The State of Emergency Medical Services and Acute Health Facility Care in Uganda: Findings from a National Cross-Sectional Survey

Albert Ningwa (✉ albert.ningwa@gmail.com)

Makerere University <https://orcid.org/0000-0003-2211-1425>

Kennedy Muni

University of Washington

Frederick Oporia

Makerere University School of Public Health

Joseph Kalanzi

Makerere University School of Medicine

Esther Bayiga Zziwa

Makerere University School of Public Health

Claire Biribawa

Makerere University School of Public Health

Olive Kobusingye

Makerere University School of Public Health

Research article

Keywords: Emergency medical services, pre-hospital care, ambulance

Posted Date: July 4th, 2019

DOI: <https://doi.org/10.21203/rs.2.10966/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Version of Record: A version of this preprint was published at BMC Health Services Research on July 9th, 2020. See the published version at <https://doi.org/10.1186/s12913-020-05508-8>.

Abstract

Background There is limited information on the state of emergency medical services (EMS) in Uganda. The available evidence is from studies that focused either on assessing EMS capacity and gaps at the national level especially in Kampala or identifying risk factors for specific emergency medical conditions (e.g., injuries). In this study, we sought to provide a snapshot of the state of EMS in Uganda by assessing EMS capacity (pre-hospital and hospital) at both the national and sub-national (district) levels. **Methods** We conducted a cross-sectional national survey where we administered structured questionnaires to EMS providers and policy makers from 38 randomly selected districts across seven of the 14 health regions of Uganda. We interviewed district health officers, hospital managers, and pre-hospital EMS providers and collected data on EMS policies and guidelines, medical products, financing, health workforce, service delivery, and information sharing. **Results** As of the time of data collection, Uganda did not have national or sub-national EMS policies and guidelines to guide emergency health work. In addition, there was no functional universal toll-free number for emergency response in the country. However, Ministry of Health officials indicated that a taskforce has been set up to lead development of national EMS policy, guidelines, and standards including establishment of a toll-free emergency number. At the sub-national level, we found that majority of ambulances lacked the products and supplies needed to provide pre-hospital care, and mainly functioned as emergency transport vehicles, with no capacity for medical care. Only 16 (30.8%) of the 52 pre-hospital providers assessed had standard ambulances, with the remaining 36 (69.2%) providers having improvised ambulances that were not equipped to provide pre-hospital care. In addition, the police and bystanders were the first responders to the majority (>90%) of the emergency cases. **Conclusion** Our findings reveal weaknesses at every level of what should be a critical component in the health care system – one that deals with the ability to treat life-threatening conditions in a time sensitive manner. The MOH needs to speed up efforts to provide policies and guidelines, and to increase investments for the creation of a functional EMS in Uganda.

Background

An emergency medical service (EMS) system is defined as one that organizes all aspects of care provided to patients in the pre-hospital or out-of-hospital environment(1). EMS is critical to the improvement of outcomes in patients with obstetric and medical emergencies and severe injuries, and other time sensitive illnesses. Despite this pivotal role, many countries in Africa have been slow to develop EMS systems (2). Because the pre-hospital space is not exclusively the purview of the health sector, and because of the need to engage different sectors whose primary mandate is not health, leadership, policy, and practice specific to EMS have been slow to take root both in Africa and elsewhere in low-and middle-income countries (3). In addition to pre-hospital care, patient outcomes are greatly impacted by the acute care delivered at the receiving health facility (4). Patient survival and recovery are dependent on the presence of appropriately trained medical personnel, and the availability of the necessary equipment, medicines, and supplies in the minutes and hours following the arrival of a critically ill patient at a health care facility (5).

With a well-established EMS system, many emergency medical conditions can be resolved in a few hours or days (6). While a few studies have been done to assess pre-hospital care in Kampala (7-9), to our knowledge, no study has been done to assess the status of EMS and acute health facility care in Uganda at national level. The Ministry of Health (MOH) recognized the need to improve acute medical care, and through this study sought to establish the status of emergency medical services and acute health facility care in the country. The assessment was conducted both at the national and sub-national levels assessing EMS capacity at the pre-hospital and facility levels using the World Health Organization (WHO) Emergency Care Systems Assessment (ECSSA) tool (10).

