

The snakebite programme in Agok

- Nurses usage of CPAP in Tanzania
- Inguinodynia and inguinal hernia recurrence
- Reporting of adverse drug reactions
- Developing an offline digital library
- Multiple uterine fibroids
- Rare heterotopic pregnancy
- Penetrating arrow in the face

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FRONT COVER: MSF physiotherapist Ngong Ngong provides physiotherapy to snakebite patients. (© Fanny Hostettler / MSF)

Snakebite is a neglected medical emergency in South Sudan

Due to increasing cases and requests from many developing countries, the World Health Organization (WHO) designated snakebite as a neglected tropical disease of high priority in 2017. According to WHO, “bites by venomous snakes can cause acute medical emergencies involving severe paralysis that may prevent breathing, cause bleeding disorders that can lead to fatal haemorrhage, cause irreversible kidney failure and severe local tissue destruction that can cause permanent disability and limb amputation.”^[1]

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The data coming out of the Médecins Sans Frontières (MSF) snakebite programme in Agok are a cause for concern for this medical emergency (See article on page 146).^[2] With no centralized data on snakebites from across the country, this bellwether programme should be celebrated and replicated.

Different states have varied rates and incidences of snakebites and one size fits interventions may not be relevant. However, a clear programme would put snakebite high on the agenda and help prevent needless deaths. When there are no specific integrated programmes, individuals resort to traditional and ineffective remedies for snakebites which could do more harm than good.

This issue is compounded by the lack of antivenoms, awareness by health workers, poor training and appropriate treatment guidelines and protocols.

The Ministry of Health and all relevant NGOs should ramp up efforts to expand the snakebite programmes by integrating them into the primary healthcare system, developing awareness and training materials, as well as ensuring the availability of antivenom as part of the essential drugs list. The MSF programme in Agok has shown that it can be done.

Let us do it.

Reference

1. [World Health Organization Factsheets](#)
2. Said et al. Perspectives from MSF Snakebite Programme Implementation in Agok, Abyei region, South Sudan. South Sudan Medical Journal 2020; 13(4):146-152



Knowledge about continuous positive airway pressure machine usage among nurses at a tertiary hospital in Tanzania

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Abstract

Introduction: Continuous Positive Airway Pressure (CPAP) provides an air pressure that maintains the patency of the airway in patients with a variety of breathing problems. Nurses provide the hour to hour management of patients who require CPAP. The aim of this study was to assess the knowledge of nurses about CPAP machine usage at the tertiary hospital in Tanzania which serves the largest number of patients who require CPAP.

Method: A hospital-based descriptive cross-sectional study was carried out from March to June 2019 at Muhimbili National Hospital (MNH) and Jakaya Kikwete Cardiac Institute (JKCI) where 149 nurses who consented to participate were recruited. Data were collected using structured questionnaires and analysed using a statistical package for social sciences (SPSS) version 20. P-value<0.05 was considered to be statistically significant.

Results: Of the 149 nurses recruited 80 (53.7%) were female and 69 (46.3%) were male; 99 (66.4%) were aged 26-35 years; 78 (52.3%) had a diploma in nursing as the highest level of education and 138 (93.9%) had work experience of less than ten years.

Forty five percent of nurses had moderate knowledge about CPAP machine usage. High and moderate level of knowledge among nurses about CPAP general information each equally accounted for 38.9% and poor level of knowledge accounted for 2.7%. Moreover, moderate level of knowledge about CPAP device contraindications accounted for 43% whilst poor knowledge attributed 8.7%. There was no significant association between nurses' knowledge and their socio-demographic characteristics.

Conclusion: Just under half of the nurses had moderate knowledge of CPAP device use and most of them had attended only a single training session on CPAP device use and the range of time from training until completing questionnaires was at least six months. Regular training on CPAP machine usage should be provided to nurses since they are in the front line in management of patients requiring CPAP.

Keywords: Knowledge, Continuous Positive Airway Pressure, Nurses, Muhimbili, Tanzania

Introduction

Continuous Positive Airway Pressure (CPAP) is a general term for a non-invasive method for providing a constant distending pressure level (above atmospheric) during inhalation and exhalation. CPAP has been useful in management of newborn infants with airway instability, oedema, and atelectasis.^[1]

CPAP is employed in infants with acute respiratory failure to correct hypoxaemia. It permits a higher inspired oxygen content, increases mean airway pressure, and will improve ventilation to collapsed areas of the lung. The recruitment of the under ventilated lung is similar to the use of positive end expiratory pressure (PEEP) in the intubated mechanically ventilated patient.^[2]

Nasal CPAP is the most widely used non-invasive continuous distending airway pressure technique in modern neonatal care. Whereas there has been emphasis on understanding which devices and pressure sources are best to implement CPAP, the optimal duration of this therapy is less well studied. At birth, premature infants have life-threatening anatomic and physiologic immaturities of the respiratory system. CPAP attenuates this pathophysiology until sufficient stability develops and continuous distending pressure is no longer needed.^[3]

Nurses have an important role in the management of patients requiring CPAP. In this setting, nurses spend many hours caring for such patients whereas the doctors may attend only during ward rounds. The tasks performed by nurses include assessment of heart rate, respiratory rate, SpO₂% range, CPAP settings (water level, temperature, pressures, size of nasal prongs/mask in use), equipment safety checks such as suction, resuscitation devices and the ventilator, intravenous syringe drivers/pump and monitor alarms, blood gases.^[4]

CPAP has been useful in treatment of acute hypoxemic respiratory failure (ARF) as it reduces breathing efforts and improves functional residual capacity. CPAP has remained to be useful in management of patients with respiratory failure since the work of breathing increases during ARF.^[5]

CPAP is an essential management technique for patients with impending respiratory failure as it has been practised at MNH and JKCI and given the significant number of patients requiring CPAP at JKCI and MNH where about half of critically ill patients require CPAP, it was considered essential to assess the knowledge of nurses providing this frontline treatment.

We are not aware of any study in Tanzania focusing on nurses' knowledge about CPAP. The aim of this study is to address this gap.

Method

This was a hospital based descriptive cross-sectional study conducted from March to June 2019 at Muhimbili National Hospital (MNH) and Jakaya Kikwete Cardiac Institute (JKCI) where 149 nurses were recruited by convenient sampling method.

Those nurses with a diploma or above were recruited upon providing written informed consent. These were registered nurses with authority to handle patients on CPAP. Using a self-administered questionnaire data were collected to assess the nurses' understanding and knowledge of the CPAP machine using scoring criteria.^[6] (NOTE: the questionnaire is available from the corresponding author).

Data were analysed using statistical package for social sciences version 20. P-value<0.05 was considered to be statistically significant.

Table 1. Socio-demographic characteristics of participants

Description		n (%)
Sex	Male	69(46.3)
	Female	80(53.7)
	Total	149(100)
Level of Education	Diploma	78(52.3)
	Advanced Diploma	7(4.7)
	Degree	53(35.6)
	Masters	8(5.4)
	Other	3(2)
	Total	149(100)
	Age group (years)	<26
26 – 35		99(66.4)
36 – 45		38(25.5)
46 – 55		4(2.7)
Total		149(100)
Work experience (years)	<10	138(93.9)
	10 – 19	6(3.4)
	20 – 29	3(1.4)
	30 – 39	2(1.4)
	Total	149(100)
Previous training on CPAP	Total	149(100)
	Yes	75(51)
	No	74(49)
	Total	149(100)
Number of training sessions respondent has ever attended	Never attended	74(49.7)
	1 session	49(32.9)
	2 sessions	12(8.1)
	3 sessions	8(5.4)
	>3 sessions	6(4)
	Total	149(100)

Table 2. Nurses' level of knowledge about CPAP general information

Description	Level of Knowledge	n (%)
Knowledge about CPAP generally	High	58(38.9)
	Moderate	58(38.9)
	Fair	29(19.5)
	Poor	4(2.7)
	Total	149(100)

Table 3. Nurses’ level of knowledge about uses of CPAP device

Description	Level of Knowledge	n (%)
Knowledge of the uses of the CPAP device	High	10(6.7)
	Moderate	62(41.6)
	Fair	63(42.3)
	Poor	14(9.4)
	Total	149(100)

Table 4. Nurses’ level of knowledge about CPAP device contraindications

Description	Level of Knowledge	n (%)
Knowledge about CPAP devices contraindications	High	179(11.4)
	Moderate	64(43)
	Fair	55(36.9)
	Poor	13(8.7)
	Total	149(100)

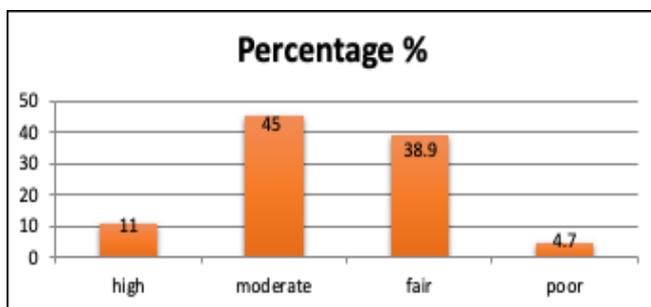


Figure 1. Overall knowledge on CPAP device usage

Ethical clearance was obtained from the Research and Ethics Committee of Aga Khan University-School of Nursing and Midwifery. Permission to conduct the study was obtained from the hospital authority.

Results

Socio-demographic characteristics of nurses

Of the 149 nurses recruited 53.7% were female and 46.3% were male. The predominant age group was 26-35 years which accounted for 99(66.4%). The highest level of education was a diploma in nursing 78 (52.3%). Most (93.9%) nurses had work experience of less than ten years. Only 45% had a moderate knowledge of CPAP machine usage and only 51% had received appropriate training (Table 1).

Level of knowledge about CPAP general information

Those with moderate and high level of general knowledge about CPAP were in equal proportions at 38.9%. There were only four nurses who were in the poor knowledge group (Table 2).

Level of knowledge about uses of the CPAP device

Only 42.3% of nurses had a fair knowledge about the CPAP device usage while a high knowledge was found in 10(6.7%) nurses (Table 3).

Level of knowledge about contraindications of CPAP device usage

Again only 43% had a moderate level of knowledge of the contraindications of CPAP device usage and 8.7% had poor knowledge (Table 4).

Overall knowledge about CPAP device use

Forty five percent had generally moderate knowledge about CPAP device use and 4.7% had poor knowledge. (Figure 1).

Table 5. Relationship between nurses’ level of education and overall knowledge on CPAP machine usage

Level of education	Overall knowledge n (%)				Total n (%)
	High	Moderate	Fair	Poor	
Diploma	5(6.4)	32(41.0)	37(47.4)	4(5.1)	78(52.3)
Advanced diploma	0(0.0)	3(42.9)	3(42.9)	1(14.3)	7(4.7)
Degree	11(20.8)	24(45.3)	16(30.2)	2(3.8)	53(35.6)
Masters	0(0.0)	5(62.5)	3(37.7)	0(0.0)	8(5.4)
Any other specify (PhDs)	2(66.7)	1(33.3)	0(0.00)	0(0.00)	3(2)
Total	18(12.1)	65(43.6)	59(39.6)	7(4.7)	149(100)

Table 2. Nurses' level of knowledge about CPAP general information

Variables Related	χ^2	p-value
Age versus machine usage	9.163	0.422
Sex versus machine usage	2.820	0.420
Education level versus machine usage	17.472	0.133
Work experience versus machine usage	11.770	0.227
Whether ever attended training versus machine usage	1.550	0.671

Relationship between nurses' level of education and overall knowledge on CPAP machine usage

Again only 47.4% of the nurses with diploma had fair overall knowledge on CPAP machine usage while 45.3% of those with a degree had moderate overall knowledge on CPAP machine usage. There was no relationship between nurses' level of knowledge and their level of education since the p-value is 0.133 (Table 5).

Relationship between nurses' socio-demographic factors and the knowledge towards CPAP machine usage

Generally, there was no relationship between respondents' socio-demographic factors and the knowledge towards CPAP machine usage (Table 6).

Discussion

In this study the female to male nurse ratio was 1.16:1 and two thirds were aged 26 -35years. Just over half (52.3%) had a diploma. This is a finding similar to that from Iraq^[7] and Karachi.^[8]

The majority (93.9%) of nurses had a work experience of <10years. Among nurses who ever attended training on CPAP, only 32.9% attended once during their course of employment. Attendance (50.3%) at training sessions was poor again similar to that found in Iraq.^[7]

Awareness of the contraindications for the use of CPAP is important but we found that only 43% of nurses had a moderate knowledge, a finding similar to elsewhere.^[7-9] However our findings concerning knowledge about CPAP device use were better than those from other studies.^[3,4]

Knowledge of CPAP is of paramount importance as it helps nurses to make appropriate decisions during management of patients treated with this technique and improves safety. There was no relationship in our study between respondents' socio-demographic factors and their knowledge of CPAP machine usage.

Training of nurses undertaking CPAP care should be improved. Our findings emphasize this since few nurses (32.9%) were found to have attended training on CPAP during their course of employment at MNH and JKCI.

Such regular in-service training on CPAP machine is highly recommended since nurses are in the front line in management of patients requiring CPAP.

Conclusion

The majority of nurses in this study had only a fair or moderate knowledge of CPAP device use and of the half that had attended a training session of CPAP device use, most of them had attended only a single session.

Acknowledgement

We acknowledge the contributions by staff of MNH and JKCI towards accomplishing data collection

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Child malnutrition and COVID-19: the time to act is now

Message from the heads of UNICEF, FAO, WFP and WHO

The COVID-19 pandemic is undermining nutrition across the world, particularly in low-income and middle-income countries. The worst consequences are borne by young children. Some of the strategies to respond to COVID-19—including physical distancing, school closures, trade restrictions, and country lockdowns—are impacting food systems by disrupting the production, transportation, and sale of nutritious, fresh, and affordable foods, forcing millions of families to rely on nutrient-poor alternatives. Strained health systems and interruptions in humanitarian response are eroding access to essential and often life-saving nutrition services. without timely action, the global prevalence of child wasting could rise by a shocking 14.3%. this would translate to an estimated additional 6.7 million children with wasting during the first 12 months of the pandemic—80% of them in sub-Saharan Africa and south Asia—and more than 10 000 additional child deaths per month during this same period.

