Analysis of the resources for emergency care in District and Regional Public Hospitals in Tanzania

by
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DECLARATION

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Said Kilindimo

Date: March 2013

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ABSTRACT

Introduction: As a new speciality in many African countries, Emergency Medicine in Tanzania was recognised in 2011. The aim of the study was to analyse the resources available for emergency care in public hospitals' acute intake areas by evaluating the equipment, human resource (availability and composition) and supportive (radiological and laboratory) services.

Methods: The study was a prospective, cross-sectional design covering 98% of regional and district hospitals, both as first referral point from primary health facilities i.e. dispensaries and health centres. We directly inspected facilities and equipment and employed a structured checklist adopted from the Emergency Medicine Society of South Africa (EMSSA) to capture the data. The investigator also interviewed both the head of the acute intake area/Medical Officer In Charge while the staff working in the area was visited to check the accuracy of the data collection, as well as to provide details on the staffing composition.

Results: Among the hospitals surveyed, there was a deficit of human resources, equipment and medications for resuscitating and stabilising acutely ill patients. An oxygen supply was present in 30% of cases while a bag valve mask was found in only 18% of cases. There was no nebuliser or set of equipment for intubation or ventilation. A working pulse oxymeter was observed in 20% of the hospitals, cardiac monitoring was possible in 3% and none had a defibrillator. Amiadorone was available in 4% of the hospitals, potassium chloride in 9% and Verapamil was present in only 7%. An x-ray service was absent in 37% of hospitals; in 25% the reason given was 'waiting for repair' and there was not a single CT-scanner among the hospitals. While the main service providers in acute intake areas were the least qualified health personnel (clinical officer in 99% and health attendant in 99%), only 10% of the acute intake areas had access to consultant from any specialty .

Conclusion: The study identified deficits in equipment and human resources quality and quantity across regional and district hospitals in Tanzania. A shortage of supplies, misallocation of the resources, a long awaiting repair time and inadequate training in life support skills partly contributed to the deficit observed.

ACKNOWLEDGEMENTS

DEDICATION

I would like to dedicate this work to my mother, Hawa Said, and my family (Zuwena, Salha and Sadra); without their caring support my work would not have been possible. The thesis is also dedicated to the memory of my father, Salum Kilindimo and my sister Sophia Kilindimo. There is no doubt in my mind that, without their tireless encouragement, it would have been impossible to reach this level.

ABBREVIATIONS

ACLS   Advanced Cardiac Life Support

AIDS   Acquired Immune Deficiency Syndrome

AMO   Assistant Medical Officer

APLS   Advanced Paediatric Life Support

ATLS   Advanced Trauma Life Support

BLS   Basic Life Support

BVM   Bag Valve Mask

CO   Clinical Officer

CT   Computed Tomography

EC   Emergency Centre

EMAT   Emergency Medicine Association of Tanzania

EMSSA   Emergency Medicine Society of South Africa

ETT   Endotracheal Tube

HIV   Human Immunodeficiency Virus

MUHAS   Muhimbili University of Health and Allied Science

OPA   Oral Pharyngeal Airway

TECCS   Tanzania Emergency Care Capacity Survey

LIST OF TABLES AND FIGURE

GLOSSARY

Acute intake areas. These are also known as Emergency Centres (ECs), but EC is not understood or appropriate in Tanzania, given the complete lack of dedicated space within health facilities for provision of emergency care. Other names are emergency room, emergency department, casualty centre, accident and emergency unity. Throughout this study, acute intake area means a space within hospitals where undifferentiated new patients are seen and either admitted or treated as outpatients.

Assistant Medical Officer. These are health personnel who have undergone an advanced course in the provision of health care. They are intermediates between the Clinical Officer (a three year diploma) and the Medical Officer (MBChB holders) and are capable of promoting and providing curative as well as preventive services in Tanzania and other countries in Africa.

Clinical Officer. This is a lower-level practitioner of medicine in East Africa and parts of Southern Africa who is qualified and licensed to practise medicine. A Clinical Officer is not from a nursing background and is trained in the medical model, as physicians are, to provide routine care in general medicine or within a medical speciality such as anaesthesia. The Clinical officer also carries out treatment that is out of the nurse's scope.

Hippocratic Oath. This is an oath, historically taken by physicians and other healthcare professionals, swearing to practise medicine ethically and honestly.

Tanganyika Medical Council. This is a registered body with a statutory obligation to establish and maintain a register of medical practitioners in the United Republic of Tanzania. This register is the definitive list of doctors licensed to practise as 'registered medical practitioners' in the country.