Methods

Sample size and sampling methodology

We obtained a sampling frame of all health facilities in Uganda from the MOH and stratified the list by health regions (there are 14 health regions in the country, with each region served by a regional referral hospital). The health regions were further grouped into Uganda's 4 geo-administrative regions (i.e., North, East, West, and Central). Within each geo-administrative region, we randomly selected one health region (Figure 1). By default, the regional referral hospital (RRH) within the selected health region was included in the study sample. We then purposively selected three additional health regions as follows: the Arua health region in West Nile is host to a large refugee population, which may impact access and availability of EMS; the Karamoja health region has a history of conflict and has historically been disadvantaged with poor access to all social services; and the Kalangala islands health region has unique access challenges.

Within each selected health region, four general hospitals were randomly selected using computer generated random numbers. In order to select health centers (HCs), we grouped all HCs in the selected health regions by ownership (i.e., government-owned, private not-for-profit/non-governmental organization (PNFP/NGO), and private for-profit HCs). Health center II facilities were excluded from the study as they are not equipped to handle EMS (i.e., they only handle very basic healthcare needs), therefore only HC III and HC IV facilities were eligible for inclusion among HCs. For each health region, we randomly selected 2 private for-profit health centers (i.e., 1 HC IV and 1 HC III), 4 PNFP/NGO health centers (i.e., 2 HC IV and 2 HC III), and 4 government-owned health centers (i.e., 2 HC IV and 2 HC III). Where a private for-profit or PNFP/NGO HC III or HC IV did not exist in the selected health regions, we filled the slot (s) with a government-owned HC III or HC IV.

Our sampling strategy resulted in a sample size containing 6 regional referral hospitals, 24 general (district) hospitals, 30 HC IV and 30 HC III. The Uganda health care system is organised into national, regional referral hospitals, general hospitals and at district level, is divided into four levels (I – IV). Health center I comprises individual health volunteers known as village health teams (VHTs). Health center II provide outpatient and community outreach services. Health center III provide inpatient care and environmental health and Health center IV include surgery and blood transfusion. In addition, Kampala

(capital city) District was considered a special region, so out of the three RRHs (i.e., Lubaga, Nsambya, and Naguru) in the city, one RRH (Naguru) was added to the study sample. Additionally, all the 52 pre-hospital care providers (which included the police and ambulance service providers) identified through the District Health Offices were included. A standard ambulance was defined as a motor vehicle licensed under the *Uganda Traffic & Road Safety Act* and marked as such, designed or adapted for the treatment and conveyance of patients in an emergency care

In summary, our study sample included 7 health regions, 38 districts (Figure 2), 111 health facilities, and 52 pre-hospital care providers. In the sampled districts, we interviewed 38 district officials (including but not limited to the District Health Officers) who are district-level decision makers and 202 key personnel involved in EMS and acute health facility care.

Data collection

We adapted the WHO Emergency Care Systems assessment tool([11](#)) to collect data on EMS at the pre-hospital and health facility levels developed by Teri Reynolds and others([10](#)). The tool assessed six EMS pillars: leadership and governance; financing; information; health workforce; medicines, equipment, and supplies; and service delivery. We administered structured questionnaires to the following: district-level policy makers, administrators or managers of pre-hospital care services, and managers of emergency departments or casualty units. A checklist was used to assess pre-hospital service providers' premises, ambulances, and emergency units within health facilities. We collected data in Open Data Kit (ODK) Collect (version 1.18.2) using Android-powered tablets ([12](#)). Data collection took place between February 12, 2018 and April 24, 2018.

In addition, we reviewed reports from previous EMS studies in Uganda, and filled gaps in information, especially concerning national-level leadership and governance issues as well as financing, through key informant interviews with senior MOH officials.