The leaders of four UN agencies have issued a call for action to protect children's right to nutrition in the face of the COVID-19 pandemic.

Five urgent actions to protect children's right to nutrition in the COVID-19 pandemic:

1. Safeguard and promote access to nutritious, safe, and affordable diets
2. Invest in improving maternal and child nutrition through pregnancy, infancy, and early childhood
3. Re-activate and scale up services for the early detection and treatment of child wasting
4. Maintain the provision of nutritious and safe school meals for vulnerable children
5. Expand social protection to safeguard access to nutritious diets and essential services.

Inguinodynia and inguinal hernia recurrence amongst Ugandan patients who underwent mesh versus non-mesh inguinal hernia repair

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Abstract

Introduction: The prevalence of inguinal hernia recurrence dropped tremendously with the advent of mesh hernioplasty. However, the prevalence of inguinodynia has increased.

Objective: To determine and compare the prevalence of chronic postoperative inguinal pain (inguinodynia) and recurrence amongst patients who underwent mesh versus no mesh inguinal hernia repair in St. Francis Hospitals Nsambya and Naggalama in Uganda.

Method: This was a cohort retrospective study conducted at St Francis Hospitals Nsambya and Naggalama. The sample size was two hundred and two patients. A consecutive sampling technique with replacement of missing charts was used. The Principal Investigator and the research assistants then made telephone calls to the patients inviting them for an interview in the two hospitals, and for those who could not attend questionnaires were administered to them on phone. This was done sequentially until the sample size for each hospital was reached. If a given telephone was not available or went unanswered, we telephoned the next patient in the sequence on the register. Inguinodynia was assessed using the Numerical Rating Pain Score (NPS). Recurrence was assessed by physical examination.

Results: Two hundred and two patients were enrolled in the study. The prevalence of chronic postoperative inguinal pain amongst patients who underwent mesh versus non-mesh inguinal hernia repair were 24.4% and 8.5% respectively and the recurrence rates were 3.1% and 4.2% respectively.

Conclusion: The prevalence of chronic postoperative pain amongst patients who underwent hernioplasty was higher than those who underwent non-mesh inguinal hernia repair. There was statistically no difference in recurrence rates between patients who underwent mesh versus non-mesh inguinal hernia repair in both hospitals.

Key words: chronic postoperative inguinal pain, inguinodynia, hernioplasty, and numerical rating pain score

Introduction

Hernia surgery is one of the most common surgical operations done worldwide. ^[1] Globally, about 20 million groin hernia surgeries are done each year. ^[2] Inguinal hernia surgery is associated with complications such as inguinodynia and recurrences. The rate of chronic postoperative inguinal pain after inguinal hernioplasty has been reported at 51.6% ^[3] and 53%. ^[4] Chronic postoperative inguinal pain is a common and dreaded complication after inguinal hernia. Inguinal hernia recurrence is a clinically detectable hernia in the site where inguinal hernia was repaired and this hernia is detected either immediately or later after surgery. ^[5] Recurrence rate in mesh inguinal hernia repair is less than in non-mesh inguinal hernia repair. ^[6]

Method

This was a cohort retrospective study conducted at St Francis Hospitals Nsambya and Naggalama from October 2017 to February 2018. All patients who underwent mesh or non-mesh inguinal hernia repair were included.

The formula used to estimate the study size was obtained from Essentials of Medical Statistics. The minimum sample size calculated was 200 patients with the ratio of cases from Naggalama and Nsambya being 2:1.

Data were collected from consecutive patients' records with replacement of missing charts. The hernia registers were reviewed and a list of names compiled for the retrieval

of the records. The telephone contacts were obtained from these records and calls made to the patients until the sample size was obtained.

Data were captured in a database designed in Microsoft Access, 2016 and transferred for cleaning and statistical analysis in STATA version 14.0 (StataCorp, College Station, TX, USA).

Approval from Institutional Research and Ethics Committee was obtained from both hospitals.

Results

The average age was 47.7 (SD=16.4) years, about a quarter were aged 61 years or more; 86.1% were males, and 68.8% were labourers or farmers. Table 1.

Table 2 shows that the prevalence of chronic postoperative inguinal pain amongst patients who underwent mesh hernioplasty was 24.4% while amongst patients who underwent non-mesh inguinal hernia repair it was 8.5%. The prevalence of recurrence of inguinal hernia amongst patients who underwent mesh inguinal hernioplasty was 3.1% while amongst patients who underwent non-mesh inguinal hernia repair it was 4.2%. The prevalence of chronic post-operative inguinal pain amongst patients who underwent mesh versus non-mesh inguinal hernia repairs was statistically significant ($p=0.006$). The prevalence of the recurrence rate of inguinal hernia amongst patients who underwent mesh versus non-mesh inguinal hernia repairs was not statistically significant, $p=0.664$.

There were no statistically significant relationships between the chronic post-operative inguinal pain and patient characteristics in the patients who underwent mesh hernioplasty (all p -values >0.05). Similar results of no relationship were observed in the patients who underwent non-mesh inguinal herniorrhaphy. See Table 3.

In Table 4 and at bivariate analysis, only hernia type

Table 1. Demographics of patients who underwent inguinal hernia surgery

Characteristics	n (%)
Sex	
Female	28 (13.9)
Male	174 (86.1)
Age (years)	
19-30	40 (19.8)
31-40	34 (16.8)
41-50	43 (21.3)
51-60	34 (16.8)
61+	51 (25.3)
Occupation	
Labourers and farmers	139 (68.8)
Civil servants	22 (10.9)
Motor cycle riders	24 (11.9)
Other	17 (8.4)

Table 2. Prevalence of inguinodynia and inguinal hernia recurrence

Variable	Response			P-value
	Yes n (%)	No n (%)	Total n (%)	
Chronic post-operative inguinal pain				
Mesh repair	32 (24.4)	99(75.6)	131(100.0)	
Non-mesh repair	6 (8.5)	65(91.5)	71(100.0)	
Total	38	164	202	0.006*
Recurrence of inguinal hernia				
Mesh repair	4 (3.1)	127(96.9)		
Non-mesh repair	3 (4.2)	68 (95.8)		
Total	7	195	202	0.664

*P-value (<0.05) considered as statistically significant

Table 3. Recurrence rate of inguinal hernia-by-hernia type and patient characteristics

Patient characteristics	Mesh			Non mesh		
	Recurrence	No recurrence	p-value	Recurrence	No recurrence	p-value
Gender	n (%)	n (%)		n (%)	n (%)	
Female	0 (0.0)	24 (18.9)	1.000	0 (0.0)	4 (5.9)	1.000
Male	4 (100)	103 (81.1)		3 (100)	64 (94.1)	
Age group (years)						
19-30	1 (25.0)	13 (10.2)	0.649	1 (33.3)	25 (36.8)	1.000
31-40	0 (0.0)	17 (13.4)		1 (33.3)	16 (23.5)	
41-50	1 (25.0)	36 (28.3)		0 (0.0)	6 (8.8)	
51-60	0 (0.0)	26 (20.5)		0 (0.0)	8 (11.8)	
61+	2 (50.0)	35 (27.6)		1 (33.3)	13 (19.1)	
Occupation						
Labourers and farmers	2 (50.0)	109 (85.9)	0.110	1 (33.3)	27 (39.7)	1.000
Civil servants	1 (25.0)	5 (3.9)		1 (33.3)	15 (22.1)	
Motor cycle riders	1 (25.0)	7 (5.5)		1 (33.3)	15 (22.1)	
Other	0 (0.0)	6 (4.7)		0 (0.0)	11 (16.1)	

(non-mesh) was statistically significantly associated with lower chronic post-operative pain inguinal hernia pain. Crude Odds ratio (Crude OR) =0.29, 95% CI:0.11-0.72. Similarly, at multivariable analysis, hernia type (non-mesh) was the only factor independently associated with chronic post-operative pain hernia pain adjusted Odds ratio (aOR) =0.25, 95% CI:0.09-0.71.

Discussion

There were 202 patients who underwent herniorrhaphy: mesh 131(64.9%) and non-mesh 71(35.1%) (Table 2). The rate of reported chronic postoperative inguinal pain after inguinal hernia repair in other studies ranged from 2% - 63% [7] The prevalence of chronic postoperative inguinal pain amongst patients who underwent mesh inguinal hernia repair in our study was 24.4 % (Table 4).

In a study conducted in Kenya, the prevalence of chronic post-operative inguinal pain was 30.2% after mesh hernioplasty^[8] similar to our experience. We found the prevalence of chronic postoperative inguinal pain amongst patients who underwent non-mesh inguinal hernia repair was 8.5% (Table 4). In Uganda, a study found the prevalence of inguinodynia was 17% in patients who underwent the Darn and modified Bassini repair.^[9]

Recurrence rates amongst patients who underwent inguinal hernia surgery vary considerably from one technique to another and is reported to range from less than 0.2% to 10%.^[10] The recurrence rate of inguinal hernia amongst patients who underwent mesh inguinal herniorrhaphy in our hospitals was 3.1%. This finding is comparable

to a study conducted in Kenya, where they found the recurrence rate amongst patients who underwent mesh hernioplasty was 4.7%.^[8] The recurrence rates amongst patients who underwent non-mesh repair in our study was 4.2% (Table 2). The recurrence rate for the Bassini technique varies between 10%-40%^[11] and that for the Shouldice herniorrhaphy ranges from 0.6%-1.4%.^[12]

There were more inguinal hernia recurrences in males as compared to females in both those who underwent mesh and non-mesh inguinal hernia repairs. There were four males who had recurrence after mesh hernioplasty while three had inguinal hernia recurrence after non-mesh inguinal herniorrhaphy. On the other hand, no females had inguinal hernia recurrence after mesh and non-mesh inguinal herniorrhaphy. Inguinal hernia recurrences after mesh and non-mesh inguinal hernia repairs were greater in the young male age groups and those above 65 years old than amongst females of comparable age groups (Table 3). This is probably due to the fact that more males than females are involved in strenuous physical activities which are risk factors predisposing to herniation. Further reasons for inguinal hernias being more in males are anatomic and developmental as the testes have to descend into the scrotum, an embryological process creating a weakness allowing for the development of inguinal hernia. Older people regardless of gender are most likely to have weak abdominal wall muscles compared to the young and so they are more prone to inguinal hernia.

Patients who underwent non-mesh inguinal herniorrhaphies experienced less inguinodynia than

Table 4. Unadjusted and adjusted factors associated with chronic post-operative inguinal pain

Patient characteristics	Proportion with pain n (%)	Crude OR (95%CI)	Adjusted OR (95%CI)
Hernia repair type			
Mesh	32 (24.4)	1.00	1.00
Non-Mesh	6 (8.5)	0.29 (0.11-0.72)	0.25 (0.09-0.71)
Sex			
Female	6 (21.4)	1.00	1.00
Male	32 (18.4)	0.83 (0.31-2.20)	1.12 (0.40-3.15)
Age group years			
19-30	7 (17.5)	1.00	
31-40	5 (14.7)	0.81 (0.23-2.84)	
41-50	5 (11.6)	0.62 (0.18-2.14)	
51-60	10 (29.4)	1.96 (0.65-5.90)	
61+	11 (21.6)	1.30 (0.09-0.48)	
Occupation			
Labourers and farmers	30 (21.6)	1.00	1.00
Civil servants	4 (18.2)	0.81 (0.25-2.57)	1.24 (0.33-4.61)
Motor cycle riders	3 (12.5)	0.52 (0.14-1.86)	0.75 (0.19-2.99)
Other	1 (5.9)	0.23 (0.03-1.78)	0.46 (0.05-3.95)

those who underwent mesh hernioplasty (8.5%, 24.4% respectively). More females (21.4%) experienced inguinodynia than males (16%) after non-mesh and mesh hernioplasty. This is comparable to a study, which showed that the prevalence of inguinodynia amongst patients who underwent the Shouldice herniorrhaphy, which is a non-mesh technique, was 7%.^[13]

There were 174 (86.1%) males and 28 (13.9%) females (Table 4). In India, a study found 1 in 5 males and 1 in 50 females will develop inguinal hernia in their lifetime. 16 Furthermore, inguinal hernias are ten times more common in males than in females.^[14] Therefore, more males than females develop inguinal hernia for the reasons described above.

The populations most affected are the young (18-40 years old) and the middle age (40-65 years old) (Table 1). The common inguinal hernia presentation amongst these patients is in Nyhus class 3 and 4 and these patients present with large, painful and longstanding inguinal hernia. Furthermore, most patients in Africa and who are in these age groups and with inguinal hernia present late to hospital or go untreated for a long time as compared to patients in the West^[15] These huge hernias interfere with the patient's activities of daily living and impact negatively on socioeconomic activities.

The majority (80.7%) of the patients who underwent

both mesh and non-mesh inguinal hernia repairs were labourers or peasant farmers, and motorcycle riders (boda boda). This finding is similar to a study conducted in Mulago National Referral Hospital, Kampala.^[16] This is probably because these occupations predispose them to acquiring inguinal hernias because of the increased intra-abdominal pressures as a result of involvement in strenuous physical activities such as digging, using oxen, or lifting heavy objects.

Conclusion

Chronic postoperative inguinal pain was higher in the mesh repairs than in the non-mesh repairs.

Recurrences were higher, but not significantly so, among non-mesh inguinal hernia repairs than mesh repairs. Both the mesh and non-mesh inguinal hernia repair techniques are good techniques in reducing inguinal hernia recurrence. However, the disadvantage of the mesh hernioplasty is chronic postoperative inguinal pain. Thus, patients undergoing mesh or non-mesh inguinal hernia repairs need to be informed about the risk of inguinodynia.

