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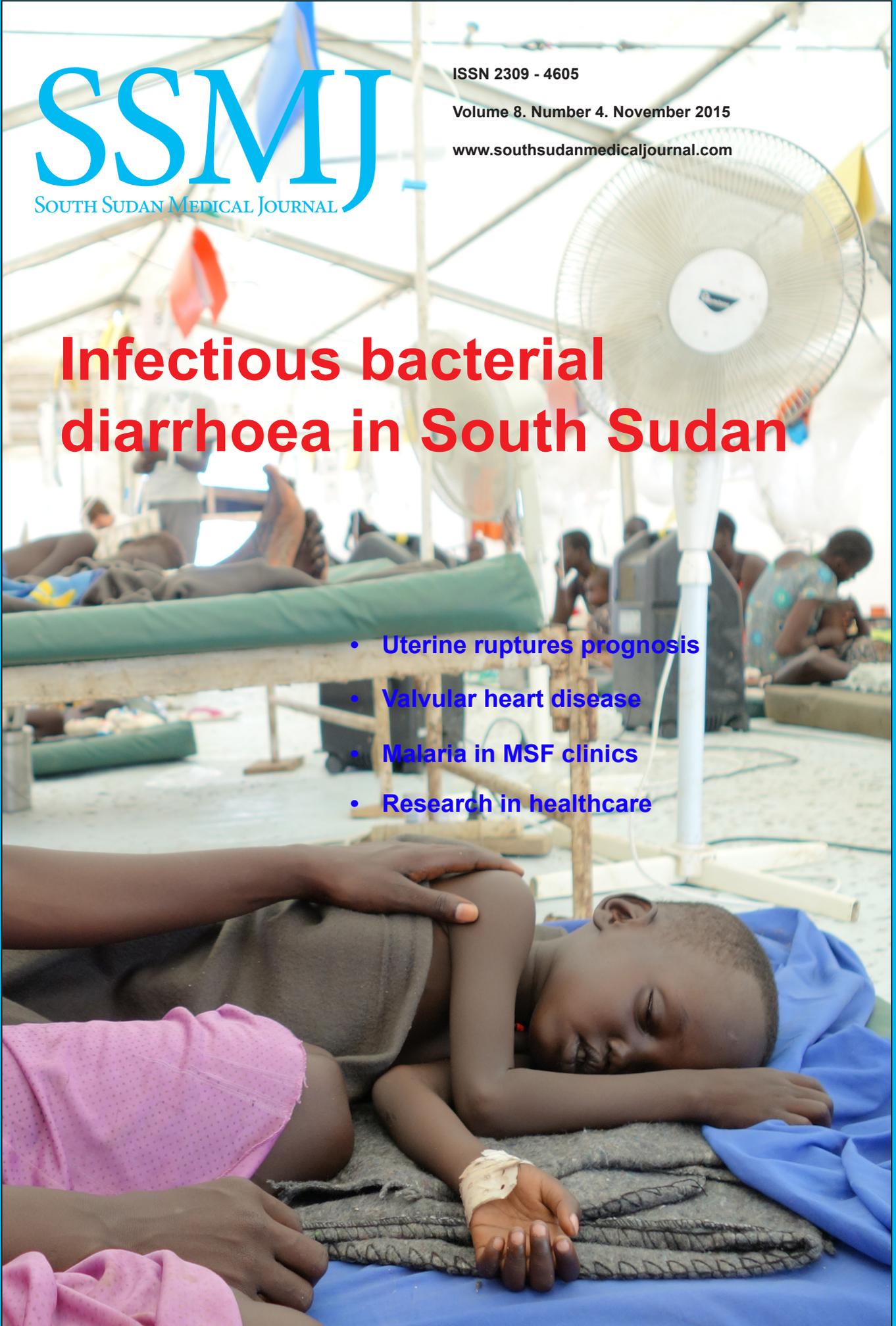
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Infectious bacterial diarrhoea in South Sudan

- Uterine ruptures prognosis
- Valvular heart disease
- Malaria in MSF clinics
- Research in healthcare



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The *South Sudan Medical Journal* is a quarterly publication intended for Healthcare Professionals, both those working in the South Sudan and those in other parts of the world seeking information on health in South Sudan. The Journal is published in mid-February, May, August and November. *Reviewers are listed on the website*

Reducing maternal mortality - more needs to be done

The World Health Organization (WHO) has released its report “Trends in Maternal Mortality: 1990 to 2015” [1] which looks into the global efforts to reduce maternal deaths as part of the Millennium Development Goals (MDGs) which are ending in 2015. It is said to “examine global, regional and country specific progress in reducing maternal mortality”. MDG Goal 5 specifically aimed to improve maternal health.

The report highlighted the following:

- Globally, the Maternal Mortality Ratio (MMR – number maternal deaths/100 000 live births) fell by nearly 44% over the past 25 years, from 385 in 1990 to an estimated 216 in 2015.
- The annual number of maternal deaths decreased by 43% from approximately 532 000 in 1990 to an estimated 303 000 (UI 291 000 to 349 000) in 2015.
- The approximate global lifetime risk of a maternal death fell considerably from 1 in 73 to 1 in 180.

Although there is a decrease in MMR globally, sub-Saharan Africa still registers the highest number of maternal deaths, accounting for 66% of the global maternal deaths. WHO reports that the estimated MMR for South Sudan has dropped from the highly publicized 2,054/100,000 to 789/100,000 live births [1]. This may be good news for the country but the challenges that kept it in this situation remain.

The major global causes of maternal deaths, accounting for 75% of the deaths, are: severe bleeding, infections, high blood pressure during pregnancy, complications from delivery and unsafe abortion [2]. There are many interventions, proven and tested that can be used to tackle poor maternal health outcomes. Health systems that support access to complete antenatal care, skilled delivery at birth and emergency obstetric care are key. Unfortunately, the barriers to the implementation remain the biggest challenge.

The conflict which started in December 2013 has reversed some of the gains made in the health infra-structure since 2005. Hospitals were destroyed, women and children displaced and thousands still face the threat of famine. It is unlikely that maternal mortality and morbidity can be reduced in such circumstances.

So much more needs to be done. The focus on training of skilled birth attendants, introduction of innovative programmes such as the use of misoprostol to reduce postpartum bleeding [3], establishment of maternal birthing homes and increased access to emergency obstetric surgery should be put in the forefront. Development partners have continuously supported the Ministry of Health in these endeavours and should be encouraged to continue.

The MDGs are being replaced by the Sustainable Development Goals. The new target is to reduce the global MMR to less than 70 per 100,000 live births by 2030. South Sudan should be able to achieve this target if all health partners work together.

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Uterine ruptures: epidemiological aspects and prognosis at N'djamena Mother and Child Hospital

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BACKGROUND: Uterine rupture is a non-surgical breach of the continuity of the myometrial wall, and is always a major obstetric emergency.

OBJECTIVE: To identify the main etiologies of uterine rupture aiming to improve its management and reduce its morbidity.

MATERIAL AND METHOD: This was a prospective and descriptive survey carried out for nine months in 2013 at N'Djamena Mother and Child hospital. The population studied was pregnant women (>28 gestational weeks), or in post-partum period, admitted for uterine rupture. Chi-square (X^2) test ($p < 0.05$) was used to compare variables.

RESULT: We recorded 54 uterine ruptures among 9384 deliveries giving a frequency of 0.57%. The average age was 26.8 years with a range of 15 to 40 years. Thirty two of the 54 patients (57.4%) were multiparous (average parity was 3.8). Eighteen had a scarred uterus ($p = 0.014$). Among the causes, foeto-pelvic disproportion was observed in 44.4% of patients ($n = 24/54$) followed by the inappropriate use of oxytocin in 24.1% ($n = 13/54$). Complete uterine rupture was noted in 77.8%. Laparotomy was performed in all cases. The conservative treatment (suture of uterine lacerations) was done in 47 cases (87%). Hysterectomy was carried out in 7 cases (13%). Five patients died (9.3%) in the intensive unit care. Fifty foetuses (92.6%) died.

CONCLUSION: Uterine rupture is an obstetrical emergency. It remains a common cause of death for the mothers and foetuses. The prevention is possible.

Key words: *uterine rupture, epidemiological aspects and foeto-maternal prognosis.*

Introduction

Uterine rupture is a non-surgical breach of the continuity of the myometrial wall of the uterus [1]. It is now rare in industrialized countries, thanks to improved ante- and peri-natal care [2]. In the sub-Saharan Africa it is a major obstetric emergency. Its frequency ranges from 0.6% in Central African Republic [3], 0.78% in Togo [4], 1.01% in Enugu (Nigeria) [5], 1.15% in Bamako (Mali) [6], 2.2% in Senegal [7] to 2.33% in Niger [8]. In Chad, there are no previous data on this serious subject.

Our objective was to identify the main causes of uterine rupture and so improve management and reduce morbidity and mortality.

Material and method

This was a prospective and descriptive survey carried out for nine months (January, 14th 2013 to October 14th 2013) at N'Djamena Mother and Child hospital.