Analysis

All quantitative analyses were done using STATA 14 (College Station, Texas, USA). The analyses were organized by the six pillars of the WHO Emergency Care Systems assessment tool (Citation). Where applicable, frequencies (counts) and percentages were calculated and qualitatively compared for different levels of the health care system.

Results

A summary of the EMS findings both at the national and sub-national levels is presented in Table 1. Detailed discussion of the results by the two levels is presented below.

National-level findings

Leadership and governance: The Department of Emergency Medical Services at the Ministry of Health was a few months old at the time of the study.

'The Ministry is prioritizing this [EMS] now, as you can see with the creation of the Department. But the major challenge is still that of resources. We have some development partners who are helping.' Key Informant, Ministry of Health.

Financing: Specifically, on funding:

'There is no earmarking of funds. We get a block vote for salaries and some limited operations here at headquarters. For the rest of the country, the districts have to determine what to spend on it [EMS]. There is no ear marking there.' Key informant interview respondent, Ministry of Health.

Coordination: The MOH was acknowledged as the lead agency in this area; however, there was an overlap of roles and ambiguity in mandates and operations, between the MOH, Office of the Prime Minister's National Emergency Coordination and Operations Center, the Police, and the armed forces. A universal toll-free telephone number was reported to be in existence, but it was not functional. The Health Management Information System (HMIS) office at the Ministry of Health did not have information specific to EMS.

Health workforce: Four courses addressing health facility-based emergency care were being taught at certain tertiary institutions in the country (Table 2). One additional course (pre-hospital emergency care) was under validation while another was under development.

Sub-national level findings

Governance: EMS delivery was plagued by poor coordination and communication. For instance, of the 11 districts with more than one EMS provider, only 5 (45.5%) coordinated their activities on regular basis. In addition, of the 52 pre-hospital care providers interviewed, 19 (36.5%) reported having dedicated emergency numbers for their ambulances and 25 (48.1%) had designated personnel to handle emergency calls. Twenty-three (44.2%) of the 52 pre-hospital care providers reported use of a central dispatch point for their ambulances. The rest had no specific dispatch mechanism.

Medical products: There was widespread lack of the most basic of equipment and medicines (e.g., blood pressure machines, electrocardiogram, glucometer, defibrillator, and forceps) needed to monitor and treat emergency conditions in ambulances and at emergency units (Tables 3-5). While triage stations were almost universally available, the capabilities in emergency units to appropriately intervene in life threatening emergencies was limited.

Seventy-nine (71.2%) of the 111 sampled emergency units reported use of clinical protocols. However, except for a few wall charts dealing with disease-specific conditions, there was little evidence of protocol use. Private-owned health facilities and ambulances were relatively better equipped and stocked than government-owned ones.

Health workforce: The Police, which was responsible for most (69%) transfers, had no trained medical personnel on board. They also used pick-up trucks with no provision for patient space beyond the bare floor of the truck. The rest of the providers had ambulances. Nine of the sixteen (56.3%) non-Police pre-hospital providers with ambulances assessed had a nurse on board, with some having an additional health worker (e.g., emergency medical technician or doctor) when handling emergencies. Ninety-four percent (15/16) of the non-Police pre-hospital providers had ambulance workers on a fixed salary, in addition to a variety of other remuneration mechanisms (e.g., allowances and pay-per-rescue).

Only 27% (30/111) of the sampled health facilities had permanent (non-rotating) staff in their emergency unit. This was evident even at the regional referral hospital level, where only three of the seven regional referral hospitals had permanent emergency room staff. Furthermore, 91% (101/111) of the emergency personnel in the sampled health facilities (regardless of the level of care), had received no specific training in the management of emergencies.

Service delivery: Nearly one in three (28.9%) of the sampled districts had more than one pre-hospital emergency services provider. The same proportion had a medical director, with 66% of the pre-hospital service providers having no medical director. Fifty (44.6%) of the 112 health facilities and police stations assessed for ambulance services had an ambulance (42 standard ambulances and 8 improvised ambulances).

