivery method for the circumstances on the ground, especially in flood-prone areas.

See <https://www.malariaconsortium.org/resources/publications/1646/delivering-a-long-lasting-insecticidal-net-campaign-in-south-sudan>

Planning for classroom teaching

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ABSTRACT

Many variables affect the outcome of classroom teaching. Planning is needed to consistently achieve success. This includes the creation of a lesson plan, with teacher and learner activity focused on achieving the intended learning outcomes. Key issues to be considered are class size; creating a physical and psychological environment for learning; and supporting learning with ‘scaffolding’ and formative assessment.

Key words: teaching, planning, classroom, lesson, learner

INTRODUCTION

Teaching is a practice, and no class is ever quite the same. Careful preparation supports more consistently successful practice. Here, we continue our series on healthcare teaching by discussing how to plan for classroom teaching.

PLANNING CLASSROOM TEACHING

Planning classroom teaching takes time, but it is time well spent. When planning a class, we think about the students’ needs and capabilities, our aim, and how we will achieve it. Planning helps ensure that the session is purposeful, that it engages students in a range of appropriate activities, and that it reflects the wider goals of the curriculum, within the constraints of time and resources. In creating our plan, we mentally rehearse our teaching. The plan provides a checklist of the teaching resources that we will need. During teaching, it acts as a prompt, helping us stay on track and keep to time. Following teaching, we can review and amend the plan for future use. Figure 1 illustrates a basic format for a classroom teaching plan.

Session Title:			No. of Trainees:	Duration:
Session Aim(s)			Resources needed to deliver the session:	
Intended Learning Outcomes By the end of the session trainees will be able to:				
Timings (Minutes)	Topic/heading	Teacher activity	Learner activity	

Figure 1. A format for a teaching plan

Rich Bregazzi 2018

The aim is a brief statement of the purpose of our teaching. For example: ‘To rehearse general paediatric clinical assessment procedures, in preparation for clinical placement’.

Intended learning outcomes state precisely what students should be able to do on completion of the session. They comprise a verb and some conditions. For example: ‘Explain how to maintain the confidence of babies and infants when carrying out a clinical assessment’; ‘Perform a general health assessment and physical examination of a paediatric patient, under supervision’; ‘Record assessment findings clearly and accurately, using appropriate documents’. Taken together, the aim and learning outcomes provide a focus for our teaching, inform students of what to expect, and provide criteria for measuring success.

We then need to decide how to go about achieving our aim. Here, we also need to consider the overall goal of the curriculum. It may, for example, be threefold: to develop the students’ healthcare knowledge, professionalism, and ‘metaknowledge’ (their self-awareness, and knowledge of their own strengths and weaknesses). How we approach teaching our particular topic should support the overall goal.

Teacher activity concerns what we will do in order to deliver our lesson. Learner activity concerns what the students will do. Teacher activity typically includes presenting information, asking, and answering questions, discussing, showing, setting tasks, and assessing. Learner activity includes listening, making notes, answering, and asking questions, but goes beyond this to include presenting, discussing, and engaging in tasks such as role play and problem solving.

Success is more likely when teachers know their students’ existing knowledge in relation to the topic, and the gap between this and the intended learning outcomes.

Teachers can then select appropriate content. However, teaching and learning are a joint endeavour. Rather than treating learners as passive receivers of information, we want them to be actively engaged in their own learning. To maintain this engagement, and stimulate learning through thought and action, we might plan a variety of activities, with a change of pace every 20 minutes or so. Learner activity can then be structured to progress from more basic to more advanced challenges: recalling facts, explaining, practicing, solving problems, analysing, evaluating, and generating ideas.^[1]

HOW DOES CLASS SIZE AFFECT TEACHING?

Class size affects communication, group-work, and the relationship between the teacher and students (see Table 1). A class of eight students offers different possibilities from a class of fifty. Class size enables and constrains possibilities for teaching, but within these limits the teacher selects the optimal approach for achieving the aim.

CREATING A LEARNING ENVIRONMENT

As well as arranging for breaks and refreshment, we should consider the physical and psychological conditions of the classroom,^[2] both of which influence learner behaviour. Physical conditions comprise room size, temperature and lighting, classroom equipment, and seating arrangements. Seating arrangements have a significant influence on the nature of class discussion, and seating should be arranged to facilitate the activities required by the teaching plan. Options include traditional classroom or boardroom arrangements, which tend to be formal and teacher focused; and less formal, more learner focused circles or small groups, with or without tables.

The suitability of the physical environment may be offset if students do not feel ‘psychologically safe’^[3] enough to

Table 1. Some distinctions between large and small group teaching

Large Group Teaching	Small Group Teaching
Physical aspects of the room are largely fixed, with students in rows facing the teacher.	Physical aspects of the room allow for various seating arrangements. Students can face each other.
Hierarchy between teacher and students is maintained.	Hierarchy between teacher and students can be reduced.
Individual students may go unnoticed. It is difficult to assess individuals and attend to individual need.	All students within the group are noticeable to the teacher. It is easier to assess individuals and attend to individual needs.
The teacher communicates with many students, but students are less able to communicate with each other or the teacher. The openness of communication may be constrained.	Students can communicate more easily, and perhaps more openly, with each other and with the teacher.
Scope for groupwork is limited, although students may work in twos and threes.	There is ample scope for group activities.

