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- How to read a CT brain scan
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devastates health service  
delivery**

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# Conflict devastates health service delivery in South Sudan

South Sudan emerged in 2005 with some of the poorest health indicators - the maternal mortality ratio of 2,054/100,000 live births was the worst in the world. Under-five and infant mortality were in the red, in addition to a low immunization coverage [1].

Independence in July 2011 saw a huge improvement in healthcare delivery throughout the country. The opening of roads improved access to health facilities, which are staffed with clinical officers and nurses, as well as drugs for treatments of malaria, pneumonia and diarrhoea – the three main killers of children in South Sudan.

The return to conflict in December 2013 has set the country back and reversed the many gains achieved. The flare up of fighting on the eve of the 5th anniversary of independence has worsened the situation. The two conflicts have displaced thousands of people and has the potential to create an environment for the worst humanitarian and health crisis in the country [2].

The effects on healthcare cannot be understated. Many health facilities have been destroyed, medical supplies looted and several health workers have lost their lives trying to save their patients. Pregnant women have no access to care, children die of malnutrition and preventable diseases due to shortages of food and drugs. The trauma of war can also have devastating consequences on the mental health of the people [3]. The economic impact of the war has seen Juba Teaching Hospital, the only referral hospital in the country, going days without electricity, curtailing its life-saving operations. Young trainee doctors have gone on strike for lack of salary payment.

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THAT THE HEALTH OF THE  
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RESTORED.**

Not only that, the crisis has seen the resurgence of epidemics, such as cholera. In April 2014, the outbreak in Juba, which subsequently spread throughout the country, led to hundreds of deaths and suspected cases [4]. In July 2016, cholera returned (5).

Many agencies, including the World Health Organization, USAID, UNOCHA and DFID, have responded to these challenges as humanitarian emergencies. These responses will be only temporary remedies. Good healthcare delivery requires security, as well as sound economic and political stability.

Only peace can ensure that the health of the people of South Sudan is restored.

**Dr. Edward Eremugo Luka**

Editor-in-Chief SSMJ

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# Endomyocardial fibrosis: is it a systemic disease?

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**BACKGROUND:** Patients with endomyocardial fibrosis (EMF) characteristically present with gross ascites and absent or minimal pedal oedema. This has long puzzled clinicians, especially since this clinical picture remains the same regardless of whether there is left, right or biventricular ventricular heart failure. The development of ascites, therefore, may not be directly and solely related to changes in the heart, but to local changes in the peritoneum. In order to investigate this possibility we performed peritoneal biopsies on 28 EMF patients.

**METHODS:** Successful peritoneal biopsies were performed on 28 EMF patients and 11 age-matched healthy controls who had died in road accidents.

**RESULTS:** All 28 patients (100%) showed complete or partial peritoneal fibrosis. Twenty Six (93%) had additional signs of chronic peritonitis characterised mainly by lymphocytes (92%) eosinophils (27%) and plasma cells (23%). Neutrophils were not seen. Vascularisation was common (87%) with an increase in capillaries and granulation tissue. Other components were Russel bodies (50%), deposits of fibrin (50%) and haemosiderin pigment (32%). Only two samples showed fibrosis without signs of inflammation. None of the controls showed any of these changes.

**CONCLUSION:** Peritoneal fibrosis was found in all and peritonitis in most of our EMF patients. This suggests that pathology of EMF is not confined to the heart but also involves the peritoneum. This local peritoneal inflammation may explain why marked ascites is often present with little or no peripheral oedema, and why conventional heart failure treatment is of limited value.

*Key words: peritoneal-fibrosis, endomyocardial-fibrosis, ascites, histology, echocardiography*

## Introduction

Although rare elsewhere EMF is a common heart disease in certain geographical clusters such as in Uganda, Mozambique, Nigeria, Ivory Coast, Kerala (India) and Brazil. In Uganda it is associated with eosinophilia and poverty, females are twice as often affected compared to males and show a bimodal age distribution with peaks at around 12 and 27 years [1, 2] and can account for up to 20% of patients seen with cardiovascular diseases [3]. Fibrotic lesions of varying severity occur in one or both ventricles. Five patterns have been observed on autopsy:

1. Affecting atrio-ventricular (AV) valves causing mitral or tricuspid incompetence
2. Affecting the only the apex causing restriction of ventricular filling.
3. Affecting AV-valves and apex leading to both of the above.
4. Stretching from AV- valve to apex with the same symptoms.
5. Patchy fibrosis which is rare.

Right and bi-ventricular EMF leads to a distortion of the cardiac shape with retraction of the right ventricle

appearing as a notch on echocardiography. The characteristic clinical features are gross ascites with little or no pedal oedema (see Figure 1a and 1b) and may appear even before signs and symptoms of cardiac disease. Often the abdomen is painful on palpation. Other EMF typical features are hepatosplenomegaly (see Figure 1c), raised jugular venous pressure (see Figure 2) and proptosis. Up to 75% of patients show an eosinophilia with abnormal eosinophils [1] and the ascites is usually (78%) an exudate [4]. The typical socio-economic history includes poverty, unbalanced diet with high tuber consumption and severe lack of protein, especially animal protein. There are geographical predilection sites for EMF in Uganda and EMF with patients being predominantly of Rwandan or Bagandan origin.

Some textbooks attribute the symptoms of EMF to the degree of fibrosis and its laterality in the heart - fibrosis of the right ventricle being associated with ascites and pedal oedema, and fibrosis of the left ventricle with pulmonary congestion. Hurst's "The Heart" 13th Edition 2011 [5] and the older version of Harrison's Principles of Internal Medicine of 2003 [6] whereas in the latest 19th Edition 2015 the symptoms are not described explicitly. However, ascites, often with abdominal pain and minimal or absent pedal oedema is the most common feature of EMF



Figure 1a. Ascites lateral view



Figure 1b. Hepatosplenomegaly



Figure 2. Raised jugular venous pressure

irrespective of which ventricle is involved, and gross ascites can be present even when fibrosis is entirely confined to the left ventricle [7]. Moreover, the ascites of EMF-patients is protein rich and has higher white blood cell counts than ascites from patients with congestive cardiac failure [8, 4]. In order to determine if this exudative ascitic fluid was a result of inflammation, or some other process, peritoneal biopsies from both EMF patients and healthy controls were examined. Some cases of EMF are shown in Figures 1 and 2.

**Methods**

Twenty-eight patients between the age-groups of 10 and 50 years old with a diagnosis of EMF were enrolled in the study. The diagnosis of EMF was based on clinical and echocardiographical observations by two independent cardiologists. To make a diagnosis of EMF combinations of the above mentioned clinical, paraclinical and echocardiographical criteria were used (socio-economic history, eosinophilia, exudative ascites and the typical echocardiographic features as described above).

Peritoneal tissue was obtained by an aseptic technique using an Abram’s needle in all patients with frank ascites and in two other patients with abdominal swelling without ascites by a mini-laparotomy [9]. Control biopsy specimens were taken from eleven age-matched previously healthy persons who had died from road traffic accidents.

The design of the study did not allow us to take pericardial or pleurabiopsies although pericardial effusion and to a lesser extend pleura effusion were seen.

**Results**

**Inventory of cases**

Twenty-eight patients were studied. There was a male to female ratio of 1:3.3. Males tended to be younger. The mean age for males was 18.8 years (range 11 – 25 years) and for females 25.6 years (range 14 – 41 years). Duration of symptoms varied between 10 days to 182 months. Blood values in means (and range) were ESR 38 (5-110) mm in the first hour by the Westergren method; total white cell count 4,900 (3,500-7,900) cells/mm<sup>3</sup>, eosinophil count 640 (40-2240) cells/mm<sup>3</sup>. Fifteen patients (42%) showed eosinophilia with more than 500 cells/mm<sup>3</sup> including 4 patients (9%) in the range of the hypereosinophilic syndrome with more than 1,500 cells/mm<sup>3</sup>. Serum protein was 6.2 (2.8-9.9) g/dl, serum albumin 3.0 (0.2-4.3) g/dl.

Half of the patients showed biventricular EMF, 30% only left and 20% only right ventricular disease. Abdominal distension with abdominal pain was seen in all patients. Two patients had abdominal distension without fluid. All others had ascites. Nineteen patients had a pericardial effusion (53%). Minor pedal oedema were seen in 8 patients (22.2%), and none had gross oedema

Mean ascitic total protein was 3.2gm/dl (0.7 to 7.9 gm/dl) and albumin 1.5 gm/dl (0.2 to 3.5gm/dl). According to total protein content ascites was classified in 75% as exudative.