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Infant feeding during Covid-19

[The Lancet](#)

Globally, infants who are not exclusively breastfed are 14 times more likely to die than infants who are exclusively breastfed. Lockdown measures have diminished household income, and the UN World Food Programme estimates that by the end of 2020, 265 million people may be facing food insecurity, making breastfeeding even more important. WHO, the Royal College of Paediatrics and Child Health and others, have unanimously asserted that no evidence exists to suggest breastfeeding increases the risk of infants contracting COVID-19, and that skin-to-skin contact remains essential for newborn health and maternal health.

The reporting of adverse drug reactions by healthcare providers in Kenya

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Abstract

Background: Spontaneous and consistent reporting is the cornerstone of adverse drug reaction (ADR) reporting. Under reporting is an enormous obstacle to effective pharmacovigilance (PV).

Objective: To determine factors affecting ADR reporting by healthcare providers in selected hospitals in Kirinyaga County, Kenya.

Methods: A cross-sectional study was conducted in four selected hospitals. A pretested self-administered questionnaire was utilised to collect data. Stratified sampling was used to recruit 224 healthcare providers. Statistical Package for Social Sciences (SPSS) version 23 analysed data. The Chi-squared test was used to determine association. Binary logistic regression assessed strength of association. Outcomes were considered significant at p-values of <0.05.

Results: Of 224 questionnaires distributed 215 were completed, 159 (74%) healthcare providers had not reported ADRs to the Pharmacy and Poisons Board (PPB) within the last 3 months. In total, 92 (42.8%) healthcare providers knew about reporting guidelines; 194 (90.2%) were not trained in ADR reporting. Those aware of the reporting guidelines and those trained were more likely to report ADRs. Continuing medical education was the preferred source of information about ADRs. The main barriers to ADR reporting include inadequate training, delayed feedback, not knowing where or to whom to report, lack of a PV centre in the county and inadequate access to ADR forms and guidelines.

Conclusion: ADR reporting among healthcare providers could be improved. Age, profession, level of education, knowledge and training affected ADR reporting. Healthcare provider centred training and promotion of ADR reporting tools are necessary to boost ADR reporting and increase patient safety.

Keywords: adverse drug reaction; spontaneous reporting; healthcare provider; pharmacovigilance, Kenya.

Introduction

The Pharmacy and Poisons Board (PPB) in Kenya defines an ADR as a response to a drug which is noxious and unintended, that occurs at doses used in humans for the prophylaxis, diagnosis or therapy of disease, or for the modification of physiological function.^[1] Modern ADR reporting practice began in 1961 when thalidomide caused phocomelia among new-borns.^[2] The PPB in Kenya launched the Department of Pharmacovigilance (PV) in 2004 and started the National PV Centre in 2009 to report ADRs and product quality issues.^[1]

Since Kenya joined the global drug monitoring programme in 2010, as of June 2019, Kenya had submitted 12,231 ADR reports accounting for 0.06% of global reports.^[3] Under reporting remains an issue and has been attributed to: lack of awareness of PV tools and national PV centre, inadequate training, no feedback and non-adherence to the ADR reporting guidelines.^[4,5]

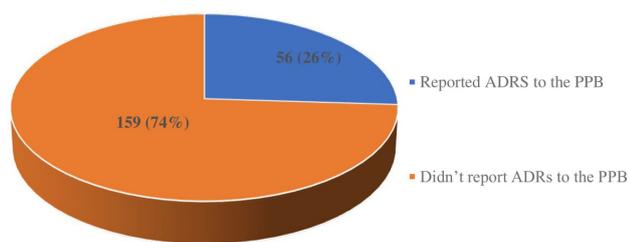


Figure 1. Proportion of healthcare providers who reported ADRs to the PPB

Spontaneous reporting involves identification and reporting of suspected ADRs on standardised report forms to the national PV centre.^[6] It is important in identifying risk-benefit profiles of drugs throughout their life cycle, product quality, medication errors, and new, rare and fatal reactions not identified in clinical trials. Clinical trials do not identify all ADR's as they are brief, use a limited number of participants and may exclude some age groups. Assessing drug safety should be incorporated in the daily practice of healthcare providers who should be trained to report ADRs.^[7]

The objective of this study was to determine factors affecting ADR reporting by healthcare providers in selected hospitals in Kirinyaga County, Kenya.

Method

A hospital-based cross-sectional study was conducted in Kerugoya Referral Hospital and Kianyaga, Kimbimbi and Sagana Sub-County Hospitals between April and September 2019.

A sample size of 224 healthcare providers was generated using the Cochran formula. A sample size of 383 healthcare providers was calculated using a 5% margin error, standard deviation at 95% confidence interval (CI) and a prevalence of 53.2%. The sample size was adjusted using the finite population correction equation to obtain a minimum sample size of 203. A 10% non-response level was added to obtain the minimum number of participants required.

Stratified sampling was utilised to recruit respondents (Consultants, Medical Officers, Pharmacists, Pharmaceutical Technologists, Nurses and Clinical Officers). The sample size of 224 was proportionately allocated to these cadres and each hospital, using the list of healthcare providers on duty. A random starting point was selected, then every Kth (Population size/Sample size = sampling interval) healthcare provider on the list was selected until the desired sample size was reached. Data were collected using a self-administered pre-tested questionnaire adopted, with revisions, from comparable studies.^[5,8,9] Questions exploring drugs withdrawn from the market due to ADRs, reporting guidelines, sources

Table 1. Association between healthcare provider characteristics and ADR reporting

Characteristics	Reported ADRs		Totals n (%)	Chi-squared and p-value	
	Yes n (%)	No n (%)			
Sex	Male	27 (30.7)	61 (69.3)	88 (40.9)	$\chi^2 = 1.662$ 0.210
	Female	29 (22.8)	98 (77.2)	127 (59.1)	
Age group (years)	18-25	4 (9.3)	39 (90.7)	43 (20.0)	$\chi^2 = 13.130$ 0.001
	26-35	31 (25.4)	91 (74.6)	122 (56.7)	
	>35	21 (42.0)	29 (58.0)	50 (23.3)	
Professional category	Nurse	25 (19.4)	104 (80.6)	129 (60.0)	$\chi^2 = 16.632$ 0.001
	Clinical Officer	10 (25.6)	29 (74.4)	39 (18.1)	
	Medical Officer/Consultant	9 (31.0)	20 (69.0)	29 (13.5)	
	Pharmacy staff	12 (66.7)	6 (33.3)	18 (8.4)	
Duration of practice (years)	<1	3 (18.8)	13 (81.3)	16 (7.4)	$\chi^2 = 1.043$ p=0.608
	1-10	43 (25.6)	125 (74.4)	168 (78.1)	
	>10	10 (32.3)	21 (67.7)	31 (14.4)	
Highest level of education	Graduates	24 (36.4)	42 (63.6)	66 (63.6)	$\chi^2 = 5.263$ 0.028
	Diploma	32 (21.5)	117 (78.5)	149 (69.3)	

Table 2. Association between healthcare providers' knowledge and ADR reporting

Healthcare provider factors		Reported ADRs n (%)	Didn't report ADRs n (%)	Total n (%)	Odds Ratio (95% CI)	p-value
Knowledge of the PPB	No	28 (18.2)	126 (81.8)	154 (71.6)	Ref.	p<0.001
	Yes	28 (45.9)	33 (54.1)	61 (28.4)	3.818 (1.995, 7.307)	
Knowledge of the ADR reporting guidelines	No	25 (20.3)	98 (79.7)	123 (57.2)	Ref.	p=0.028
	Yes	31 (33.7)	61 (66.3)	92 (42.8)	1.992 (1.076, 3.689)	
Training on ADR reporting	No	45 (23.2)	149 (76.8)	194 (90.2)	Ref.	p=0.006
	Yes	11 (52.4)	10 (47.6)	21 (9.8)	3.642 (1.453, 9.130)	

of ADR information and feedback from the PPB were added to verify participants knowledge and practice in ADR reporting. The modifications helped to build on the inconclusive data in the literature.

Socio-demographic characteristics, awareness and training were compared between ADR reporters and non-reporters. Data were analysed using Statistical Package for Social Sciences (SPSS) version 23. The Chi-squared test was used to determine the association between independent and dependent variables and Fisher's exact test to determine significance. P-values of <0.05 were considered statistically significant.

Kenyatta University-Ethical Review Committee granted ethical approval, the National Commission for Science, Technology and Innovation authorized the research, and the County Director of Health, Kirinyaga County gave permission for the study.

Results

Of 224 questionnaires distributed 215 (96.0%) were returned. Socio-demographic characteristics of 215 healthcare providers are shown in Table 1 column 5.

Figure 1 shows the proportion of healthcare providers who reported or did not report ADRs to the PPB within the last three months.

Factors affecting ADR reporting

Chi-squared test compared socio-demographic characteristics between reporters and non-reporters. A significant relationship was reported between age, profession and level of education (Table 1).

Respondents were more likely to report ADRs if they were aware of the existence of the PPB, aware of the reporting guidelines or had been trained (Table 2).

Information concerning ADRs caused by new brands was obtained by 93 (43.3%) from continuing medical education and 57(26.5%) from the internet, 28 (13.0%) from a medical representative, 19 (8.8%) from seminars/

conferences and 18 (8.4%) from textbooks.

Table 3 lists barriers to ADR reporting.

Healthcare providers suggested the following strategies to improve reporting:

- Develop a PV centre in the County.
- Devolve functions of the National PV Centre to County level.
- Routine healthcare provider-centred training on ADR reporting.
- Appoint focal PV persons to coordinate PV activities.
- Lobby for prompt feedback from the PPB by improving the communication gap.
- Make ADR forms and guidelines available in all hospital departments.
- Use ADR reporting to appraise performance of healthcare providers.
- Make ADR reporting part of the prescribing standard operating procedures.
- Deploy pharmacists to the wards to assist in ADR identification and reporting.
- Routine patient follow-up to capture ADRs early.

Discussion

This study shows that in a 3-month period 26.0% of healthcare providers reported ADRs. This is greater than that found in the Philippines where, in a 6-month period, 14.0% reported ADRs.^[10] This difference could be attributed to differences in the studies such as inclusion of more cadres and the healthcare setting.

The WHO receives at least 200 reports per million population annually from countries with a functional ADR reporting system.^[11] Considering 610,411 population in Kirinyaga County the expected rate would

Table 3. Barriers to ADR reporting

Category	Barriers	n (%)
Healthcare provider factors	Not knowing where or to whom to report	40 (18.6)
	Inadequate accesses to ADR report form and guidelines	26 (12.1)
	Perception that no action will be taken	19 (8.8)
	Insufficient time to report/ busy schedules	19 (8.8)
	Managing the patient is more vital	17 (7.9)
	Not sure what caused the ADR	15 (7.0)
Health-system factors	Inadequate training	66 (30.7)
	Delayed feedback	47 (21.9)
	Lack of a PV centre in the County	23 (10.7)
	Understaffing	15 (7.0)

be 122 reports annually translating to at least 10 reports per month. Assuming the sampled healthcare providers reported once within the 3-month period, 56 reports in three months suggests good reporting rates considering it was only a sample population. However, this could be enhanced by filling gaps in reporting.

In this study age, level of education and profession were significantly associated with ADR reporting. A northeast Ethiopian study also reported a significant relationship between profession and reporting,^[12] however a comparable Kenyan study reported that socio-demographic factors did not influence reporting.^[5] An Ethiopian study conducted among doctors found that sex, work experience and level of education, but not age, significantly affected ADR reporting.^[13]

In our study, older healthcare providers reported ADRs more often. This could be because they have a positive perception towards ADR reporting. Pharmacists reported ADRs more than other cadres. The PPB's quarterly PV report also showed that pharmacists submitted most of the ADR reports.^[3] Nurses reported ADRs less frequently than other cadres. An Ethiopian study^[14] also reported that nurses registered the lowest knowledge and practice score while pharmacists registered the highest. Another Kenyan study revealed that pharmacists accounted for 85.2% of submitted ADRs, while nurses accounted for 3.7%.^[4] Pharmacists are more knowledgeable about the ADR system. Respondents with higher educational levels reported ADRs most frequently; a finding similar to that reported by an Ethiopian study.^[13]

In our study, 28.4% of healthcare providers were aware of the national PV centre whereas in India 58.67% were aware of it.^[8] Not knowing where ADR report forms are submitted nationally would affect reporting and identify poor communication from the national PV Centre.

In our study, 57.2% of healthcare providers were unaware

of the ADR reporting guidelines compared to 59.4% in a Nigerian study.^[15] This may be the consequence of insufficient promotion of the ADR reporting guidelines and implies that healthcare providers are not educated on the ADR reporting scheme.

The study noted that healthcare providers with knowledge of the ADR reporting guidelines and national PV Centre were twice as likely to report ADRs, a result also found by Necho and Worku.^[9] This implies that knowledge on ADR reporting system is a key determinant of ADR reporting.

The majority of healthcare providers, 90.2%, had not been trained on ADR reporting. An Ethiopian study reported a slightly lower figure at 77.6%.^[9] This may be because hospital administrations are not prioritizing training. Trained healthcare providers were more likely to report ADRs. Similar findings were reported by other studies.^[5,16]

Healthcare provider barriers to ADR reporting were not knowing how to report, inadequate access to ADR forms, insufficient time and perception that no action will be taken. Chief health system barriers were inadequate training and delayed feedback. These findings are in line with studies from India and Ethiopia.^[8,9,10,13] To overcome these obstacles, healthcare providers suggested that there should be ADR forms and guidelines available in all hospital departments; routine healthcare provider-centred training on ADR reporting, a PV Centre in the County and lobbying for prompt feedback from the PPB. These are similar to those proven by studies across the globe.^[8,9,13,14,15]

A limitation of this study was that only four public hospitals were included.