Government (particularly the police) as well as private for-profit and not-for-profit agencies provided pre-hospital care services. Thirty-three (63.5%) of the 52 pre-hospital EMS providers were government-funded, with for-profit and not-for-profit agencies funding the remainder. Of the 52 pre-hospital providers, 16 (30.8%) reported having ambulance services with vehicles while the remaining 36 who were the Uganda Police had no ambulances but improvised means of transportation (Police patrol trucks) in emergency situations. The median cost for a long ambulance run was 114 US dollars (400000 Uganda shillings) with a range between 9 US dollars (30000 Uganda shillings) and 943 US dollars (3,300,000 Uganda shillings). This excludes government-owned pre-hospital care providers (especially the Police) who generally provide free transportation to health facilities. Forty-two (84%) of the 50 pre-hospital care providers that had ambulance services were attached to a health facility. Only 8 (16%) of these providers were stand-alone (i.e., not attached to a health facility).

While it was expected that lower levels of the healthcare system (i.e., HC III and HC IV) might be closed for the night, we found 18.4% of hospitals, including regional referral hospitals, where emergency services were not available 24 hours a day. Forty-two (37.8%) of the 111 sampled health facilities did not have laboratory support for part of the day. Moreover, there was little capacity to manage extra-ordinary events at all levels of the healthcare system.

Information use and sharing: There was wide variation in the formats and types of data collected on EMS within districts. Most information was neither shared with relevant agencies and offices, nor was there much indication that it influenced planning. Even operations-specific information such as the fact that critically ill patients were being transferred to a certain health facility was not always shared. For instance, 26 (50%) of the 52 EMS providers interviewed reported that they never notified health facilities prior to transferring emergencies there. Only 13 (34%) of the 38 sampled districts used their EMS data for district-level system planning. Data for planning EMS came from health facility records, police records, mortuary records, and community sources. Thirty (57.7%) of the 52 pre-hospital care providers reported sharing their information with authorities at the district level while 17 (32.7%) shared their data with the MOH. Other stakeholders with whom data were shared included District Police Commanders, the National Road Safety Council, and the media.

Discussion

Our study found an emergency medical services system hobbled by lack of a national policy, guidelines, and standards; funding; medical products, and coordination. For instance, ambulances and emergency areas in health facilities lacked the most basic of equipment and medicines both to monitor and to treat emergency medical conditions. This severe lack of equipment and medicines was observed at all levels of the health system regardless of level or ownership of the facility or the ambulance, although private health facilities and ambulances were relatively better equipped and stocked than government ones. The limited availability and functionality of medical equipment for responding to emergency medical conditions meant patients were getting very limited care in the pre-hospital phase, and then being transported to health facilities that were only marginally better equipped to manage their acute events. Moreover, service delivery was plagued by poor coordination and communication. For instance, 26 (50%) of the 52 EMS providers interviewed reported that they never notified health facilities prior to transferring emergencies there. In addition, 18.4% of hospitals, including regional referral hospitals did not have EMS available 24 hours a day. That police patrol vehicles (pick-up trucks) were the commonest (36 of 52 providers) mode of transporting patients in need of emergency care is likely a reflection of the resource challenges in the districts. Because the study had defined an ambulance as one providing both emergency transportation and care while in the pre-hospital space, it meant that the majority of pre-hospital providers did not have ambulances, but they were providers of emergency transportation. Moreover, at every level, there was evidence of insufficient financing for EMS.

Despite these challenges, the MOH has shown strong leadership and commitment to improving the state of EMS in the country. This was evident by the establishment of a whole department for emergency medical services in the MOH and the setting up of a special taskforce to spearhead the development of national EMS documents including a policy, guidelines, and standards. Our findings corroborate previous studies that found government financed EMS systems that need to be formalized and invested in (2, 8).

This was a national survey and therefore the findings can be generalized to Uganda, however the findings from this cannot be generalized to low- and middle-income countries since they are a representation of

one country in one region of LMICs. A second limitation is the potential for measurement error from reliance on self-reports for some of the outcomes (e.g., data use for planning), which could have resulted into social desirability bias. However, majority of the key outcomes (availability and functionality of medical products) in the study were measured through direct observation.