N'Djamena Mother and Child hospital is a third level hospital caring for referred patients from surrounding hospitals.

The population of the survey was composed of pregnant women (> 28 gestational weeks) or in the post-partum period who were admitted for uterine rupture.

Studied variables were: age, parity, etiology, number of prenatal consultations, treatment and prognosis. Consent from the patient for inclusion in the study was obtained after explaining to her the need for the survey. All consented patients with uterine rupture were included. Agreement of the Director of N'Djamena Mother and Child hospital and the ethical committee were also obtained. Data were analyzed using SPSS 17.0. Chi-square (X^2) test ($p < 0.05$) was used to compare variables.

Results

Epidemiological aspects

Frequency

We recorded 54 uterine ruptures among 9384 deliveries (frequency of 0.57%).

The average age was 26.8 years (range 15 to 40 years). The highest proportion of cases (35.2%) were in the age

group 31 to 35 years (n=19/54), as shown in table 1.

Multiparous represented 57.4% (n=32/54) of the patients. Average parity was 3.8 (table 2).

Prenatal consultation and admission mode

Thirty eight patients (70.4%) had had less than the WHO-recommended 4 antenatal visits, the remaining 16 patients had 4 antenatal consultations. The majority of patients (n=34/54 i.e. 62.3%) lived in a rural area. Forty six patients (85.2%) were referred in labour from surrounding hospitals.

Clinical data

We recorded 18 patients with scarred uterus among 54 patients admitted for uterine rupture (p=0,014) (table 3).

Foeto-pelvic disproportion was most common at 44.4% (n=24/54). Inappropriate oxytocin used has concerned 24.1% (n=13/54). Inappropriate use of uterotonic (misoprostol and oxytocin) represented 18 patients (33.4%) (table 4).

Pathological anatomy

Complete rupture that involved all uterine occurred in 77.8% (n=42/54). Inferior segment was ruptured in 81.5% (n=44/54). Laparotomy was performed in all cases. Conservative treatment (suture of uterine lacerations) was done in 87% (n=47/54). Hysterectomy was carried out in 7 cases (13%).

Fifteen patients (27.8%) in the post-operative period were anaemic (see table 5).

Foetal and maternal prognosis

Five patients (5/54 i.e. 9.3%) died in the intensive unit care. Causes of maternal death were: severe anemia (4/5 i.e. 80%) and septic shock (1/5 i.e. 20%). We registered 50 foetal deaths among 54 foetuses, giving a perinatal mortality of 92.6%.

Discussion

Epidemiological aspects

In France, uterine rupture frequency varies between 1/1000 to 1/2000 [9], in the United States of American the frequency is less than 1 case for 1000 deliveries [10, 11]. The rupture frequency in our survey was 0.57%. Our proportion is similar to that reported in Madagascar (0.5%) [12] and Central African Republic (0.6%) [3]. However it is less than noted in Senegal (2.2%) [7] and Niger (2.33%) [8].

Our findings could be associated with the high number of patients visiting the study hospital and its proximity to surrounding hospitals. Patients prefer being seen in the Mother and Child Hospital as they benefit from free treatment.

According to the literature, the multiparous (4 parity)

Table 1. Age of patients

Age in Years	Number (%)
15- 20	8 (14.8%)
21-25	13 (24.1%)
26-30	11 (20.4%)
31-35	19 (35.2%)
36-40	3 (5.5%)
Total	54 (100%)

Table 2. Parity

Parity	Number (%)
Primiparous	8 (14.8%)
Pauciparous (parity 2-3)	13 (24.1%)
Multiparous (≥parity 4)	11 (20.4%)
Total	19 (35.2%)

Table 3. Relationship between previous uterus scar and number of uterine ruptures

Uterus scar	Deliveries Number	Uterine rupture Number (%)
Scarred uterus	137	18 (13.1%)
Unscarred uterus	9247	36 (0.39%)
Total	9384	54 (0.57 %)

is the key risk factor for uterine rupture [3, 4, 6, 7, 9, 10, 11, 12, 13, 14].

Most patients (82.5%) had been referred and the majority (62.3%) lived in rural areas. Other surveys have reported a high proportion of referred patients of up to 98% [12; 15]. In Chad, patients living in peripheral areas have to consult at peripheral health center before they can be referred. Transport difficulties lead to delays in accessing better care in N'Djamena Mother and Child hospital.

Etiology

Foeto-pelvis disproportion was most commonly seen (44.4%). According to the literature, the etiologies of the reported causes of uterine rupture vary from one survey to another. In the Ivory Coast, foeto-pelvic disproportion was the most common [13]. However others suggest that the inappropriate use of oxytocin was the main etiological factor in around 40% of cases [12; 16]. Inadequate antenatal care and the high proportion of referred patients may explain our findings. Antenatal consultations are the opportunity at which to spot obstetrical complications.

Table 4. Etiology

Etiology	Number (%)
Foeto-pelvic disproportion	24 (44.4%)
Dystocic presentation	12 (22.2%)
Inappropriate misoprostol	5 (09.3%)
Inappropriate oxytocin use	13 (24.1%)
Total	54 (100%)

Table 5. Post-operative morbidities

Morbidity	Number (%)
Anemia	15(27.8%)
infection	5 (9.3%)
Dehiscence of suture	2 (3.7%)
Thrombocytopenia	1 (1.8%)
No complication	31 (57.4%)
Total	54 (100%)

Pathological anatomy

In the third trimester, the inferior segment of the uterus is the predilection part for rupture [17]. In this survey 81.5% of ruptures found in the inferior segment. Laparotomy was performed in all cases. The treatment was conservative in 87 %. The remaining patients (13%) required a hysterectomy. Rabarikoto [12] reported also more conservative treatment (86.1%). Diallo [15] noted a 44% hysterectomy rate. The achievement of hysterectomy (radical treatment) or suture of uterine laceration (conservative treatment) depends of the extension of uterine laceration and the hemodynamic state. When maternal prognosis is worst, hysterectomy is performed.

Foetal and maternal prognosis

Maternal mortality in this survey was 9.3%. Our proportion of maternal deaths linked with uterine rupture is similar to reported elsewhere [3, 4, 10, 14]. This mortality rate was mainly due to the lack of blood products during the management. Severe anemia was the cause of 80% of the maternal death. As in previous studies [8, 12, 13, 18] we noted a high foetal death rate (92.6%).

Conclusion

Uterine rupture is an obstetrical emergency. It remains a serious cause of death for the mother and foetus. Prevention is possible: it needs correct prenatal consultation, good surveillance of labour, and the improvement of referral peripheral centers.

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is no conflict of interest.

Funding: No financial assistance or grants were solicited or obtained during the course of preparing this article.

Consent: We got the consent of the patients and the agreement of the Director of N'Djamena Mother and Child hospital.

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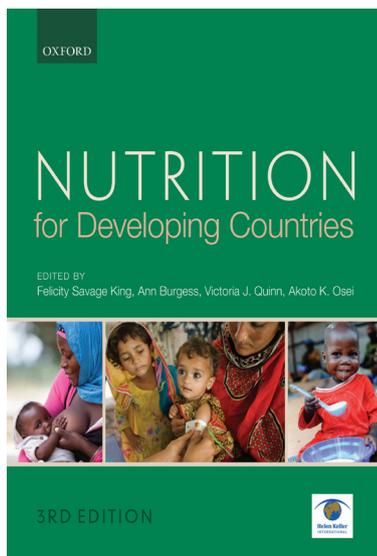
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Nutrition for Developing Countries – 3rd edition

Oxford University Press

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Nutrition is an essential component of the work of all health and community workers, including those involved in humanitarian assistance in South Sudan. This fully revised and updated third edition of *Nutrition for Developing Countries* has been prepared by an international team with extensive field experience in Africa and Asia. Using clear, simple language and many illustrations it brings together the essential basics of nutrition in a way which is accurate, up-to-date, and suitable for a wide range of readers.

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Epidemiological and antibiotic susceptibility profiles of infectious bacterial diarrhoea in Juba, South Sudan

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BACKGROUND: Diarrhoeal diseases have remained a major health problem in South Sudan where they accounted 45% prevalence in under five-year olds. Between 2006 and 2007, the country reported a morbidity of 8,337 cases and 176 deaths due to diarrhoeal outbreaks.

METHODOLOGY: We investigated causative agents of diarrhoeal diseases and their antibiogram in persons presenting with diarrhoea to selected health facilities in Juba.