Table 2. Examples of ‘scaffolding’

Written task instructions that are available for students when needed.

Visual aids, diagrams, and images, to help students grasp the topic.

Thoughtful ‘Socratic’ questioning^[8], using questions to clarify, probe, and uncover assumptions, reasons, alternatives and implications.

Asking students to complete tasks in pairs, before completing similar tasks individually.

Using ‘Think, pair, share’^[9]: ask students to think about a question, then ask them to share their thinking in pairs; if time permits, pairs can share their conclusions with another pair, or the class.

Table 3. Examples of formative assessment

Assess student progress, provide guidance on goals, standards, and how to improve.

Observe, listen, question; diagnose the learning problem and discuss.

Design activities that prompt students to present the outputs from their task, allowing learning to become visible to the teacher and the class.^[12]

Incorporate self-assessment and peer-assessment into tasks, so that students can develop responsibility for their own learning.^[13]

engage fully in classroom activity. A lack of psychological safety can reduce risk taking activity, such as speaking up in class or involvement in activities. More acute stress can affect learning by inhibiting ‘cognitive flexibility’^[4], the ability to think flexibly about more than one idea.

Of course, healthcare professionals work in stressful conditions. Their education should prepare them to be resilient and to overcome challenge. In this, confidence in one’s capability, or ‘self-efficacy’^[5] is important. Self-efficacy helps reduce stress, and enhances commitment to sustaining effort and mastering tasks. It can be promoted, in the classroom, by encouragement, by seeing peers succeed, and by experiencing success. Setting students’ appropriate challenges can motivate learning and help develop self-efficacy. Challenge is best offered, though, in conditions of psychological safety, and selected with the capabilities of the learners in mind.

The relationship between students and teacher is central to creating a learning environment. How we demonstrate our trustworthiness, care, and respect for students is likely to be shaped by our personality, as well as social and cultural norms. It is important, though, to remain genuine.^[6] Approaches include:

- Making personal connections with students.
- Starting the session with a brief ‘icebreaker’ exercise, to relieve any tension and promote readiness to engage.
- Not disparaging students’ efforts, or allowing students to disparage each other.
- Treating questions as genuine, and worthy of an answer.

- Encouraging and giving time for students’ contributions.

SUPPORTING LEARNING WITH ‘SCAFFOLDING’

Teachers should always remain alert to the needs of their students, providing support to the class and to individuals. Knowles^[7] advises that teachers should find out what the learners already know and build from this, constructing new learning on the foundation of existing knowledge. The construction of new learning may require ‘scaffolding’: temporary support that can be withdrawn as learners’ move towards more independent and confident understanding. This comes in many forms, both practical and psychological. It may, for example, mean offering visual, verbal, and practical ways of grasping a topic; simple encouragement; managing the class to enable student-to-student support; or providing ways for students to find help when needed. Table 2 offers some more examples of ‘scaffolding’.

THE IMPORTANCE OF FORMATIVE ASSESSMENT

‘Formative assessment’^[10,11] is a process of evaluation and feedback that is integral to teaching. It is used to motivate and direct learning, offering information to students about performance, standards, and ways to improve. Formative assessment may be authoritative or provisional, it may focus on the learning objectives or on students’ interim needs, but to be truly ‘formative’ the information has to be accepted and put to use. Although teachers may initiate formative assessment, because it is processed and put to

Table 4. Applying these ideas to your practice

<p>What is your overall educational goal? How can your approach to teaching support this goal?</p> <p>Think of two new ways to engage students in activity during a class.</p> <p>Think of two new ways to encourage psychological safety in your class.</p> <p>Think of two new ways to encourage student self-efficacy in your class.</p> <p>Think of two new ways to demonstrate your trustworthiness, care, and respect for the learners in your class.</p> <p>Think of two new ways to ‘scaffold’ learning in your class.</p> <p>Think of two new ways to provide formative assessment in your class.</p> <p>Use the template provided to develop a teaching plan for one of your teaching sessions.</p> <p>How will you set out your classroom to support your teaching plan?</p> <p>Following your teaching, review your teaching plan to amend and improve it for the future.</p>

use by the learner it is ultimately a joint accomplishment between teachers and students. This requires students to apply metacognitive skills, and so formative assessment can contribute to developing both clinical knowledge, and ‘metaknowledge’.

Table 3 offers some examples of formative assessment.

IMPROVING TEACHING PRACTICE

Teaching and learning are conditional and uncertain practices. What works best in any situation is open to discussion. Teaching requires perseverance, adaptation, and experimentation to build a repertoire of expertise. Planning teaching, then reviewing and amending plans in the light of experience, supports this process. In Table 4, we encourage you to think further about these ideas, discuss them with colleagues, and apply them to your situation as you continue to develop your own teaching repertoire.