INTRODUCTION

Emergency Medicine is a new speciality in South Africa and throughout much of Africa, and was only recently recognised in Tanzania. The first Emergency Medicine residency program started in October 2010 at Muhimbili University of Health and Allied Sciences (MUHAS) with eight residents who are expected to graduate in 2013. In May 2011 the Emergency Medicine Association of Tanzania (EMAT) was founded by physicians and nurses working in emergency care and was successfully registered by the Registrar of Societies (1).

Tanzania is a country in Eastern Africa bordered by Kenya and Uganda to the north; Rwanda, Burundi and the Democratic Republic of the Congo to the west; and Zambia, Malawi and Mozambique to the south. The country's eastern border lies on the Indian Ocean (see Appendix A). Its total area covers 947 300 sq. kilometres with a population of 42 746 620, (see Table 1). (2) The Tanzanian Mainland is divided into 21 administrative regions and 105 districts.

Table 1. POPULATION DISTRIBUTION

Age group	Percentage
0 – 14 years	42% (male 9 003 152/female 8 949 061)
15 – 64 years	55,1% (male 11 633 721/female 11 913 951)
65 years and above	2,9% (male 538 290/female 708 445)

Tanzania is among the few African countries with many natural resources including gold, diamonds, Tanzanite gemstones, platinum, coal, uranium, nickel, chrome, iron ore, tin and other minerals. It ranks number three (after South Africa and Ghana) for production of gold in Africa. The economy is mostly dependent on agriculture, which contributes more than half of the GDP, provides 85% of exports and employs 80% of the workforce. Most of its industries are based on processing agricultural products. Although the country is rich in natural resources, it remains among the world's poorest economies in terms of per capita income. The World Bank, IMF and others donors frequently provide supplementary funds for the country (3).

The Health Services Delivery System in Tanzania consists of 4 679 dispensaries, 481 health centres and 219 hospitals distributed throughout the country (4). The dispensaries and health centres are the primary health care facilities and serve an average population of 10 000 and 50 000 respectively, while district hospitals serve a population of about 250 000 (4). The referral system is designed for primary access at the dispensary and health centres level and for the health centres to refer patients to hospitals. Due to lack of efficient patient transport systems, poor communication systems and a

shortage of staff (5), many patients with acute complaints present to district or regional hospitals while having received no prior treatment.

Clinical Officers (COs) are the mainstay of health care providers in most primary health facilities. They are qualified with a Diploma in Clinical Medicine, take the Hippocratic Oath and are registered by the Tanganyika Medical Council to practise medicine (4). Assistant Medical Officers (AMOs) form another important group of registered health care providers with the qualification of an Advanced Diploma in Clinical Medicine. AMOs are supposed to be in charge of facilities at health centres but, due to a shortage of Medical Officers, this has led to AMOs being in charge of district hospitals, some even serving as District Medical Officers. Health attendants are qualified health workers with certificates in health and they are meant to provide routine individualised healthcare such as changing bandages, dressing wounds and applying topical medication to patients in a care facility (4).

In Tanzania the leading cause of death in all age groups is malaria. Human Immunodeficiency Viruses/Acquired Immunodeficiency Syndrome (HIV/AIDS) is the second cause of death among adults, while heart failure and neoplasms are among the top ten killers. The second cause of death in children aged below five years is anaemia while HIV/AIDS ranks sixth (4). The pattern of diseases (e.g. sepsis and its complications, dehydration due to diarrhoea, etc.) causes time-sensitive illnesses which require urgent resuscitation. The urgent treatment during these life-threatening emergencies has not been given attention by health systems in developing countries, including Tanzania (6).
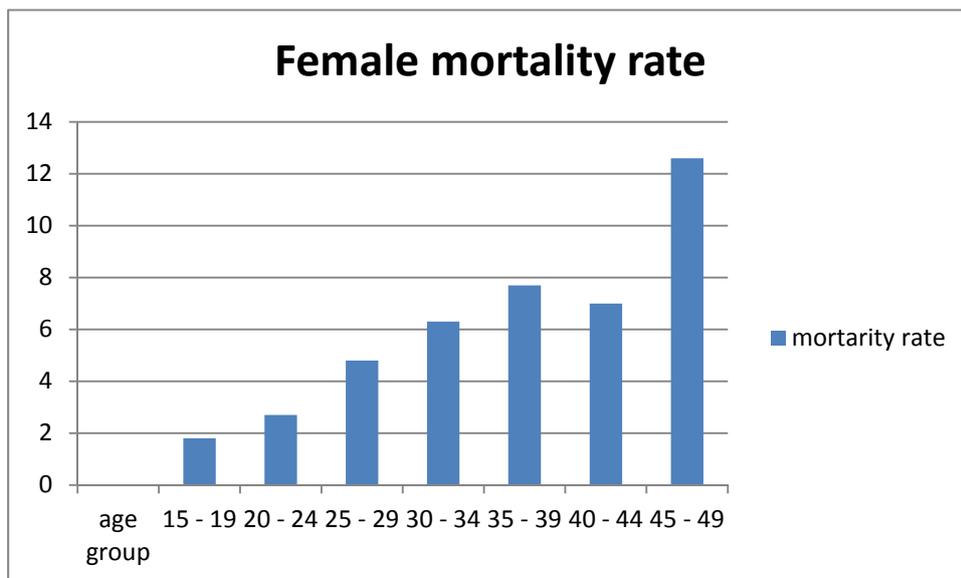
Figure 1. Female mortality rate