Conclusion

While it is not in doubt that Uganda has a multi-tiered system of health facilities to which patients can go for emergency medical care, our findings for the pre-hospital care component beg the question, 'does Uganda have an EMS?' This study was conducted at a time when there was no EMS policy, no standards, very poor coordination at national and sub-national levels, and no clear medical direction. However, there was a process underway to develop a policy and guidelines for the establishment of the EMS. From our findings, it therefore seems prudent to conclude that there was in fact no EMS, but a number of important components were in place which could contribute to the establishment of the system. This conclusion would be consistent with a 2017 study of EMS across Africa, which found that Uganda had no EMS system ([2](#)). However, there was evidence of dedicated and strong leadership at the MOH (this study was commissioned by the MOH), and a taskforce had been appointed to develop the policy.

Abbreviations

ECSSA:Emergency Care Systems Assessment

EMS: Emergency Medical Services

EMT: Emergency Medical Technician

HC: Health Center

HMIS: Health Management Information System

MOH: Ministry of Health

NGO: Non-Governmental Organization

ODK: Open Data Kit

PNFP: Private Not-For-Profit

RRH: Regional Referral Hospital

WHO: World Health Organization

Declarations

Ethics approval and consent to participate: This study was approved by Higher Degrees Research and Ethics Committee of Makerere University School of Public Health and the Uganda National Council for Science and Technology. Permission to conduct the study was obtained from the respective district authorities and the health facilities. Participants provided written consent to be interviewed and did not receive compensation for participation in the study.

Consent for publication: Not applicable

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author [AN] on reasonable request.

Competing interests: The authors declare that they have no competing interests

Funding: This work was supported by a grant from the Federal Ministry of Cooperation, Germany through Malteser International. The funding body had no role in the design of the study and collection, analysis, and interpretation of data and in writing the manuscript.

Authors' contributions: All authors contributed to the study design. AN, KM, and JK supervised data collection. KM and AN conducted statistical analysis. OK, AN, KM, EBZ, and FO led the writing of the manuscript. All authors read and approved the final manuscript.

Acknowledgments: The authors are indebted to the Ministry of Health, in particular, the Office of the Permanent Secretary, and the Department of Emergency Medical Services. We also acknowledge the support and cooperation of the Uganda Police at various levels, and the senior officials of the local governments which were surveyed. We are grateful to the large number of health workers and pre-hospital service providers who participated in the survey.

References

1. Mistovich JJ, Hafen BQ, Karren KJ, Werman HA, Hafen B. Prehospital emergency care: Brady Prentice Hall Health; 2004.
2. Mould-Millman N-K, Dixon JM, Sefa N, Yancey A, Hollong BG, Hagahmed M, et al. The state of emergency medical services (EMS) systems in Africa. *Prehospital and disaster medicine*. 2017;32(3):273-83.

3. Plummer V, Boyle M. EMS systems in lower-middle income countries: a literature review. *Prehospital and disaster medicine*. 2017;32(1):64-70.
4. Hirshon JM, Risko N, Calvillo EJ, Ramirez SSd, Narayan M, Theodosis C, et al. Health systems and services: the role of acute care. *Bulletin of the World Health Organization*. 2013;91:386-8.
5. Mock C. Guidelines for essential trauma care: World Health Organization; 2004.
6. Kobusingye OC, Hyder AA, Bishai D, Joshipura M, Hicks ER, Mock C. Emergency medical services. *Disease control priorities in developing countries*. 2006;2(68):626-8.
7. Bayiga Zziwa E, Muhumuza C, Muni KM, Atuyambe L, Bachani AM, Kobusingye OC. Road traffic injuries in Uganda: pre-hospital care time intervals from crash scene to hospital and related factors by the Uganda Police. *International journal of injury control and safety promotion*. 2018:1-6.
8. Mehmood A, Paichadze N, Bayiga E, Sloboda A, Luggya T, Kalanzi J, et al. 594 Development and pilot-testing of rapid assessment tool for pre-hospital care in Kampala, Uganda. *BMJ Publishing Group Ltd*; 2016.
9. Balikuddembe JK, Ardalan A, Khorasani-Zavareh D, Nejati A, Raza O. Weaknesses and capacities affecting the Prehospital emergency care for victims of road traffic incidents in the greater Kampala metropolitan area: a cross-sectional study. *BMC emergency medicine*. 2017;17(1):29.
10. Reynolds TA, Sawe H, Rubiano AM, Do Shin S, Wallis L, Mock CN. Strengthening health systems to provide emergency care. *Disease Control Priorities: Improving Health and Reducing Poverty 3rd edition: The International Bank for Reconstruction and Development/The World Bank*; 2017.
11. World Health Organization. Emergency and trauma care Geneva, Switzerland. Available from: <https://www.who.int/emergencycare/activities/en/>.
12. Hartung C, Lerer A, Anokwa Y, Tseng C, Brunette W, Borriello G. Open data kit: tools to build information services for developing regions. *Proceedings of the 4th ACM/IEEE International Conference on Information and Communication Technologies and Development*; London, United Kingdom. 2369236: ACM; 2010. p. 1-12.

