ORIGINAL ARTICLE

Quality improvement in emergency service delivery: Assessment of knowledge and skills amongst emergency nurses at Connaught Hospital, Sierra Leone

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ABSTRACT

Introduction: The ability to deliver quality emergency care services is reliant on a well-trained workforce. Since Sierra Leone was declared Ebola free in December 2015, the country has now moved into the post-Ebola reconstructive phase focusing on specialty training of healthcare workers. This development aligns well to the growing momentum for improved emergency medicine as a speciality in other regions of Sub-Saharan Africa. The first stage in assessing how to develop an emergency nursing speciality in Sierra Leone is to conduct an assessment of what is needed in terms of educational interventions. Concurrently enhancing emergency nursing capacity requires a comprehensive understanding of the role, function and emergency nurse educational requirements. This study was conducted to fully understand the current context, elucidate current nursing functions and gain knowledge of the educational desires and needs of nurses in the emergency centre at Connaught Hospital, the largest referral hospital in Sierra Leone.
Methods: This mixed-methods study comprised self-assessment, one multiple-choice questionnaire, focus group interviews and observational methods.
Results: Emergency nurses scored relatively low on the multiple-choice questionnaire, indicating through the self-assessment that they aspired to learn more about several topics within emergency care, and identified several themes which were considered to be barriers to delivery of care through focus group discussions and observations in the emergency centre.
Conclusion: This study has identified key aspects of emergency nursing speciality training to be developed through theoretical and skill-based education provided by the nursing schools and hospital clinical facilities in Sierra Leone.
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African relevance

- No previous studies have described the role of the emergency nurse in Sierra Leone.
- The study may help guide educational interventions.
- Attention to optimising nursing skills in West Africa is required.
- Continued advocacy for the development of emergency nursing in in low income settings is vital.

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Introduction

Emergency medicine is in its infancy in Sub-Sahara Africa (SSA). Although established as a distinct speciality in many high-income countries, few residency-training programmes are available in low- or middle-income countries. In SSA, regulated official training programmes are currently available only in South Africa, Ethiopia and Ghana.

The World Health Organisation (WHO) has emphasised the importance of the ability of a state or a community to deliver quality emergency care, recognising the growing implications for public health given the increasing burden of medical, surgical and traumatic emergency conditions [1]. Nurses provide the backbone of the emergency care workforce, making up the majority of providers working in emergency centres in SSA [2,3].

The Republic of Sierra Leone is located on the west coast of Africa. From 1991 to 2002, the country was ravaged by a civil war that left the infrastructure in ruins and had a sustained negative impact on population health [4]. The country has now returned to stability, however it is still facing considerable challenges with its health outcomes and economic indicators, ranking at 181 out of 188 countries on the Human Development Index [5].

As with many other countries in the SSA region, Sierra Leone is experiencing a chronic shortage of trained healthcare professionals [6]. In 2008, the WHO reported that Sierra Leone had a primary healthcare worker density of 0.39 trained health workers per 1000 population [7], failing to reach the benchmark for healthcare worker density set at 2.28 trained health workers per 1000 population [8,9]. In 2014, the total trained healthcare workforce practicing in Sierra Leone was estimated to be approximately 6000 workers; of those 991 were authorised nurses [10]. It was estimated that 296 national healthcare workers died responding to the Ebola crisis [11]. This critical loss of front-line healthcare workers has exacerbated an already inadequate human resource for health in the country.

Nursing education in Sierra Leone is primarily provided by the College of Medicine and Allied Health Science, University of Sierra Leone, Freetown. The university offers three exit points for nursing education: BSc. (Hons) in Nursing (duration – four years), Diploma in Nursing (SRN – duration three years) and, Certificate in Nursing (SECHN – duration two and a half years). Other than Ophthalmic Nursing there is no specialised training offered for nurses. Since 2014, the King's Sierra Leone Partnership (KSLP) has advocated for a focus on specialisation among emergency nurses, adapting the African Emergency Nursing Curriculum (AENC) developed by The Emergency Nursing Group for the African Federation for Emergency Medicine (AFEM) in 2016 [12] to develop teaching programmes and training at Connaught Hospital.

This study was conducted to fully understand the current context, elucidate emergency nursing roles and functions as well as gain knowledge of the educational desires and needs of emergency nurses working in the emergency centre at Connaught Hospital. The purpose of this study was to underpin the further development of emergency nursing as a specialisation in Sierra Leone.

Methods

Connaught Hospital, located in Freetown in the Western Area region, is home to an estimated 60% of Sierra Leone's total population [13]. It is the principal adult tertiary hospital, providing medical and surgical services to people in the region as well as receiving referrals from around the country. At the time of this study, it was estimated that the emergency centre served approximately 12,000 patients a year.