**Table 1. Frequency and density of inflammatory cells seen in peritoneal biopsies from 26 EMF patients**

Cell type	Frequency		Density		
	n	%	mild	moderate	marked
Lymphocytes	24	92	15	2	1
Eosinophils	7	27	6	1	-
Plasma cells	6	23	5	1	-

Density according to number of cells in high power fields: mild=1-4, moderate=5-9, marked=10+.

**Table 2. Frequency and density of various deposits seen in peritoneal biopsies from 26 EMF patients**

Cell type	Frequency		Density		
	n	%	mild	moderate	marked
Russel bodies+	13	50	5	4	4
Fibrin**	13	50	5	6	2
Haemosiderin**	8	32	3	3	2

\*Densities according to number of +Russel bodies seen in the biopsy: mild=1-4, moderate=5-9, marked=10+;

\*\*fraction of biopsy tissue showing fibrin or staining for haemosiderin pigment, respectively: mild= <1/3, moderate=>1/3, marked=>2/3.



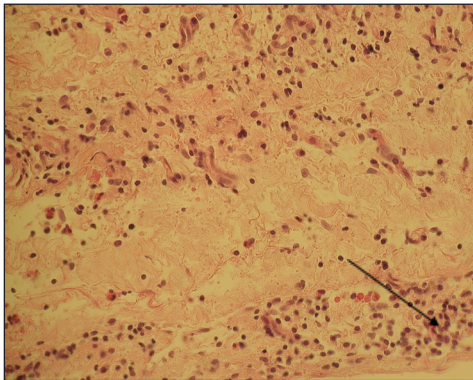


Figure 3. A mixed cellular infiltrate of lymphocytes, eosinophils and plasma cells. Russel bodies are distinct in the right lower corner, and there is concomitant increase in vascularisation (H&E, objective x 20)

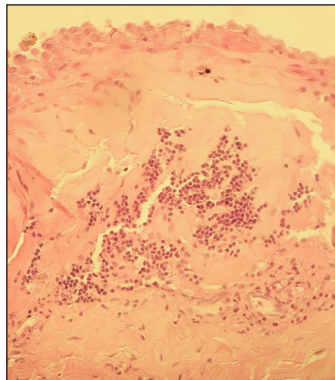


Figure 4. Serosal lining with activated mesothelial cells over area with chronic inflammation and fibrosis (H&E, objective x 10).

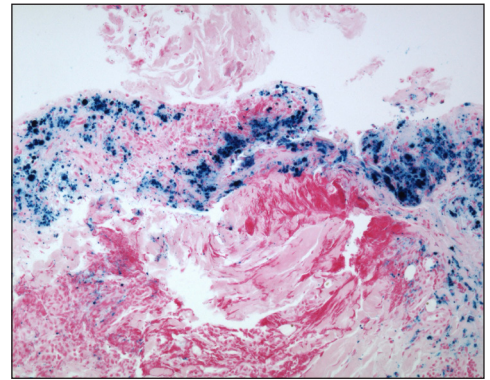


Figure 5. Marked deposits of fibrin (red) and haemosiderin pigment (blue; Prussian blue)

### Histology

All peritoneal biopsies showed varying degrees of fibrosis. Fifty per cent showed activated mesothelial cells, and in one case fibrosis was the only other change.

Ninety three per cent of the patients (N=26) showed mild or moderate inflammatory changes indicative of chronic peritonitis. Severe inflammation with dense infiltrates were not seen. Lymphocytes predominated. Plasma cells and eosinophils were less common. Neutrophils were not seen (Table 1). All three cellular components were found in only three patients. Seven patients showed two cell types. Lymphocytes alone were most commonly seen and showed marked variation in density. In two samples the cells were focally numerous and formed lymphoid aggregates. Plasma cells and eosinophils were present mainly in mild infiltrates. Mild vascularisation was noted in 88% showing an increase in capillaries or formation of granulation tissue. This tended to be associated with lymphocytic infiltrates.

Other components of inflammation were seen in the form of Russel bodies, fibrin and haemosiderin pigment in frequencies and graded densities not very different from each other (Table 2). Their respective frequencies were 50%, 50% and 32%, and they were distributed in the tissue with densities ranging from mild to severe.

Peritoneal biopsies from 11 controls showed several types of tissue, namely fascial and adipose tissue, mostly covered by a serosal lining with a collagenous band, and striated muscle. These tissues appeared to be normal with no features similar to those in the EMF group.

### Discussion

This first report of the peritoneal histology of EMF patients suggests that the exudative nature of ascitic fluid found in this condition may be as a result of an inflammatory process. Lymphocytes, plasma cells, deposits

of fibrin and activated mesothelial cells are features similar to those in synovial tissues in non-active rheumatoid arthritis. Additional findings not seen in other types of peritonitis are mild eosinophilia, high content of Russel bodies indicating hypersecretion of immunoglobulins, frequent deposits of haemosiderin pigment and marked fibrosis. There is also concomitant vascularisation often seen in many other types of inflammation.

Inflammation may account for abdominal pain and distension, which are frequently observed in EMF patients even before the appearance of ascites. It may also explain the marked ascites and lack of pedal oedema observed even in pure left ventricular disease. There are other reports of extra-cardiac lesions in EMF. An immunofluorescent study on autopsy material showed fibrin in a number of organs, which were not seen in tissues from cases with myocardial infarction and hypertensive heart disease [10]. Small granulomata were detected in the liver in a high proportion of cases [11]. The high frequency of pericardial effusions suggests that inflammatory processes may affect the pericardium as well as the peritoneum and other serosal membranes [7]. Moreover, fibrosis may be seen not only in the heart and peritoneum but also in skeletal muscle. It is possible, therefore, that EMF could be a widespread systemic disease, and not just confined to the heart [12].

Fibrosis and associated fibrin deposits may impair the resorptive capacity of the peritoneum and hence explain the failure of diuretics to reduce ascites. Looking for signs of abdominal inflammation and fibrosis might not only be of diagnostic assistance in early EMF where echocardiographic findings are still equivocal, but could also lead to a more appropriate therapy with anti-inflammatory drugs. Anecdotal reports suggest that the use of anti-inflammatory therapy late in the course of the disease reduces the number of abdominal paracentesis required to alleviate abdominal discomfort. Such

treatment, if prescribed early in the disease process when there is little or no echocardiographically visible cardiac involvement might delay or even prevent progression to irreversible cardiac damage. A controlled trial of anti-inflammatory therapy is needed to test this hypothesis.

**Conflict of Interest Statement:** There is no conflict of interest.

(All figures by Juergen Freers.)

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# Infant feeding methods among HIV-positive mothers in Yei County, South Sudan

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**INTRODUCTION:** This study describes the infant feeding methods chosen by HIV-positive mothers in Yei County, South Sudan and the factors that influenced their choice.

**METHODS:** This cross-sectional study used quantitative and qualitative methods to collect data from a sample of HIV positive mothers from Yei Hospital Mother and Child Health (MCH) section, and St Bakhita Primary Health Care Centre.

**RESULTS:** The results showed that the mothers' levels of correct knowledge about HIV transmission to infants, and infant feeding guidelines to prevent transmission were high. Most mothers chose exclusive breastfeeding.

**CONCLUSION:** The factors which were significantly associated with the choice of infant feeding methods included: marital status, level of education, income, knowledge about prevention of mother-to-child transmission of HIV, cultural beliefs, social stigma and cost of infant feeding method.

*Key words: HIV/AIDS, prevention-of-mother-to-child transmission, infant feeding, South Sudan*

## Introduction

The fourth Millennium Development Goal, that aimed to reduce mortality rates among young children by two thirds by 2015, depended on optimizing breastfeeding practices. However, there are some conditions which make breastfeeding impossible, difficult or contraindicated. For example, if the mother is HIV-positive (as the virus can be transmitted via breast milk), absent or severely ill. If a mother is HIV-positive, exclusive replacement feeding (e.g. with infant formula) is usually recommended provided it is affordable and safe. This is often not possible in resource limited settings, and then exclusive breastfeeding for 6 months with antiretroviral medication is recommended [1].

South Sudan's 2012 Antenatal Care (ANC) Clinics Sentinel Surveillance Report [2] showed that the national HIV prevalence rate dropped from 3.1% in 2007 and 3.0% in 2009 to 2.6% in 2012. The prevalence in Yei County, the site of this study, was 1.8% (CI 0.3-3.3). With a population of 8,058 pregnant women, the estimated number of mothers who are HIV-positive in Yei County may be as high as 167. This reflects the number of infants exposed to maternally-transmitted HIV [2, 3, 4]. Little is known about the level of these mothers' knowledge about the prevention of mother-to-child-transmission (PMTCT) of HIV.