Conclusion

ADR reporting should be improved; gaps in reporting can

be bridged by creating routine training programmes for healthcare providers, such as online training courses by the PPB and including PV training at higher institutions. Departmental heads should check healthcare providers ADR reporting practices. The County should employ focal PV persons to co-ordinate PV activities and deploy pharmacists to the wards to assist in identification and reporting ADRs. Promoting reporting forms and guidelines, establishing prompt feedback, decentralising roles of the national PV centre and developing a PV centre in the County would enhance ADR reporting. Further research should be conducted to check PV practices and ADR reporting rates after implementing these suggestions. Baseline studies are recommended across all hospitals to harmonise the practice of ADR reporting in the County. Further research is necessary to determine other health system factors to give a more holistic finding on determinants of ADR reporting nationally.

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Conflict of interests. None to declare.

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Perspectives from MSF snakebite programme implementation in Agok, Abyei region, South Sudan

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Abstract

Introduction: Snakebite is a neglected tropical disease affecting around five million people, causing more than 100,000 annual deaths, as well as serious disabilities; however, access to antivenom and high-quality programmatic care remain a global challenge.

Objective: Due to the high burden of snakebite in South Sudan and the serious negative outcomes if left untreated, Médecins Sans Frontières (MSF) integrated snakebite care for the first time among its priorities and consolidated a programme in Agok Hospital.

Method: We describe the history, implementation, and challenges of the MSF snakebite programme.

Results: The number of snakebite patients at MSF Agok Hospital has increased each year. From 2013 to 2019, MSF treated 2,005 snakebite patients. In 2019 there were 527 snakebite admissions, 47% presented with severe envenomation, and one death. Puff adders, vipers and various cobras were identified. Agok Hospital gained understanding on the barriers and facilitators for the population to access care after a snakebite. MSF developed “snakebite diagnosis and treatment” algorithms, and provided clinical training, with the validation of national health authorities. Preventive activities were reinforced. Integration of surgical services was an essential programmatic aspect to monitor and treat complications. Challenges for implementation included a lack of easily available antivenoms in the international market. and the need of a strong supply chain and procurement systems.

Conclusion: The delivery of healthcare towards snakebite patients can be successfully implemented when prioritized. Global efforts to improve access and quality of antivenoms and snakebite care could help removing Snakebite Envenoming from the Neglected Tropical Diseases list.

Keywords: snakebite, snake, envenoming, antivenom, implementation, humanitarianism, secondary care, South Sudan

Citation:

Said et al. Perspectives from MSF Snakebite Programme Implementation in Agok, Abyei region, South Sudan.

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Introduction

Global and national burden

Every five minutes, somebody dies from a snakebite. According to the World Health Organization (WHO), an estimated 5.4 million people get bitten worldwide every year and around 81,000 to 138,000 people die each year because of snake bites.^[1] In Africa alone, 435,000 to 580,000 victims^[2] suffer snakebite envenoming and South Sudan could be one of the countries with the highest incidence. However, snakebite still receives less attention globally than other Neglected Tropical Diseases (NTDs) and comprehensive programmes and efforts to provide care to snakebite patients are limited.

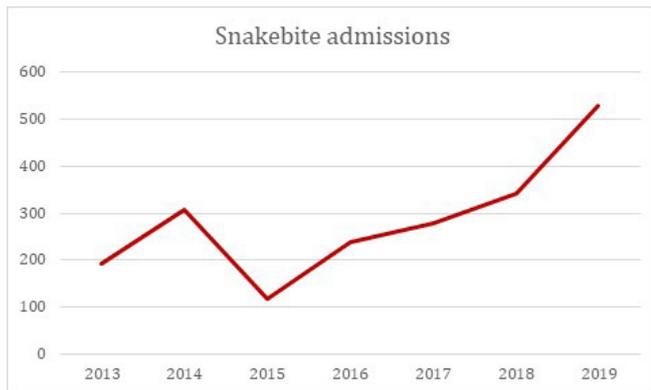


Figure 1. Snakebite admissions

Due to the high number of snakebite admissions, the limited availability of antivenom, and the serious negative outcomes if left untreated, Médecins Sans Frontières (MSF) has been implementing a Snakebite Programme as part of its medical activities at Agok hospital, in the Special Administrative Area of Abyei since 2014.

MSF started nutritional medical activities in 2006 in the Abyei region. However, in 2008, conflict and violence displaced hundreds of thousands of people, including the MSF team, to the far south of the region. MSF started providing nutritional care and expanded activities to inpatient care in the town of Agok. Today, MSF's hospital in Agok is the only secondary health care facility in the region, with a catchment population of some 140,000 people. On average, the hospital provides more than 4000 consultations and hospitalizes over 800 patients per month.

In 2014, the MSF medical team at the hospital received an unexpected high number of snakebite patients (up to 90 in a single month) for which the organization was not fully prepared. This triggered the need to respond to the significant burden of a neglected disease in Agok and surrounding areas. In addition, pharmaceutical company Sanofi Pasteur announced in 2014 that it would stop producing the only recognized safe and efficient polyvalent antivenom, FAV-Afrique. MSF and the South Sudanese Ministry of Health therefore, implemented a study in partnership with Epicentre, MSF's epidemiological research arm, to assess two new antivenoms and to increase access and quality of care for snakebites. Advocacy for better access to snakebite care and antivenom was also carried out nationally and internationally, including towards the WHO.^[1-6]

From January 2013 to December 2019, MSF treated 2,005 snakebite patients in Agok, on average 286 per year. Hospital mortality due to snakebite dropped from 3 deaths in 2014 (on arrival), to only 1 in 2019, despite recent doubling of admissions. Indeed in 2019 alone, MSF provided care for 527 snakebite victims, out of which 47% presented with severe envenoming.

Current implementation

Snakebite patients are considered priority cases in the triage area of the Emergency Room (ER). They are transferred to the Intensive Care Unit (ICU) if signs of envenoming are identified, or to the Inpatient Department for 24 hour-observation if no alarming signs are present. Severely envenomed patients are kept in the ICU as long as the antivenom is indicated and receive continuous intensive monitoring to identify and respond to decompensation or shock, swelling, bleeding, neurological disorders, and severe adverse reactions due to the antivenoms, such as allergic or anaphylactic reactions (10% mild, <1% severe).

Surgery can be required in severe cases and is an essential component of the snakebite treatment programme. The hospital surgeons intervene for compartment syndrome (compression of the veins in the muscles due to swelling) or when gangrene is suspected. If needed, fasciotomies are performed, and unfortunately also amputations of toes, fingers, or feet when patients present late with advanced envenoming. At the hospital, snakebite injuries are the fifth leading cause of surgical intervention among all performed surgical interventions. In 2019, 66 procedures among the total 527 snakebite patients represented 9.4% of all surgical interventions.



Figure 2. A MSF nurse changes the dressing of Aluk Manut. (© Fanny Hostettler / MSF)



Figure 3. MSF physiotherapist Ngong Ngong (left) provides physiotherapy to snakebite patients. (© Fanny Hostettler / MSF)

Aluk Manut, aged six, was bitten by a snake on her right leg. Aluk and her mother, Teresa Aluoc Majok, travelled 150 km by public transport from Gogrial to get to the hospital in Agok, South Sudan. Aluk received three doses of antivenom and has had seven surgical interventions. (Figure 2) In figure 3, MSF physiotherapist Ngong Ngong provides physiotherapy to snakebite patients to prevent the total loss of function in their limbs. Sometimes, the severity of the pain means the physiotherapy must be performed under anaesthesia. Here, Awien Maguor, aged 10, was bitten on her arm by a snake while she was sleeping under her mosquito net. She received three doses of antivenom and has had more than ten surgical interventions.

Whole Blood Clotting Test (WBCT20) is the standard coagulation test method, as recommended by the WHO snakebite management guidelines. It can be performed immediately at the bedside with modest resources and has the advantage of giving results in 20 minutes. However, the method also presented some performance issues when utilized in a limited resource context due to implementation challenges.

WBCT20 (sensitivity 94% and specificity 76%)^[7] is systematically performed when patients are admitted into the ER, and again 6 and 24 hours after arrival. Clinical features indicating haemotoxicity are paramount to take diagnostic and treatment decisions regardless of confusing test results.

Currently, there are two available antivenoms in the programme. The first, Equitab Plus by ICP (Costa Rica), is used to cover the majority of cytotoxic and haemotoxic envenoming cases according to MSF protocol. It was designed to neutralize the venom of *Echis ocellatus*, the West African carpet viper and its East African cousin *Echis pyramidum*, as well as *Bitis arietans* puff adders' and *Naja nigricollis* spitting cobras' venoms (the last 2 species are frequent in Agok). The second, SAIMR-Polyvalent, is reserved for the rare cases of neurotoxic envenoming or critically ill patients according to MSF protocol. It is effective against cobras' (*Naja*), mambas' (*Dendroaspis*), and some large vipers' (including *Bitis arietans* frequent in Agok) venoms. These two antivenoms have proven successful in a clinical setting like Agok Hospital, mainly due to the training of medical staff in administering and evaluating the treatment.

Between 2014 and 2016, MSF medical teams simplified the 2010 WHO guideline into a pocket guide for South Sudan. After consulting with the Ministry of Health and receiving authorizations by the Drug and Food Control Authority (DFCA), we introduced a syndromic protocol (Figure 4 and Table 1) and started importing the two previously mentioned antivenoms. By that time, all remaining stocks of the internationally recognized polyvalent antivenom FAV-Afrique (Sanofi) had been used up and the manufacturer had stopped producing it.

Achievements and discussion

MSF has responded to the burden of snakebites, enforcing the supply of antivenom and the cold chain, reviewing and improving algorithms, and strengthening knowledge and skills to better diagnose and manage snakebites. As a result, the delivery of care through a comprehensive programme and adequate health care may be one of MSF’s major achievements when tackling one of the most neglected conditions in the world.

The integration of surgical services has proven essential when responding to complicated cases and is one of the main assets of the snakebite programme in Agok. Logistics have also played an important part in the successful implementation of the programme. With the support of national authorities, antivenoms have been procured and imported, thus facilitating the complex supply chain process. Logistics actively maintain a cold chain to avoid ruptures in order to guarantee the availability of a safe antivenom. At the hospital, 24/7 power supply via diesel generators and solar panels has been installed. This shows

that it is fundamental to have a multisectoral approach.

Besides clinical interventions, a monitoring study has been implemented since April 2018, in collaboration with the South Sudanese Ministry of Health. It examines the use of Equitab Plus and SAIMR antivenoms, advancing the efforts to generate evidence and to increase access and quality of care for snakebites. The scientific aim of the study, approved by the Ministry of Health and Ethics Committee, is to monitor snakebite patients to describe all clinical symptoms, cure rates, and adverse reactions through regular clinical evaluations of vital signs, swelling size, clotting tests at 0, 6 and 24 hours, and neurological signs. We try to identify snake species by comparing patient descriptions of them with photographs.

So far, the community of Agok is receptive, positively accepting the research implementation and consenting to be enrolled. In part, this is due to the overall good acceptance of the local population towards the hospital during the last 10 years.