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Tuberculous Pericarditis

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ABSTRACT

Tuberculous pericarditis is a serious problem in sub-Saharan Africa with a mortality at six months of about 40% if there is associated HIV infection and 17% without. The key to improved treatment is for the clinician to be alert to the warning features, to conclude the diagnosis promptly and institute treatment as a matter of urgency.

Key words: tuberculous pericarditis, effusion, pericardiocentesis, steroids.

INTRODUCTION

A recent review by Apiu et al in this journal highlighted the importance of recognising extra-pulmonary tuberculosis.^[1] It is now proposed to describe in more detail the various extra-pulmonary sites that may become infected with *Mycobacterium tuberculosis*. This article, based on our “Back to Basics” initiative, focuses on tuberculous pericarditis.

The pericardium is an important structure that surrounds the heart and the great vessels. It comprises two main layers: an outer fibrous layer and a thinner internal serous one. The fibrous pericardium is attached to the central tendon of the diaphragm and is relatively rigid. The serous pericardium has two layers: an outer parietal and an inner visceral one that forms the epicardium. The space between the fibrous and serous pericardial layers normally contains between 20 and 60ml. of fluid. See Figure 1.

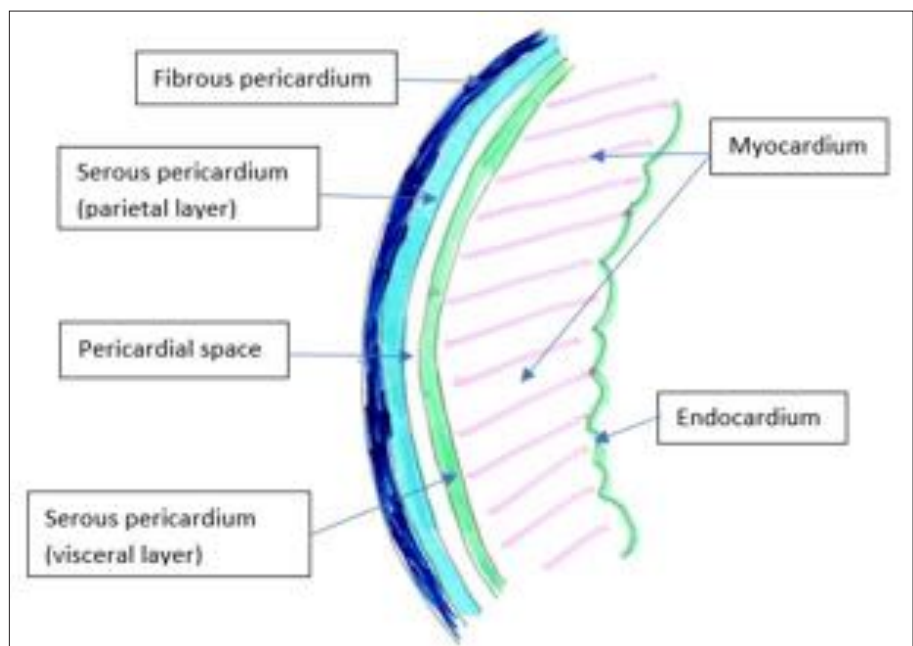


Figure 1. Schematic diagram of pericardial structures

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There are four key functions of the pericardium:

1. Fixation of the heart within the mediastinum.
2. Lubrication of movement of the heart.
3. Limits any overfilling of the heart.
4. Protection against infection from adjacent structures, especially the lungs. However tubercular infection of the pericardium may still result from erosion from adjacent mediastinal lymph nodes.

Inflammation of the pericardium (pericarditis) has numerous causes:

1. Viral including the human immunodeficiency virus and Covid19.
2. Bacterial especially *Staphylococcus*, *Streptococcus* and *Pneumococcus* and *Mycobacterium tuberculosis*.
3. Fungal: e.g. *Candida albicans*.
4. Parasitic e.g. *Taenia solium* (cysticercosis), *Entamoeba histolytica* (amoebiasis), *Echinococcus granulosus*.
5. Dressler's syndrome following myocardial infarction or cardiac surgery.
6. Connective tissue disorders e.g. rheumatoid arthritis and systemic lupus erythematosus.
7. Renal failure.
8. Malignancy especially lung and breast cancer.

Between 1% and 2% of patients with pulmonary tuberculosis (TB) are found to have an associated pericardial infection. The occurrence of this cause of pericarditis has increased with the spread of HIV.^[2] In a series from Tanzania patients with large pericardial effusions and HIV all had TB pericarditis.^[3] TB is the commonest cause of pericarditis in developing and emerging countries.^[4]

WHEN TO SUSPECT TUBERCULOUS PERICARDITIS AND EFFUSION

The clinical history and physical examination are key to indicating the likelihood of tuberculous pericarditis. Known or detection of TB elsewhere in the body should raise suspicions further.

1. Retrosternal chest pain that may be aggravated by deep breathing, coughing and lying supine. It tends not to occur with exercise as with angina pectoris (ischaemic coronary artery disease).
2. Pericardial friction rub heard especially over the lower sternal area. It may be loudest in full expiration, sitting up and leaning forward. It disappears as pericardial fluid accumulates.