## Objectives

To identify the factors that influence HIV-positive

mothers' choice of infant feeding options including their knowledge of PMTCT, their attitudes towards, and preferences of, infant feeding options, and socio-economic factors.

## Methodology

This was a cross-sectional study among HIV-infected women attending postnatal clinics in Yei County. Using the post-natal list from the Yei Hospital mother and child health (MCH) section, and St Bakhita Primary Health Care Centre clinics, 100 consenting mothers with babies aged 0 – 24 months were selected using simple random sampling and were interviewed using a questionnaire designed by the investigator. The sample size was based on the estimated number of HIV-positive mothers in the study areas per the results of the 2012 ANC sentinel surveillance.

Focus group discussions were held with 20 of the mothers, and two clinic health workers were interviewed. Statistical analysis was done by SPSS version 20 software, logistic regression model was used and odds ratio obtained for the factors that have significant association with choice of exclusive breast feeding, reference p-value of <0.05 was considered as level of significance. Qualitative information was obtained from the focus group discussions and interviews by thematic content analysis.

## Results

Table 1 shows the distribution of 100 mothers according to their social-demographic characteristics. The



**Table 1. Distribution of mothers by their social-demographic characteristics**

Socio-demographic characteristic	Category	Percent (%)
Age years	25-18	35
	33-26	38
	40-34	21
	41 and above	6
Marital status	Married	69
	Not married	31
Level of education	Pre-School/Primary	84
	Secondary/Higher	16
Employment status	Employed	48
	Not employed	52
Type of employment	Private sector	12
	Government employee	6
	Farmer	30
	Housewife	52
Level of monthly income South Sudanese pounds	<1000	85
	≥1000	15
Age of child months	6-0	61
	11-7	21
	≥12	18
Place of residence	Urban	30
	Rural	70

majority were aged between 18 and 34 years, were married, lived in a rural area, had a monthly income of under 1000 South Sudanese pounds and had not reached secondary school; about half were 'unemployed' housewives.

Table 2 shows the distribution of the mothers' knowledge about HIV and AIDS, PMTCT and infant feeding guidelines.

The information that the mothers were given during counselling, and the feeding option they chose are shown in Table 3.

The socio-economic factors in Table 4 are the ones that have statistical significance in association with the choice of the appropriate infant feeding method. Age, place of residence, employment and type of employment are the factors with no statistical significance.

## Discussion

The results show that almost all the mothers were well informed regarding PMTCT and the recommended guidelines for feeding their babies. This may be attributed to the fact that health workers in Yei County had counselled the mothers using the PMTCT and Infant Feeding guidelines at their health facilities, and that mothers were willing to receive this information for the

**Table 2. Distribution of mothers according to their knowledge of HIV and PMTCT**

Variable	Response	Percent (%)
Mother knows meaning/transmission of HIV and AIDS	Yes	97
	No	3
Mother has received counselling/information about PMTCT	Yes	97
	No	3
Mother thinks counselling sufficient and appropriate	Yes	96
	No	4
Mother believes period/s when HIV can be transmitted to infants is:	During pregnancy only	16
	During delivery only	28
	During pregnancy, delivery and breast feeding	55
	Do not know	1
Mothers knows the guidelines on infant feeding	Yes	89
	No	11

sake of their babies' health. Secondly, given the HIV status of the mothers, health workers would have given them special care and counselling whenever they visited the health facility for antenatal, delivery and post natal care. Similar results were obtained in a study in Kinshasa [5] where HIV-positive mothers knew about, and adhered to, recommended infant feeding methods. Most of these mothers attended antenatal and post natal care visits where health workers gave HIV/AIDS and PMTCT counselling and other support services as required.

Table 3 shows that 78% mothers exclusively breastfed, 18% used exclusive replacement feeding and 4% used mixed feeding. The finding that most mothers were using exclusive breastfeeding, which provides optimal nutrition and protection against infections, is in agreement with the World Health Organization and South Sudan guidelines [1, 6].

The results agree with the findings of a study in Kenya and Zambia where most mothers preferred exclusive breastfeeding and continued to exclusively breastfeed their infants even after the recommended six months [7]. However they are contrary to those from a study in Nigeria where the 94% of HIV-positive mothers choose formula (replacement) feeding and 4% admitted to mixed feeding.

**Table 3. HIV-positive mothers' answers to questions related to infant feeding methods**

Questions and mothers' answers	Percent (%)
Were you counselled on recommended infant feeding options?	
Yes	94
No	6
Which infant feeding options were you advised to use?	
Exclusive breastfeeding	89
Exclusive replacement feeding	11
Which infant feeding option did you choose?*	
Exclusive breastfeeding	78
Exclusive replacement feeding	18
Mixed feeding	4
What was the main reason for your choice of infant feeding method?	
The only one I know"	13
"All women do the same"	29
"This is the accepted way in my family"	4
"This is the accepted way in my culture"	13
"It reduces infant sickness"	10
"It increases bonding"	11
"It provided infant with all nutrients"	19
Who influenced how you fed your infant?	
Only myself	49
Husband	42
Other family member	9
Did your family influence how you fed your infant?	
Yes	54
No	46
Did your community influence how you fed your infant?	
Yes	55
No	45

\* 'Exclusive breastfeeding' means giving only colostrum or breast milk (and modern medicines and micronutrients if prescribed) but no other foods, water or other drinks. 'Replacement feeding' (or 'Artificial feeding') means giving animal milks or other foods instead of breast milk. 'Mixed feeding' means giving both breast milk and other milks or foods.

The major factor influencing the choice of infant feeding by 85% of these Nigerian mothers was the desire to reduce the risk of HIV transmission [8]. For a third of these mothers the greatest support in maintaining their chosen infant feeding option was the spouse. Differences in these studies may be due to socio-cultural variation between South Sudan communities and those communities.

In our study mothers expressed different attitudes, preferences and practices regarding the different infant feeding methods; these were based on social and economic factors as well as on the health implications involved after choosing a certain method.

Our Yei study also found out that specific socio-economic factors have a statistical significance of association with the choice of infant feeding method (Table 4). These factors include marital status, level of education, level of income, family and community members, cultural beliefs, social stigma and perceived cost of the feeding method. Of these factors the ones that could be important when designing local interventions for PMTCT may include mothers' knowledge and education, family and community members, cultural beliefs, social stigma and perceived cost of feeding method.

Results from the focus group discussions and key informants' interviews, while confirming that the majority of the mothers preferred and practiced exclusive breastfeeding, highlighted additional challenges faced by those mothers using replacement feeding. These include social stigma, high costs of infant formula, and the influence of family and community members on the mother's choice of infant feeding methods. The in-depth study in Nigeria also found that a major challenge faced by formula-feeding mothers was stigmatization [8].

Our questionnaire was not validated, but the rigor of the study was ensured by using both quantitative and qualitative approaches which captured the factors influencing mothers' infant feeding choices.

## Conclusion

HIV/AIDS and PMTCT knowledge among HIV-positive mothers was high due to the counselling and supportive services given by health workers. Exclusive breastfeeding is the most preferred and practiced method followed by exclusive replacement feeding, while mixed feeding was the least preferred and practiced method in Yei County. Socio-economic factors such as marital status, education, social stigma, cultural beliefs, cost of infant feeding method and income were associated with the choice of the infant feeding methods among these mothers.

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2. Southern Sudan Antenatal Care Clinics Sentinel

Table 4. Factors influencing choice of exclusive breastfeeding among HIV+ mothers

Socioeconomic factors	Categories	Number of mothers in category	Number of mothers exclusively breastfeeding	Odds ratio (OR)	P-value	95% confidence interval (CI)	
						Lower limit	Upper limit
Marital status	Married	69	68	1.881	0.028	1.681	4.058
	Not married	31	10	Ref			
Level of Education	Pre-school/primary	84	65	5.436	0.060	1.329	6.247
	Secondary/higher	16	13	Ref			
Level of Income SSP/month	< 1000	85	66	5.635	0.050	3.632	6.243
	≥ 1000	15	12	Ref			
Knowledge of PMTCT	Yes	87	67	9.842	0.058	4.366	10.367
	No	13	11	Ref			
Cultural beliefs influence	Yes	88	68	2.764	0.010	1.314	2.909
	No	12	10	Ref			
Social stigma	Stigmatized	88	67	1.735	0.003	1.635	3.782
	Not stigmatized	12	11	Ref			
Perceived cost of infant feeding method	Cheap	89	68	2.332	0.020	1.841	5.331
	Expensive	11	10	Ref			

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# Hepatitis B among young people in Lere health department (Chad)

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**BACKGROUND:** Hepatitis B is an infectious disease that affects many people worldwide. It may be acute or chronic. Age-specific prevalence varies by geographical region with highest endemicity levels in sub-Saharan Africa and prevalence below 2% in regions such as tropical and central Latin America, North America and Western Europe.