The overall mortality rate per 1 000 for men and women is 5, 0 and 5, 1 respectively. Female mortality is higher during child bearing age i.e. 20-34 years, (see Figure 1), but generally the mortality rate increases with increasing age for both sexes. For children, infants have a mortality rate of 51 per 1 000 live births and the under-five mortality rate for the same period is 81 per 1 000 children. This is very high and is mostly attributed to lack of timely and appropriate medical intervention (3).
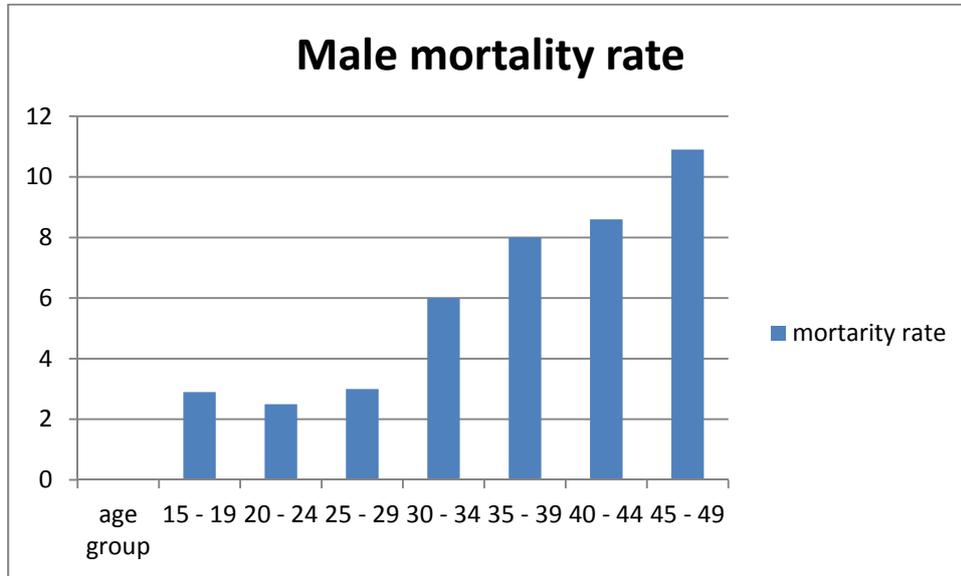
Figure 2. Male mortality rate

LITERATURE REVIEW

A recent study on evaluation of trauma care capability showed that limited resources for acute resuscitation and monitoring are the major issue in the care of these patients, especially lack of oxygen and of pulse oxymeter. Other problems identified included lack of chest tubes, stiff suction catheters, and medications, especially antibiotics and analgesics (7).

The deficit of qualified human resources for health care is a major limiting factor in overall health care provision in the developing world (8). In stable patients, emergency care may appropriately and effectively be delivered at a primary health facility staffed by non-doctor clinicians; however such a facility would be grossly inadequate for the management of a severely unstable patient e.g. with polytrauma injuries (9).

In response to a critical shortage of health care personnel with clinical skills, 25 out of 47 nations in sub-Saharan Africa have trained and officially authorised non-physician clinicians to provide clinical services, including writing prescriptions and performing minor surgery (10). In 19 countries these clinicians are authorised to provide obstetrical care, but in only five (Ethiopia, Ghana, Malawi, Mozambique and Tanzania) they are allowed to do caesarean sections and other major emergency obstetrical surgery.

A study done of 13 district hospitals in seven less developed countries shows that the quality of care differs among the countries and, within one country, differs among the hospitals (11). Generally, there is a delay between initial assessment and treatment of the patients. The majority of acute intake areas are poorly organised and lack essential supplies. Relatives who escort patients are required to buy emergency drugs before they can be administered. Most of the staff (doctors, nurses and medical assistants) in district hospitals lacks adequate knowledge about managing important childhood illnesses.