3. Malaise.
4. Fever and nocturnal sweating.
5. As the pericardial fluid collects the patient becomes breathless on exercise with the following physical signs:
 - i. Tachycardia and falling blood pressure.
 - ii. Pulsus paradoxus: with respiratory inspiration the arterial pulse becomes weaker and the systolic blood pressure falls.
 - iii. The jugular venous pressure rises and further still on inspiration (Kussmaul's sign) which is the opposite of normal.
 - iv. The heart sounds become less audible with an added third heart sound.
 - v. The cardiac apex beat is less easily palpable.
 - vi. With increasing compression of the heart hepatomegaly and
 - vii. Ascites develop.

If the pericardial effusion collects rapidly there is less time for the pericardium to stretch and the above signs appear more quickly indicating an emergency situation.

CONFIRMATION OF THE DIAGNOSIS

1. An electrocardiogram recording will show a falling voltage of the QRS complex as an effusion collects. In the early stages of the pericarditis there may be an upward curvature of the elevated ST segment.
2. A chest Xray may show evidence of pulmonary TB including a pleural effusion. With the accumulation of pericardial fluid the heart silhouette enlarges and becomes globular. With longer standing disease the pericardium may calcify and be seen on the Xray outlining the heart.
3. An echocardiographic examination confirms the presence of a pericardial effusion. In the absence of this facility an abdominal ultrasound machine may be used directing the probe upwards from the xiphisternum. If the effusion is less than 0.8 cm. thick then there is likely to be up to 200 ml. and if 1.5 to 1.8 cm. the volume may reach 1,000ml.^[5]
4. In 80% the effusion is bloody containing large numbers of lymphocytes and a high protein (>30G/L). In up to two thirds a culture will be positive for TB.
5. In the absence of any other obvious cause (see list above) then TB pericarditis must be seriously considered.

6. In all cases the HIV status of the patient should be established. If positive this will increase TB as the underlying cause.

MANAGEMENT

The rapid onset of cardiac compression (tamponade) is an emergency. Aspiration of the pericardial effusion is required. This is best and most safely done with echocardiographic guidance via the sub-xiphoid route. However, without such guidance the careful insertion of a needle and plastic cannula can be life-saving.

There are many risks with pericardiocentesis.^[6] The key ones are:

1. Puncture of the heart.
2. Damage to epigastric, intercostal and coronary arteries.
3. Pneumothorax.
4. Cardiac dysrhythmias.
5. Infection.

In the absence of an emergency and if no facility or skill is available for diagnostic aspiration of pericardial fluid then a judgement must be made about the likelihood of a tubercular cause. If the latter is concluded then treatment is urgent.

Anti-TB treatment should be along conventional lines including the four drugs isoniazid, rifampicin, pyrazinamide and ethambutol given for four months. Thence another two months of isoniazid and rifampicin.

The benefit of adding steroids to the treatment regimen remains uncertain. There are indications that there is a more rapid recovery, a reduction in re-accumulation of pericardial fluid, less need for pericardectomy later and reduced mortality although the latter has not always reached significance in trials.^[7,8] The schedule of prednisolone cited by Parry et al^[9] is:

- Loading dose of 60 mg,
- 30 mg daily for 5 – 8 weeks reducing to
- 15 mg. daily for 9 – 10 weeks and
- 5 mg. daily for week 11.

With optimal measures being taken to treat, the effusion resolves in about 80% of patients but 20% go on to develop a thick fibrinous pericardial exudate and calcification and

a degree of chronic cardiac constriction with a fifty percent chance of needing a pericardectomy. The mortality remains a challenge: a South African study^[10] revealed at six months a 40% mortality of the group of patients who also had HIV and 17% in those who were HIV free.

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Abdominoscrotal hydrocoele: a case report

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ABSTRACT

Abdominoscrotal hydrocoele is a rare condition in which the hydrocoele sac extends beyond the scrotum into the abdomen through the inguinal canal. Various ideas have been proposed regarding this condition but controversy remains. We report a case of abdominoscrotal hydrocoele in a 16-year-old boy. The operative findings are discussed.

Key words: Hernia, surgery, abdominoscrotal hydrocoele, Ethiopia

INTRODUCTION

Abdominoscrotal hydrocoele (ASH) is rare accounting for only 1.25% of all types of hydrocoeles.^[1] Associated diagnoses include cryptorchidism and contralateral hernia. ASH presents as a dumbbell –shaped giant hydrocoele that occupies the scrotum and extends into the abdominal cavity through the inguinal ring with either an intraperitoneal or retroperitoneal component.^[2]

CASE REPORT

A previously healthy 16-year-old boy presented to Wolaita Sodo University Teaching and Referral Hospital in January 2022 with a gradual onset over two years of a right lower abdominal and scrotal swelling associated with dull dragging pain. He had no history of fever or trauma or any other condition. On examination there was a large non-tender lump in the right iliac region extending towards the right side of the umbilicus and the right inguinal area (Figure 1). The right testis was not palpable but the left testis was normal. An ultrasound examination showed a large anechoic cystic lesion extending from the abdomen to the scrotal region through the right inguinal canal and with a right mild hydronephrosis.