Tables

Table 1 A summary of the results highlighting the six EMS pillars

National	Leadership and governance	Strong and committed leadership at MOH. No policy, no guidelines. Development of policy and guidelines underway.
	Financing	No designated funds for EMS.
	Information	Health management information system has no EMS specific data. Data on acute facility care limited.
	Health workforce	Limited staff.
Sub-national	Leadership and governance	No clear lead agency in some districts. No coordination. No policies, guidelines, standards.
	Financing	Low, no ear-marking of funds for EMS. Facility based care funded as part of facility funding.
	Information	Poor generation and use. Limited information sharing.
	Health workforce	Present but limited in EMS. Present in limited numbers, poorly trained in and outside facilities, most facilities have no fixed staff in emergency areas.
	Medicines, equipment, & supplies	Acute shortages in pre-hospital and health facility spaces, even of basics.
	Service delivery	Limited by poor coordination and financing.

Table 2 EMS courses currently taught at Ugandan tertiary institutions

		Cadre	Course	Award	Duration	Curriculum status
I. Pre-hospital	Community	Lay first responder	Emergency First Aid Responder-	Certificate	3 days	Under validation
	Ambulance	Ambulance Officer	Emergency Medical Technician – Basic (EMT-Basic)	Certificate	5 weeks	Under development
Health facility	Hospital	Nurse	Diploma Emergency Medicine	Diploma	2 years	Running
			Diploma Emergency Nursing	Diploma	2 years	Curriculum under development
			Master of Science	Master's	2 years	Running
			Critical Care Nursing			
		Clinical Officer	Diploma Emergency Medicine	Diploma	2 years	Running
		Doctor	Master of Medicine Emergency Medicine	MMED	3 years	Running

Table 3: Pre-hospital availability of equipment and medicines found in ambulances

		LEVEL OF HEALTH FACILITY THAT MANAGES AMBULANCE			(8) Stand-alone PHP n (%)
	Equipment and Medicines	(5) Referral Hospital n (%)	(20) District Hospital n (%)	(17) Health Centers n (%)	
Ambulance equipment and emergency medicine available	Epinephrine (%)	1 (20.0)	9 (45.0)	5 (29.4)	1 (12.5)
	IV fluids (%)	1 (20.0)	12 (60.0)	5 (29.4)	5 (62.5)
	Tranexamic acid (%)	0 (0.0)	1 (5.0)	0 (0.0)	1 (12.5)
	Salbutamol (%)	0 (0.0)	6 (30.0)	4 (23.5)	3 (37.5)
	Pain medication (%)	0 (0.0)	2 (10.0)	2 (11.8)	1 (12.5)
Airway management equipment	Suction device (%)	0 (0.0)	5 (25.0)	0 (0.0)	4 (50.0)
	Non-rebreather face mask (%)	0 (0.0)	4 (20.0)	1 (5.9)	4 (50.0)
	Tongue depressor (%)	1 (20.0)	4 (20.0)	1 (5.9)	1 (12.5)
	Nasopharyngeal airway (%)	0 (0.0)	5 (25.0)	1 (5.9)	6 (75.0)
	Oropharyngeal airway (%)	1 (20.0)	3 (15.0)	1 (5.9)	4 (50.0)
Advanced life support equipment	Vital signs monitor (%)	0 (0.0)	1 (5.0)	1 (5.9)	0 (0.0)
	ECG (%)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	Defibrillator (%)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	Intubation set (%)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Table 4: Health facility availability of equipment and medicines at the health facilities