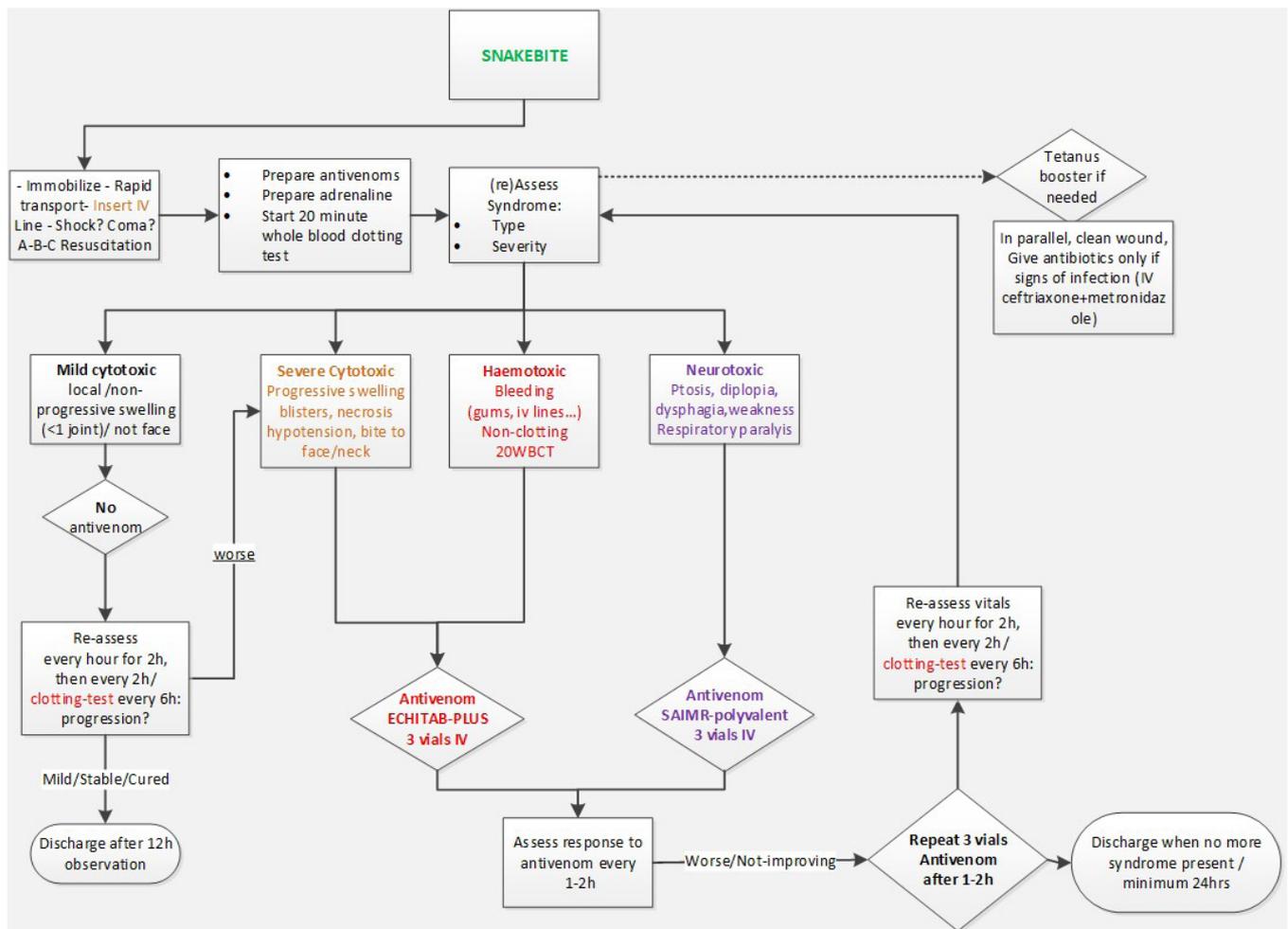


Figure 4. MSF Agok Snakebite Protocol algorithm

Table 1: MSF Agok Snakebite syndromic classification

Syndromes	Cytotoxic (pain, swelling, shock if severe)	Haemotoxic Bleeding, non-clotting <i>'Viperid syndrome'</i>	Neurotoxic Progressive paralysis <i>'Elapid syndrome'</i>
Species	<ul style="list-style-type: none"> ● Puff adders <i>Bitis arietans</i> ● Carpet vipers <i>Echis spp</i> ● Spitting cobra <i>Naja nigricollis</i> 	<ul style="list-style-type: none"> ● Carpet vipers <i>Echis pyramidum</i> ● Puff adders <i>Bitis arietans</i> ● Rarely boomslang 	<ul style="list-style-type: none"> ● Egyptian Cobra <i>Naja haje</i>, ● Black Mamba <i>Dendroaspis polylepis</i> & others
Severity	<ul style="list-style-type: none"> ● Mild: vipers, colubrids 		
Mild <i>>> No antivenom needed</i>	Local swelling with no extension beyond 1 joint, Consider antivenom for finger/toe (risk amputation) and face/neck (risk on airways)		
Severe envenoming <i>>> Antivenom rapidly</i>	Systemic signs: Hypotension/shock, persistent tachycardia, persistent vomiting/diarrhea, abnormal thoracic pain		
	Rapid swelling Beyond knee/ elbow 4 hours post-bite Half a limb > 15 cm/hour Face/neck.	Prolonged bleeding from fang punctures or wounds; or gums/mouth. Severe headache	Bilateral ptosis (droopy eyelids), difficult speech. Paraesthesia, excessive sweating, salivation, strange taste, myosis
Severe + life-threatening <i>>> Antivenom + life-support</i>	Swelling of whole limb	Positive clotting test (20'WBCT non-clotted)	Weakness, trismus, shortness of breath, respiratory paralysis
	Hypotensive shock. Swelling threatening airway, compartment syndrome, necrosis of limb, amputation.	Spontaneous bleeding or hematomas. Hemorrhagic shock Convulsions (cerebral hematoma)	Bradypnea, respiratory failure, hypoxia - Coma or myocardial infarction.

Challenges and barriers

Agok is a flat land with seasonal swamps. Flooding due to heavy rain in the wet seasons displace snakes from their habitats (holes in the soil) to look for dry and raised land and this exposes people to bites while carrying out different activities such as farming, fetching water, fishing, or even sleeping indoors.

The poverty level and vulnerability of the population also put some people at risk of snake bites. For instance, people cannot afford to buy protective gear such as boots or closed shoes. Rural paths can be dark, making it easy to accidentally tread on a snake. Some traditional house constructions are snake-prone, food storage is not always separated, attracting rodents that in turn attract snakes. Finally, sleeping on the ground without a mosquito net can also increase the risk of being bitten.^[8]

Ensuring provision of antivenom is one of the most important challenges, particularly after the production of the “gold-standard” polyvalent FAV-Afrique antivenom was stopped in 2014 by Sanofi Pasteur. The last vial of FAV-Afrique expired in 2016. Since then, Equitab Plus (Costa Rica) and SAIMR (South Africa) antivenoms, also effective,^[9] were successfully introduced in MSF’s Agok hospital but their extremely high price is a major constraint in ensuring their availability across primary healthcare centres more widely in South Sudan and elsewhere. The price of a vial of Equitab Plus is around 35 USD and SAIMR is around 300 USD per vial. Three vials are needed for a standard treatment, and this dose may be repeated once or twice, depending on severity. The overall cost is therefore out of reach for the vast majority of health facilities and patients.

Another significant challenge is the remoteness of the area and the long time it takes patients to reach the hospital. During the rainy season (July to November), bad roads and lack of transport make timely access to the hospital almost impossible. Delays can increase the risk of complications, long term sequelae, disabilities, and mortality.

Local beliefs and traditions also influence the management of patients. Snakebite victims may delay seeking care due to preference of traditional medicine, causing complications which require additional care.^[10] In some instances, patients are reluctant to receive surgical interventions even if strongly needed and recommended. Fasciotomies and amputations are understandably difficult to accept. Counselling and health education are provided to support patients in taking informed decisions. However, sometimes this is not enough and surgical procedures for severe complications are simply refused. It is important to find ways to address this in order to diminish the negative health outcomes of snakebites.

Conclusions and recommendations

The medical and antivenom component of snakebite management is paramount, but a significant number of complications would not be addressed without integrated surgical services. It is therefore, important to gain acceptance of the local population for surgical interventions when required.

The general implementation of the MSF snakebite programme has been successful and keeps improving thanks to standardized treatment protocols, close supervision, strong logistical and pharmaceutical teams overseeing the supply and cold chains, as well as the support from and collaboration with health authorities to facilitate the procurement of the antivenoms.

Polyvalent antivenoms effective in treating envenoming from a broad number of snake species need to be made affordable and accessible to provide health providers, including in low-income settings, with the means to save the lives of snakebite victims.

Acknowledgements: We thank the health authorities of the Central Ministry of Health, as well as the health authorities of the Abyei Special Administration Area (ASAA). MSF Agok clinicians and surgeons, managers, pharmacists, lab technicians, logisticians, and all staff members committed to providing a service and contributing to the delivery of care for snakebite patients.

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Five people die of snakebites in Tonj East

[RADIO TAMUZUJ](#) TONJ EAST - 22 SEP 2020

At least five people including children have died from snakebites in Tonj East County of Warrap State since June, a local official said.

The floods that hit many parts of Warrap State have forced snakes to seek higher ground. That has led to more snakebites.

Albino Angok Majak, the Executive Director of former Luanyjang North County, told Radio Tamazuj on Tuesday that they had recorded about 13 cases of snakebites from June until 21 September.

“Five people have died since June until yesterday (Monday) when I received the fifth person who died due to snakebites,” Albino Angok said. “Those who included children and a pregnant mother, I have their names here with me.”

According to the World Health Organization (WHO), snakebite envenoming is responsible for thousands of deaths among rural populations globally every year.

The executive director said eight other people have recovered from the snakebites. He further said about 15,000 households have been displaced from their homes by floods to higher ground within the area and that they are in dire need of humanitarian aid.

Angok said the floods have destroyed all the crops in the whole villages of Luanyjang, saying the situation of the displaced families is expected to worsen in the coming months if there is no support.

The local official calls upon humanitarian organizations to intervene before the humanitarian situation deteriorates further.

Developing an offline digital library for South Sudan - the SolarSPELL Health: nursing and midwifery library

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Introduction

Qualified healthcare professionals are sorely needed in East Africa^[1], and schools lack crucial and up-to-date medical training materials such as textbooks, manuals, instructional videos, and other resources needed to educate nurses and midwives.

The SolarSPELL initiative, based out of Arizona State University (ASU), is developing an offline Digital Nursing and Midwifery Library to empower nursing and midwifery educators and students at the Juba School of Nursing and Midwifery (JSNM) in South Sudan. While visiting Juba in 2019, the co-founders of SolarSPELL and an ASU Edson College of Nursing and Health Innovation professor saw first-hand the lack of infrastructure and resources in hospitals and healthcare training facilities. They learned that students and clinicians share limited, and often outdated textbooks, and that there was minimal access to medical or nursing libraries.

An in-field partnership established with local NGO EmpowerKids - South Sudan, helped the team start the necessary conversations with local health-focused entities, like the University of Juba, the College of Physicians and Surgeons, and Health Pooled Fund of South Sudan. Education and practice leaders shared that medical and nursing students are not educated in evidence-based practice, because healthcare education in South Sudan lacks the library resources to support access to the medical and nursing literature. Based on these conversations, the SolarSPELL team visited the Juba School of Nursing and Midwifery and launched the process of developing and preparing an offline, digital library for nursing and midwifery students.

The SolarSPELL (Solar Powered Educational Learning Library) is an offline digital library that mimics an online experience by generating its own offline WiFi hotspot to which any WiFi-capable device can connect. This enables users to freely surf the library's expansive, yet localized, content, without the need for internet or electricity, or costly infrastructure improvements. Until recently, the SolarSPELL initiative has primarily focused its efforts on providing libraries with content targeted for primary and secondary schools. Indeed, there are currently approximately 15 primary and secondary schools within the Juba-area using SolarSPELL libraries; a SolarSPELL Teacher Training Centre was established at the Juba Girls Secondary School in June 2019. During the COVID-19 pandemic, while schools have been closed and lessons moved to being given over the radio, SolarSPELL libraries have been brought to multiple schools around the Juba area, allowing thousands of parents to come to the schools at coordinated times, to download their children's textbooks and supplementary educational materials, allowing the learning to continue from their homes.

Developing a digital health library for nurses and midwives

Given the positive results we have seen in the education sector, the SolarSPELL initiative has begun expanding its efforts to the health sector, with its first health-focused library to be specifically targeted for nursing and midwifery students. According to the World Health Organization (WHO), nurses and midwives are often the first and only point of contact for communities.^[1] SolarSPELL offers the opportunity to eventually expand and support health education across East

Africa in schools lacking reliable, robust, or any access to internet and electricity.

We hope that with the SolarSPELL Health: Nursing and Midwifery Library, educators at the Juba School of Nursing and Midwifery will be able to provide a more comprehensive and engaging learning experience for their students. We plan to conduct prospective evaluation to assess the impact on students' educational outcomes and how to reduce the shortage of nurses and midwives in the community. This SolarSPELL digital library developed for Juba School of Nursing and Midwifery will include high-quality, health-focused educational materials to supplement the current nursing and midwifery curriculum with a variety of written and video resources and interactive modules that will provide educators and students with the information they need to deliver enhanced care in their communities. Figure 1.

When the WHO declared 2020 the Year of the Nurse and Midwife^[2], no one could have predicted that 2020 would also be the year of a global pandemic. The eyes of the world refocused on the nursing profession in the face of COVID-19.

Due to the pandemic and travel constraints, in-person training for the Juba School of Nursing and Midwifery's instructors and students on the use of the Digital Nursing and Midwifery Library has been delayed. However, the SolarSPELL team has continued collecting and curating library content relating to the educational needs in South Sudan. Among the SolarSPELL team, outside of ASU, are two South Sudanese university students, Winny and Grace, who interned during the Summer of 2020. They have been able to contribute to the project remotely from their universities in Texas and New York, respectively.

Winny says, "What I like most about SolarSPELL is the end result of each one of their projects...someone somewhere gets to have access to educational materials that they would otherwise not be able to get." Winny helped curate content for the Digital Nursing and Midwifery Library and feels that the new library is going to be helpful to the students since it contains many of the books that they need to fulfil their degree requirements.

Grace also curated the content for the digital library and was most excited about a resource she curated about adverse childhood experiences and how that shapes a child's long-term health. She says, "This resource is needed in South Sudan because childhood experiences shape their future and lifestyle. Children face and experience a lot of abuses and these abuses are not addressed and this later causes depression and psychological problems."

SolarSPELL Co-Founder and ASU Faculty, Dr. Laura Hosman has always included ASU students in every aspect of the SolarSPELL initiative because students are



Figure 1. Students at Juba School of Nursing and Midwifery get the opportunity to try out the SolarSPELL digital library (Credit: The SolarSPELL Initiative, Arizona State University)

critical to its success. ASU students not only contribute to work in the field but they also learn from opportunities to engage globally, behave entrepreneurially, carry out real-world work with purpose, and transform society.

These are some testimonials from ASU students who have been involved in the project:

Mpho, an ASU student, is currently studying Applied Biological Sciences. She attended most of her primary and secondary schooling back in her home country of Botswana and understands first-hand the importance of SolarSPELL in resource-constrained communities. She says, "It brings me great joy to know that future health-care practitioners of South Sudan will have a wide range of resources to use as they learn and acquire all the necessary information that they need to become qualified in their fields."

SolarSPELL also has two Family Nurse Practitioner (FNP) students, who are nurses obtaining their Doctor of Nursing Practice (DNP) degree and have provided insights not just from their schooling, but real-world experiences. FNP student, Amira, says, "What we take for granted here, such as access to up-to-date educational materials, does not come as easily in South Sudan. In addition to this, we have had to tailor the content to what is realistic and applicable in their country. I am thankful to be a part of this project and I hope that this library is useful to the nursing and midwifery students."

Several ASU Biomedical Engineering students who had previously been working on other SolarSPELL digital library projects also spent Summer 2020 with the content curation team for the Nursing and Midwifery library. Karla, one of these students, says "[It] has taught me a lot about the health content needs in different parts of the

world, specifically South Sudan, and just how critical it is to have access to relevant health resources especially for those preparing as healthcare professionals.”

SolarSPELL is continuing to work on the development of the SolarSPELL Health: Digital Nursing and Midwifery Library for the Juba School of Nursing and Midwifery. As soon as travel is possible, the team plans to return to South Sudan in 2021 to deploy the library, training teachers and students to incorporate the SolarSPELL library into lesson plans and incorporating evidence-based practice into learning and practice. Until then, the team continues to improve the library. We are always open to recommendations for open access digital resources that can be added to the SolarSPELL library. If you have questions about the project or would like to offer resource ideas, please email solarspell@asu.edu.