Figure 1. Abdominoscrotal swelling in the right lower quadrant of the abdomen extending into the groin and scrotum.

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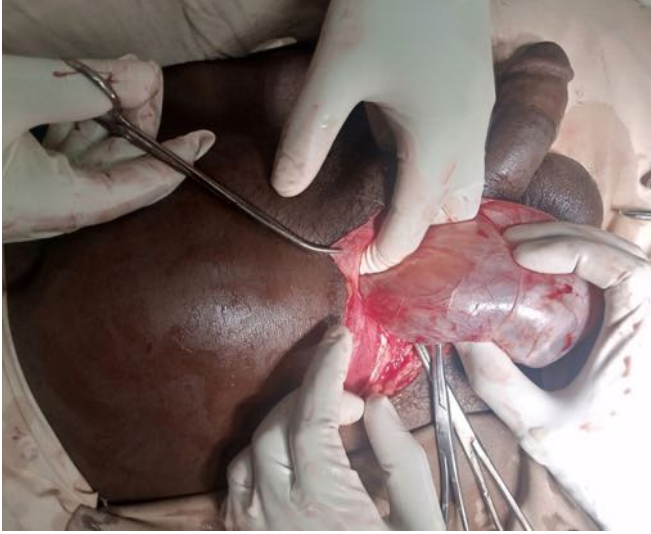


Figure 2. The right inguinal incision and dissection of the sac.



Figure 3. Extension of incision and identification of the sac.



Figure 4. Drainage of fluid from the sac

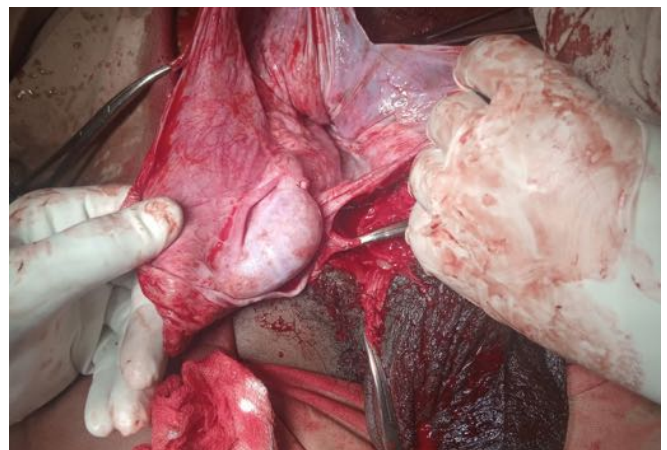


Figure 5. Excision of sac

An incision was made over the right inguinal region extended to suprapubic area about 6cm area. The tissue layers were dissected out and the dartos fascia was incised, exposing the hydrocoele. The sac was separated superiorly from the extra-peritoneal fascia and inferiorly from the scrotal wall with sharp and blunt dissection. The hydrocoele and testicle were delivered through the incision and dissected away from the spermatic cord. The hydrocoele sac was freed from the surrounding tissue with a moist sponge, clearly exposing the parietal layer of the tunica vaginalis. The hydrocoele was incised and approximately 700ml straw-coloured fluid drained.

The redundant hydrocoele sac was excised and sent for histopathological examination. The edges of the sac were everted loosely behind the testis and sutured to each other using a running 3-0 polyglycolic (Vicryl). The dartos fascia and scrotal skin were closed with running and interrupted 3-0 chromic sutures. All bleeding points were cauterized to maintain haemostasis, a drain was placed and the skin closed (Figures 2,3,4,5). The patient tolerated the procedure well.

He was kept nil per mouth for six hours and started maintenance fluid normal saline 0.9% 1 liter every eight hours and IV antibiotics ceftriaxone 1g BID for 72 hours and analgesia with tramadol 50mg QID and diclofenac sodium 75mg IM and elevation of scrotum to reduce swelling. After 24 hours the drain was removed. On the 5th postoperative day the wound was clean and the patient was discharged from hospital.

DISCUSSION

ASH presents typically as a scrotal hydrocoele associated with an ipsilateral abdominal mass. The aetiology of ASH is not clear. A likely cause is enlargement and extension of a scrotal hydrocoele into the retroperitoneal or preperitoneal space after closure of the processus vaginalis. It has been found that the hydrocoele fluid was exudative.^[1] Massive enlargement of the hydrocoele may extend into the upper abdomen and be associated with hydroureter and hydronephrosis, lower extremity oedema or even appendicitis.^[1]

Brodman described a high obliteration of the processus vaginalis above the deep inguinal ring, leaving a high infantile hydrocoele.^[2] However, a more widely accepted view by Dupuytren suggests that excessive intracystic pressure causes cephalad extension of a scrotal swelling through the deep inguinal ring.^[2]

The diagnosis is strongly indicated from careful clinical examination. Ultrasound scanning is a useful technique defining the surgical anatomy. CT and MRI imaging, if available, would provide further information.^[3,4]

The usual surgical approach is an inguinal incision with proximal dissection of the hydrocoele sac from its abdominal attachments and then distally with complete or partial mobilization.^[5] Aspiration of the scrotal component may facilitate the proximal dissection.