The study population comprised 47 nurses working in the triage and resuscitation area, medical observation unit and the doctor's consulting room of the emergency centre. A non-probability con-venience sample was used and 42 individuals agreed to participate. Senior nursing management did not participate in the written evaluation or focus groups.

The emergency centre's nursing manager acted as the gatekeeper to recruitment, informing the nurses about the study, explaining that participation was voluntary and that there would be no penalty for non-participation. Posters explaining the nature of the study were advertised at each nursing station. The researchers were trained in both conducting interviews and non-participant observation methods, and were accessible to answer any questions.

To best understand the needs and educational aspirations of the nurses participating in the study, a four-pronged analysis tool was developed (Table 1). The tool included the following: a 45-question self-assessment survey aiming to identify the nurses' desires for educational interventions using scaling measures to identify priorities, a 25-question multiple choice questionnaire (MCQ), focus group discussion based on case scenarios presented, and non-participant observations of nursing practice. Two emergency nurses and the KSLP general nursing team piloted the tool and adjustments were made to create a clear and unambiguous instrument.

This study was supported and approved in October 2015 by the Hospital Research and Development Department, Emergency Centre Management Team and the King's Sierra Leone Partnership. Participants provided consent when returning the self-assessment survey and agreed to further dissemination of the data collected through non-participant observation and focus group discussions. The study adheres to the Declaration of Helsinki.

Based on body system specific topics and subtopics described in the AENC and the AFEM Handbook, a 45-question survey tool was created through collaboration between the study team and external advisors. The nurses were asked to indicate whether they would like to learn more about the about essential anatomy and physiology topics and associated pathologies. If they indicated interest by circling 'Yes', they were asked to rate their level of interest in each area either high, medium, or low. 'High' indicated wanting to attend more than three lectures and reading extensively about the topic, 'Medium' indicated the nurse would be willing to attend two to three lectures about the subject reading moderately about the topic, and 'Low' indicated an interest to attend a training session but not actively searching for literature or data on the topic. The survey draws on the self-assessment tool developed by Rominski et al. [14] and modified to better represent the clinical realities at Connaught Hospital and represent the Sierra Leonean context.

Demographic information was collected from each nurse including years of service, level of education, emergency centre service, working hours and shifts, preferred learning styles and, work/volunteer status. The self-assessment survey was administered to participants at shift commencement with a request to complete it within two days.

Table 1
Assessment tools overview.

Tool	Source	Sample	Outcomes
Self assessment	AFEM HAMC, AENC	n = 42	Emergency nurses indicated interest in all topics presented. They are willing to spend time outside set work hours.
Multiple Choice Questionnaire	CEN study guide, TNCC, AFEM HAMC	n = 42	Low scores (37% average score), signalling a need for educational intervention.
Observation	Guided by checklist developed by Rominski et al. (2011).	100 h	Themes emerged such as: organisation, long-term employment, salary, teamwork, Ebola-effects, working structure
Focus Groups	Nurses in the emergency centre, study team. Based on the questions presented in the MCQ.	n = 12 (4 groups of 3 nurses)	Emergency nurses show enthusiasm for learning, affected by hierarchical power structure though they recognise a lack of autonomy in practice.

AFEM HAEC, AFEM Handbook of Acute Emergency Care; AENC, African Emergency Nursing Curriculum; CEN study guide, Certified Emergency Nurse Review Manual and Online Exams; TNCC, Trauma Nursing Core Course.

A 25-item MCQ was designed to test existing knowledge of the participants. In collaboration with the (nursing) Sister in Charge, questions were developed by KSLP emergency nursing advisors based on the Trauma Nursing Core Course [15] and Certified Emergency Nurse Review Manual and Online Exams [16] by the Emergency Nurses Association (ENA), AENC (2015) and the AFEM Handbook Of Acute and Emergency Care [17]. To make the tool context sensitive, the questions were modified on the basis of Sierra Leone's reported burden of disease and the most frequent recorded diagnoses noted in medical records. The MCQ was implemented on-site in the same manner as the self-assessment survey.

The observations encompassed a total of 100 h in the emergency centre. The clinical observation was made using a competency-based assessment tool and conducted by KSLP emergency nursing advisors from September to December 2015. The different themes that were assessed included: nursing assessment, nursing interventions, correct use of equipment and instruments, management of medication, communication between nurses and other clinical professions and patients, and use of nursing processes.

In some cases, nurses interacted with other health professionals or patients in Kriol, which made some of the observations difficult. Qualitative data were securely stored in Excel.