**OBJECTIVE:** To determine the frequency and characteristics of infected persons with hepatitis B among people from the Lere health department.

**PARTICIPANTS AND METHOD:** A 2-month cross-sectional survey was performed in eleven villages in the Lere health department, Chad. At least 100 young people were screened in each village giving a total study population of 1,150 (607 males and 543 females aged ≤ 25 years). Those immunized against hepatitis B were excluded. Studied variables were: age, sex, ethnic group and the results of testing.

**RESULTS:** Hepatitis B tests were positive in 268 cases (23.3%) – 95% of these were from the Moundang ethnic group. Thirty two per cent of boys and 19% of girls aged 15 years were infected; 25% of boys and 13% of girls aged over 15 years were infected.

**CONCLUSION:** This study shows a high prevalence of hepatitis B in a rural area in Chad. The high proportion among youths aged ≤15 years indicates that the main way of infection is likely to be the fetal- maternal transmission.

*Keys words: Hepatitis B, Youth, Chad*

## Introduction

Hepatitis B is an infectious disease that affects many people worldwide [1]. The evolution of this infection can be acute or chronic [2]. In an important proportion the virus may disappear without treatment. However this is infrequent when the virus is transmitted perinatally. Thus many persons live with the hepatitis virus at different stages [2, 3].

A World Health Organization report has shown that 350 billion people are living with hepatitis B. It is endemic in Africa and Asia where 10 to 15% of persons are infected [3,4]. Age-specific prevalence varies by geographical region with highest endemicity levels in sub-Saharan Africa and prevalence below 2% in regions such as tropical and central Latin America, North America and Western Europe [5]. In Chad there has been no previous study to indicate the national prevalence. Available reports are those of routine vaccinations coming from each health department. According to Lere health department there is a high prevalence of hepatitis B among the population compared with the neighboring health department [6]. Our regular observations indicated that a significant number of people

with hepatitis complications, such as liver carcinoma and cirrhosis, are coming from Lere department.

The objective of this study was to determine the frequency and characteristics of infected persons with hepatitis B among people from the Lere health department.

## Patients and methods

This was a cross-sectional survey carried out over two months (January 1st to February 28th 2015) in Lere health department which is situated in the south-west of Chad, bordering north-west Cameroon.

This department is the land of the Moundang people. Since Chad gained independence in 1960 many other people have migrated to this area. Trade and weekly markets provide opportunities for people to meet.

The survey covered eleven villages. At least one hundred young people were examined from each village. Then a total of 1,150 youths aged under 25 years were recruited (because after the age of 25 years, some of the young are in university). Those immunized against hepatitis B were excluded (161 youths).



**Table 1. Positive hepatitis B test results for each ethnic group**

Ethnic group	N	Percentage
Moundang	254	95.00
Haoussa	2	0.70
Lame	1	0.35
Moumbaye	1	0.35
Toupouri	1	0.35
Ngambaye	1	0.35
Moussey	1	0.35
Djoukoum	1	0.35
Sara Kaba	1	0.35
Nangtchere	1	0.35
Kim	1	0.35
Arabe	1	0.35
Kera	1	0.35
Sarh	1	0.35
<b>Total</b>	<b>268</b>	<b>100.00</b>

The study team was supervised by the Director of Lere Health Department. Each participant was screened by the AgHBS strip (DeterminAgHbs: Swe-Care Rapid One-step Test Strip: Manuf Date 2014-05-23, Expire date 2017-05-22 Lot 20140523).

The variables collected were: age, sex, ethnic group and the result of testing. Data were analyzed using Microsoft software 2011.

**Results**

One thousand three hundred eleven (1,311) youths were screened. One hundred and sixty one (161) were excluded because they were immunized. This left 1,150 youths in the study (607 and 543 girls) of whom 268 (23.3%) tested positive for hepatitis B. Among the positive cases, 254 (95%) were in the Moundang ethnic group - see Table 1.

**Discussion**

The hepatitis test was positive in 23% of this study population. This is similar to that reported previously (22.3% to 23.1%). [1, 2, 3]. Other studies have indicated a range of 5% to 20% in sub-Saharan Africa [7, 8]. Recent studies quoted a decrease of chronic HBV infection across the world. This is particularly evident in central sub-Saharan, tropical and central Latin America, South East Asia and central Europe [5]. Our findings confirm a high proportion of hepatitis B in the region. Vaccine reports of Lere health department region showed

that less than 60% of 1 year-olds were vaccinated against hepatitis B. The 2014 Annual report quoted that less than 30% of those aged 25 years have received vaccine again hepatitis B [9]. This situation allows one to say that the transmission of hepatitis B from mother to child and deficiency of hepatitis B vaccine in Lere health department are factors spreading the infection.

In this survey, the Moundang group was the most numerous. Although this ethnic group is the majority in this area, a high proportion of positive cases seems indicate a link between cases and familial transmission of hepatitis B from mother to child or by using the same infected materials. Previous surveys have reported a familial transmission of hepatitis B among ethnic groups [6, 10], and that the transmission mode within a family is from mother to child. The risk is increased when a brother or sister in the same family is infected. In this case, transmission from mother to child can be the way for contaminating the youth. Transmission can occur during pregnancy or delivery. The lack of immunoglobulin injection and vaccine for babies whose mothers are infected have been cited.

As with all epidemics, there are social and environmental factors that affect the prevalence and incidence of hepatitis B infection. These include age, sex, environmental and social circumstances. Reports show a high incidence of hepatitis B infection in tropical Africa, south Asia and China with an important proportion of infection among newborn and children [11]. Transmission of hepatitis B from mother to child or within families may explain our result. In contrast to those aged 15 years, sexual transmission may be an issue for those aged more than 15 years. A Chad national report [5] and a previous study reported by Foumsou [12] have shown that around the age of 16 years young people are often married. Such behaviors allow the spreading of hepatitis B. In many families, brothers or sisters can share infected objects like blades or needles for cutting hair or nails. For rural people, the lack of information about hepatitis B and its transmission may contribute to maintaining the prevalence of hepatitis B. When people do not know how they can be infected, they will keep the same behavior.

**Table 2. Results of screening for hepatitis B by age and gender**

Sex	Age range – years	Positive N (%)	Negative N (%)	Invalid N (%)	Total N
Female	≤15	66 (19%)	275 (81%)	0 (0%)	341
	>15-25	26 (13%)	176 (87%)	0 (0%)	202
Male	≤15	110 (32%)	231(68%)	0 (0%)	341
	>15-25	66 (25%)	198 (74%)	2 (1%)	266
<b>Total</b>		<b>268 (23%)</b>	<b>880 (76.5%)</b>	<b>2 (0.5%)</b>	<b>1150</b>

**Conclusion**

This study shows a high prevalence of hepatitis B among young people in Lere (Chad) especially among the Moundang ethnic group. The high proportion among youths aged 15 years indicates that a main way of infection is likely to be maternal transmission. According to this survey, there is a need to improve the rate of immunization.

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**Answers to Quiz on infant feeding**

1. **What is the definition of 'exclusive breastfeeding'?** Exclusive breastfeeding means giving only colostrum and breast milk (and modern medicines and micronutrients if prescribed), but no other foods, water or other drinks – even in hot, dry places.
2. **For how long does WHO recommend that a baby is exclusively breastfed?** Until the age of 6 months. Giving babies artificial milks and/or other foods, water or other drinks before the age of 6 months, puts them at risk of malnutrition and infection.
3. **List 3 advantages of breastfeeding.** There are many – for example:
  - Breast milk and colostrum contain all the nutrients and water that a baby needs up to the age of 6 months. The nutrients are more easily digested and absorbed, and used more efficiently in the body, than the nutrients in artificial milks.
  - Breast milk and colostrum, unlike artificial milks, contain living anti-infective factors that protect babies against many infections.
  - Breastfeeding helps mothers and babies to bond.
  - Exclusive breastfeeding is an effective method of family planning.
  - Breastfeeding immediately after delivery makes the mother's womb contract, and reduces bleeding; breastfeeding helps the mother to regain her pre-pregnancy weight; and reduces her risk of breast and ovarian cancer.
  - Breast milk costs less than formula, is always ready, and needs no preparation.
4. **How much salt should be added to an infant's complementary foods?** None. There is no need to add salt to an infant's food because she or he needs very little salt even in hot climates. The infant gets enough from breast milk (or formula) or family foods. Too much salt is harmful, and puts too much strain on young kidneys.