Some surgeons advocate orchidopexy to avoid iatrogenic cryptorchidism torsion.^[5] An alternative approach is via a midline abdominal incision for large bilateral cases or laparoscopic decompression of the abdominal component followed by inguinal excision to avert injury to the spermatic cord or vas deferens.^[1,4,5] An abdominoscrotal hydrocoele is a collection of fluid in the tunica vaginalis, which extends from the scrotum to the abdominal cavity.^[6]

CONCLUSION

Abdominoscrotal hydrocoele should be included in the differential diagnoses of an abdominal cystic mass.^[7,8,9] A careful clinical examination is likely to indicate the correct cause followed by ultrasound scanning.

Conflicts of interest: Nil

Credits for images: Figure 1 Louis Marko, Figures 2, 3, 4 and 5 Dr Nikolas and Nurse Taferhu.

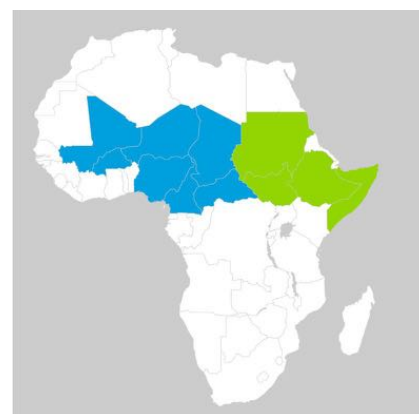
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Acute heart failure from electrical shock: a case report

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ABSTRACT

A report of a 13-year-old female with respiratory distress following an electrical shock at home and the management undertaken at the hospital in Yei; including implications for South Sudan.

Key words: electrical shock, heart failure, respiratory distress, South Sudan

CASE REPORT

A 13-year-old female was brought to our hospital in distress after sustaining a shock when she placed her left hand on wire coming from the wall socket. Initial assessment showed T 37.1°C, pulse 133/minute, BP 118/42, O₂ saturation 66% on room air, as assessed by pulse oximetry. The patient had marked breathlessness. There were crackles throughout the chest. Heart examination revealed tachycardia without murmurs or gallop rhythm. Her spleen was palpable 4cms below the left subcostal margin. The liver was not palpable. There were multiple blisters, mild swelling and marked pain in so she was unable to fully open or close her left hand (Figure 1a).

She was given O₂ supplementation via nasal cannulae and IM diclofenac 75 mg for severe pain. On O₂ 2 Lpm, her O₂ saturations increased to 84%. She was given dexamethasone 16 mg IV and then frusemide 40 mg IV and her respiratory status improved substantially over one hour Her O₂ saturations increased to 94%, still on 2 Lpm via nasal cannulae. We put Silva-sulphadiazine cream on the burns of her hand with using a sling sheet to minimize the oedema. The oxygen saturations continued to improve. Because of concerns about myoglobinaemia



Figure 1a. This picture shows the hand at presentation. The palm was discoloured. There was induration and the patient was unable to close or open the palm. There were blisters that were assumed to be the primary points of contact with the electrical wire. (Credit: Ann Mutunga)

Citation: Mutunga et al. Acute heart failure from electrical shock: case report. South Sudan Medical Journal 2022;15(4):162-164 © 2022 The Author (s) License: This is an open access article under [CC-BY-NC](https://creativecommons.org/licenses/by-nc/4.0/) DOI:<https://dx.doi.org/10.4314/ssmj.v15i4.10>



Figure 1b. The hand one week later, showing resolution of the induration and normal function of the fingers. The blisters were superficial and not inflamed. (Credit: Ann Mutunga)



Figure 1c. Another view of the hand in recovery. Other than the blisters, there was no evidence of injury. (Credit: Aaron Osman)

leading to obstruction of renal tubules and balanced against the concerns for her heart, we gave a slow infusion of normal saline, 3 L over 18 hours. Ultrasound of the heart showed tachycardia, but normal contractility and size of the ventricles.

The next morning, she had O₂ saturations of 96% on room air. The swelling in the hand was substantially reduced. We treated her empirically for malaria because of the splenomegaly.

One week later, the patient had blisters without evidence

of infection on the left hand (Figures 1b and c). The swelling had reduced and normal function had returned. Her BP was 118/50 and pulse 88 / minute. O₂ saturation on room air was 99%. T 36.1°C. The remainder of her examination was normal.