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Two children die, 30 ill after measles outbreak in South Sudan

[East African](#), Saturday November 07 2020

Two children have died of measles and 30 others are in critical condition in a Médecins Sans Frontiers (MSF) health facility in Pibor Administrative Area, South Sudan, the medical charity has said. In a press statement seen by the East African on Friday, MSF says the contagious life-threatening disease is causing a severe crisis.

“We believe measles is now widespread and getting out of control. It is especially concerning that the Greater Pibor Administrative Area is flooded and in an emergency. We started with four, then six and then 18 isolation beds,” MSF’s Dr Adelard Shyaka said.

The charity urged health organisations to urgently launch a vaccination campaign to curb the outbreak.

“The severity of the outbreak is being magnified by other illnesses like severe malaria, pneumonia and severe malnutrition. Two children have already died and we are deeply concerned that without a prompt reactive vaccination campaign, more children will continue to die,” Dr Shyaka said.

MSF epidemiologist Laura Wright said measles can infect around 12 to 18 other people during the eight-day period in which a person with the disease is infectious. “We can expect the infection rate of measles in Pibor today to be alarmingly higher than these estimates. A total 71 per cent of patients are under one year of age. This is likely due to a disruption of routine vaccinations, resulting from the flooding that also happened this time last year and the ongoing conflict,” she said.

Measles is a highly contagious disease that is transmitted through the air. It has no specific treatment, but vaccination is effective.

Multiple uterine fibroids in an 18-year-old: a case report and review of literature

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Abstract

Uterine fibroids are benign monoclonal neoplasms arising from smooth muscle cells in the uterine wall. They are common gynaecological tumours in women of reproductive age, but, a rare occurrence in adolescence.

We present a case of a Nigerian 18-year-old undergraduate with abnormal uterine bleeding and abdominal swelling with a clinical diagnosis of uterine fibroids. She had an open abdominal myomectomy. Histology confirmed uterine fibroids. There is need for medical practitioners to consider this condition as a differential diagnosis especially among this group of women albeit a rare occurrence.

Keywords: uterine fibroid, gynaecological tumours, reproductive age, myomectomy, Nigeria

Introduction

Uterine fibroids are the commonest benign gynaecological tumour arising from the smooth muscle cells.^[1,2] They are usually firm, well demarcated whorled tumours and have been found to occur in 70-80% of women before or by the onset of menopause.^[2,3] The prevalence increases with age, and although it has been reported rarely in adolescents, the exact aetiology of a leiomyoma is not clearly understood. A number of risk factors have been implicated.^[4] In adolescents, it is hypothesised that ovarian activation, genetic characteristics, prenatal hormone exposure, growth factors could predispose to the development of leiomyomata.^[2,3,5]

The presentation and clinical features of uterine fibroids depends on the size and location.^[5] Among the women diagnosed with leiomyoma the majority will be asymptomatic and will not require treatment.^[1,2,5] However, in symptomatic cases, abnormal uterine bleeding is the most frequent complaint, the commonest of which is heavy menstrual bleeding.^[5,6] Other symptoms include; abdominal pain, dysmenorrhoea, pressure effect, spontaneous miscarriage and infertility.^[1,6]

Case Report

An 18-year-old nulliparous undergraduate presented to our outpatient department with a history of heavy menstrual bleeding with passage of clots for one-year and a progressively increasing lower abdominal swelling of eight months' duration. She used an average of six sanitary pads per day as against her usual three. The duration of her menstrual flow increased from three days to eight days with associated dysmenorrhoea severe enough to disturb her daily activities and sleep. There was no history of bleeding from other parts of her body, no easy bruising, and no history of intermenstrual bleeding. There were occasional episodes of palpitation and dizziness, but no syncopal attacks. There was no personal or family history of breast, ovarian, endometrial, or colon cancer. Her grandmother, mother, and two older sisters had a history of uterine fibroids. She had no chronic medical condition and attained menarche at ten years of age with a moderate flow for five days in a regular 28-day menstrual cycle, before the onset of present symptoms. She was *virgo intacta*.

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Figure 1. Fibroid riddled uterus (Credit: Dr Ugwu).

Her general physical examination was normal apart from a degree of pallor. No abnormality was detected in the respiratory and the cardiovascular systems. Abdominal examination revealed no hepatomegaly, splenomegaly or palpable kidneys. A 20 weeks' sized pelvic mass was noted. It was smooth, firm, regular and mobile. There was no ascites and bowel sounds were normal. Vaginal examination showed an intact hymen. A diagnosis of symptomatic uterine fibroids was made with the differential diagnosis of an ovarian tumour.

Full blood count showed a packed cell volume (PCV) of 26% and haemoglobin of 8.6g/dl. Her serum electrolyte, urea and creatinine, urine beta HCG and alpha-fetoprotein levels were within normal limits. Pelvic ultrasonography revealed an anteverted and markedly enlarged uterus with multiple well defined, hypoechoic solid masses of varying sizes, the largest measured 13.4cm x 8.5cm located in the fundus. Subserous and submucous components were also seen. Magnetic resonance imaging (MRI) of the pelvis could not be done due to financial constraints.

She was subsequently counselled on different options of management in the presence of her parents and they opted for an open abdominal myomectomy. They were further counselled on the benefits as well as the associated risks, recurrence and future fertility. Informed consent was obtained. Intraoperative findings (Figure 1) were that of a 20-week sized fibroid riddled uterus with multiple sub-serous, intramural and submucous fibroids. Thirteen fibroid nodules were enucleated with the smallest size measuring 2cm and the largest 16cm. The fallopian

tubes and ovaries were healthy. Estimated blood loss was 600mls.

Her immediate post-operative period was uneventful and her vital signs remained clinically stable. Her postoperative PCV was 28.6% while her haemoglobin was 9.5g/dl. Her postoperative recovery was satisfactory and she was discharged home on the 4th postoperative day on iron, folic acid and vitamin B supplements. At her first follow-up visit two weeks later she was asymptomatic and the surgical site was well healed.

At four weeks she had a PCV 30% and haemoglobin of 10g/dl. The histology report confirmed uterine fibroids. Though she was adolescent and not sexually active, she was still counselled on contraceptive options.

Discussion

Uterine fibroids are benign monoclonal tumours of smooth muscle cells of the myometrium composed of large amounts of extracellular matrix containing collagen, fibronectin, and proteoglycan.^[7,8] They account for 3.2–7.6% of new gynaecological cases seen in gynaecology clinics.^[9] Fibroids have been reported in up to 70% of uteri at hysterectomy.^[7] They are uncommon in the adolescent age group.^[7,8] The exact aetiology of uterine fibroids has not been fully elucidated. However, cytogenetic and genetic studies suggest that they result from somatic mutations in myometrial cells with aberrations involving chromosomes 6,7,12 and 14.^[7,8] These chromosomal aberrations are not present in all the fibroids in a single uterus suggesting that there may be other explanations in the pathogenesis.^[7]

Each fibroid is believed to be monoclonal in origin and arises from a single muscle cell.^[8] It has been established that the growth of these fibroids is closely dependent on ovarian steroids.^[7,8] Abnormalities in uterine vasculature and angiogenic factors have also been implicated as fibroids have a rich blood supply.^[7] Known risk factors for uterine fibroids includes: black race, nulliparity, obesity, familial predisposition, polycystic ovary syndrome, diabetes and hypertension.^[8,10] The risk factors identifiable in this patient include being of the black race, positive first-degree relative family history of uterine fibroids, nulliparity and being of reproductive age. High consumption of red meat (beef), as a source of extra oestrogen, has been noted to increase the likelihood of developing uterine fibroids by 1.7 fold.^[10,11]

Fibroids can be classified by their anatomical location in the uterus: intramural, sub-serous, sub-mucous, cervical, intra-ligamentary, pedunculated or parasitic in which case the leiomyoma has acquired an extrauterine blood supply usually from the omentum with atrophy and resorption of its pedicles.^[7,8] The International Federation of Gynaecology and Obstetrics (FIGO) classification can also be used to classify them.^[12,13]

The clinical features of uterine fibroids depends on the size and location.^[8] Although they maybe asymptomatic in up to 70% of cases heavy menstrual bleeding is the commonest symptom^[8] as in our patient. The possible mechanisms by which fibroids may cause menorrhagia include: enlargement of the surface area of the uterine cavity, congestion and dilatation of endometrial venous plexuses, imbalance in uterine prostaglandin production and disturbances in normal myometrial contractility.^[8] Patients may also present with chronic pelvic pain, dysmenorrhoea, dyspareunia, pelvic pressure, urinary symptoms and rarely venous thrombosis and constipation or intestinal obstruction from recto-sigmoid compression.^[7,8,10]

Diagnosis of uterine fibroids can be made following a good history and physical examination. Ultrasound scans (especially transvaginal) remain invaluable first-line imaging modalities.^[7,8] This patient however had a trans-abdominal pelvic ultrasound done because she was *virgo intacta*.

Management can be conservative, medical, or surgical. Asymptomatic patients are managed conservatively. This involves explanation, reassurance, and re-examination at periodic intervals.^[8] In symptomatic cases, with menorrhagia, anaemia if found should be corrected. Tranexamic acid, combined oral contraceptives or levonogestrel releasing intrauterine device can be used to reduce menorrhagia.^[7,8] Gonadotropin-releasing hormone (GnRH) analogues cause temporary regression of fibroids by decreasing estrogen levels.^[7,8] GnRH analogues are typically used for a maximum of six months due to their side effects such as vasomotor symptoms, osteoporosis and other common postmenopausal symptoms.^[7,8] These side effects especially vasomotor symptoms can become so severe to require add-back therapy with primarin or combined oral contraceptives.^[7,8] Hence the main use of GnRH is to reduce the size of fibroid preoperatively in order to minimize intraoperative blood loss.^[8]

The selective progesterone receptor modulator ulipristal acetate has shown remarkable results in effectively reducing pain, bleeding and fibroid size without producing oestrogen deficiency symptoms like hot flashes.^[7,8] However, prolonged use of this drug is discouraged as fulminant hepatic failure has been noted in some patients after prolonged use.^[7] Surgical methods of management include myomectomy, hysterectomy, myolysis, uterine artery embolization and bilateral uterine artery ligation.^[7,8,14,15]

Myomectomy can be via open abdominal surgery or endoscopic surgery (laparoscopy, hysteroscopy).^[7,8] The surgical method of choice depends on the age of the patient, the size of the fibroid, the severity of symptoms, the desire for fertility, and the skill of the surgeon.^[8,14]

Surgical options of management such as hysterectomy, uterine artery embolization and ablation procedures are reserved for women who have completed their family sizes.

This patient would have benefitted from a laparoscopic myomectomy based on the fact that it is a minimally invasive procedure with little or no risk of adhesions that might complicate future fertility. However, she had an open abdominal myomectomy because her fibroids were relatively large and she was *virgo intacta*. There is a risk of recurrence following myomectomy hence hysterectomy is considered the definitive treatment for uterine fibroids.^[7]

Management of symptomatic uterine fibroids in an adolescent can be difficult as the clinician is faced with the major challenge of preserving the fertility of the patient, the plausible risk of recurrence and the attendant complications of surgery which include adhesion formation and increased need for Caesarean delivery in the future. Irrespective of the above, myomectomy still remains the preferred management option in this group of young patients.

Conclusion

This was a case of an adolescent with multiple uterine fibroids. Uterine fibroids should be in the differential diagnosis list when evaluating adolescent women who present with a pelvic mass, abnormal uterine bleeding and abdominal pain. This group of women should be adequately counselled on the different options for management with the ultimate goal of preserving their future reproductive career.

Conflict of interest: None declared.

Consent for publication: A written informed consent was obtained from the patient before publication of this case report and accompanying image.

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Heterotopic pregnancy: case report of a rare clinical presentation from Wau, South Sudan

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Abstract

Heterotopic pregnancy, although common with assisted reproductive technologies, is very rare in natural conceptions. A high index of suspicion can help in timely diagnosis and appropriate intervention especially in low resource settings like South Sudan. Delayed diagnosis puts the mother at risk of potentially life-threatening complications. We report the case of heterotopic pregnancy in a young female that was successfully treated.

Key Words: heterotopic pregnancy, assisted reproductive technologies, South Sudan, case report

Introduction

Heterotopic pregnancy is defined as the coexistence of a living or dead intrauterine pregnancy (singleton or multiple) and extrauterine pregnancy located anywhere (in the oviduct, ovary, uterine cornus, cervix or peritoneal cavity).^[1,2] It is rare, occurring 1 in 30,000 in naturally conceived pregnancies, but is more common with assisted reproductive technologies (1 in 390).^[3] This case highlights the challenges surrounding the diagnosis and management in a low resource setting.

Clinical Assessment

A 26-year old gravida 2 para 1, presented with vaginal bleeding and acute onset lower abdominal pain. Her last normal menstrual period was on 17 November 2019. Urine pregnancy test had been positive at a private clinic on the 3 February 2020. Several days before her current admission she had attended a public hospital in Juba with abdominal pain and vomiting and was treated as an outpatient.

With no improvement, she attended another private hospital where a transabdominal ultrasound scan was done and revealed an intrauterine large gestational sac with no foetal pole seen; the sac diameter was equivalent to nine weeks gestation and five days. She was diagnosed to have a blighted ovum (failed intrauterine pregnancy) and a dilatation and curettage was planned.

However, the patient refused surgery after counselling. She described the pain as severe, colicky and not radiating, associated with nausea but no vomiting, fever or abdominal distension. The bleeding was minimal and dark red in colour. Her pregnancy had resulted from natural conception and there was no history of contraception use such as progesterone only pills or intrauterine contraceptive devices. There was no history of pelvic inflammatory disease or abdominal surgery.