Preceding the MCQ, the nurses were invited to attend groups where the case scenarios and nursing interventions presented in the questionnaire were discussed. In total, there were four focus groups with three participants in each group. The researchers took notes during the discussion, which were used to analyse verbal answers further. The use of the moderator was in line with the recommendations described by Krueger and Casey [18]. Nurse leaders were excluded to reduce potential bias. Data were securely stored in Excel.

Results

Forty-two nurses completed the self-assessment questionnaire. Regarding educational level, 88.1% (n = 37) had completed a SECHN qualification 9.5% (n = 4) had completed a Diploma in Nursing whilst 2.5% (n = 1) a Nursing Assistant education and none of the nurses had received specialist training. The majority (n = 24; 57%) of nurses had been working in the emergency centre for more than one year and another 31% (n = 13) had worked in the emergency centre for less than a year. Only 12% (n = 5) of the nurses had been working in the emergency centre for over three years. 71.4% (n = 30) reported working 36–40 h per week. The majority of the nurses reported that they were willing to stay late or come early to attend classes though most would not come in on their day off. The nurses indicated that they wanted to learn more about all the topics presented in the survey. The highest score of 'yes' was for infectious diseases (n = 42; 100%) indicating that they would like to learn more about this; HIV and malaria being the specific conditions the nurses showed the most interest in (Table 2).

All 42 nurses completed the MCQ. The average score was 37%, with a range from 20% to 60%. The questions with the highest percentage of correct answer related to urology (81%) and trauma (46%), whilst questions on orthopaedics (25%) and gynaecology (24%) scored lowest. The lowest total score was for a question related to orthopaedics where only three participants provided the correct answer (Table 3).

Several themes emerged during the non-participant observations. Even though overlapping and interrelated, the observations were categorised as follows: teamwork, decision-making, and the Ebola impact.

First, the teamwork observed in the emergency centre could be characterised as cohesive rather that formal teamwork. Nursing roles and areas of responsibility were not outlined in any formal job description. It was also observed that other hospital departments sent their patients to the emergency centre so that vital clinical observations could be performed due to a lack of equipment and competency in nursing staff in other departments. This situation contributed to growing frustration among emergency nurses. A sense of teamwork and good communication between healthcare professionals in the different departments within the hospital was lacking. In particular, the emergency centre suffered from a lack of recognition as a specialty. Other departments questioned the implementation of systems and algorithms such as the triage scale, as systems such as these often interfered with the subjective interest in keeping a non-objective out-of-pocket payment practice. It was reported that the emergency nurses often experienced verbal abuse from nurses working in other departments due to this.

Regarding decision-making, the nurses' autonomy was heavily influenced by the power dynamics of the hospital hierarchy. The presence of senior management and/or physicians inhibited their freedom to express their opinion regarding roles or policies.

Rather than initiating nursing interventions autonomously, nurses carried out orders from physicians and senior nursing management or followed algorithms such as the Sierra Leone Early Warning Score (SLEWS) or South Africa Triage Scale (SATS). The latter was implemented in 2014 by KSLP to create a more effective use of human resources, as well as well as initiate nursing autonomy at ward level. However, efforts to encourage nursing autonomy for key elements of emergency nursing care seldom occurred in the emergency centre unless it was supported by senior management or physicians.

The third theme noted was how the Ebola epidemic had impacted on emergency nursing practice. The loss of colleagues to Ebola, as well as the consequences of existing stigma in society for those who cared for patients with infectious diseases profoundly affected the nurses. The participants described what they experienced as a reduction in community confidence in the health sector which has fed through to negative views of nurses working at Connaught Hospital. Several nurses were rejected by their community, for example, by not being able to get a taxi, being ignored at the market, or having had experienced a neighbour moving away.

A lack of protocols providing guidance on case management in a post-Ebola period, concerns for their own safety, and avoidance of touching patients with Ebola-like symptoms (e.g. body aches, haematemesis, fever) resulted in frustration among the nurses and a profound sense of insecurity. The nurses expressed difficulties when admitting patients to other departments who partially met diagnostic criteria for Ebola and discussed their fear of Ebola survivors. They also expressed concerns that in 2015 no nurses were educated in Sierra Leone, as nursing schools were closed due to the Ebola epidemic.

Focus group discussions commenced by addressing the nursing interventions and clinical scenarios presented in the MCQ. The discussions shifted rapidly to how the nurses experienced a lack of equipment, adequate space and opportunities for further professional development. Despite the decrease in identified cases, Sierra Leone was still not free from Ebola at the time of the study. Notably, the nurses addressed this and how they desired to be part of a strong health system, able to respond to a similar event on a national level. The desire to learn and be able to provide high quality care was evident. The nurses mentioned low, or in some cases no, salaries, poor career opportunities and bureaucratic recruitment processes as barriers for further development of skills and knowledge. Nurses clearly identified the challenges they faced and many knew what they needed but did not have the ability to achieve this. Some of the nurses appeared demotivated; with no additional training, equipment or supplies their purpose was unclear.