RESULTS: Bacterial agents were prevalent in 20 (6.9%) of the 286 patients with 5.7% (4/70) in under five-year olds alone. *S. dysenteriae* 50% (10/20) accounted for the majority of the identified pathogens followed *S. flexneri* 25% (5/20) and *S. typhi* 25% (5/20). Antibiotic testing showed that *S. flexneri* (5/5) and *S. typhi* (5/5) were all 100% sensitive to ceftriaxone, and gentamicin while *S. dysenteriae* had varying sensitivity to ciprofloxacin (70%), nalidixic acid (90%), and ceftriaxone(100%). These pathogens had 100% resistance to amoxicillin, ampicillin, tetracycline and cotrimoxazole. No difference existed in isolation rates among different age groups, educational status, gender, water drank, use of chlorine, toilet use, exposure at home to diarrhoea patient, hand washing with soap and location of residence. However, diarrhoeagenic bacteria isolation was higher for participants with no source of income (OR=6.08, $p<0.05$).

CONCLUSION: With emerging menace of resistance to commonly used antibiotics in South Sudan we recommend antibiotic resistance monitoring and regulation of antibiotic use.

Introduction

Diarrhoeal diseases are a major health problem in developing countries [1] and accounts for an approximate global mortality of two million people annually [2]. Globally, 88% of diarrhoea cases are attributable to unsafe drinking water, inadequate sanitation or insufficient hygiene. In Africa, an average morbidity rate of 912.9 million diarrhoeal episodes per year in children has been reported with four out of 10 deaths annually caused by diarrhoeal disease[3]. Diarrhoeal diseases are also common among travelers to tropical areas [4]. *Escherichia coli*, Rotavirus, *Salmonella* spp., *Shigella* spp., *Campylobacter jejuni*, *Entamoeba histolytica*, and *Giardia lamblia* are the common diarrhoeogenic pathogens [5, 6, 7]. Ample fluid and electrolyte replacement and maintenance is the cornerstone for management of diarrheal illness [8]. Suitable antimicrobial treatment shortens bacterial excretion and clinical periods, but the incidence of multidrug-resistance is rising [9].

South Sudan, with a reported 45% prevalence of diarrhoea in children aged under five years of age, has experienced outbreaks in the recent past. In 2009 and 2010 there were 68,983 and 147,071 diarrhoeal cases with 0.09 and 0.08 case fatality rates (CFRs) respectively.

In April 2006 alone, there were 5,108 diarrhoea cases and 98 deaths (CFR: 1.92%) in Juba City [10]. From January-June 2007, there were 3,157 diarrhoeal cases with 74 deaths (CFR: 2.34%) [11]. These outbreaks could be due to the influx of people from neighboring countries following the comprehensive peace agreement (CPA). Movement of people is associated with spread of disease and antibiotic resistance [12]. To our knowledge, no diarrhoea-causing bacterial pathogens were identified in these outbreaks due to facilities for bacterial culture and isolation being unavailable. This study determined the prevalence, distribution and antibacterial susceptibility profiles of enteropathogenic bacteria causing diarrhoea in patients attending selected health facilities in Juba City.

Materials and methods

Study design, site, target population and sample size

A cross-sectional study was conducted in Juba Teaching Hospital (JTH), Al Sabah children's hospital, and Malakia, Kator, Munuki and Nyakuron primary health centres (PHC). JTH is the main teaching and referral health facility in South Sudan with 516 beds. A total of 286 stool specimens or rectal swabs from randomly selected adults and children with diarrhoea respectively were collected between September and December 2012,

Table 1. Distribution and bacterial culture results for diarrhoeagenic bacterial among study participant attending selected health facilities in three payams of Juba City, South Sudan.

Payam (District)	Participants n (%)	Bacterial Isolation		
		(-) n (%)	(+) n (%)	
Juba	32 (11.18)	29	3	
Kator	111 (38.81)	106	5	
Munuki	143 (50)	131	12	
Education level and employment				
Higher certificate and above	12 (4.2)	12 (4.5)	0 (0.0)	
Secondary	57 (19.93)	50 (18.9)	7 (35.0)	
Primary	84 (29.37)	81 (30.6)	3 (15.0)	
Uneducated	132 (49.15)	122 (46.0)	10 (50.0)	
Unemployed	216 (75.5)	198 (74.5)	18 (90.0)	
Employed	70 (24.5)	68 (25.)	2 (10.0)	
Health facilities		Sex		
Al sabah	47 (16.43)	female	26	2
		male	18	1
JTH	55 (19.23)	female	32	1
		male	20	2
Kator	61 (21.33)	female	28	4
		male	29	0
Melikia	26 (9.09)	female	13	2
		male	11	0
Munuki	58 (20.28)	female	28	3
		male	27	0
Nyakuron	39 (13.64)	female	26	2
		male	8	3
All participants (286)		female	153 (53.49%)	14 (4.89%)
		male	113 (39.52%)	6 (2.09%)

(+)=culture positive and (-) = culture negative for diarrhoeagenic bacteria.

inoculated into Cary Blair media (Oxoid®, UK) and transported in a triple package container at 2°C-8°C for laboratory analysis. Diarrhoea was defined as the passage of at least three loose or liquid stool in 24 hours. Patients who could not consent or had known underlying causes other than bacteria were left out.

Isolation and identification of bacterial pathogens

Stool specimens were emulsified in peptone water, selenite F broth, Alkaline Peptone Water (APW) and incubated at 35-37°C for 6-8 hours. Peptone water-emulsified specimens were inoculated into Karmali medium, Sorbitol MacConkey (SMAC) and Deoxycholate Citrate agar (DCA) and Hektoen enteric agar (HE) for *Campylobacter*, *E. coli* O157 and *Shigella* spp isolation respectively, using sterile plastic loops. Selenite F broth emulsified specimens were inoculated into DCA and HE for *Salmonella* isolation. APW-emulsified specimens were inoculated into Thiosulfate Citrate Bile Salts sucrose agar for *Vibrio cholerae* isolation and sub-cultured in Heart infusion agar (HIA). Inoculated plates were incubated at 35-37°C except Karmali plates that were incubated at 42°C in 5% carbon dioxide atmosphere for 18-24 hours. The plates were examined for growth and pure isolates with colonial characteristics of the target diarrhoeagenic bacteria were sub-cultured and identified using specific agglutinating antisera (Remel® UK) and API20E® (Biomérieux, UK).

Antibacterial susceptibility testing

Antibacterial susceptibility was determined by Kirby Bauer disc diffusion method using Mueller–Hinton (MH) agar and results interpreted according to Clinical Laboratory Standards Institute (CLSI, 2011). Commonly used antibacterials as per South Sudan treatment guidelines were selected for sensitivity testing.

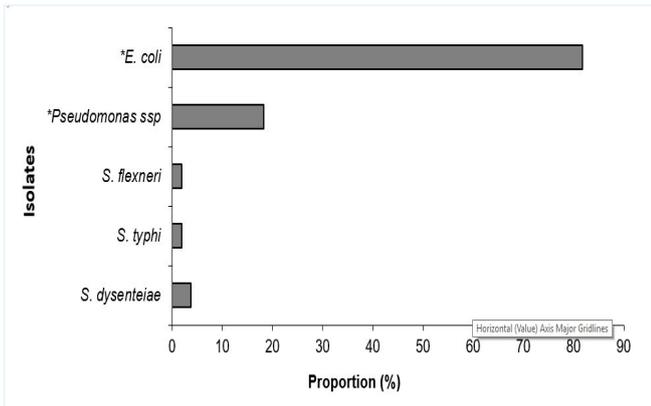
Ethical consideration, data collection and analysis

Ethical approval and specimen shipment clearance was obtained from the Ministry of Health. Data were collected on standard structured questionnaire, entered, cleaned and analyzed by Epi Info® 7 (CDC, Atlanta, USA). Generated data were kept in a password protected computer. Personal identifiers were removed to ensure confidentiality.

Results

Demography and characteristics of the participants

We recruited 286 participants, 167 (58.4%) females and 119 (41.6%) males, mean age 19.81±14.8; range 2-71 years, between August and November 2011 from selected health facilities (HFs).



*These were normal gut flora, although there could be pathogenic *E. coli* among the *E. coli* isolates, there was no further analysis for pathogenic strains, a limitation in this study

Figure 1. Proportionate Isolation rate of bacteria among the study participants attending selected health facilities in Juba City.

The majority of the participants were from Munuki 143/286 (50.0%), followed by Kator and Juba (11.2%). Only 12 (4.2%) participants reached higher education with certificates or higher, and 70 (24.5%) were employed – see Table 1. The participants presented with either diarrhoea with blood or other diarrhoea.

Bacterial isolates and isolation rates

A total of 286 stool specimens were analyzed and diarrhoeagenic pathogens isolated from 6.99% (20/286) of the specimens. The prevalence in under five-year olds was 5.7% (4/70) and adults 7.4% (16/216). The pathogen specific prevalence were *S. typhi* (1.7%), *S. flexneri* (1.7%) and *S. dysenteriae* (3.5%). Nonpathogenic gut flora grew in 93.01% (266/286) of total specimens. *E. coli* 18% (48/266) and *Pseudomonas ssp* 82% (216/266) were isolated (see Figure 1 No *E. coli* O157 was isolated from SMAc and other *E. coli* isolates were not analyzed further for presence of other pathogenic strains. The isolates of enteric bacteria pathogens had similar distribution trends across all ages as shown in Figure 2.