		LEVEL OF HEALTH FACILITY		
		(9) Referral Hospital n (%)	(27) District Hospital n (%)	(68) Health Centers n (%)
Triage components at the facilities	Triage station	9 (100.0)	26 (96.3)	67 (98.5)
	Formal triage protocols	8 (88.9)	18 (66.7)	40 (58.8)
	Designated triage personnel	8 (88.9)	20 (74.1)	50 (73.5)
	Time targets for certain triage designation	4 (44.4)	10 (37.0)	8 (11.8)
	Compliance tracking for triage time target	3 (33.3)	5 (18.5)	2 (2.9)
Equipment and supplies for managing circulation in the emergency unit	Different size cannulas	9 (100.0)	27 (100.0)	60 (88.2)
	Crystalloids	8 (88.9)	27 (100.0)	64 (94.1)
	Dextrose	9 (100.0)	27 (100.0)	63 (92.6)
	Central venous catheters	0 (0.0)	2 (7.4)	1 (1.5)
	Fluid administration set	9 (100.0)	27 (100.0)	66 (97.1)
	Blood administration set	7 (77.8)	19 (70.4)	13 (19.1)
Equipment for managing breathing in the emergency unit	Different size cannulas	6 (66.7)	20 (74.1)	28 (41.2)

		LEVEL OF HEALTH FACILITY		
		(9) Referral Hospital a/b (%)	(27) District Hospital a/b (%)	(68) Health Centers a/b (%)
Equipment for managing the airway in the emergency unit	McGill forceps (%)	0 (NaN)	7/7 (100.0)	1/1 (100.0)
	Suction apparatus (%)	6/7 (85.7)	14/15 (93.3)	16/20 (80.0)
	Laryngoscope (%)	3/3 (100.0)	8/9 (88.9)	9/9 (100.0)
	Nasopharyngeal airway (%)	1/1 (100.0)	5/5 (100.0)	2/2 (100.0)
	Oropharyngeal (adult) (%)	4/5 (80.0)	10/11 (90.9)	10/11 (90.9)
	Endotracheal tube ETT (%)	2/3 (66.7)	8/8 (100.0)	7/8 (87.5)
	Tracheostomy set (%)	3/3 (100.0)	5/5 (100.0)	0/0 (NaN)
Equipment for managing the airway in the emergency unit	Oxygen cylinder (%)	7/9 (77.8)	15/16 (93.8)	16/20 (80.0)
	Nasal prongs (%)	8/8 (100.0)	16/19 (84.2)	15/19 (78.9)
	Chest tube and underwater seal drainage (%)	2/2 (100.0)	4/4 (100.0)	0/0 (NaN)
	Mechanical ventilator (%)	0 (NaN)	3/3 (100.0)	1/3 (33.3)
Equipment and supplies for managing circulation in the emergency unit	ECG machine (%)	2/3 (66.7)	9/9 (100.0)	2/3 (66.7)
	Defibrillator (%)	1/1 (100.0)	4/4 (100.0)	1/1 (100.0)
Equipment and supplies for immobilisation and splinting	Cervical collar (soft/hard collar) (%)	2/2 (100.0)	7/7 (100.0)	5/5 (100.0)
	Spine board (%)	1/1 (100.0)	1/1 (100.0)	1/1 (100.0)

Table 5: Functional status of available equipment in the health facility

a = Number of functional equipment available, b = Total number of equipment available NaN = Equipment not available at this level of health facilities

Figures

Figure 1

Visual representation of the study sampling methodology

Figure 2

Map of Uganda highlighting districts included in the study