On initial examination she was pale and distressed, her heart rate was 113 beats/minute and blood pressure of 60/32 mmHg. The patient was intubated in theatre, given I.V fluids, whole blood and ephedrine 10 mg. The initial urine output on catheterization was 130 ml from admission at 6:35am to the operation time at 8:30 am. Her oxygen saturation was ranging from 78% to 86%. Facilities for arterial blood gases and pH were not available. The right lower quadrant of the abdomen was tender with no fluid thrill or shifting dullness. On speculum

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Figure 1. Transabdominal sonography showing intrauterine pregnancy (IUP), extrauterine pregnancy (EUP) with foetal pole and Pelvic Haematoma (PH). It does not show free fluid collection in the posterior cul de sac, para-colic gutters or Morison's pouch.



Figure 2. Transabdominal sonography showing ectopic pregnancy with Crown-rump Length (CRL) of 22.4 mm equivalent to nine weeks and one day.

examination, the cervix appeared healthy, slightly open with minimal bright red blood coming from the internal os. On vaginal examination the uterus was about ten weeks in size with cervical tenderness on palpation.

Investigations

Haemoglobin was 8.5 g/dL, (compared to 11.4 g/dL a week before). Blood group was A Rh positive and cross matching was done in anticipation of the need for a transfusion. Renal and liver functions tests, complete blood count and standard coagulation tests were not available. Bed side clotting and bleeding time were normal.

An emergency bedside abdomino-pelvic ultrasound scan (Figures 1 and 2) reported an intrauterine gestational sac of nine weeks and three days with no foetal pole seen. Another extrauterine singleton foetus with visible cardiac activity and gestational age of nine weeks and one day (by crown-rum length) was seen in the right adnexa.

The patient was given antibiotics, (intravenous ceftriaxone 1g stat, intravenous metronidazole 500mg was given stat 20 minutes before surgery to reduce the risk of infection), analgesia as she was in pain (intravenous tramadol 100mg stat – which was the only analgesia available), intravenous fluids (1.5 litres of normal saline), urethral catheter was inserted and informed and written consent for exploration was given.

Intraoperative management

With the diagnosis of heterotopic pregnancy, the patient was rushed to the operation theatre for emergency surgery and resuscitation was continued in theatre. Under general anaesthesia the abdomen was opened via an infra-umbilical midline incision. One litre of blood was drained from the abdomen. There was a right tubal pregnancy (6 x 4 cm) with active bleeding from the fimbrial end of the tube was seen (Figure 3). The contralateral fallopian tube and

ovary were normal with no other pelvic pathology. Right salpingectomy was done and haemostasis was secured. Dissection of the excised ectopic pregnancy revealed a well-formed foetus in a clear amniotic sac (Figure 4).

Surgical evacuation of the intrauterine pregnancy was done by dilatation and curettage (Figure 5). Unfortunately, although histopathological examination of the evacuated retained products of conception was considered, this service was not available.

Postoperative management and progress

Two units of whole blood were given and recovery was uneventful. An ultrasound scan before discharge confirmed an empty uterus with no intra-abdominal free fluid (Figure 5). She was reassured of her fertility, advised on the risk of a further heterotopic pregnancy and early attendance for antenatal care was emphasised.

Reproductive outcome after ectopic pregnancy usually is evaluated by determining tubal patency by hysterosalpingograph (HSG) to determine the subsequent intrauterine pregnancy rate, and the recurrent ectopic pregnancy rate. Pregnancy rates are similar (79%), in patients treated by either salpingostomy or salpingectomy provided that there is no pathology in the contralateral tube.

Discussion

The diagnosis of a heterotopic pregnancy is difficult especially in a low resource setting like South Sudan. The major features (which our patient demonstrated) are abdominal pain (83%), vaginal bleeding (50%) and shock (13%).^[1,4] Transvaginal ultrasound, although it is not routinely practiced in South Sudan, is the key to diagnosing heterotopic pregnancy. However, it has a low sensitivity with the diagnosis often missed.^[5] A delayed diagnosis can have serious consequences as in our case.

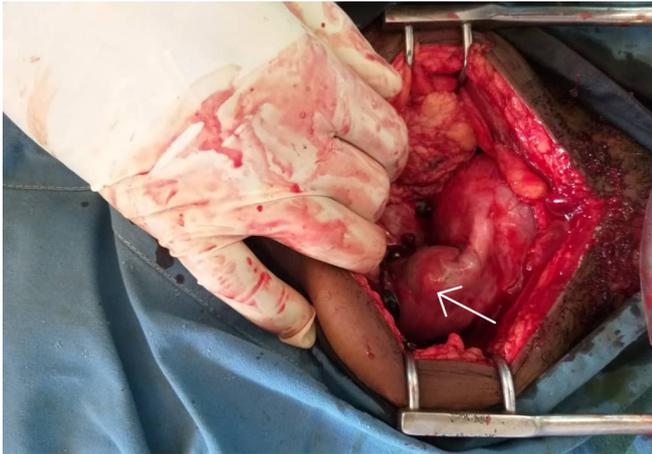


Figure 3. Intraoperative photograph of right tubal ectopic pregnancy, see white arrow. (Credit Mr John Leo).



Figure 5. Intraoperative photograph showing surgical evacuation of the intrauterine pregnancy (Credit Mr John Leo).

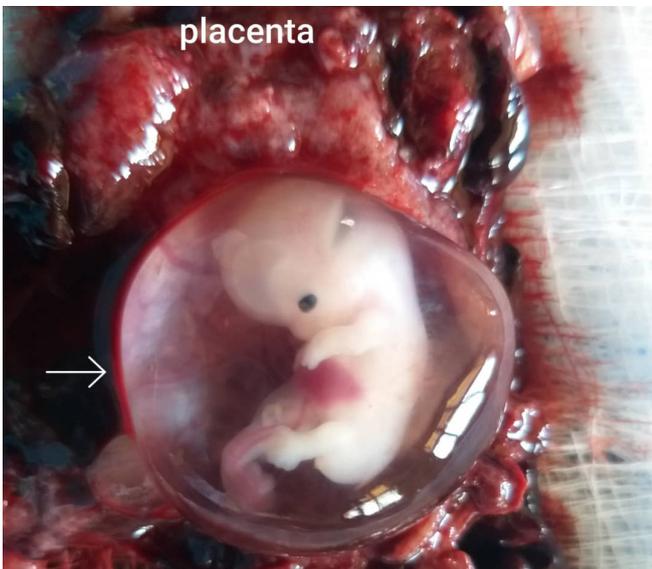


Figure 4. Amniotic sac (arrow), containing nine weeks foetus (after dissection of the excised right tubal ectopic pregnancy).

Usually, the management of heterotopic pregnancy is complicated requiring emergency surgery.^[2, 3] Earlier diagnosis may minimize the need for surgical management as well as decrease the risk to the patient.^[6] If early diagnosed, other options like medical management can be done to avoid surgery and its complications. Surgical management was the only option in this particular case (because of deranged vital signs, having extrauterine pregnancy with visible cardiac activity). Medical management is not feasible in South Sudan, however in some situations early recognition allows for possible medical management using a drug like methotrexate and the woman can attend early and be followed up to make sure she is no longer pregnant.

Conclusion

1. While the incidence of heterotopic pregnancy is extremely low in natural conceptions the morbidity associated with a missed diagnosis is significant.

2. Clinicians should have a high index of suspicion for heterotopic pregnancy among patients presenting with abdominal pain.
3. Careful clinical examination and complete pelvic ultrasonography in all pregnant patients with abdominal pain can help minimize the chances of missing a heterotopic pregnancy.

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Penetrating arrow in the face: a case report

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Abstract

Cases in which a foreign body is embedded in the maxillofacial region are uncommon and rarely reported. Our case is an unusual one of an arrow stuck in the face (in the naso-orbitoethmoid and maxillary region) during a fight resulting in severe pain and discomfort. To our knowledge, impaction with this type of foreign body has not been previously reported.

The patient was successfully treated, using a multidisciplinary approach, with the patient assessed and treated by a variety of specialists.

Keywords: Maxillofacial trauma; retained foreign body; penetrating injury, Namibia

Introduction

Foreign bodies embedded deep in facial tissues present a challenge to maxillofacial surgeons. These cases may result from trivial accidents, gunshot, industrial accidents, interpersonal violence, and knife impactions.

Approximately one third of all foreign bodies are missed during initial examination. Foreign bodies like grit particles, wooden pieces, thorns, pebbles, or glass particles may get embedded into deep facial tissues which are detected only accidentally either with the help of radiographs or at a later stage when a patient presents with some signs and symptoms like pain, pus discharge, sinus formation etc. However, some cases represent real emergencies if the foreign body is located near vital structures such as the eye.

Foreign bodies in the face pose a diagnostic challenge due to their size, difficulty of access and their close relation to vital structures. Ocular acuity and mobility should be investigated on admission as they are frequently associated with ocular trauma.

Case Report

A 30-year-old male presented to the Intermediate Hospital Oshakati (IHO) complaining of pain and discomfort on the face and left eye following a fight with another man while drinking in a bar. He came straight to the hospital, was given analgesics, and anti-tetanus prophylaxis, and admitted to the maxillofacial ward. Posterior-anterior (PA) and lateral (LV) X-rays of the skull showed a radiopaque object about 23cm in length in the facial bones, involving the internal orbital wall, nasal and ethmoid bones, right maxillary bone and right temporomandibular joint. (Figure 1).

The left eye was assessed in the Ophthalmology Department a day after injury when no abnormalities were detected and the maxillofacial surgeon continued the management.

Clinical examination showed a foreign body stuck in the internal angle of the left eye, no bleeding was detected or any sign of eye injury or functional problems. The orbital rims were intact and non-tender on palpation. The globe of the eye was intact and vision was normal in both eyes. Eye movements were not restricted and there was no diplopia in all gazes. There was severe pain and restricted mouth opening to 2.5cm, caused by the injury.

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Figure 1. Preoperative view PA and LV X-rays of the skull



Figure 2. 3D CT scan showing foreign body involving orbital, naso-orbitoethmoid and maxillary region causing fracture of the right zygomatic arch

A computed tomography (CT) scan with 3D reconstruction was done to assess the extent of the injury and the tissues involved (Figure 2). Angiography was not possible because the patient, being a foreigner, would have had to pay for this. The CT showed a metal object in the orbit, which was extending into the naso-orbitoethmoid region, upper maxilla and right temporomandibular region. A right zygomatic arch fracture was detected but, as it had no displacement, no treatment was needed. A neurosurgical opinion was that there were no intracranial lesions.

Surgery was performed on the third day of admission under general anaesthesia and endotracheal intubation. Prophylactic antibiotics was started one hour before the operation with cefuroxime 1500 g and continued every 8 hours 750 g on the day of the surgery.

The neck on the right side was opened with an incision of 6 cm following the anterior border of the sternocleidomastoid muscle in order to access the external carotid artery and pass a loose ligature to deal with severe bleeding in case it was impossible to manage locally. A local anaesthetic with adrenaline was injected in the area of the laceration prior to making an incision through the internal wall of the left orbit, surrounding the foreign body, extending for about 6 cm. A careful dissection through the soft tissue layers was made down to the bone, exposing the entrance of the object being careful not to displace it. (Figure 3).

Naso-orbital osteotomy was performed with a micromotor and a surgical bur, similar to the one we use in third molar surgery and osteotomies, in order to make the entry wound wider and allow the gentle removal of the object with forceps. (Figure 4). As no significant bleeding occurred, the bone was filled with a similar bur but with the active part round, similar to those prosthodontics use for dentures, and the wound was irrigated with hydrogen peroxide 3%, and betadine 10%. The wound was closed

by layers in the orbit with vicryl 3-0 and nylon 4.0. Tarsorrhaphy was performed to protect the eye for the first two days.

The neck was sutured by layers with chromic 3-0 and nylon 3.0. A corrugated drainage was left in the wound for 2 days.

The orbital region was also sutured the same way and tarsorrhaphy was performed (Figure 5).

Postoperative recovery was successful and the patient was discharged after one week (Figure 6).

Discussion

It is not easy for maxillofacial surgeon to diagnose the presence of foreign bodies at the initial examination clinically. Approximately one-third of all foreign bodies are initially missed.^[51] Many cases of embedded foreign bodies go unnoticed at initial examination and reveal their presence at a later stage when patient revisit the surgeon with some complaints with the associated area. Often foreign bodies are detected as an additional finding on radiographs, which were basically advised for ruling out bony injuries.

Retained foreign bodies following penetrating injury to the maxillofacial region by an arrow are uncommon and rarely reported. We have found reported cases in South Africa^[12], USA^[3] and elsewhere.^[4-12]

Management of injuries, caused by a foreign body like an arrow, to the maxillofacial region should be thorough and systematic requiring a multidisciplinary approach including ophthalmology, otolaryngology, neurosurgery and maxillofacial surgery. Initial airway and haemodynamic stabilization of the patient should be established with



Figure 3. Dissection to access the carotid artery and the bone surrounding the foreign body



Figure 4. Foreign body extracted from the wound.



Figure 5. Tarsorrhaphy on the left eye.



Figure 6. Satisfactory postoperative progression

assessment of damage to vital structures. Then appropriate laboratory and radiographic investigations may be performed. A detailed history of the events leading to the injury should be obtained from the patient, witnesses, or family. This should reduce the chance of a penetrating injury being overlooked. Complete examination of the head and neck region should be performed, with care taken to explore any wounds that appear more than superficial. Patients may often present with other knife wounds to the hands and thoraco-abdominal areas.

Radiographic examination is essential with any clinical evidence or suspicion of a retained foreign body. As a minimum, two plain radiographs taken at right angles should be obtained in order to identify the location of the foreign body in relation to vital structures.^[1-4]

Computed tomography (CT) is usually the first line of imaging performed in cases of deeper penetrating injuries, particularly when attempting to detect metallic foreign bodies.^[5, 6] In cases where plain film or CT may not be immediately available, ultrasonography has been documented to be useful in foreign body detection.^[7]

Thorough knowledge of the vascular anatomy of the maxillofacial region is especially important. If a foreign body, such as a retained knife blade, is visualized on plain films or CT, angiography may be indicated.^[8] While catheter angiography is the standard of care in the identification of vascular injuries, CT angiography is an alternative approach.^[9] Many major vessels are present in the maxillofacial region, and damage to the vasculature should be initially suspected until proven otherwise.