Antibiotic phenotypic susceptibility profiles

Antibiotic resistance in the three (3) different species of pathogenic bacteria of 30-100% was found to amoxicillin, ampicillin, chloramphenicol, tetracycline and co-trimoxazole. Although all isolates were however ceftriaxone susceptible, quinolone resistance was identified with intermediate susceptibility to ciprofloxacin in the majority of *Shigella* isolates and nalidixic acid resistance in all of the *S. typhi* isolates.

Bivariate analysis

A bivariate analysis for association of the most plausible factors with stool culture results was done but did not yield any independent significant association - see

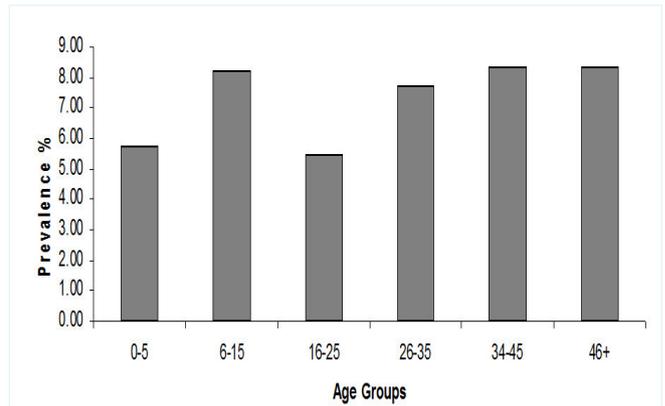


Figure 2. Age group specific prevalence of diarrhoeagenic bacterial among study participant attending public health facilities in Juba City.

Table 3. Reporting either having any other diarrhoea or diarrhoea with blood by the participants did not have any association with their education level, employment status and sex. Having a source of income was significantly associated (OR=6.08, p<0.05) with stool culture results - see Table 3.

Discussion

Infectious diarrhoea is a major public health problem in South Sudan. This study established the prevalence and antimicrobial resistance profiles of bacterial pathogens isolated from stool of persons with diarrhoea. *S. typhi* (1.7%), *S. flexneri* (1.7%) and *S. dysenteriae* (3.5%) were the enteric pathogens isolated with an overall prevalence of 6.99%. This prevalence was lower than that of Ifeanyi [13] in Nigeria probably due to difference in socioeconomic indices and the exclusion of *E. coli* for determination of our prevalence. The prevalence of diarrhoeagenic bacteria in under five-year olds was 5.7% (4/70) and in adults 7.4% (16/216), demonstrating that everyone is at risk. This concurred with the findings of Samie et al [14] in South Africa and Sabrina et al [15] in Tanzania.

The distribution and isolation rates observed in this study were lower for *S. flexneri* but similar for *S. typhi* and *S. dysenteriae* compared to a related study by Jafari et al [16] in Tehran. These could be due to seasonal differences and geography [13]. Little difference existed in pathogenic bacteria isolation rates among different age groups, educational status, gender, the water drank, use of chlorine, use of toilet, exposure at home to diarrhoea patient, use of water and soap for washing hands, and location of residence. However, odds of diarrhoeagenic bacteria isolation was higher for participants with no source of income as compared to those with some income (OR=6.08, p<0.05).

Evaluation of antibiotic susceptibility profiles revealed that *S. flexneri* 5(100%) were all sensitive to ceftriaxone, nalidixic acid, gentamicin and resistant to amoxicillin, ampicillin, tetracycline and co-trimoxazole. This is not unusual as Ruslan et al [17] also found out that *S. flexneri* was resistant to ampicillin, co-trimoxazole, chloramphenicol and tetracycline. *S. dysenteriae* isolates were sensitive to ciprofloxacin (70%), nalidixic acid (90%), ceftriaxone (100%), while resistance was observed to amoxicillin (100%), ampicillin (100%), co-trimoxazole (90%), chloramphenicol 7 (70%) and tetracycline 8 (80%). A similar result was obtained in a related study in Kenya [18,19]. *S. typhi* 5(100%) were sensitive to ciprofloxacin, and ceftriaxone but 100-90% resistant to tetracycline, amoxicillin, ampicillin, cotrimoxazole, gentamycin nalidixic acid although Willie et al [18] reported a lower resistance to nalidixic acid at 44%.

Conclusion

This study has established enteropathogenic bacteria as a significant cause of diarrhoea among children and adults irrespective of their ages as evident by 6.99% prevalence. Although it is difficult to draw firm conclusions about antibiotic susceptibility patterns from the small numbers of pathogenic bacteria isolated in this study, profiles were generally consistent with other studies. The high rates of resistance to ampicillin, co-trimoxazole, tetracycline and chloramphenicol indicate they should not be given as empirical treatment for these infections. Further study of antimicrobial resistance trends in the area, including during outbreak periods, would help to inform antibiotic choices. There is an emerging menace of resistance to commonly used antibiotics in South Sudan with ceftriaxone being the only antibiotic currently reliably active against the enteropathogenic bacteria isolated in this study. Antibiotic use needs to be monitored and regulated in South Sudan to prevent outbreak of multidrug resistance.

Limitation

In this study we could not analyze *E. coli* isolates for pathogenic strains due to financial constraints, however presence of *E. coli* O157 is ruled out since there was no growth on SMaC agar media. Other pathogens (virus) and physiological factors could be responsible for much of the uncharacterized diarrhoea in the study but which are difficult to identify by methods deployed in this study.

Table 2. Antibiotic and bacterial strain specific distribution of resistance in bacteria isolated from patients attending selected health facilities in Juba City, South Sudan

	<i>S. Dysenteriae</i>			<i>S. Flexneri</i>			<i>S. Typhi</i>		
	I	R	S	I	R	S	I	R	R
Antibiotics									
CIP	7	3	-	-	5	-	5	-	-
NAL	9	1	-	-	5	-	-	-	5
AMP	-	-	10	-	-	5	-	1	4
CRO	10	-	-	5	-	-	5	-	-
CHL	2	1	7	-	-	5	2	-	3
GEN	3	4	3	5	-	-	5	-	-
TET	-	2	8	-	-	5	-	-	5
SXT	-	1	9	-	-	5	-	-	5
Age groups									
5-0		3			0			1	
15-6		2			2			1	
25-16		1			1			1	
35-26		1			2			1	
45-34		2			0			1	
+46		1			0			0	

R=Resistant, S=sensitive, I=intermediate CIP=ciprofloxacin, NAL=nalidixic acid, AMP=ampicillin, CRO=ceftriaxone, CHL=chloramphenicol, GEN=gentamicine, TET=tetracycline, SXT=co-tremoxazole

Acknowledgment

We acknowledge and appreciate the support of AMREF Kenya country office, Wilson Branch for allowing the testing of the research specimens and the World Health Organization, South Sudan for supporting the shipment of specimens.

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Table 2. Antibiotic and bacterial strain specific distribution of resistance in bacteria isolated from patients attending selected health facilities in Juba City, South Sudan

Variables (exposures)	Culture Results		OR (%95 CI)	P-Value	
	(+v)	(-v)			
<i>Payam of Residence</i>					
Juba	(+)	3	152	0.71(0.19, 2.57)	0.84
	(-)	17	116		
Kator	(+)	5	106	0.50(0.17, 2.57)	0.28
	(-)	15	160		
Munuki	(+)	12	131	1.55(0.61, 3.90)	0.48
	(-)	8	135		
Female		14	153	1.95(0.72, 5.24)	0.39
Male		6	113		
Toilet facility	(+)	9	82	1.84(0.73, 4.60)	0.22
	(-)	11	184		
Drink tank water	(+)	17	199	1.91(0.54, 6.71)	0.42
	(-)	3	67		
Use chlorine	(+)	10	123	1.16(0.47, 2.89)	0.82
	(-)	10	143		
Use soap & water	(+)	2	18	1.53(0.33, 7.21)	0.92
	(-)	18	248		
Employment	(+)	2	68	0.32(0.07, 7.21)	0.19
	(-)	18	198		
No income		16	152	6.08(1.56, 39.77)	<0.05
Some income		2	116		
Education	(+)	10	143	1.17(0.47, 2.90)	0.91
	(-)	10	122		
Husehold exposure	(+)	14	51	0.98(0.32, 3.07)	0.79
	(-)	16	207		
Female		15	112	0.84(0.51, 1.41)	0.61
Male		84	35		

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DR PETER NEWMAN APPOINTED ROYAL COLLEGE OF PHYSICIANS ASSOCIATE INTERNATIONAL DIRECTOR FOR SUB-SAHARAN AFRICA



Royal College
of Physicians

Dr Peter Newman has been appointed Royal College of Physicians London (RCP) Associate International Director for Sub-Saharan Africa.

A consultant neurologist based in Middlesbrough, he takes over from Professor Simon Taylor-Robinson who has stepped down to focus on his role on the RCP Council.