**Resources**

- World Health Organization - Breastfeeding <http://www.who.int/topics/breastfeeding/en> and Documents on infant feeding/breastfeeding [http://www.who.int/maternal\\_child\\_adolescent/documents/infant\\_feeding/en](http://www.who.int/maternal_child_adolescent/documents/infant_feeding/en)
- Lancet series on Breastfeeding at <http://www.thelancet.com/series/breastfeeding>
- Consensus Action on salt and health <http://www.actiononsalt.org.uk/salthealth/children>

# The role of the Diabetes Specialist Nurse

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The following article focuses upon the essential role of the Diabetes Specialist Nurse (DSN) in the care and management of patients with diabetes. The author is a DSN in the United Kingdom (UK), where the specialist nursing role has become a fundamental and crucial part of the diabetes multidisciplinary team (MDT) and service. The author draws upon her own experiences within the UK as a DSN and discusses ways in which the role could prove advantageous for a low income country such as South Sudan. The article considers key targets for developing countries and how the DSN role could help them to be achieved.

There are two main types of diabetes: type 1 and type 2. Global statistics often do not differentiate between the two, therefore in this article the author refers to both types under the general term of 'diabetes'. There is, however, a greater emphasis placed upon type 2.

*Key words: Role, Diabetes, Specialist, Nurse, DSN.*

## Background

Diabetes has become an increasingly serious health issue on a global scale, with the number of people living with diabetes rising significantly over the last 35 years. There are now reported to be 422 million adults with diabetes (1 in 11) internationally, the majority having type 2 [1]. According to the World Health Organisation (WHO), the biggest increase is amongst low and middle income countries, such as South Sudan, where an estimated 7.43% of the population has diabetes [1]. The rise in diabetes in developing countries is suggested to be due to population growth, ageing and urbanisation: Urbanisation tends to result in physical inactivity and a greater risk of obesity [2].

In developing countries, the majority of people with diabetes are in the 45-64 age range, whereas in developed countries, the majority are aged 64 and above [1]. By 2030, it is estimated that the number of people with diabetes, aged 64 and above, in developing countries, will be over 82 million. In contrast, the number of people with diabetes aged 64 and above in developed countries by this time is estimated to be just over 48 million [1].

## Significance of diabetes

The human and economic costs of the diabetes epidemic is enormous, particularly for developing countries, where the provision of screening services can be poor. There is often limited access to diabetes treatment and a lack of awareness and understanding of the condition and its associated complications [3]. Poorly controlled diabetes can lead to serious health complications, which results in other specialist areas needing to become involved.

This means more pressure upon resources and a greater financial burden being placed upon the health system.

## Complications - See Box 1

There are both short-term and long-term complications that arise from poorly controlled diabetes.

Short-term complications include:

- Hypoglycaemia,
- Diabetic ketoacidosis (DKA) and
- Hyperosmolar hyperglycaemic state (HHS).

Long-term complications include problems with:

- The eyes (retinopathy),
- Kidneys (nephropathy),
- Nerves and feet (neuropathy) and
- Heart (cardiovascular disease) [4].

Those with cardiovascular disease are at a far greater risk of having a heart attack or stroke. Diabetes is also one of the leading causes of vascular dementia and Alzheimer's disease [5].

In South Sudan, diabetes and its associated complications account for more hospital admissions and deaths than any other non-communicable disease [1].

Such complications have dire consequences for a person's health and well-being, as well as a negative impact upon the economies of nations and the finances of individuals and families. The adequate management of blood glucose, blood pressure and cholesterol greatly helps to reduce the risk of such complications. This can only

**BOX 1: What is diabetes?**

Diabetes is a life-long metabolic disorder in which blood glucose is raised. Poorly controlled diabetes causes both short-term and long-term complications which are listed in 'Role of Diabetes Nurse Specialist' on page 63.

**How diabetes develops**

Glucose is the main source of energy of the body and is released as we digest food. Insulin, a hormone which is produced in the pancreas, helps glucose to enter into the cells, where it is metabolised to produce energy. Insulin is like a key unlocking the cell so glucose can enter

In diabetes the pancreas produces insufficient insulin or the available insulin is not able to act on the cells (insulin resistance). So, instead of being used to produce energy, glucose accumulates in the blood causing high blood sugar levels (hyperglycemia); some might spill into the urine causing diabetic symptoms such as thirst or frequent urination. However many people with diabetes initially have no symptoms, or mild symptoms, and do not seek medical help until serious complications occur. It is very important for diabetes to be diagnosed as early as possible because it will get progressively worse if left untreated.

There are 3 main types of diabetes:

**Type 1** develops when the insulin-producing cells in the pancreas have been destroyed and the body is unable to produce any insulin. This can develop at any age but usually appears before the age of 40 years, and especially in childhood. About 10% of people with diabetes have type 1.

In type 1 diabetes there is no key (insulin) to unlock the cell so glucose cannot enter, and builds up in the blood

**Type 2** is the most common type of diabetes which occurs when the body becomes resistant to insulin (insulin resistance) or the pancreas does not make enough insulin.

In type 2 diabetes the key (insulin) or the lock on the cell does not work properly so glucose builds up in the blood.

The modifiable risk factors for type 2 diabetes are: obesity, especially abdominal obesity; and sedentary life style.

**Gestational diabetes** - in pregnancy, various hormones increase insulin resistance and in some women glucose levels can rise to diabetic levels. Gestational diabetes can increase the risk to:

- The mother of acquiring complications such as urinary infections, and hypertension; and
- The baby of being born large-for-gestational age and developing diabetes and obesity later in life.

Gestational diabetes usually disappears after pregnancy but mother and child are at increased risk of developing type 2 diabetes later.

Further reading

- What is diabetes? Diabetes UK <https://www.diabetes.org.uk/Guide-to-diabetes/What-is-diabetes/>
- Diabetes. World Health Organization. <http://www.who.int/entity/diabetes/en/>

**Contributed by Ann Burgess**

be achieved through prevention, treatment, education, support, regular check-ups and more specialist input for those who need it [6].

**Management of diabetes in the UK**

In the UK, the diabetes multidisciplinary team (MDT) plays an important role in the prevention and management of diabetes. The main specialist roles include Diabetologists, Inpatient Diabetes Specialist Nurses (DSNs), Community DSNs, Diabetes Dietitians, Podiatrists and Ophthalmologists. The specialist MDT works together across primary (community) and secondary (in hospital) care, providing support, education and specialist input for the management of more complex patients. The MDT helps to provide a seamless service between primary and secondary care and assists General Practitioners (GPs) and Practice Nurses in the community. The GPs and Practice Nurses are the patients' first port

of call for regular check-ups and ongoing management within the community. The MDT is essential in ensuring that patients receive the specialist input they need and this helps avoid complications and hospital admissions.

**Role of the DSN**

The DSN plays a central role in the provision of diabetic care within primary and secondary care and is one of the most active participants within the MDT. The DSN forms a key link between the patient and other healthcare professionals and provides patient-centred care that meets the physical, psychological, social and spiritual needs of the patients and their families [7]. The DSN is recognised as a highly skilled healthcare practitioner in diabetes care who is able to lead, motivate, counsel, educate, coordinate and help manage the care of the diabetic patient.

One key aspect of diabetes care is prevention. The prevention of type 2 diabetes is of utmost importance



and is initially more effective for a person's health and a country's finances, than management via medication at a later stage. Therefore, the DSN plays a key role in education, which includes the education of other healthcare professionals, families, children and young adults. Such education involves discussing any concerns, misconceptions or beliefs the patient or family may have, as well as offering advice on diet and lifestyle.

The DSN plays an important role in the early detection of diabetes and is able to intervene and manage the condition early on. The majority of DSNs have a specialist qualification in diabetes and many are qualified to prescribe as well. The DSNs have a good knowledge base of oral therapy and insulins and are therefore key professionals in deciding when treatment should be commenced and what type of treatment is appropriate. Through regular screening and continuing care, the DSN is able to decide when oral medication needs adjusting and when insulin doses need titrating. This ensures that the patient receives a high quality service that empowers them to manage their condition and avoid illness and hospital admissions. For those patients who are in hospital, the DSN is able to ensure a rapid and appropriate treatment plan for their diabetes.

A steady increase in the number of patients with diabetes results in a severe strain being placed upon the diabetes service and the resources available. The DSN can help ease this pressure by reviewing patients alongside the doctors in the community. Many diabetes clinics are specifically nurse led and these clinics are used as an opportunity to provide education and support in between Consultant appointments and to check blood glucose readings and blood results. DSNs are able to monitor the patient closely and flag up any concerns early on. For those clinics that are Consultant led, DSNs can be on hand to support the clinic and the Consultant, helping with the flow of patients and the quality of care. If the Consultant were to commence a patient on insulin, for instance, the DSN is there to then teach the patient about the regime and practise administration and injection techniques. This frees the Consultant up to see the next patient and it ensures that the patient is safe and confident to start their new treatment plan, without further delay, at home.