DISCUSSION

The severity of electrical shock varies greatly, from mild discomfort to death. Cardiac complications include dysrhythmias, asystole, and direct injury to the

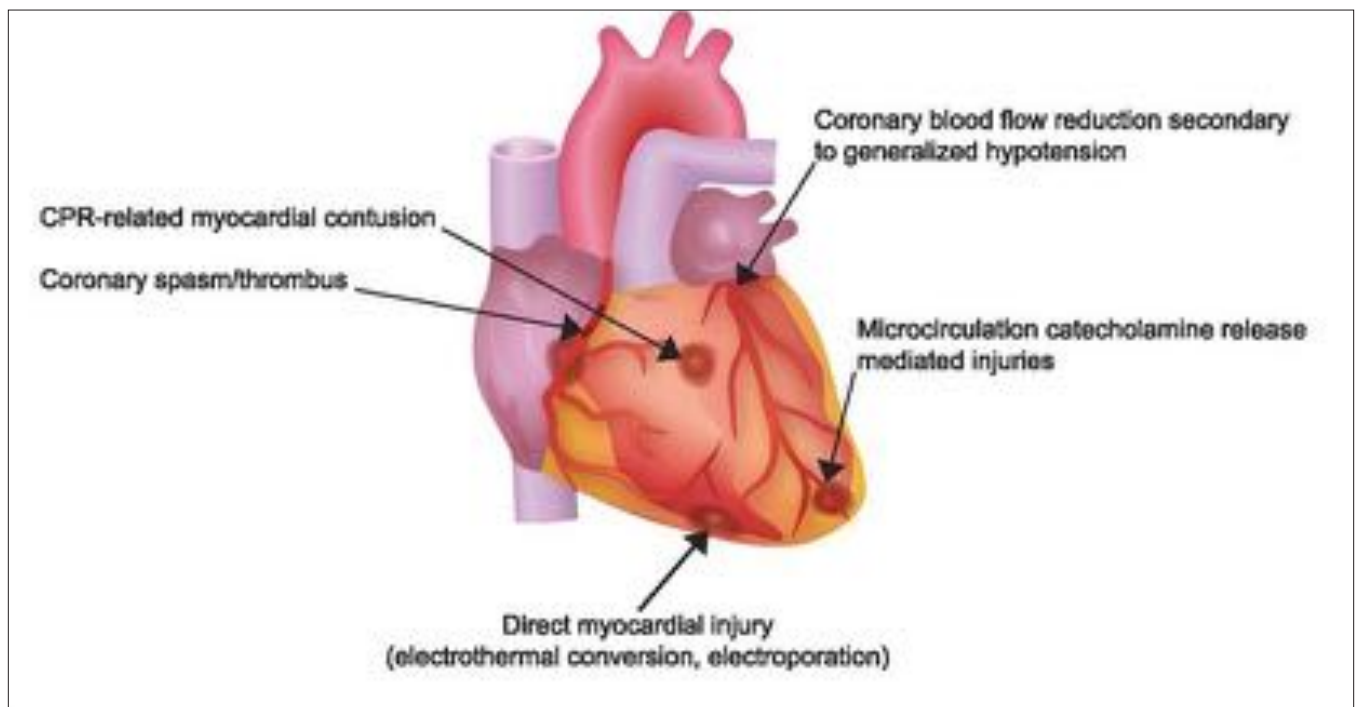


Figure 2. This diagram shows potential means of injury to the heart following an electrical injury, ranging from direct myocardial injury to dysrhythmias to physical injury if CPR was required. (Published with permission from *Electrical cardiac injuries: current concepts and management. European Heart Journal* 2018;39(16))

Table 1. Power sources and their electrical potential for causing injury (published with permission^[4])

Current Intensity (I)	Effect
1 mA	Tingling, barely perceptible
16 mA	Maximum current a person can grasp and 'let go'
20 mA	Muscle tetanization
20–50 mA	Paralysis of respiratory muscles, respiratory arrest
50–100 mA	Ventricular fibrillation threshold
2 A	Cardiac standstill and internal organ damage
15–30 A	Common household circuit breakers

A = Ampere

myocardium.^[1] Figure 2. We had no facility to measure cardiac troponins which would reflect myocardial damage. It is uncertain whether there was some myocardial injury in our patient, but her rapid recovery suggests that any damage was minimal. Dilated cardiomyopathy has been described, but that was excluded by ultrasound. Ideally a prolonged period of cardiac monitoring and follow-up is recommended,^[1] but our hospital does not have that capacity. However, pulse oximetry is widely available and was invaluable in monitoring our patient.

The young age of our patient may have contributed to her rapid recovery. The frusemide may have been a factor if indeed the pulmonary crackles were a sign of pulmonary oedema. The steroid dexamethasone may have had a role in her recovery, as it is well documented that electrical injury results in damage to cell membranes of muscle and other organs, and may have played a role in protecting against severe myocardial damage. Guidance for the use of corticosteroids is limited. There are reports of late onset dysrhythmias.^[1] Finally, renal damage from tubular obstruction secondary to myoglobin released from injured muscle has been reported.^[2] The careful administration of fluids was necessary to balance between stressing the compromised heart and the theoretical concern regarding the risk of myoglobinaemia, but we concluded that careful administration of fluids was also important. One reference suggested 0.5 to 1 ml/kg/hour for renal protection^[3] although we utilized a slightly higher rate.

