A Retrospective Analysis of Mortality Distribution in Juba Teaching Hospital, Southern Sudan

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Background

Southern Sudan has just emerged after over 20 years of civil war and is rebuilding its infrastructure and healthcare system from virtually nothing. In Juba, the capital, Juba Teaching Hospital (JTH) is the largest tertiary referral centre in the country and has close ties with the Ministry of Health in the Government of Southern Sudan. St Mary's, Isle of Wight has been linked with JTH since November 2007 as one of the global health partnerships affiliated to the Tropical Health and Education Trust. Two of us (JA and DA) have been working in JTH since August 2008 on attachment from the UK. Part of our brief from the directors at JTH has been to evaluate and improve the acute care delivered in the emergency department.

Southern Sudan has one of the highest rates of maternal mortality in world[1]. However there is very little reliable published data on admissions and mortality rates in secondary and tertiary care. Despite being a large teaching hospital, documentation at JTH is often poor and official statistics on admissions and mortality are sparse and their reliability is sometimes questionable. For this reason we undertook a retrospective descriptive analysis of hospital admissions and inpatient mortality rates during July 2008 In particular, [we address the question of] OR we looked at the *chronological* distribution of mortality, in order to ascertain/find out whether acute care services were in fact an area of priority in reducing total hospital mortality.

Methods

All hospital admissions are recorded daily on each ward in a ward admissions logbook by nursing staff. The admission books from each ward were examined to determine admissions figures by department.

Mortality figures are not accurately recorded. The Statistics Department in JTH issues death certificates but it is not clear if these are exclusively issued to the in-patient population or also for other deaths in Juba outside the hospital. Also, there are no permanent medical records storage facilities in JTH and it is

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normal for patients to take their medical case notes away with them on discharge. It is not clear what proportion of mortality case notes of inpatients who died was retained by the Statistics Department.

We individually analysed the case notes of confirmed deaths to give reliable minimum mortality rates. In addition we categorised the deaths by age of the patient and calculated the duration from admission to death. The results were collated and analysed using Microsoft Excel 2007.

Results

Admissions and Mortality

The total number of admissions to JTH during the month of July 2008 ranged from 2203 – 2399 giving a mean number of admissions of 71.1 – 77.4 patients per day.

At present there is no reliable way in JTH for accurately calculating total hospital admissions, which accounts for this range. Most, but not all, admissions from the emergency department are to the dedicated emergency wards. The minimum number of admissions therefore reflects the sum of the admissions to the emergency wards. The maximum number of admissions reflects the sum of admissions to *all wards*. However retrospectively it is impossible to tell which of those were ward to ward transfers and which were true new admissions to the hospital. For example, in the department of Medicine (which has a high acute admissions rate) ward to ward transfers are very common, particularly when patients with chronic conditions are admitted. Percentage mortality of admissions have therefore been calculated according to the lower limit as this is far more likely to be closer to the true admission figures.

Admissions to the department of paediatrics formed the biggest proportion of total admissions (37.3% – 39.2%) followed by those to the department of medicine (27.9% – 31.3%). Paediatrics also had the highest mortality rate (minimum 5% of admissions) see Table 1.

Table 2 shows the total hospital mortality in July 2008 was at least 3.5%. Eighty three case notes of confirmed patient deaths were reviewed in detail. Although the statistics department officially records 168 deaths in July, these remaining case notes were unavailable for review so we cannot verify this figure. Mean number of deaths therefore ranges from 2.7-5.4 patient deaths per day.

Table 1. Confirmed Hospital Admissions and Mortality Rates to JTH in July 2008

Department	Frequency of Admissions Range	% of Total Admissions Range	Frequency of Mortality	% Mortality of Admissions
Psychiatry	3	0.1% – 0.1	0	0.0
O&G	365	15.2% – 16.6	3	0.8
Surgery	312 – 340	14.2% – 14.2	1	0.3
Medicine	614 – 751	27.9% – 31.3	34	5.5
Paediatrics	863 – 894	37.3% – 39.2	45	5.2
Ophthalmology	46	1.9% – 2.1	0	0.0
Total	**n = 2203 – 2399**	**100.0**	**n=83**	**3.7**

Table 2. Total Admissions and Mortality Rates to JTH in July 2008

	Lower Limit	Upper Limit*
Total Admissions	2203	2399
Total Mortality	83	168
Hospital Mortality	**3.5%**	**7.6%**

*Upper Limit of mortality refers to claimed mortality from the Statistics Department but not verified by case note inspection.