Even if significant bleeding is not present on initial examination, the foreign body may cause disruption of the vessel walls, causing development of pseudoaneurysms. If disrupted during foreign body removal, these may result in severe bleeding.^[10] The surgeon may consider consulting interventional radiology or vascular surgery in the event a problem during retrieval of the object and selective embolization or surgical ligation of the associated vessels

may be necessary. In this respect, we decided to access the external carotid artery placing a loose ligature to be used in the event of serious hemorrhage.

Surgical management of patients sustaining penetrating wounds to the maxillofacial region with retained foreign bodies depends on clinical and radiological findings and of course on the composition and type of foreign body, size, location, and relationship to local structures. The ideal method of removing a retained knife blade is careful extraction through the initial entrance wound under general anaesthesia.^[11] Care should be taken to avoid trauma to adjacent structures during withdrawal, especially if the blade is serrated. Thorough exploration of the wound after foreign body removal should then be performed with copious irrigation of the site. When indicated, tetanus prophylaxis and appropriate perioperative antibiotics should be administered.^[12]

As seen in this case, the initial history of the associated trauma is often inaccurate or incomplete, especially when alcohol consumption or intoxication is involved. Physical findings may not entirely correlate with the reported nature of the injury or predisposing event.

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A NEW COLLEGE OF PHYSICIANS

East, Central and Southern Africa College of Physicians (ECSACOP)

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Background

It is evident that there is a shortage of doctors in sub-Saharan Africa. Statistics show that 25% of the world's disease burden occurs in Africa which has only 1.7% of the world's doctor population and accounts for 1% of the world's financial resources for health.^[1] All specialities in medicine are affected.

Objective

“The College aims to improve access to well-trained physicians across the region by establishing a network of dedicated training centres and implementing an internationally recognized postgraduate medical qualification. The college will ultimately improve health outcomes for the region's >200 million inhabitants, with a focus on expanding healthcare provision in centres serving the rural population.”

Training

The training curriculum will be delivered through an in-service, apprenticeship model in existing health facilities. Through this approach, ECSACOP will harmonise internal medicine training across the region, establishing regional standards and ultimately improving health outcomes for countless patients.

ECSACOP is a regional college (currently comprising Kenya, Malawi, Tanzania, Uganda, Zambia and Zimbabwe) that seeks to contribute to the resolution of manpower shortages of physicians.^[2] ECSACOP is one of six constituent colleges of the ECSA College of Health Sciences which was established following a resolution passed at the 52nd Health Ministers Conference held in Harare, Zimbabwe 2010 (ECSA/HMC52/R9: Strengthening Partnerships for Health).

ECSACOP was officially inaugurated in 2015 and has thus far held three scientific and annual general meetings in Zimbabwe (2016), Uganda (2017) and Zambia (2019).

ECSACOP Award – the College awards Fellowship through instruction and examinations. Enrolled trainees participate in full-time instruction in approved training institutions.

The Fellowship (Part 1)

After the first two years, trainees should complete the FCP (Part 1) examination and be able to take responsibility for emergency medical admissions, deal with life-threatening situations resulting from a variety of causes and be able to diagnose and plan treatment for a variety of common and important medical conditions. The FCP (Part1) examination does not confer specialist status but qualifies a candidate to register for and pursue higher medical training.

The Fellowship (Final) examination leads to the qualification of Fellow of the East Central and Southern Africa College of Physicians, FCP (ECSA). This qualification is recognition that the candidate has reached the level of knowledge and practice of internal medicine sufficient to practice independently at a consultant or specialist level.

The holder of the FCP (ECSA) qualification is envisaged to be a physician who:

ECSACOP Award

Fellowship location	ECSACOP accredited training sites
Type of Fellowship	Full-time
Year of Commencement	September 2018
Length of Fellowship	4 years
Award	Fellow of the East, Central and Southern Africa College of Physicians
Designation of Award	FCP (ECSA)

1. Is specialized in all aspects of care of unselected general medical problems, in particular those that involve nonspecific symptoms, unusual presentations, multisystem disorders and complex multiple problems
2. Has an approach to practice that is strongly based on clinical skills and who applies technology in an appropriate, efficient and economical fashion, displays a high level of professionalism in his/her interaction with patients, their relatives, colleagues and the health system
3. Is capable of lifelong self-directed learning.

FELLOWSHIP/MEMBERSHIP

Founding Fellow

Any internal medicine physician registered as a specialist with a medical regulatory authority in the region shall be eligible to be a Founding Fellow (until such time as ECSACOP's first set of examinations occurs).

Ordinary Fellow

Any person trained as Internal Medicine specialist and who is certified by the College through its examination shall be eligible for Fellowship in the College.

Associate Fellow

An Associate Fellow shall be any registered Physician from outside the Region. They shall apply to Council for fellowship.

Honorary Fellow

An Honorary Fellow shall be any individual who has made substantial contributions to advancement of the mission and vision of the College. They need not be physicians. They shall be proposed by two College Fellows for consideration by the Council.

Corporate Member

A corporate member shall be any institution, organisation or business community of good standing and demeanour with an interest in internal medicine.

Ordinary Member

An ordinary member shall be any person currently enrolled in postgraduate training in internal medicine at the College.

PARTNERSHIPS

ECSA Health Community

The East, Central and Southern African Health Community (ECSA-HC) is an inter-governmental health organization that fosters and promotes regional cooperation in health among member states. Member states of the ECSA Health Community are Kenya, Lesotho, Malawi, Mauritius, Swaziland, United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

Infectious Disease Institute, Uganda

ECSACOP's Secretariat is currently housed within IDI's HQ on the Makerere campus in Kampala, Uganda. ECSACOP benefits from IDI's expertise, networks and technical support. We also utilise IDI's financial, IT and human resource functions.

Royal College of Physicians (RCP), London

ECSACOP's principal partner throughout its inception phase has been the RCP (London). ECSACOP has benefitted enormously from both institutional and individual support across the organization.

National Associations of Physicians

The National Associations of Physicians in the six member states are the principal collaborators when it comes to the identification and recruitment of training sites and trainers, curriculum design, accreditation and quality control.

Status of ECSACOP 2020

ECSACOP was due to hold its first Part 1 examination in mid-2020, but this was deferred because of the COVID-19 pandemic. ECSACOP comprises 6 countries, but expansion to other East, Central and Southern African countries is the vision of the College. South Sudan should look forward to joining this promising College in the same way that it has now been integrated into the College of Surgeons of East, Central and Southern Africa (COSECSA).

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600k
people affected

600k
people displaced

24
flood-affected counties

18
affected counties in crisis & emergency food insecurity

22
affected counties with response ongoing

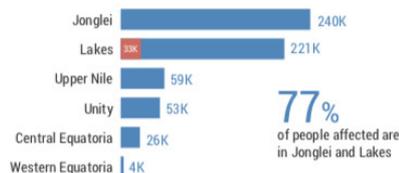
SITUATION UPDATE

More than 600,000 people have been affected by flooding in areas along the White Nile since July, with Jonglei and Lakes the worst affected states. Heavy rains have caused rivers to overflow their dykes and banks, flooding vast areas and settlements along the White Nile in the centre of the country.

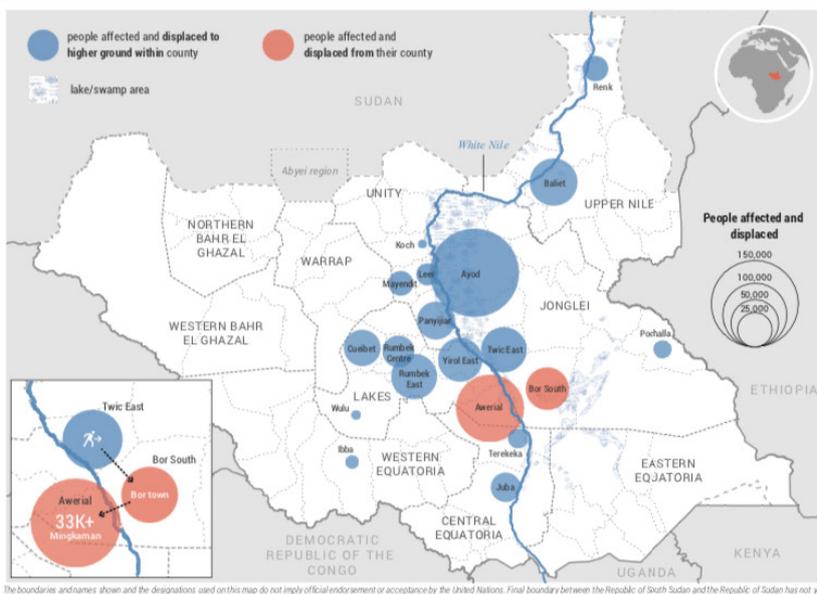
The majority of people displaced moved to higher ground near their homes and plan to return once the flood waters recede. In Bor South, over 33,000 people earlier displaced by conflict and flooding in Twic East and Duk counties to the north have moved west into Aweiral county, and are now sheltering in Mingkaman town IDP settlement.

A coordinated humanitarian response scale-up in the most affected states of Jonglei, Lakes and Unity was initiated to respond to the increased needs of people affected and displaced by the flood waters. Rapid needs assessments were conducted in six of the affected counties in early August and partners are now responding to the immediate needs of the flood-affected people, with more assessments planned and efforts ongoing to reach the more remote areas. According to early assessments, priorities include water purification tablets, plastic sheeting for temporary shelter, mosquito nets, fishing kits and medicine for malaria, diarrhoea and other waterborne diseases.

FLOOD-AFFECTED PEOPLE BY STATE

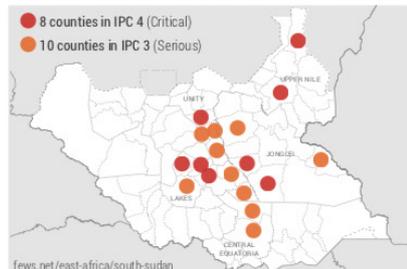


PEOPLE AFFECTED AND DISPLACED BY FLOODS

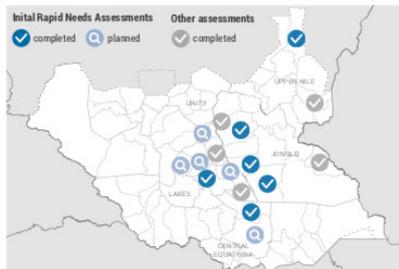


Creation date: 03 September 2020 | Sources: OCHA, FEWS NET, humanitarian partners in South Sudan | Feedback: ochasouthsudan@un.org | unocha.org/south-sudan | reliefweb.int/country/sd | southsudan.humanitarianresponse.info | @OCHASouthSudan

FOOD SECURITY OUTLOOK AUG-SEP (FEWS NET)



ASSESSMENTS



RESPONSE



RESPONSE STRATEGY

The flood response is targeting counties with food insecurity and nutrition challenges based on assessed needs and counties in Integrated Food Security Phase Classification (IPC) phases 3 and 4. The locations prioritized include settlements located along the Nile river down through the centre of the country where the majority of flood-affected communities were displaced to higher ground. Locations where over 5,000 people were affected, where property is now uninhabitable and over half of water infrastructure and health facilities were destroyed are top priorities for response.

Localization of the response will be promoted by assessing and strengthening the capacity and providing additional resources to national, local and faith-based organizations. Based on lessons learned from the 2019 flood response, UN agencies will conduct a periodic review of pipelines to identify gaps and advocate for additional resources to ensure the continuity of the response. With the COVID-19 travel restrictions, high-level advocacy to ease restrictions is recommended and well as advocacy for additional funding.

- JONGLEI**: Health, Nutrition, WASH, Protection, Food, Emergency Shelter & NFIs
- LAKES**: Health, Nutrition, WASH, Protection, Food, Emergency Shelter & NFIs
- UPPER NILE**: Health, Nutrition, WASH, Protection, Food
- UNITY**: Health, Nutrition, WASH, Protection, Food
- C. EQUATORIA**: Health, Nutrition, Protection

CHALLENGES AND GAPS

CONFLICT **ACCESS** **COVID-19** **FUNDS**

The combination of floods with conflict, displacement, food insecurity and disease outbreaks have exacerbated needs in South Sudan. The arrival of COVID-19 and related travel restrictions imposed by the government significantly impacted how aid agencies respond. Access is a major challenge, with the majority of flood-affected areas inaccessible by road. The transport of aid by air is extremely expensive. Many of the areas are highly insecure due to the ongoing sub-national violence, especially in Jonglei. Additional funding is needed to scale up response to reach communities affected by the combination of shocks. Capacity and supplies on the ground are limited and need to be replenished to meet increasing needs.

PHASE ONE EMERGENCY RESPONSE

- HEALTH
- WASH
- NUTRITION
- PROTECTION
- FOOD
- LIVELIHOOD
- SHELTER/NFI

HOUSEHOLD LEVEL

Distribution of WASH NFIs, COVID-19 package, nutrition supplies, food assistance, fishing kits, protection supplies and emergency shelter and NFIs

COMMUNITY LEVEL

Rehabilitation and chlorination of water sources, replenishment of medical, nutritional supplies and dignity kits

PHASE TWO RESILIENCE SUPPORT

- REPAIR
- VACCINATE
- TOOLS
- ADVOCATE

Distribution of seeds and tools, animal vaccinations, rehabilitation of boreholes, latrines and schools
Advocacy with authorities and development partners to engage in disaster risk reduction and climate change adaptation activities

Creation date: 03 September 2020 | Sources: OCHA, FEWS NET, humanitarian partners in South Sudan | Feedback: ochasouthsudan@un.org | unocha.org/south-sudan | reliefweb.int/country/sd | southsudan.humanitarianresponse.info | @OCHASouthSudan

Every effort has been made to ensure that the information and the drug names and doses quoted in this Journal are correct. However readers are advised to check information and doses before making prescriptions. Unless otherwise stated the doses quoted are for adults.