In his first term in the post, Dr Newman led the RCP's work in Africa between 2005 and 2009 and was integral in implementing its first projects in the region including a series of 'Doctors as Educators' courses attended by several doctors from South Sudan. He is a regular PACES examiner in the UK and overseas, and member of the interview panel for the RCP's Medical Training Initiative – a scheme which enables international medical graduates to undertake a 2-year training fellowship in the UK.

He joins a team of seven RCP associate international directors, each of whom is responsible for a different region of the world and leads on developing strategy and implementing projects in that region. Dr Newman will continue to work with Dr Eluzai Hakim, RCP Adviser for South Sudan and looks forward to the rekindling in due course of the intercollegiate initiative in postgraduate medical training.

Valvular heart disease is changing – a challenge for Africa

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The pattern of valvular heart disease is changing in Western populations [1]. There are implications for Africa as healthcare improves and people live longer.

Over the last half century in Western countries there has been a change in the incidence of valvular heart disease from a rheumatic cause to one of degeneration. Until the age of 64 years all **moderate to severe** valve disease affects less than 2%. In the group aged 64 – 75 years the proportion increases to 4 - 8% and after age 75 years it rises to 12 - 13%. **Mitral incompetence (regurgitation) and aortic stenosis contribute to the majority of cases. Mitral stenosis** is much more common in patients who have had rheumatic heart disease. As the population ages the healthcare burden of valvular heart disease will become greater.

Mitral incompetence is commoner than aortic stenosis. There are two main causes:

- The first, **primary**, arises from an abnormality of the valve.
- The second, **secondary**, follows an abnormality of the left ventricle.

In primary mitral incompetence the valve leaflets do not come together adequately at the time of systolic contraction of the left ventricle. The result is that some of the blood that should have been pumped out (i.e. a proportion of the stroke volume) is regurgitated into the left atrium. In severe cases this regurgitant volume may exceed 50% of the stroke volume. The left atrium then dilates. The left ventricle compensates by dilating to increase stroke volume following Starling's law of the heart. Initially no clinical symptoms may appear but eventually the left ventricle fails.

There are various forms of primary mitral incompetence:

- “Degenerative”: this may lead to thickening or thinning of the valve leaflets. If the chordae tendinae lengthen or rupture then the leaflets prolapse into the left atrium.
- Bacterial endocarditis.
- Rheumatic cause is much less common than in developing countries.

- Congenital abnormalities of the valve.
- Drugs e.g. pergolide and carbergoline as used in Parkinson's disease [2].

The progression of primary mitral incompetence varies. About 50% of patients come to no harm. However at the opposite extreme about 20% develop heart failure. If the incompetence is severe when first diagnosed then the outlook is much worse. Also if the cause is a ruptured of chorda tendinae the prognosis is also poor.

Myocardial infarction or a cardiomyopathy leading to left ventricular dilatation or hypertrophy may cause a dilatation of the mitral ring and hence secondary mitral incompetence. The valve leaflets themselves remain normal but do not come together in systole. Ischaemic coronary artery disease (including myocardial infarction) is the commonest cause. So when the latter occurs it is on top of an already damaged left ventricle. About 12% of patients develop moderate to severe mitral incompetence a month after a myocardial infarction.

Aortic stenosis results from an impaired mobility of the valve cusps (normally three). The opening of the valve in left ventricular systole gradually reduces (normal 3 – 4 cm²). Eventually the rising pressure gradient across the valve leads to extra work for the left ventricle. The ventricle compensates by increasing the muscular wall thickness (hypertrophy). Exertional breathlessness indicates failure of the left ventricle.

There are three main causes of aortic stenosis in Western countries:

- A bicuspid aortic valve is a congenital abnormality and is more prone to calcification.
- A normal tricuspid valve may become calcified.
- Rheumatic heart disease but this is now rare.

A number of factors predispose to thickening of the aortic valve (before stenosis occurs this is called sclerosis):

- Increasing age.
- Males more than females.
- Hypertension.
- Smoking.

- Diabetes mellitus.
- Hyperlipidaemia.

About a quarter of people over aged 65 years have a degree of aortic sclerosis. Almost 10% of these develop aortic stenosis during the next five years.

Aortic incompetence (regurgitation) occurs if the valve cusps do not come together closely in left ventricular diastole. The consequence is that some of the stroke volume flows back into the left ventricle in diastole. In severe cases this may reach 50% of the stroke volume putting extra strain on the left ventricle which then gradually dilates and the wall hypertrophies. For a time this creates a compensatory situation but eventually the left ventricle fails.

The underlying causes of aortic incompetence include:

- Abnormality of the valve itself e.g. congenital bicuspid structure, bacterial endocarditis.
- Aortic root abnormality especially if this is accompanied by a dilated root as in e.g. syphilis or Marfans syndrome.

Mitral stenosis results from a thickening and fusion of the valve leaflets. The opening of the valve (normal 4cm²) is reduced during left ventricular diastole (left atrial systole). The pressure in the left atrium rises and this chamber dilates. The lung vascular pressure rises (pulmonary hypertension). The patient becomes breathless on exercise. Wheezing may mimic bronchial asthma and hence suggest the wrong diagnosis. Finally in turn the right ventricle dilates and signs of right ventricular failure with pedal oedema and eventually ascites do occur.

The cause of mitral stenosis in Western populations is now much more likely to be a congenital abnormality whereas in a developing rheumatic fever remains the overwhelming cause.

The situation in Africa

A review of valvular heart disease (rheumatic and non-rheumatic) in Africa [3] shows that **the focus remains on rheumatic heart disease.**

In Western nations valvular heart disease affects the older patient and is slow in onset. In Africa it is the young who tend to be affected and the disease progresses much more rapidly.

The Lancefield Group A streptococcus is the precipitating cause of acute rheumatic fever. In Western countries it occurs in less than 1 in 100,000 of the population whereas in Africa (e.g. Sudan) it is as common as 1 in 1,000. The reasons for this difference probably include:

- Household overcrowding, especially with increasing urbanisation, leading to closer person-to-person contact.
- Patterns and / effectiveness of antibiotic use.
- Virulence of the infecting streptococcus.

A review of some of the incidences of chronic rheumatic heart disease in school children is striking:

- Nairobi (Kenya): 2.7 in 1,000
- Kinshasa (DRC): 14.3 in 1,000
- Soweto (South Africa) (1975): 6.9 – 20 in 1,000
- Kampala (Uganda) (2012): 14.7 in 1,000 [4]

What happens to the heart in acute rheumatic fever

Echocardiographic studies indicate that severe mitral incompetence is the result of annular (the ring structure at the base of the valve) dilatation and elongation of the chordae tendinae leading to prolapse of the valve leaflet back in the direction of the left atrium. Sometimes the systolic murmur of mitral incompetence cannot be heard with the stethoscope and it is then that echocardiography is so useful.

Initially the valve leaflets are normal but later may become fibrosed and rigid adding stenosis to the incompetence.

This is what happens clinically in **acute rheumatic fever:**

- Streptococcal infection: usually a sore throat (pharyngitis).
- Up to three weeks later: fever and large joint pains and swelling.
- Fast heart rate (tachycardia) which seems greater than would be expected with the degree of fever.
- Systolic and diastolic mitral murmurs vary from time to time and frequent auscultation is mandatory.
- If pericarditis develops then a pericardial friction rub may be heard.
- Signs of heart failure suggest heart muscle damage.

However it must be appreciated that only about a quarter of patients who are found to have rheumatic valvular disease later in life give a clear history of rheumatic fever.

It is worth mentioning the importance of **rheumatic heart disease in association with pregnancy.** Where there is a significant rate of teenage pregnancy and a high

incidence of rheumatic heart disease the coincidence of each condition in the same patient is potentially serious. But which patients are at greatest risk? Mitral stenosis is the most common lesion, it is the most serious lesion and may be discovered for the first time in the antenatal clinic. In practice there are three main situations that may face the clinician and obstetrician:

- Known mitral stenosis and wishes to become pregnant.
- Mitral stenosis that is well compensated in a patient already pregnant.
- Severe mitral stenosis, a critical cardiac state (i.e. poor haemodynamic condition) and in advanced pregnancy.

The physiologically increased cardiac rate during pregnancy with its reduced diastolic filling time of the left ventricle poses the main danger for the pregnant woman with mitral stenosis. Wherever possible such patients should be referred urgently for a specialist opinion. The options include the use of diuretics, a beta-blocker, mitral valvuloplasty and valve replacement. However the surgical options are likely not to be available.

Non-rheumatic valvular heart disease in Africa

All of the non-rheumatic heart conditions that occur in Western populations may, of course, appear in African countries but there are a number of differences.

Bacterial endocarditis

The high prevalence of rheumatic valvular heart disease in Africa means that there are large numbers of patients at risk of bacterial endocarditis. This places a great burden on limited healthcare resources. Clearly efforts must be directed at the prevention of rheumatic valvular disease by prevention of the original rheumatic process caused by the streptococcus: namely the effective treatment of streptococcal infections and improved social conditions where such infections proliferate.