In the UK, the majority of patients with diabetes are community based and the DSN plays a vital role in ensuring that they are able to access care and can remain at home rather than coming into hospital. There are various ways in which the DSN is able to reach out to and monitor these patients, for instance in clinics, by visiting them in their own homes, or simply by checking in with them over the telephone.

### **Role of a DSN in South Sudan**

In low and middle income countries, where the

management of diabetes is often poor and resources are lacking, education and prevention is essential. The WHO recommends the provision of education to the general public, including school children, with a focus upon diet and exercise as ways to prevent diabetes [1]. South Sudan has high rates of undernutrition, especially among young children. The availability of affordable, healthy food, alongside the intervention of a DSN and Dietitian, would help prevent or delay type 2 diabetes, as well as improve the health of those already diagnosed.

In South Sudan, the provision of care within the community would be of significant importance in ensuring that people are able to access care and treatment. Likewise, it is in the community that education should initially be provided to individuals, families and communities and preventative measures first put into place. The role of a DSN would help ensure that even the most isolated and poorest of people within society have access to care and their treatment is not hindered or delayed.

### **Conclusion**

The role of the DSN is diverse and needs to continually evolve to respond to the needs of the population and the resources available. Unfortunately, the increasing number of people being diagnosed with diabetes and the strain this has upon resources and finance, can hinder the role from evolving [7]. There are challenges associated with restructuring roles and financing the recruitment and development of staff. It is clear, however, that the DSN role has an immensely positive impact upon the prevention and management of diabetes, which in the long term proves to be extremely cost effective. It is therefore apparent that long term investments need to be made for the future care of patients. By investing in the recruitment, development and retention of DSNs, an investment is also being made into the future healthcare system and economy of the country.

With a steady increase in people being diagnosed with diabetes, there is inevitably going to be an increase in the number of people needing treatment and management plans, especially if further complications develop. The DSN plays an integral role within the prevention, diagnosis and adequate management of diabetes. The specialist role can increase skills, knowledge and confidence, as well as support and empower the person with diabetes to self-manage their condition and reduce the chances of developing further health complications.

There is now an urgency to tackle the diabetes epidemic. World leaders have committed to reducing the burden of diabetes and have listed it as one of the four non-communicable diseases (NCD) to be tackled [8]. The 2030 Agenda for Sustainable Development has set a target to reduce premature mortality from NCDs by one third. The implementation of a DSN in low income countries

such as South Sudan would play a key part in helping to achieve this. In order to achieve targets and reduce the burden the diabetes epidemic has upon patients and the nation's economy, there needs to be a long-term plan for the recruitment and development of diabetes specialist nurses in both primary and secondary care.

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**Diabetes Specialist Nurse**

It is timely that we developed the role of Diabetes Specialist Nurse in South Sudan. Currently we have many people diagnosed with type 2 diabetes in South Sudan without any diabetic specialist service to care for them. Most of the diagnosed patients are middle-aged adults. Records of their demographics do not exist and as such there are no prevalence figures for this condition in South Sudan. There are no doctor run diabetes clinics.

Most people are referred to further evaluation and treatment to Khartoum. A number of patients have suffered lower limb amputations due to complications of diabetes. In the absence of a diabetic clinic patients are not routinely checked for complications of the condition. Testing is random and diabetic drugs are only available in the private pharmacies.

The current situation is dire and needs a trained diabetes specialist nurse to organise the service in order to offer the following clinical services:

- Educate patients and families with diabetes;
- Instigate changes in lifestyle, especially weight control and eating a balanced healthy diet; and
- Provide care needed in a structured environment.

I hope that these comments will stimulate interest overseas to help us set up this service in Juba (See back page for details). The Juba College of Nursing and Midwifery has graduated a number of high calibre nurses who are potentially trainable to take on this role in South Sudan.

# How to interpret an unenhanced CT Brain scan. Part 1: Basic principles of Computed Tomography and relevant neuroanatomy

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## Introduction

The aim of this article is to:

- Cover the basics of Computed Tomography (CT) Brain imaging.
- Review relevant CT neuroanatomy.

## Basic principles of CT imaging

- A CT image is produced by firing x-rays at a moving object which is then detected by an array of rotating detectors (Figure 1).
- The detected x-rays are then converted into a computerised signal which is used to produce a series of cross sectional images.
- The raw data can be reconstructed into different imaging planes i.e. axial, sagittal and coronal planes [1,2].
- The image produced is dependent on the differential densities of which the object is made up of.
- Using computer processing, slice thickness (typically ranging from 3-5 mm for routine scanning) can be varied according to the level of details that is required for image interpretation [3].
- **Remember:** When interpreting a CT image, the right side of the viewed image is in fact the left side of the patient's anatomy and vice versa.

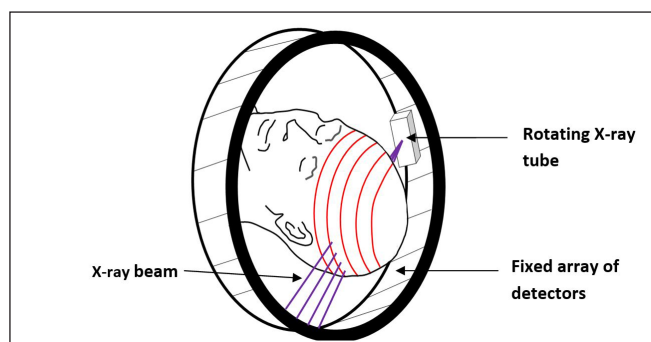


Figure 1. Modern helical CT scanning technique comprising a rotating x-ray tube and a fixed array of detectors

## Interpreting CT images

- CT images are displayed as varying shades of grey based on the characteristic absorption (or attenuation) patterns that different tissues exhibit when exposed to ionizing radiation.
- In contrast to plain x-rays which only displays 5 densities (i.e. air/fat/soft tissue/bone/metal), CT displays a huge range of densities ranging from air (black) to bone (white).
- The Hounsfield Unit (HU) is an arbitrary scale which is used to display the range of tissue densities when viewing a CT scan. The scale ranges from -1000 to +1000 with water by convention designated the value of 0. The higher the HU, the brighter (or denser) the tissue displayed (Figure 2).
- When viewing a CT, if a tissue has a low attenuation (e.g. air), very little radiation is absorbed by the tissue allowing most of the radiation to pass through and hit the detector. The resulting image displayed is dark.
- In contrast, a tissue with a high attenuation absorbs most of the radiation, only allowing a small amount of the radiation to pass through. The image displayed appears brighter [1 - 3].

## The ventricular system

- The secretory epithelium of the choroid plexus produces cerebrospinal fluid (CSF).
- CSF flows from the lateral ventricles to the third ventricle via the interventricular foramen of Monro, then from the third to the fourth ventricle via the cerebral aqueduct. From the fourth ventricle, CSF circulates into the subarachnoid space by exiting through the medial and lateral apertures.
- The majority of CSF reabsorption occurs at the level of the superior sagittal sinus via the arachnoid granulations (Figure 3) [2].

## Neuroanatomy

The below CT axial slices highlight common anatomical structures which are helpful to know when interpreting a

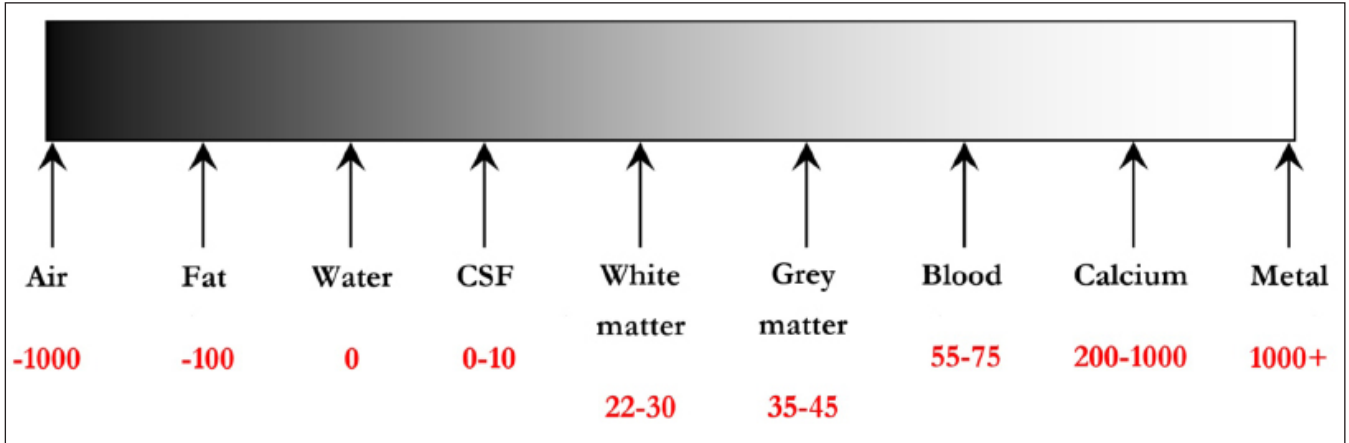


Figure 2. Hounsfield scale ranging from -1000 to + 1000

CT Brain scan. The following images are representative axial slices through the normal brain proceeding inferiorly from the most superior axial slice (Figures 5 - 8).