Electrical damage can cause significant swelling of the tissues in the hand, potentially resulting in a compartmental syndrome, much like a snake bite.^[3] We employed the same techniques we use for snake bites, namely elevation to reduce the risk. Since the tissue has been compromised, it is important to use a loose, non-binding wrap and keep the hand elevated above the level of the shoulder and heart.

SUMMARY

Electrical power is becoming more common in South Sudan, but building codes are frequently ignored. Direct current (from batteries) is generally felt to be less potentially serious than alternating current as from the municipal grid. Our patient sustained a significant, potentially fatal, injury from direct current. Table 1 lists the potential amperes from various sources, which makes this patient's injury all the more surprising.

In the United States, there are approximately 4,400 serious electrical injuries annually, with about 400 deaths. About 10% are from lightning.^[1] High voltage in industry and heavy equipment accounts for the majority of the rest, but electrical injuries, including fatalities, do occur at home.^[1] The suggested monitoring of electrically injured patients is extensive^[3] but impractical for most South Sudanese hospitals. We think our management of this patient provides a reasonable template for South Sudanese medical providers faced with similar electrical injuries. Further reports of experiences would be collectively valuable.

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Obituary: Dr Gatkuoth Khatir Lamba Takh

South Sudan has lost another young medical doctor with a future in front of him, Dr Gatkuoth Khatir Lamba Takh, who died of a cardiac arrest on 6 November 2022 in the South Sudanese capital, Juba.

Since November 2017, Dr Gatkuoth has worked as a medical doctor with Children Aid South Sudan (CASS) at the Rubkona PHCC in Unity State. A graduate of Upper Nile University with a Bachelor of Medicine and Bachelor of Surgery (MBBS) degree in 2008, Dr Gatkuoth worked as a medical officer at the Bentiu State Hospital in Unity State from January 2011 to February 2014. He also worked as a medic with the White Nile Petroleum Operating Company Limited from January 2011 to May 2011.

Many of Dr Gatkuoth's colleagues remember him for his beautiful traits and exemplary life.

Dr Ruot G Teny, who has known Dr Gatkuoth for the last 17 years, and worked with him closely in Bentiu State Hospital in 2011, said this about him: "Dr Gatkuoth was a dedicated and committed doctor, who executed his duties with passion. His dream was to see indiscriminate access to healthcare services for all. By his death, we lost a talented doctor and leader".

"Dr Gatkuoth was a dedicated and committed doctor, who executed his duties with passion."

- Dr Teny

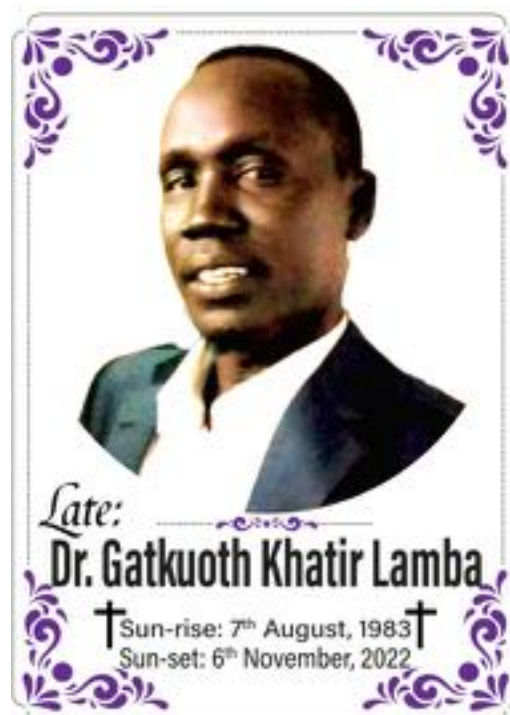
Another of his colleague, Dr Jonathan Majok, remembers him as a decent, empathetic, and dedicated professional. He was known as a soft-spoken gentleman who appeared too young for his age but exceptionally knowledgeable, with a steady smile throughout the long hours of duty and surgeries. Dr Majok said: "Dr Gatkuoth was also extremely humble, a trait that brings him the closer to the hearts of people and the epitome of great physicians." He added: "It was a normal scene to find him with his untucked shirt chatting with patients and their companions who rarely referred to him as doctor, but rather addressed him by his known name Garo."

"Dr Gatkuoth was extremely humble, a trait that brings him closer to the hearts of people and the epitome of great physicians."

- Dr Majok

Born on 7 August 1983, Dr Gatkuoth studied at St Stephen Primary School (1990-1999) and Ali Al-Said Secondary School (1999-2002) in Khartoum, Sudan. At the time of his death, Dr Gatkuoth was unmarried.

The medical fraternity will surely miss Dr. Gatkuoth's friendly personality, sense of humour and boundless talents.



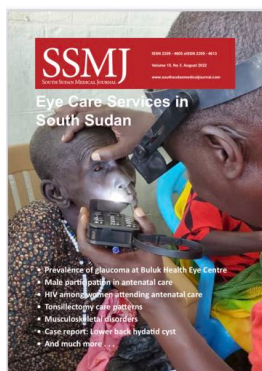
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