In addition the sources of infection for the endocarditis must be managed. For example, by adequate dental care and **appropriate** antibiotic use especially for streptococcal throat infections. In the UK, National Institute for Health Care and Excellence guidelines [4] no longer advise prophylaxis. There is no clinical evidence that prophylactic antibiotics reduce the incidence of infective endocarditis. The disadvantages (e.g. allergic reactions and increased bacterial resistance) may be greater than the benefits. But does this also apply in the same way to African circumstances [6,7]? Antibiotic-related side effects do occur but are uncommon after a single dose of antibiotics as for prophylaxis [8,9]. The American Heart Association [9] considers it safe to give a single dose of a broad spectrum antibiotic (e.g. amoxicillin) if there is no

history of hypersensitivity. The controversy remains (see Author's note below).

Secondary prevention of rheumatic heart disease

This depends on adequate public health arrangements. Ideally benzathine penicillin 1.2 mega units once per month (or sulphadiazine 500mg twice daily) to those aged over 10 years and once daily to those under aged 10 years. The duration of this prophylaxis depends on how severe the original disease was and how long since the attack [10]. Usually the duration is taken as five years or until the patient is 18 years old.

Submitral Aneurysm

This condition is thought to be congenital in origin arising from a weakness in the mitral annulus. Most reports of this left ventricular aneurysm come from sub-Saharan Africa. It causes severe mitral incompetence because of undermining of the valve leaflets and papillary muscle. Sometimes the aneurysm ruptures into the left atrium. Cardiac dysrhythmias are common and myocardial ischaemia may be caused by compression of the left circumflex coronary artery. The only satisfactory treatment is surgical.

Finally, a quote directly from the publication by Essop and Nkomo [3]:

"Africa faces many difficulties, and the challenge of preventing and treating the scourge of rheumatic heart disease is enormous. If we are to rise to this challenge, we need to establish the scope and magnitude of the problem with large, properly conducted epidemiological trials, and health authorities must be urgently convinced of the need to institute efficient and readily accessible programs for the primary and secondary prevention of rheumatic heart disease."

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Author's note: There clearly is controversy about the use of antibiotics to prevent bacterial endocarditis in Africa. This needs further research. The clinical experience of colleagues in South Sudan reported to this journal would be most valuable: Is bacterial endocarditis often seen or recognised? Does it appear to follow interventions such as dental extractions?

STARLING, Ernest Henry (1866 – 1927) was a British physiologist studying at Guy's Hospital in London and later became Professor of Physiology at University College (London). He described what has become known as "Starling's law of the heart": the force of contraction of the heart muscle is proportional to its initial length. This means that, in for example mitral incompetence, as the left ventricle dilates and the muscle wall stretches the power (force) of contraction after each cycle of stretch increases. However eventually this "law" fails and so does the left ventricle. Another way of looking at this is to take an elastic band: stretch it to say 10 cms and release it and measure the distance it is projected. Then repeat the exercise but stretch the band to 20 cms before release: it should be projected approximately twice the distance. However if you then gradually increase the initial stretch further there will come a time when the band breaks. If you try this experiment be very careful not to flick the band into your eyes or someone else's!!!



SOUTH SUDAN GENERAL MEDICAL COUNCIL LAUNCHED

The South Sudan General Medical Council (SSGMC) has officially launched its services in a ceremony in Juba on 4 November. The launch also saw the official unveiling of its website – see <http://southsudangmc.org/>. The South Sudan General Medical Council is an autonomous body responsible for the registration and regulation of medical, dental and pharmaceutical practices in the world's newest country.

The importance of research in healthcare

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Abstract

In June 1913 the Medical Research Committee held its first meeting. The objective was to implement a national scheme for health insurance which would provide hospital treatment for tuberculosis (TB) and to initiate research comparing TB in animals and humans. The committee is now known as the Medical Research Council (MRC). Research has been supported ever since so acknowledging its vital role within our society. During the last century there have been many discoveries and amazing innovations changing the way healthcare professionals treat patients.

Introduction to healthcare research

International Clinical Trials Day is celebrated on the 20th May each year to commemorate the day that James Lind started his important trial on scurvy. The day aims to highlight research in healthcare and how vital it is in the delivery of high-quality medical practice.

James Lind (1716 – 1794) was a Scottish physician. In 1747 he was a surgeon in the Navy and noticed that the men on board ship for long voyages suffered from symptoms such as bleeding gums and loose teeth; these symptoms became known as the disease called scurvy. The disease is caused by lack of vitamin C but in 1747 the relationship between vitamins and health was unknown. James Lind decided to investigate. He divided 12 men into 6 pairs. Each pair had something added to their diet:

Pair 1 had cider,

Pair 2 had 25 drops of sulfuric acid,

Pair 3 had seawater,

Pair 4 had vinegar,

Pair 5 had a spicy paste mixed with barley water and

Pair 6 had oranges and lemons.

Pair 6 regained their strength and well-being within 5 days and were passed fit to return to work on the ship. It was the astonishing reaction by pair 6 to the oranges and lemons (which contain vitamin C) that made this piece of research, the first known of its kind, become well-known, and which led to the cure for scurvy.

Now most treatments in healthcare come from research: radiotherapy for cancer, bed nets to stop mosquito bites and hence malaria, antiplatelet drugs such as aspirin and anticoagulants (e.g. warfarin) to reduce stroke and heart

disease, folic acid to improve foetal development. Health screening services such as screening for deafness in babies, cervical cancer, breast cancer, prostate cancer, abdominal aortic aneurysm, and more recent research such as stem cell transplants have all come from research.

History of healthcare research

Research techniques and their findings have evolved continually throughout the last century. In the early 1900's there was much investigation of the role of vitamins on the human body. The British Physician, Sir Edward Mellanby (1884 – 1955), in 1916 discovered how increasing Vitamin D in the diet could cure rickets, a common disease at the time. Sir Frederick Gowland Hopkins (1861 – 1947) was awarded the Nobel Prize (1929) for his pioneering work on the importance of vitamins. Thence forward was a new era of enthusiastic research. There followed breakthroughs in finding new treatments for numerous infections that previously had resulted in many deaths in the early 1900's: meningitis, pneumonia, septicaemia. In 1929 Sir Alexander Fleming (1881 – 1955) discovered penicillin which remains one of the most widely used drugs today. There were advances in metabolic medicine such as the discovery of two types of diabetes mellitus.

The study of life styles and their effects on the human body were studied. It became clear that tobacco smoking was a major cause of lung cancer and contributes heart disease and stroke. Research into cell function and molecular biology are areas of focus today (e.g. the discovery of interferon and its role in cancer treatment and that of multiple sclerosis). The discovery of double helix of Desoxyribo Nucleic Acid (DNA) (accredited to James Watson and Francis Crick in 1953) was a huge advance leading to the understanding of many diseases. The amazing work of Audrey Smith in the 1960's led to Cryobiology research which has enabled the storage of frozen sperm, eggs and embryos for In Vitro Fertilisation (IVF)

Healthcare research in the UK

The British National Health Service (NHS) Constitution paper (2013) states what the patients, the public and the staff working within the NHS can expect from the NHS. Patients should be offered the latest effective treatments and should have the right to

be offered the opportunity to take part in research. The National Institute for Health Research (NIHR) clinical research network provides the infrastructure for high-quality clinical research. This support ensures that clinical research carried out within the NHS is of a high standard. This aims at ensuring patients benefit from that research.

Ensuring research is an integral part of the NHS also encourages all professionals to question and rationalise clinical management and creates a culture of continual learning and development. It also assists professionals to learn more about their chosen area, to have confidence in the treatments they are offering and to learn from their patients.

Why carry out research within healthcare

Does taking part in clinical research help patients? Evidence suggests that patients who receive care in research-active hospitals have better health outcomes. This is due to the research-active hospital being able to offer wider treatment options and more opportunities to be included in clinical trials. Research-active institutions have an ethos of advanced learning and so benefits the patients. Patients taking part in clinical trials also have tend to have increased time with the clinical team members. Therefore problems are likely to be identified sooner. Taking part in research can help patients gain a better understanding of their condition and management. A poll carried out by the National Institute of Health Research in 2012 showed that 82% of the public think that it is important for the National Health Service to offer opportunities to take part in healthcare research - only 7% said they would never take part in a clinical research.

Carrying out high quality research by healthcare institutions leads to financial support for this work from health charities (e.g. Cancer UK), the pharmaceutical companies and the universities. Finance is a major issue: typically it costs £1.15 billion to do all the research and development necessary before a new medicine can be licensed for use

Many health professionals find that clinical research provides an alternative and rewarding career path. This can be exceptionally rewarding when research leads to real benefits for patients.

Is health research applicable in South Sudan

A resounding “Yes”. Research can be carried out anywhere no matter what the clinical facilities. Just ask

a question within clinical practice, work with colleagues to refine that question and analyze the various elements. Then design a proforma to record your findings e.g. how many cases of malaria do we see each week? How quickly do we confirm a diagnosis and start treatment? Is there a relationship between these factors and clinical outcome? Some will say this is “clinical audit”: that is true but it is from such enquiry that other questions arise and “research progresses.