The importance of **windowing**:

- Window settings are used to aid detection of pathologies involving the brain substance (e.g. infarcts), skull vault (e.g. fractures) or soft tissues (e.g. haematomas).
- Window settings are described in terms of window width (WW) and window level (WL). These values are typically displayed on the computer screen.
- WW is the range of HU displayed and WL is the HU in the centre of the window width.

- Let's take an example: A typical stroke window setting is WW 40 and WL 40. This means that a total range of 40 HU is displayed, centred on a density of 40 HU. Therefore, the actual range of HU displayed is 20 to 60 HU).
- Altering the window settings helps reduce the range of HU displayed. This in turn helps to maximise the pickup rate of different pathologies (Figure 9) [2, 5].

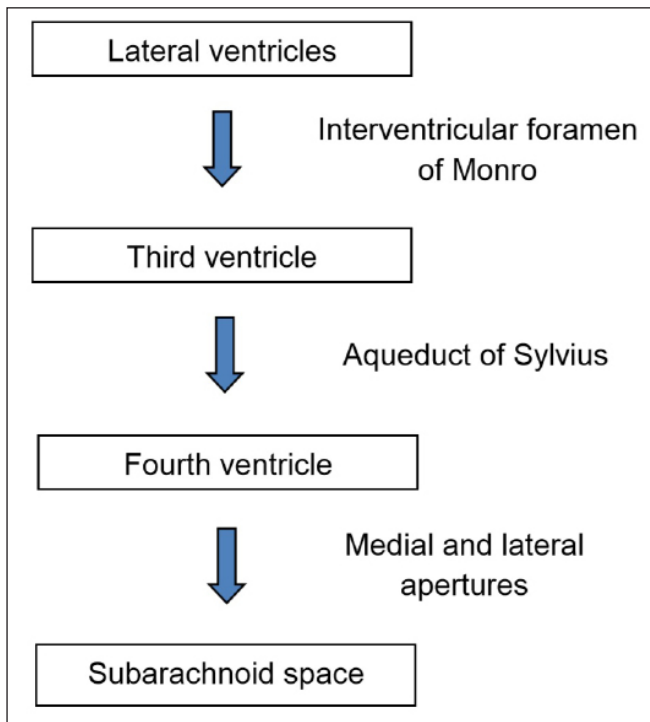


Figure 3. Flow diagram illustrating the CSF flow through the ventricular system

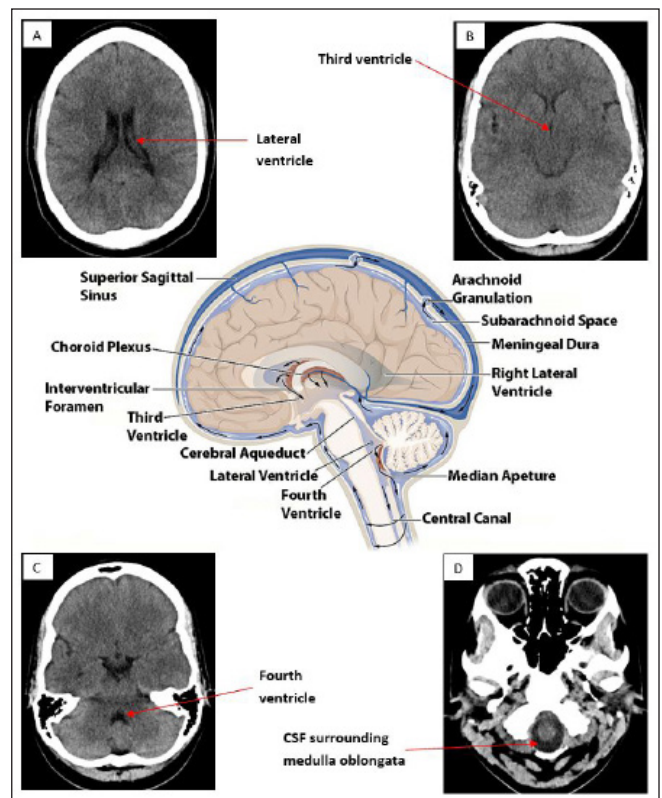


Figure 4. CT axial slices at different levels of the ventricular system with a central image depicting normal CSF flow. A: Level of the lateral ventricles B: Level of third ventricle C: Level of the fourth ventricle D: Level of the spinal cord. Central image obtained from Wikipedia [4]



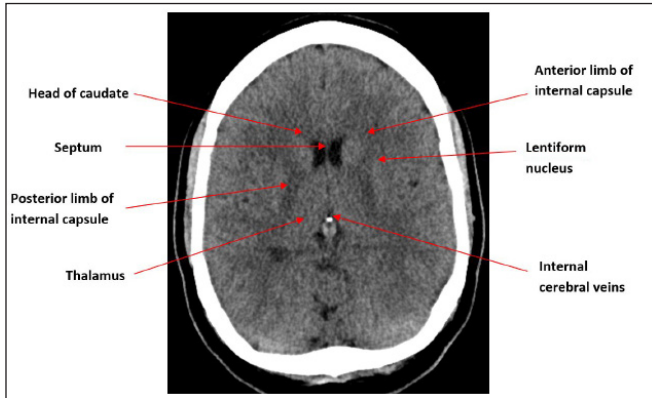


Figure 5. Axial CT slice at the level of the lateral ventricles [6]

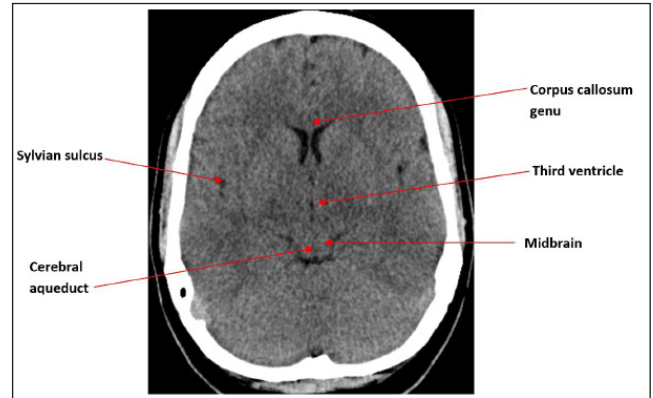


Figure 6. Axial CT slice at the level of the third ventricle [6]



Figure 7. Axial CT slice at the level of the pituitary fossa [6].

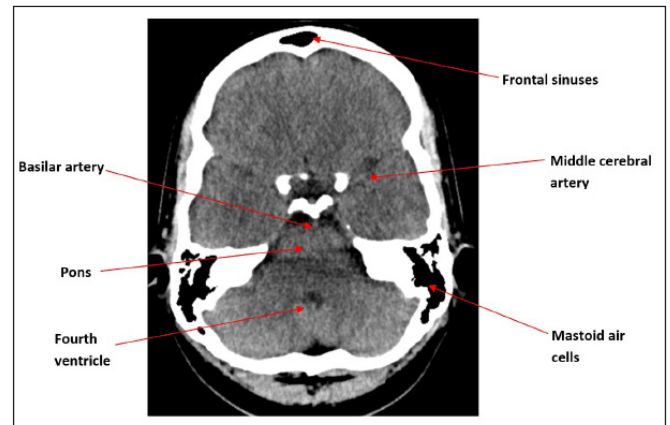


Figure 8. Axial CT slice at the level of the pons [6].