In Malawi, the introduction of paediatric emergency care in the Queen Elizabeth Hospital reduced in-patient paediatric mortality from between 10% and 15% to between 5% and 8%. However, the frequently encountered limitations were shortages of consumables (e.g. drugs, cannulas, strapping and plaster of Paris) and lack of maintenance of equipment such as oxygen concentrators. Except for paediatric patients, all other emergencies were seen in the outpatients department by the Clinical Officer or Assistant Medical Officer. Support services are minimal e.g. laboratory investigations, bloods slide for malaria parasites, haemoglobin concentration, and stool and urine analysis (12).

In Ghana, Mock et al. (13) identified several problems related to emergency care provision, including the lack of basic airway equipment in the Emergency Centre; they also observed that the available equipment was often adult size with only few or none in paediatric sizes. Some services, such as Computed Tomography (CT) scanning, were not available to all patients, only to those who could pay; this limits the availability of such services in an emergency situation (13). The gross mismatch of human and physical resources is another problem identified in this study. For example, in many hospitals, staff and supportive service such as x-rays, ultrasounds and laboratory tests were available during normal working hours. However the trained staffs for these services were not available during nights or weekends, which was the peak time for most emergencies.

There are many barriers to providing emergency medical care in developing countries (14). In Ethiopia, 81% of health care providers had only a very basic level of medical training; although the majority of providers felt comfortable diagnosing emergency conditions, fewer felt comfortable treating them. A shortage of supportive services is not exceptional as 44% of health facilities lacked access to diagnostic equipment.

A study of emergency and surgery services at 48 primary hospitals in Tanzania showed that there are significant gaps existing in the emergency care facility, including a deficit in human resources, essential equipment and infrastructure (15). Among the facilities surveyed, only 42% had access to oxygen all the time and only six had a functioning pulse oxymeter. An x-ray facility was not available in 23% of the hospitals, and had an interrupted service in 44%. The annual summit meeting of the Ministry of Health in Tanzania (2008) shows that human resources in most primary hospitals are critically absent, with less than one third of posts filled (6).

A more accurate assessment of the equipment and staff in district and regional hospitals' acute intake areas (known in South Africa as Emergency Centres; however, this terminology is not understood or appropriate in Tanzania, given the complete lack of dedicated space within health facilities) is needed as it will help in defining the practice and quality of the service, and will serve as a guide for health system priorities. The results of such a study will also provide a foundation to strengthen and guide context-appropriate development of the speciality of Emergency Medicine in Tanzania.

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AIM OF THE STUDY

The aim of this study was to analyse the resources available for emergency care in the acute intake areas of public district and regional hospitals in Tanzania. To achieve the aim, the study had the following objectives:

- to evaluate the availability of emergency care equipment
- to evaluate the staff characteristics in acute intake areas (availability, composition and percentage trained in life support skills)
- to identify the support services (bedside test/laboratory, radiology and pharmacy/medications) available for the emergency care of patients.

METHODOLOGY

Study design

This was a cross-sectional, prospective study. It was part of the Tanzania Emergency Care Capacity Survey (TECCS), a large assessment of the general emergency care capacity of all district and regional hospitals in Tanzania. The larger study aimed at describing the clinical presentation, resources, investigations, procedures and diagnoses of patients presenting with acute complaints to public district hospitals, as well as documenting the capacity of public district hospitals to deal with emergencies and disasters. This part of the study focused on the human and equipment resources available for emergency care.

Site visit process

Across the country, 98% of public district and regional hospitals' acute intake areas were visited during data collection. The investigators were allocated among six zones based on geographical considerations i.e. Coastal zone, Lake zone, Northern zone, North-Central zone, Southern Highlands zone and Southern zone (see Appendix A). The dates to collect data from individual hospitals within each zone were assigned according to geographical proximity and easy accessibility between the districts.

The investigators visited each district hospital's acute intake areas and other relevant areas within the hospital e.g. pharmacy, laboratory, radiology department and minor theatre, for a 12 hour period for each hospital. Direct inspections of facilities and equipment were conducted, then the investigator interviewed both the head of the acute intake area or Medical Officer In Charge, while the staff working in the area visited to check the accuracy of the data collection, and to provide details on the staffing composition.

Data collection

Five emergency physicians participated in data collection for an integrated clinical audit and survey. The study was conducted across all 21 Tanzanian mainland regions covering 98% of all districts and regional hospitals, between July and November 2012. Two district hospitals, Kwimba and Meatu, were not covered for logistical reasons, while all private hospitals and four other health centres which initially were regarded as hospitals were excluded. Regional hospitals were included in the study as they serve as referral hospitals from dispensaries and health centres in their respective district. (We found that most districts had either district or regional hospitals and some had only health centres.)