The following are points for healthcare professionals and policy makers to consider:

1. Research is needed particularly into health infrastructure its optimal design within the constraints of available resources, prevalence of tropical diseases and viral illnesses and variation between regions (“geographical pathology”), attitudes towards transmissible diseases and non-communicable diseases.
2. Training in research methodology and biostatistics and computing.
3. As a new nation South Sudan needs the establishment of a sound research base now so that universities adopt and cultivate the culture of research
4. This is the time in the life of a nation to allocate research funding as part of healthcare development.

Summary

Research relies on scientific and academic innovation. By posing new ideas and suggesting alternative answers to medical and social questions we aim to have evidence based care and practice at the forefront of health delivery. Put simply; research needs to be an integral part of any healthcare environment.

Further reading

- National Institute of Health Research Clinical Research Network. <http://www.nihr.ac.uk>
- Medical Research Council. <http://www.mrc.ac.uk>
- The NHS Constitution Paper for England. <http://www.england.nhs.uk/2013/03/26/nhs-constitution>

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MSF treats highest number of malaria patients in years in parts of South Sudan



Figure 1. A MSF doctor treats Achan, aged 5 years, for cerebral malaria (credit Jacob Kuehn)



Figure 2. A MSF medical staff member treats a child recovering from malaria in Agok (credit Pierre-Yves Bernard)

The medical humanitarian organization, Médecins Sans Frontières (MSF), fears people living in some regions of South Sudan are facing one of their worst malaria seasons in years as exceptionally high numbers of patients are being treated for severe malaria in MSF medical facilities.

In August this year MSF warned that South Sudan, particularly the malaria prevalent north-west, may have an equally devastating malaria season as was seen in 2014. Then, in some project locations, MSF treated three times the number of patients as they did in 2013. The situation in 2014 was made worse by lack of access to suitable treatment in other medical facilities as well as shortages of malaria treatment drugs in some parts of the country. This prompted MSF to issue a warning that access to treatment and malaria medicines must be urgently reinforced in the most-affected parts of the country in order to avoid preventable loss of life.

In a review of MSF's medical data spanning from May to late September 2015, spikes of malaria in MSF projects in Northern Bahr al Ghazal, Warrap State and the Abyei Special Administrative Area have continued, and even intensified, surpassing the 2014 figures. In its project in Aweil hospital, MSF has been forced to rapidly expand its hospitalization capacity to 215 beds, as the number of children admitted with severe malaria has approached or exceeded 200 per week, representing an overall increase of more than 11 percent from last year.

In Agok, in the Abyei Special Administrative Area,

MSF has treated more than 6000 patients with simple malaria between May and September. More than 900 patients have been hospitalized with severe, life-threatening malaria in the same period, representing an increase of more than 40 percent from 2014. This has prompted MSF to take exceptional measures in an effort to provide earlier access to treatment. Since June, MSF has expanded its hospitalization bed capacity from 125 to 169 beds and trained a network of community healthcare workers. These workers test for malaria in the community using the rapid diagnostic test (RDT); they check for fever and history of fever and refer cases with fever and negative tests to health facilities. They provide early access to treatment for simple malaria by giving a first dose of artemisinin-based combination therapy (ACT) and demonstrating how to take further doses so patients know how to complete their regimens, thus decreasing patients' risk of developing severe malaria.

Similarly, MSF is increasing its support to healthcare structures in Warrap State as malaria caseloads in the MSF health centre in Gogrial are also exceeding the alarmingly high figures from 2014. From May to September of this year, MSF provided hospital care to over 640 patients with severe malaria, nine per cent more than last year, and also provided treatment for more than 18,000 simple malaria cases. In response, MSF has established a dedicated malaria treatment unit in Gogrial, as well as running mobile clinics in support of four healthcare facilities in the surrounding area.

The severe malaria season is also affecting refugee

populations living in South Sudan. In the Doro refugee camp in Upper Nile State, MSF is providing hospital care to nearly double the number of severe malaria patients as last year. In the Yida refugee camp in northern Unity State, MSF provided hospital care to over 60 percent more patients than last year from May to September and the number of patients treated for simple malaria more than doubled. In recent weeks, the trend has accelerated, with up to four times as many patients hospitalized for malaria and 10 times as many treated for simple malaria in some weeks this October compared to last year.

Taken as a whole, these trends lead MSF to fear many locations in South Sudan may be experiencing the worst malaria season in many years. While the availability of medical services and stocks of life-saving malaria drugs varies across different locations within the country, MSF has seen evidence of drug shortages and ruptures again this year, particularly in Northern Bahr al Ghazal. Many patients are arriving in MSF facilities after long journeys because treatment is not available in other healthcare facilities.

MSF is responding with urgency to this exceptional

malaria season. It is also deeply concerned the situation may deteriorate further if these spikes in malaria persist and they are not met with an urgent response. MSF is calling upon health authorities to ensure urgently access to life-saving malaria drugs and treatment in the worst-affected parts of the country.

Médecins Sans Frontières (MSF) is an international, independent, medical humanitarian organization that offers assistance to people based on need, irrespective of race, religion, gender or political affiliation. MSF has been working in the region that today constitutes the Republic of South Sudan since 1983, and currently runs 17 projects in the country. MSF employs more than 3,200 South Sudanese staff to work alongside 300 international staff in its projects. In 2014, MSF treated over 170,000 malaria patients in South Sudan. For more information contact Jacob Kuehn msf-ssudan-com@msf.org or go to our website <http://www.msf.org/south-sudan>.

INFORMATION ON MALARIA

See the following websites for information on malaria, and its diagnosis, prevention and treatment:

<http://www.msf.org.uk/malaria>

<http://www.who.int/malaria/areas/diagnosis/en/> and

<http://www.who.int/malaria/publications/atoz/9789241549127/en/>

<http://www.who.int/mediacentre/news/releases/2015/sage/en/>

Healthy communities through access to well-trained physicians: establishing the College of Physicians of East, Central and Southern Africa

The lack of access to trained physicians in East, Central and Southern Africa is stark and well documented - the latest WHO health workforce figures show that the physician-to-population ratio does not exceed 20 per 100,000 anywhere in the region – see Table 1 and http://gamapserver.who.int/gho/interactive_charts/health_workforce/PhysiciansDensity_Total/atlas.html

The number of doctors graduating from the region's medical schools remains extremely low despite a recent proliferation in the number of medical schools in response to the chronic shortage of doctors. Furthermore, this increase in the number of medical schools has led to questions around differing standards and the quality of doctors graduating. Also the fact that there has been no expansion of postgraduate training on a similar scale means that the investment at undergraduate level is not built upon and is often lost. Finally, there is a significant urban/rural divide in access to physicians, with many graduates choosing to stay in major cities due to the lack of clinical support and poor pay and working conditions in some secondary rural hospitals¹.

The College of Physicians of East, Central and Southern Africa (ECSACOP) aims to improve access to well-trained doctors across all ten countries in the ECSA Health Community region² by establishing a network of dedicated training centres and implementing an internationally recognised postgraduate medical qualification. The ECSACOP programme will encourage participation in continuing professional development

Table 1. Physicians-to-population ratio in selected African countries

Country	Physicians per 100,000 capita
Tanzani	3.1
Lesotho	4.9
Swaziland	17
Mozambique	4.0
Zimbabwe	8.3
Zambia	17.3
Tanzania	3.1
Kenya	19.8
Uganda	11.7
Malawi	1.9

and build morale amongst staff in district hospitals as they participate as trainers and encourage local research opportunities.

The new college aims to train 500 doctors by 2025, and ultimately improve health outcomes for the region's 200 million inhabitants. It seems likely that ECSACOP could in time expand geographically beyond the political entity of the ECSA Health Community, as the Surgical College (COSECSA) has done to include South Sudan, Ethiopia, Rwanda, Burundi, Mozambique, Botswana and Namibia.

The role of the new college

By forming an international college, the training of physicians can be standardised and best practice in both policy formation and clinical practice can be easily shared, as with the successful formation of a College of Surgeons of East, Central and Southern Africa (COSECSA) in 1999. Furthermore, smaller countries with no national association of physicians will be able to draw strength and expertise from those that do.

Key areas where the college will add value to the existing postgraduate training structure include:

- Postgraduate training: Increasing the number of trained physicians across the ECSA region through a supervised learning model. Making use of training facilities in hospitals both within and outside of the universities, trainees will follow a structured curriculum leading to an approved regional qualification, with the potential to support sub-specialty training in the future.
 - Standards: Set standards of training by:
 - o Supporting the harmonisation of existing postgraduate training programmes to ensure a common standard between universities across the ECSA region.
 - o Developing continuing professional development (CPD) systems and support for physicians to engage in learning throughout their careers.
 - o Supporting the development of research skills early in the training process.
 - Advocacy: Act as the voice of the medical profession, continually seeking to improve standards of healthcare and disease prevention for the people of the region.