Distribution of Confirmed Mortality by Age

Of the 83 confirmed deaths, 54.2% (n=45) were under 18 years of age, and 45.8% (n=38) were adults. Patients aged under 5 years formed the greatest proportion (37.3%, n=31) of total hospital mortality. Further breakdown by age is illustrated in Figures 1 and 2.
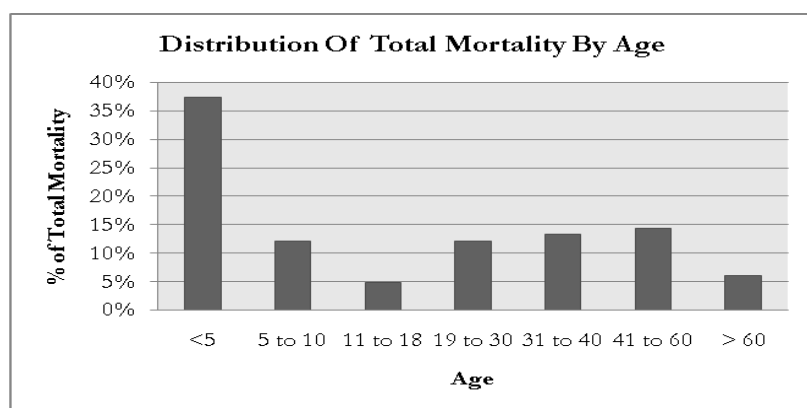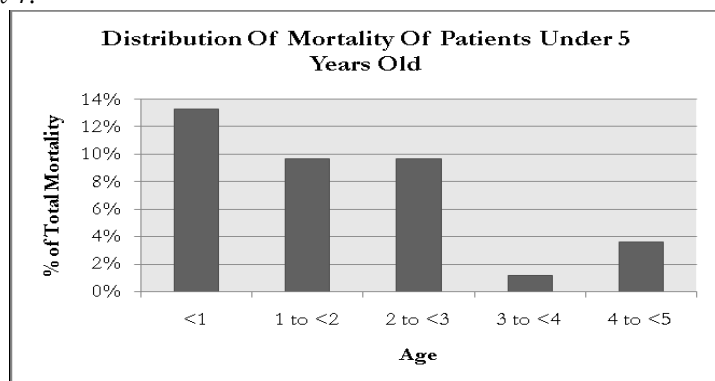

Figure 1.

Figure 2.

Chronological Distribution of Mortality:

Table 3 shows the chronological distribution of deaths by department. 59% (n=49) of total confirmed hospital deaths occurred within the first 24 hours of admission.

Table 3. Duration of Hospital Stay Prior to Patient Death

Duration of Stay

Department	≤24h	1 - 2 Days	2 - 3 Days	3 - 4 Days	> 4 Days	Total
Paediatrics	31 (37.3%)	6 (7.2%)	2 (2.4%)	2 (2.4%)	4 (4.8%)	**45 (54.2%)**
Medicine	17 (20.5%)	3 (3.6%)	1 (1.2%)	2 (2.4%)	11 (13.3%)	**34 (41.0%)**
Surgery	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.2%)	**1 (1.2%)**
Obstetrics & Gynaecology	1 (1.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (2.4%)	**3 (3.6%)**
Total	**49 (59.0%)**	**9 (10.8%)**	**3 (3.6%)**	**4 (4.8%)**	**18 (21.7%)**	**83 (100.0%)**