The following data was collected at each hospital using a structured checklist (see Appendix B) adopted from the Emergency Medicine Society of South Africa (EMSSA) (16).

- the equipment available for emergency care e.g. equipment for airway, monitoring, etc.
- staff characteristics (e.g. composition – how many doctors, nurses, Clinical Officers, AMOs, and porters); availability during 'working' and 'on call' hours; number of staff trained in life support skills in the past four years)
- support services available at the hospital (e.g. laboratory, radiology and pharmacy).

Each of the items on the checklist was assessed and then put into one of the following three categories:

- ABSENT, was given a score of 0;
- PRESENT BUT NOT WORKING, was given a score of 1; and
- PRESENT AND WORKING, was given a score of 2.

Items were physically assessed including expiry dates and working conditions. For example, if a diagnostic test was not performed because of a lack of reagents or because the test equipment was waiting for repairs, it was scored as 1; if medication had expired, it was scored as 0. In some hospitals they had equipment but it had never been used because none of the staff knew how to use it, it was scored as 1.

Because certain medications require specific storage conditions, all medications were regarded as available and scored 2 if either present in the acute intake area or in the hospital pharmacy, or 0 if absent or expired.

Another assessment which was done was availability of staff which was assessed through the head of the acuity intake area and/or matron; their availability immediately on the hospital during working

hours or after hours (as defined by the Tanzanian Government) was recorded; an assessment was also made of the proportion of staff on call from home.

Ethics

All data collected was held by the investigators, and then handed over to the principal investigator, who kept it in a password-protected and encrypted computer. No identifying details of patients or interview subjects were recorded. In addition to ethical approval from the University of Stellenbosch, permission was also obtained from the Ministry of Health and Social Welfare – Tanzania, Muhimbili University of Health and Allied Sciences and from participating hospitals.

Reporting of results

A full comprehensive report will be given to the Ministry of Health and Social Welfare in Tanzania and to all hospitals involved in the study. A manuscript will be developed for publication in a peer-reviewed journal.

RESULTS

This study was conducted in 99 out of 102 (98%) regional and district hospitals in Tanzania (see Figure 1) and all hospitals surveyed completed our checklist.
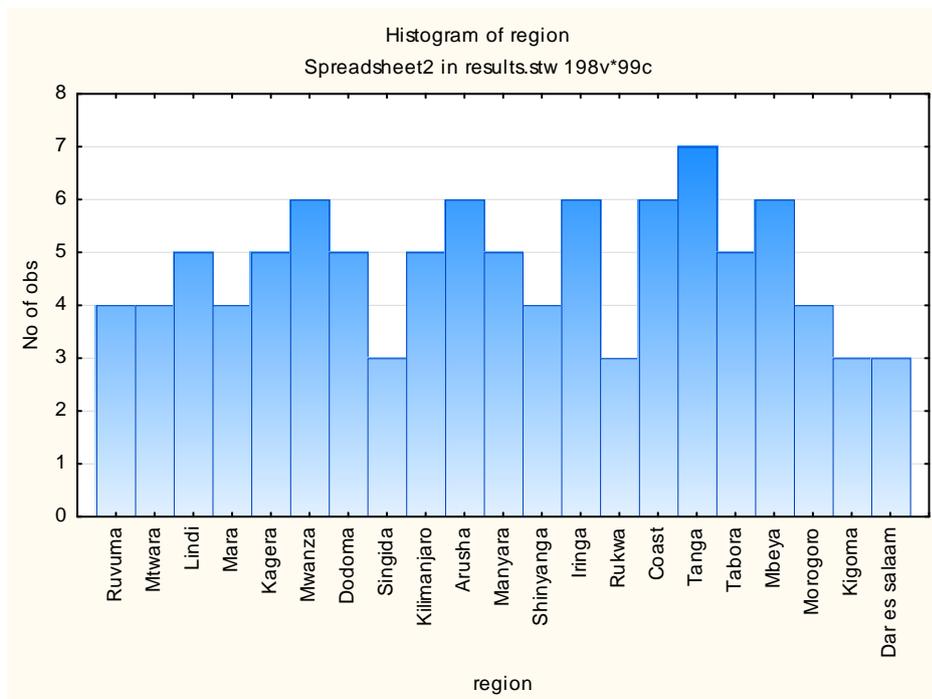
*No of obs (observations) = number of hospitals visited

Figure 3. Number of district and regional hospitals surveyed

Table 2. AVAILABILITY OF EQUIPMENT.