Progress to date

In September 2014, nominated representatives from the region's national associations of physicians came

together in Nairobi to form the steering group for the establishment of the new college. At this successful first meeting, working groups were formed to develop a constitution, training syllabus, and strategic plan. A foundation chair was elected and a vision and mission were agreed:

Vision: Healthy communities through access to well-trained physicians.

Mission: To improve standards of healthcare throughout the region by providing specialist training for physicians committed to life-long learning.

The foundation group met for the second time in Arusha, Tanzania in November 2014, and most recently in Kampala, Uganda in April 2015. By the close of the meeting in Kampala the group had made significant progress on the college's constitution, fundraising plan and syllabus.

The foundation group is now in the process of developing its curriculum and preparing for the college's planned official inauguration at the meeting of ECSA Health Ministers in November 2015.

Win-win partnerships for sustainability

Long-term strategic partnerships will be essential as the new college develops into a regional community organisation representing the profession, helping to establish standards of excellence in clinical care and improving the health of a growing population. Sustainable funding will require a resilient plan for different sources of income, as fees for membership, training courses and examinations are unlikely to be sufficient to sustain the new college. Clearly the larger the size of its membership the greater the economies of scale will be. At this early stage, the foundation group is considering how best to build strategic partnerships with the region's paediatricians, psychiatrists, public health physicians and other related disciplines to maximise economies of scale. This has been the model in West Africa and South Africa, with specialties having their own chapter and qualifying examinations that are delivered centrally.

The existing colleges of ECSA (Surgeons, Pathologists, Nurses, Ophthalmologists and Anaesthetists) have each enjoyed strategic support from international colleges and other organisations of related disciplines. For example the ECSA College of Surgeons has links with the College of Surgeons in Ireland, and the College of Pathologists with the College of Pathologists in UK, and the College of Ophthalmologists with the Christoffel Blindenmission.

Financial and in-kind support of governments will have to be negotiated on the basis of cost effectiveness of training and, by helping to retain physicians in district hospitals improving health care outcomes. The mushrooming fragmentation of medical education and the lack of adequately trained doctors in district hospitals makes this a good time politically to introduce a recognised

regional qualification, and to encourage a new medical training eco-system.

By engaging with national associations of physicians, examinations will be co-developed, within a co-developed curriculum framework. This will facilitate recognition of the examination and qualification in each country. Similarly training hospitals will be accredited using a national authorisation process of institutions that meet standards that are set in an agreed framework model. The foundation group are planning to identify 4 or 5 places as model hospitals but allowing the governments to impose the hoops, with several layers of quality assurance. Ultimately the College is aiming at trans-national accreditation and transferability of the qualification, so a framework model will be helpful in providing appropriate input from stronger national associations.

ECSACOP will welcome and celebrate further partnerships with governments, professional organisations, charitable organisations and commercial entities that see mutual benefit in win-win synergies. Initially development partnerships and development funds will be particularly helpful to get the college started. The foundation group is particularly keen to learn from different models of financial sustainability.

In addition to the strong support of the ECSA Health Community, ECSACOP has enjoyed a key partnership with the Royal College of Physicians London. Established in 1518, the Royal College of Physicians London (RCP) is an internationally respected leader in postgraduate medical education. Having worked with the West African College of Physicians since 2011 to support strategic development and strengthen clinical training programmes in West Africa, the RCP has an in-depth understanding of the infrastructural requirements for an independent and sustainable international college. The RCP is working to support the ECSACOP foundation group by providing ongoing technical support, and access to a range of experts on curriculum development, examinations, constitution and fundraising.

To support the ECSACOP foundation group and the Royal College of Physicians in the development of this important new college, please contact:

- Professor Evarist Njelesani. Chair of the foundation steering group East, Central and Southern African College of Physicians njelesanie@gmail.com
- Prof Keith McAdam Adviser for East, Central and Southern Africa Royal College of Physicians Keith.McAdam@lshtm.ac.uk

1. Fitzhugh Mullan et al 2011. 'Medical schools in sub-Saharan Africa. *Lancet*, 377, 9771. 1113-1121
2. Kenya, Lesotho, Malawi, Mauritius, Seychelles, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe

JUBA NATIONAL REFERRAL HOSPITAL ELECTRIFICATION APPEAL

Power for the People seeks funding to replace Juba Hospital's insufficient, erratic, diesel-based electricity supply with 24h x 7d, reliable, cost-effective, solar electricity.

Today South Sudan's only teaching and referral hospital, serving 11.7 million people, is plagued by acute shortage of electricity and daily power cuts. This costs lives and precious resources. Our project will replace this with ample, reliable, cost-effective solar power. The hospital can then operate an uninterrupted service, use diagnostic machines as needed, and expand services. Many more lives, and much precious resource, will be saved - like the baby fighting so bravely in the Premature Delivery Unit. The project will also create local skills, and reduce the hospital's carbon emissions by 90%.

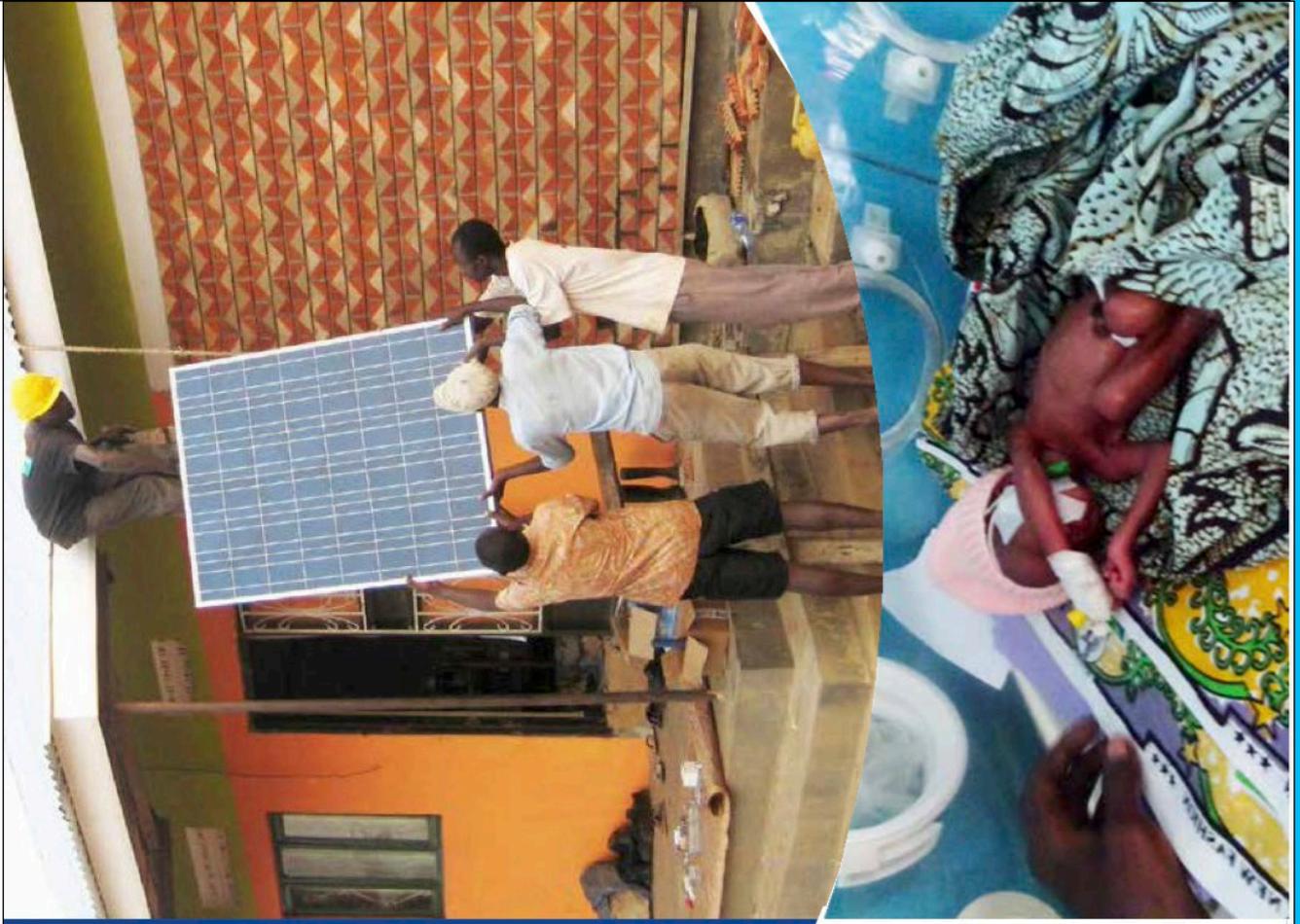
**PLEASE DONATE NOW AND HELP US
GIVE JUBA HOSPITAL THE POWER
THEY NEED TO SAVE LIVES**
<https://www.pfp.global>

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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.