Figures 3 and 4 show the chronological distribution of mortality within the departments of medicine and paediatrics in more detail. The proportion of deaths that occurred within 24 hours of admission was 50% (n=17) in the department of medicine and 69% (n=31) in the department of paediatrics.
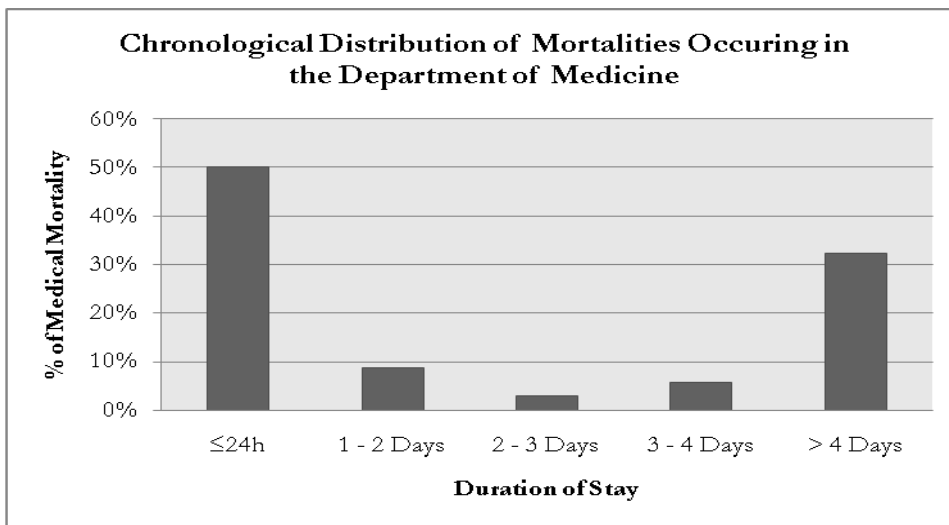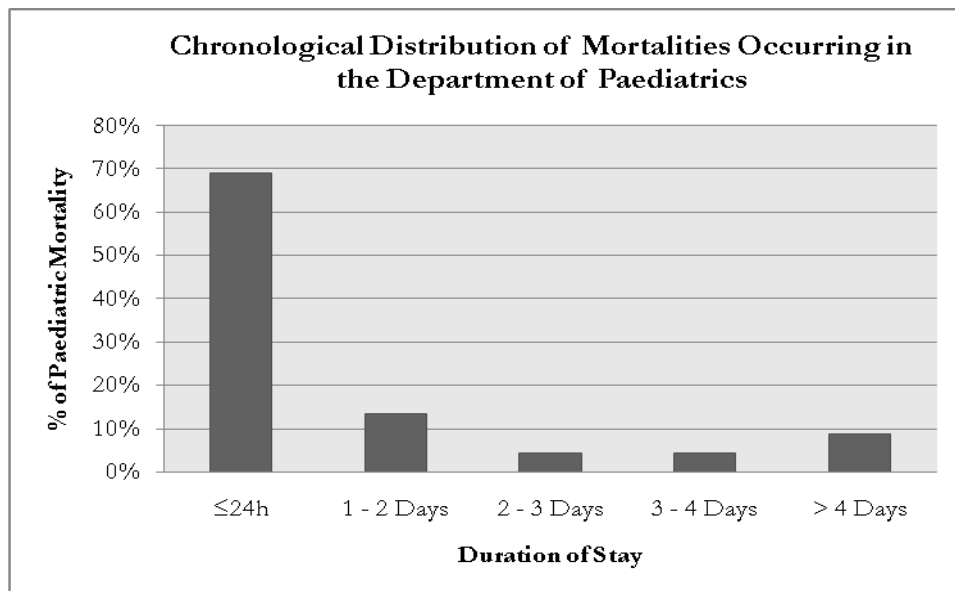

Figure 3.

Figure 4.

Figure 5 plots by department the distribution of total inpatient mortality during July 2008 and the proportion of total mortality occurring within the first 24 hours of admission.
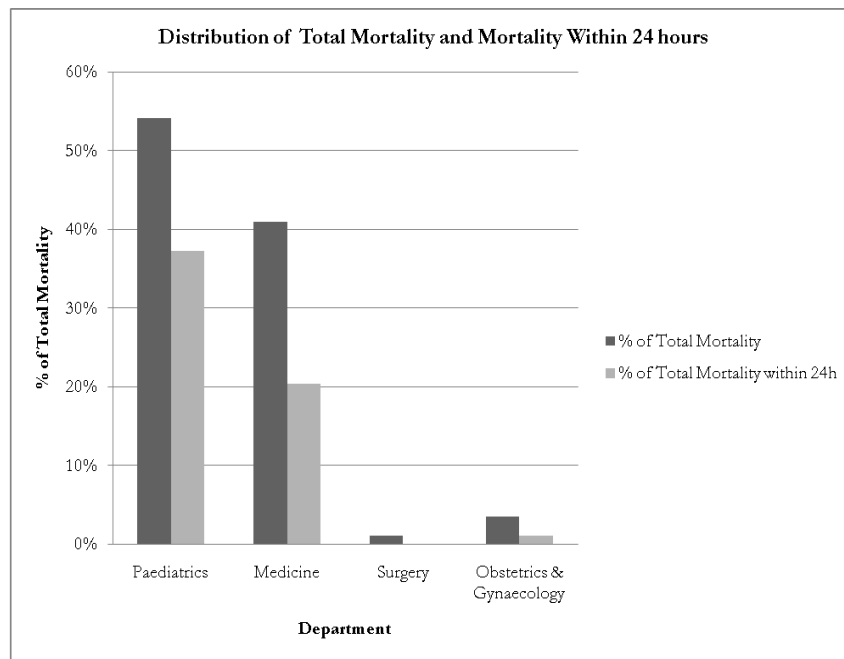
Figure 5

Discussion

This study has several limitations related to the quality of the documentation and mortality reporting systems in JTH. Once again, it should be emphasised that the mortality rates quoted above relate to the deaths confirmed by the authors by case note inspection, and as such are *minimum* mortality rates. It is likely that there were more deaths for which the case notes were not kept by the Statistics Department. For example, it is not unusual for a patient's family to take the medical case notes away with them after the patient has died. Moreover, it is not uncommon for patients to die in the Outpatient / Emergency Department waiting room before being seen by a doctor. Such patients have no case notes and so could not be included in this study.