Equipment	Available (%)		Not available (%)
	Working	**Not working**	
For opening and protecting airway			
Laryngoscope set			
-Adult blade curved	2	1	97
-Adult blade straight	1	1	98
-Paediatric blade curved	1	1	98
-Paediatric blade straight	1	-	99
-Endotracheal tube	-	-	100
Suction device	17	3	80
Size 0, Oral Pharyngeal Airway (OPA)	2	1	97
Size 1, OPA	5	1	94
Size 2, OPA	4	-	96
Size 3, OPA	4	2	94
Size 4, OPA	3	1	96
Size 5, OPA	2	1	97
Laryngeal mask airway	-	-	100
Magill's forceps	1	1	98
To deliver oxygen and ventilation			
Bag valve mask	18	8	74
Partial re-breather mask	4	3	93
Nebuliser	-	1	99
Oxygen supply	30	3	67
Ventilator	-	-	100
For monitoring and treatment			
Cardiac monitor	3	3	94
12 lead E.C.G	8	7	85
Defibrillator	3	1	96
Transcutaneous pacer	-	-	100
Cardiac arrest board	-	-	100
Stethoscope	100	-	-
Pulse oxymeter	20	10	70
Blood pressure monitoring device	3	3	94
Thermometer	90	3	7
Other important equipment			
Drip stand or equivalent	94	-	6
Paediatric Broselow tap	1	1	98
Semi-rigid collar	8	-	92
Spine board/bed	6	3	91
Splinter device	64	9	27
Personal protection device	97	-	3
Maternity delivery pack	30	3	67
Cord clamp	26	2	72
Suture material	69	-	31
Thoracotomy set	-	-	100
Resuscitation algorithms	7	-	93

The shortage of equipment for management of airways and breathing was observed in the majority of the hospitals. A laryngoscope set for adults was found in 2% of hospitals and a paediatric set was only

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in 1% of the hospitals. While none of the hospitals' acute intake areas had endotracheal tubes or laryngeal mask airways of any size, a working suction device was present in 17% of the hospitals. We also found that an oxygen supply was available in 30% of the hospitals while a working bag valve mask was present in only 18% of the hospitals. None of the hospitals had a working ventilator or equipment for nebulisation (see Table 2). Monitoring of acutely ill patients is of absolute importance for providing the best care possible and optimising the efficiency of such care. Among 98% of hospitals visited, 94% had blood pressure monitoring devices and 90% had thermometers. Cardiac monitoring was possible in 3% and oxygen saturation monitoring could only be done in 20% of the hospitals. None of the hospitals had a transcutaneous pacer.

In trauma patients, immobilisation has a number of advantages including pain control and protection of neurovascular structures. In the hospitals surveyed, only 6% had spine boards/beds which could be used and 8% were found to have semi-rigid neck collars. The majority of hospitals (98%) had personal protection devices such as gloves, facemasks and aprons.

Table 3. STAFF AVAILABILITY

	Available (%)		Not available (%)
	Within hospital	**Out of hospital**	
(A) Working hours (08H00–16H00)			
Clinical Officer	99	-	1
Assistant Medical Officer	94	1	5
Medical Officer	53	3	44
Medical specialist	10	1	89
Health attendant	98	-	2
Enrolled nurse	89	-	11
Registered nurse	63	-	37
(B) After hours (16H00–08H00)			
Clinical Officer	99	-	1
Assistant Medical Officer	67	16	17
Medical Officer	34	8	58
Medical specialist	3	7	90
Health attendant	95	-	5
Enrolled nurse	72	-	28
Registered nurse	41	-	59

Checking blood glucose was possible in 96% of hospitals and checking haemoglobin was possible in 94% of the hospitals; 92% of hospitals had access to safe blood transfusion. An x-ray service was not available in 37% of the hospitals and none of the hospitals had blood gas analysers or CT-scans (see Table 4).

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Although some of the essential medications e.g. Diazepam (100%), Adrenaline (98%), glucose containing fluids (99%), were available in almost all hospitals, the distribution of other equally important medications was not even e.g. Phenytoin (44%) and B-stimulant nebulisation (53%). There was a shortage of antiarrhythmic drugs such as Amiadorone, only available in 4% of surveyed hospitals and Verapamil, only found in 7% of hospitals surveyed (see Table 6).

Table 4. SUPPORT SERVICE (Radiology and Laboratory)

Items	Available (%)		Not available (%)
	Working	Not working	
Blood glucose	96	-	4
Haemoglobin	94	5	1
Urinalysis	3	6	91
Blood gas analysis	-	-	100
Blood transfusion	92	-	8
Electrolyte, urea & Createnine	55	10	35
X-ray	63	25	12
Utra-sound scan	65	26	9
CT-scan	-	-	100

Clinical Officers and health attendants were the most available human resource in hospitals' acute intake areas. While Clinical Officers were available in 99% of the hospitals during and after working hours, health attendants were present within the hospitals in 98% of hospitals during working hours and 95% after hours (see Table 3).