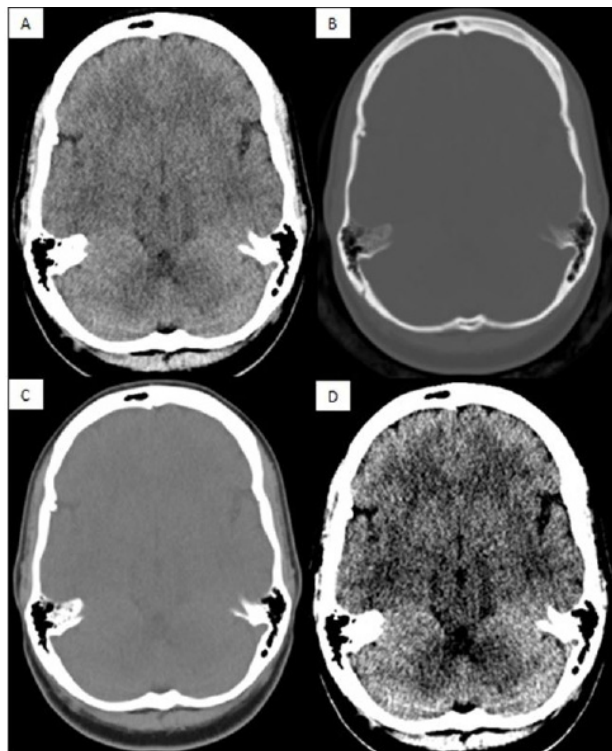


Figure 9. Common window settings used when interpreting a normal CT Brain scan. **A:** Brain window (WW 80, WL 40); **B:** Bone window (WW 3000, WL 500); **C:** Soft tissue window (WW 260, WL 80); **D:** Stroke window (WW 40, WL 40).

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*All CT images used in this article are the property of the Ashford and St. Peter's Hospitals NHS Foundation Trust.*

# Medair: providing life-saving services to the most vulnerable

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“In this area, it’s hard to access healthcare. It’s a long walk to the clinic, which is especially difficult for the elderly and those seriously ill. During this time of the year, when it hasn’t rained a lot yet, it’s still feasible. However, when the heavy rains start, the roads will turn into mud pools and there will be water everywhere. It will be very hard to walk to the clinic. Also, sometimes there are drugs in the clinic, but sometimes there aren’t.”

The people of South Sudan face significant challenges in accessing healthcare, as one local community member described to us recently. For the past 21 years, Medair [www.medair.org](http://www.medair.org) has been working in the region that today constitutes the Republic of South Sudan, seeking to provide life-saving services to the most vulnerable. Medair is an international humanitarian relief agency, specialising in health, nutrition, water, sanitation and hygiene and non-food items / emergency shelter.

Medair currently has static projects in Maban, Renk and Leer in addition to a mobile Emergency Response Team. Current health-related activities in the static locations include the provision of primary healthcare and nutrition clinics, 24-hour delivery services, an inpatient nutrition stabilisation centre and community activities such as Care Groups. Care Groups are an evidence-based method through which groups of volunteers are trained and provide peer-to-peer support to one other as they motivate their neighbourhood mothers to adopt healthier family practices within their communities.

The Emergency Response Team responds rapidly to emergency health needs across the whole of South Sudan, including responding in Juba itself in July 2016. Responses are often triggered by conflict-related displacement of populations, outbreaks of disease and emergency levels of malnutrition. Typical activities include establishing emergency primary healthcare services for displaced populations, supporting other partners to restart primary healthcare services that have been disrupted and responding to disease outbreaks through appropriate case management and emergency vaccination campaigns.

Last year, in Bentiu Protection of Civilians camp, cases of malaria rose to unprecedented levels, well beyond the capacity of the existing health facilities with minimal

space available to open up additional clinics. The resulting mortality for under-5s rose above the emergency threshold and it was noted that the majority of people dying had not even presented to a health facility.

The Medair Emergency Response Team responded in Bentiu by modifying an existing tool to fit a new context. Integrated Community Case Management (iCCM) has been used in South Sudan for some time to enable mobile community outreach workers, known as Community Based Distributors (CBDs) to treat children up to five years of age for malaria, diarrhoea and pneumonia. However, in order to address the high malaria mortality affecting all ages, Medair recruited and trained up teams of CBDs from the community not only to undertake iCCM, but also to diagnose and manage uncomplicated malaria in older children and adults. This intervention ran for six months, treating well over 2,000 patients per week at its peak. During this time, the caseload of the existing camp health facilities was closely monitored. When it was observed that the incidence of malaria cases was decreasing, Medair withdrew the teams of CBDs one by one, monitoring attendance at the health facilities weekly to confirm that the existing services were able to continue to address the health needs of the population without this additional support. See Figures 1 and 2.

In May this year, the Emergency Response Team responded to a measles outbreak in Aweil North County, Northern Bahr el Ghazal [Lol State]. Due to chronic insufficiency of routine immunisation activities, the number of unvaccinated and susceptible individuals across the country had reached a critical threshold, resulting in several measles outbreaks across the country in recent months. A few days after the Aweil North outbreak was confirmed, Medair was asked to respond with an emergency vaccination campaign across the whole county. This was no small undertaking, given that the target population, initially estimated at over 43,000 children, was scattered across a large and rural area with limited road access. The community reported to us that children were already dying from measles. Time was critical, since the rains were expected to begin at any moment, which would severely restrict access to many parts of the county. A rapid response and good coordination with local actors was the key to successful completion of the campaign.



Figure 1. Medair Consultation and Treatment point in UN Protection of Civilians camp, Bentiu ©Medair/Diana Gorter

Medair was able to respond rapidly and effectively through a combination of factors. Firstly, the Emergency Response Team routinely prepares for this kind of typical intervention in advance – the measles outbreak response plan had been reviewed just the month before this outbreak and supplies had been repositioned in Juba well beforehand. A plane was then chartered to bring the supplies to the required location. Secondly, the funding for the Emergency Response Team has been arranged in advance to allow several responses to take place over the year, without the delay of waiting for funds to become available for any specific intervention. Thirdly, Medair aims to work closely alongside the Ministry of Health and existing health partners to allow the best use of existing systems and networks, whilst aiming to further strengthen these through the intervention. The team usually sends a small number of staff from Juba to train up local teams and individuals to undertake the key activities within the intervention. In this way, the skills that are passed on then remain within the community even after the intervention has finished. In the case of this measles response, five Medair health staff travelled from Juba to recruit, train, equip and co-ordinate 297 local staff, who then vaccinated 49,483 children across the county.

Lot Quality Assurance Sampling (LQAS) was used to undertake a post-campaign vaccination coverage survey, as Medair has done for various campaigns previously. LQAS enabled estimation of the likely average coverage of the whole catchment area of Aweil North County, despite



Figure 2. Community Based Distributors taking temperature of a boy in UN Protection of Civilians camp, Bentiu ©Medair/Diana Gorter

the lack of reliable population estimates, and also guided which specific areas within this to target for the mop-up phase of the campaign.

Just as the campaign was completed, the rains set in. Many of the areas that had been reached became completely inaccessible, with roads turning to rivers overnight. But the population was now protected from measles. In the words of one of our local vaccinators, Maria, “If Medair had not intervened in this measles outbreak, it would have gotten much worse. Even some children would have died. As you are protecting the people against this disease, we are receiving a lot of thanks from the community. I give thanks to you. You rescue people from diseases. It is good that you’ve come.”

For the people of South Sudan, it is hard to access healthcare. When new emergencies arise, it becomes harder still. As the crisis continues, Medair continues to respond to emergency health needs, working alongside communities to overcome challenges and provide life-saving services to the most vulnerable.

*“Medair’s Emergency Response Team is funded by UK aid from the UK government, the European Commission’s Humanitarian Aid and Civil Protection department, the Common Humanitarian Fund (CHF), and the Dutch Ministry of Foreign Affairs (through the Dutch Relief Alliance Joint Response for South Sudan, in partnership with Tear Netherlands).”*

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# Can you help to develop the role of a Diabetes Specialist Nurse for South Sudan?

The Directorate of Nursing and Midwifery in the Ministry of Health, South Sudan, is seeking a partner(s) to develop the role of Diabetes Specialist Nurse (DSN) to deliver much needed diabetes care in various parts of South Sudan.

Diabetes is increasing in prevalence in middle-aged people in South Sudan possibly due to life style changes especially changes in dietary habits; smoking and adoption of a sedentary lifestyle may also be contributory factors. There is no diabetes clinic in South Sudan and no physician with interest in this condition. I believe that a trained Registered Nurse in diabetes care will make a great deal of difference in the diagnosis, management and prevention of complications associated with this condition. Increasing numbers of lower limb amputations in people presenting late with the diagnosis of diabetes are seen. The prevalence of complications associated with kidney injury, blindness, strokes, ischaemic heart disease and nerve injury complicating diabetes are unknown.

Any organisations with an interest in nurse training are welcome to partner with my Directorate in the training of Registered Nurses in Diabetes Care. The role of the DNS will be valued by our developing society and prevent the complications of this condition.

Those charities that are interested in forming a partnership with my Directorate to develop this role may contact me on the email address below for discussions and the way forward.

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Director General for Nursing & Midwifery, Ministry of Health, Government of the Republic of South Sudan



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.