Nevertheless whilst these mortality figures are not *exhaustive*, we believe it is reasonable to infer that the sample of case notes reviewed (n=83) is very likely to be *representative* of the mortality distribution in JTH. These data clearly demonstrate a significant peak in hospital mortality rates within the first 24 hours of admission.

Several factors may be responsible for this peak.
Patients characteristically present to secondary care at a late stage in their illness and often when severe complications have occurred. This is partly related to patient education and also to limitations in access to secondary care facilities in Southern Sudan.
There are often limitations to basic life-saving equipment in the receiving emergency wards. For example, there is very limited access to oxygen therapy. Simple items such as intravenous cannulae may not be readily available on the ward, so the patient's relatives may have to walk to an external

pharmacy to buy one. Such delays in basic resuscitative measures will contribute to a poorer prognosis.
The structure of the Emergency Department in JTH is such that it also functions as an outpatient clinic, to which approximately 300-500 patients per day present/come. The on-call doctors have a very high workload of patients to see, and it may be difficult to recognise and focus on those who are more haemodynamically unstable. In addition, there is no established system of triage to differentiate and prioritise haemodynamically unstable patients.
There is limited access for staff, both medical and nursing, to postgraduate education, including training in acute care management.

Conclusion

This study clearly demonstrates a significant peak in mortality within the first 24 hours of admission, particularly in the paediatric and medical departments. Whilst official healthcare policy in Southern Sudan, and other countries with comparable healthcare problems, rightly emphasises community-based health care, we believe that poor early management of acute care in the secondary and tertiary care setting is a major cause of mortality and morbidity. We also believe that significant improvements in outcome could be achieved with relatively simple and cost-effective measures.

Suggested specific areas on which to focus should include:
- The adequate stocking of the emergency wards with basic life saving equipment.
- The adequate training of those staffing such wards in basics of resuscitation and acute care management.

- A review of the structure of the emergency /outpatient department in JTH, to include a method of triage to allow the early recognition and prioritisation of haemodynamically unstable patients.

References
1. Ministry of Health/Government of Southern Sudan (MOH/GOSS). 2006. *Southern Sudan Household Survey (SSHS).*

Inspection of private clinics/health facilities in Juba town

Data from a survey carried out by the Directorate of Curative Medical Services, Directorate of Nursing and Midwifery in collaboration with Juba Teaching hospital and State Ministry of Health of Central Equatoria for the Ministry of Health GOSS.
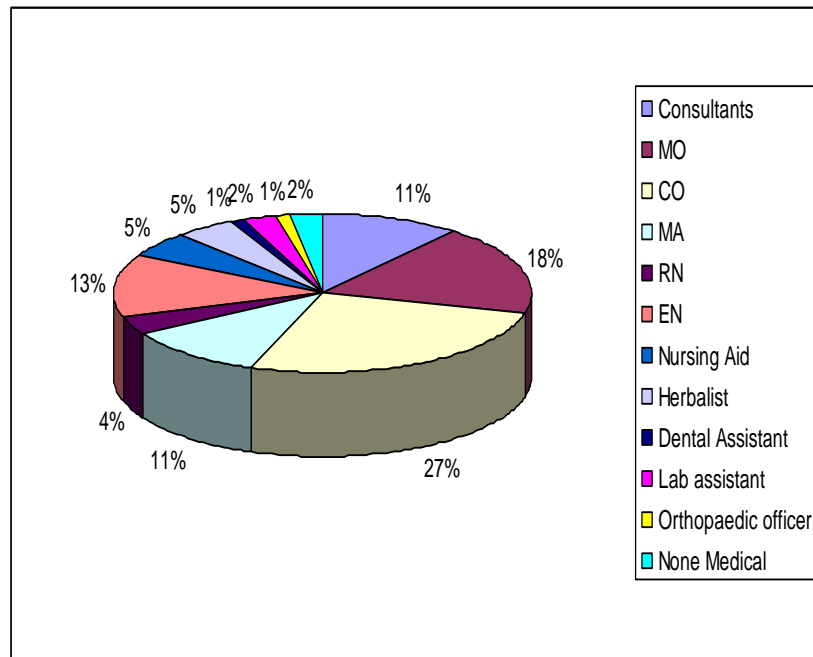
Categories of medical personnel running private clinics/health facilities in Juba town

Quiz (based on an article in Volume 1 number 4 of the Bulletin)

What do you know about anaemia?

1. What is the main nutritional cause of anaemia in S Sudan?
2. Why are pregnant women at high risk of anaemia?
3. What is the haemoglobin cut-off level in pregnant women used to diagnose anaemia?
4. Which foods are highest in haem-iron?
5. Should you give iron supplements to severely malnourished anaemic children?

See answers below.