Table 5. STAFF TRAINED IN LIFE SUPPORT COURSES WITHIN PAST FOUR YEARS

	BLS (%)	ACLS (%)	ATLS (%)	APLS (%)	EQV (%)
Clinical Officer	2	-	1	-	1
Assistant Medical Officer	1	-	1	-	2
Medical Officer	3	-	1	-	1
Specialist	1	1	1	1	-
Health attendant	1	-	1	-	1
Enrolled nurse	1	-	1	-	3
Registered nurse	2	-	1	-	2

BLS = Basic Life Support; ACLS = Advanced Cardiac Life Support

ATLS = Advanced Trauma Life Support; APLS Advanced Paediatric Life Support

EQV = Local equivalent courses (e.g. Obstetric Emergency Care and Essential Surgical Skills)

The majority of the hospitals (89%) did not have access to any kind of medical specialist consultation during working hours and 90% of the hospitals did not have access after-hours. Training in life support was at its lowest level as we found at least training in Basic Life Support (BLS) and Advanced Trauma Life Support (ATLS) being given to staff, although to only a few of them (see Table 5).

Table 6. MEDICATION WITHIN HOSPITALS

ITEMS	Availability (%)
(A) Essential drugs	
Activated charcoal	2
Adrenaline	98
Amiadorone	4
Antibiotics	95
Antihistamine	94
Aspirin	93
B-stimulant inhaler or oral	53
Calcium Chloride	17
Dextrose (5% or 10% or 50%)	99
Diazepam	100
Digoxin	73
Furosemide	88
Fibrinolytics	1
Glucagon	-
Heparin	11
Hydrocortisone	98
Insulin	87
Lignocaine (local infiltration)	99
Magnesium sulphate	80
Morphine	10
Potassium chloride	9
Phenytoin	44
Post Exposure Prophylaxis	99
Paracetamol	100
Nitroglycerine	2
Quinine	94
Sodium bicarbonate	15
Thiamine	9
Acetycystain	-
(B) Recommended drugs	
Inotropes (e.g. dobutamine)	8
Etomidate	3
Haloperidol	88
Ketamine	91
Mannitol	72
Phenobarbitone	87
Prednisolone	88
Propofol	5
Suxamethonium	46
Rocuronium	16
Tetanus Toxoid	93

DISCUSSION

Limitations

The author aimed to assess the availability of resources for emergency care in Tanzania but there were several limitations to the study.

- Firstly, although physical inspection of equipment was objective, information about the human resources depended mostly on personnel who were interviewed. We expected different answers from administration staff compared to those staff working directly in the units e.g. doctors, nurses and attendants. The investigators attempted to overcome these problems by interviewing different workers at each facility.

- Secondly, when data are being collected by different investigators, there is a chance of incorrect or human error in recording the data; we tried to control this by later phoning the respective hospitals for more clarification when there was doubt.

- Thirdly, the study was conducted only in the government's district and regional hospitals; this gives no information about the status of the private and tertially hospitals as far as emergency care is concerned. Also, it limits the ability to generalise about the resources in all hospitals in Tanzania.

- Fourthly, we were not able to verify facts about those who claimed to have attended a life support course in the past four years.

Regardless of its limitations, the study provides comprehensive data which has been partially reported. It identifies the shortage of equipment for acute resuscitation, as well as the lack of monitoring and support of the patients.

Absence of equipment

Availability of equipment in health facilities not only improves staff morale, but also provides more convenient, efficient and safe patient care. We found that most of the district and regional hospitals lack the basic equipment for acute resuscitation, such as oxygen, Bag Valve Mask (BVM), Oral Pharyngeal Airway (OPA), suction devices. The shortage is due to lack of money to buy the equipment or delays in the procurement process. This is consistent with a study done in Mexico by Arreola-Risa et al., and had been previously reported by Mock et al. in Ghana. (7, 8, 12, 15). The majority of the acute intake areas in hospitals surveyed does not provide medical intervention to the patients in terms of resuscitation; rather, sick patients are sent to the wards. Most times, even in the wards, there is no oxygen, no appropriate oxygen masks and no trained staff for managing these patients. This creates delays in time-sensitive illnesses such as hypoxia and hence acts against the principle of resuscitation where cleared airways are a priority.

A long waiting time for repairs

Some equipment for resuscitation and support was found to be not in working order; the equipment was either broken/malfunctioning or waiting reagents/refills (e.g. oxygen cylinder), as seen in Ghana (8, 12). We observed this problem in the majority of hospitals; the common explanation was that there were no funds to buy the spares required or that there awaited technician had to come from a different region or country. This duration of no service because of malfunction of the equipment ranged from a week to three months; it creates difficulty for the clinician on the management plan to these patients as sometimes clinical findings are not reliable in a chaotic environment such as acute intake areas.

Lack of knowledge

Some equipment observed was kept in storage and not in acute intake areas e.g. pulse oxymeter, semi-rigid neck collar and Magill's forceps. Surprisingly, the staff in acute intake areas had no idea of the existence of the equipment and they did not know when and how it should be used. This mismatch was also observed in Ghana where equipment was available and working but no one among the staff could use it (13). Most of this equipment had been supplied by donors via the Ministry to the district or regional authority without considering training the respective staff on how to use it.

Delayed access to the equipment

Inappropriate allocation of the equipment e.g. oxygen placed in theatres/wards, chest tubes being found only in the wards, oral-pharyngeal or endotracheal tubes found only in theatres and not in acute intake areas, was found in the majority of the hospitals. Medications e.g. adrenaline, dextrose and fluids were not kept in acute intake areas and families had to buy them from the hospital pharmacy before they were given to the patients. This is in keeping with a study done in Malawi (11). Similar findings were also observed in Ghana by Mock et al. (13). This creates significant delay in availability of the resources when dealing with critically ill patients.

Human resources

The deficit on both quantity and quality of human resources is a significant problem among all hospitals surveyed and has led to the majority of hospitals' acute intake area being staffed by non-doctors (8, 10). Our study found that Clinical Officers are the commonly available staff in acute intake areas at any given time of the day; in some hospitals during after-hours there is only a clinical officer and health attendant running the unit. These are health personnel with the lowest qualifications from whom one would expect poor quality service delivered in both diagnosis and management. This is in keeping with the study done in (15).

Very few staff working in acute intake areas had undergone life support training. For the past four years Clinical Officers who had trained in Basic Life Support consisted of 2% of the staff, and only

1% was trained in Advanced Trauma Life Support. It was also observed that the number of hospitals with qualified doctors decreases during after-hours compared to during official working hours, with similar trends in nursing staff. The shortage of staff was also previously reported in study by Penoyar et al. (15).

This deficit of qualified medical doctors is partly due to an inadequate training curriculum and brain-drain. Many doctors leave the country looking for better salaries in Botswana, Namibia, South Africa and overseas. Both inadequate training and shortage of staff compromise the quality of emergency care. From the findings in this study it is obvious that life support training is almost non-existent and therefore should be incorporated into all training for Clinical Officers, Assistant Medical Officers and universities to increase awareness and improve the emergency care provision.

Prioritising care of life-threatening illnesses by correct training, budget allocation for emergency care, monitoring and quality improvement from both Ministry and individual hospitals will reduce the shortage and improve the quality of emergency care.

CONCLUSION

The study identifies deficits in equipment and the quality and quantity of human resources across regional and district hospitals in Tanzania. Misallocation of the equipment, long- awaiting repair and inadequate training in life support skills partly contribute to the deficit observed.

RECOMMENDATIONS

Physical resources

- Each hospital should identify a dedicated space for resuscitation within the acute intake area, and ensuring the availability of equipment and supplies that are essential for emergency care (see Appendix E).

- Each hospital should establish quality monitoring and an improvement process that will ensure the availability of such essential equipment.

- The procurement process should be promoted and fastened to ensure the availability and timely repair of the essential equipment.

- Hospitals should optimise the planning that matches both human and physical resources i.e. staff should be trained on the new equipment supplied. This will avoid wasteful mismatches.

Human resources

- Training capacity should be increased in the medical school/colleges by increasing the number of student enrolled yearly.

- Emergency medicine should be taught in all medical schools and colleges.

- Life support skills training should be incorporated in the primary curriculum in all colleges for Clinical Officers, Assistant Medical Officers and Medical Officers.

- Continuing education on life support skills should be initiated and promoted.

- The migration of doctors and nurses to high-income countries should be decreased (brain-drain).

Administrative issues

- Planning and monitoring capacity for emergency care in both individual facilities and at Ministry level should be strengthened.

- The role of a hospital's acute intake areas in the early care of critical patients has to be redefined and reinforced.

- A special task force should be established to regularly analyse the strengths, weaknesses, opportunities and threats to emergency care services as well as to advise the Ministry of Health appropriately.

- Availability of funds to the health sector, particularly to emergency care, should be increased.

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APPENDICES

Appendix A: Map of Tanzanian regions and zones