Table 2
Results of self-assessment survey (n = 42).

	Category	% 'Yes'	High (%)	Medium (%)	Low (%)
General topics	Environmental Emergencies	95.2	72.5	22.5	5.0
	Gastrointestinal	95.2	72.5	27.5	0
	Cardiovascular	97.6	68.2	26.8	5.0
	Orthopaedic	97.6	54.0	36.0	12.0
	Ear, Nose, Eyes and Throat	92.8	66.5	23.0	10.5
	Dermatology	95.2	67.5	25.0	7.5
	Neurology	92.8	51.2	30.8	18.0
	Haematology and Oncology	90.4	57.8	34.2	7.8
	Infectious Diseases	100	78.6	16.7	4.7
	Metabolic and Nutritional	95.2	55.0	37.5	7.5
	Psychiatry	90.4	34.3	44.7	21.0
	Respiratory System	95.2	47.5	42.5	10.0
	Renal and urology	92.8	51.2	35.8	13.0
	Trauma	92.8	51.2	41.0	7.8
	Other	0			
Disorder by body system					
Cardiovascular	Acute Coronary Syndrome	92.8	51.2	33.0	15.8
	Acute Myocardial Infarctions	95.2	57.5	35.0	7.5
	Arrhythmias, tachycardia, bradycardia	97.6	56.0	31.7	12.2
	Cardiac Medications	95.2	65.0	27.5	7.5
	Congestive Heart Failure Care	97.6	63.5	36.5	0
	Deep Vein Thrombosis	95.2	57.5	37.5	5.0
	Shock	92.8	64.0	30.7	5.3
	Other: Hypertension	2.3			
Neurology	Stroke	90.4	22.0	31.5	10.5
	Intra Cranial Haemorrhage	92.8	64.0	33.3	2.7
	Pain Management	88.0	59.4	32.4	8.2
	Headaches	85.7	47.2	38.8	14.0
	Other	0			
Respiratory	Airway management	92.8	66.7	30.7	2.6
	Ventilators	85.7	44.5	44.5	11.0
	Pneumonia	88.0	67.5	27.0	5.5
	Pulmonary embolism	90.4	44.7	45.3	10.0
	Breath Sounds	88	46.0	40.5	13.5
	Asthma	92.8	64.0	36.0	
	Chronic Obstructive Pulmonary Disease	85.7	58.3	36.4	8.3
	Pneumothorax	83.3	48.6	34.2	17.2
	Other	0			
Infections	HIV	92.8	76.9	18.0	5.1
	Meningitis	90.4	57.9	29.0	13.1
	Malaria	95.2	72.5	25.0	2.5
	Wound Care	88.0	59.4	32.4	8.2
	Tuberculosis	90.4	63.1	34.2	2.7
	Cholera	90.4	63.1	31.5	5.4
	Hepatitis	97.6	58.5	34.1	4.4
	Viral haemorrhagic Fever	92.8	66.7	28.2	2.1
Psychiatry	Mental Health	80.9	50.0	38.2	11.8
	Other	0			

HIV, human immunodeficiency virus.

Table 3
Multiple choice question outcomes.

Topic	No. of questions	Average score %
Respiratory system	2	28.4
Neurology	2	45.0
Gynaecology	1	24.0
Infectious disease	1	29.0
Cardiovascular system	4	29.0
Gastrointestinal	3	54.0
Orthopaedics	3	25.0
Trauma	8	46.0
Renal and urology	1	81.0
Overall	25	Mean score: 37.0%

Discussion

The complexity of nursing practice can be challenging to measure [19]. However, the result of this assessment has identified areas to address to further develop a speciality training programme in emergency nursing both in the clinical environment and in nursing schools in Sierra Leone. These results are comparable to outcomes of similar assessments carried out in the SSA context. Rominski [14] and Bell [20] conducted their assessment in Ghana, while Gondwe and Brysiewicz [21] conducted theirs in Malawi. Both assessments concluded that having no nurses trained in emergency nursing posed significant challenges for the development of a quality oriented healthcare system.

The nurses working in the emergency centre at Connaught Hospital are qualified to be practicing as a nurse, yet due to lack of access they have not been in a position to increase their post-basic competency. The current context in which they are working requires a more formal and structured approach to emergency nursing principles. This was highlighted by the Ebola epidemic as well as the flood which hit the impoverished area of Kroo Bay in Freetown, September 2015, where 7000 people lost their homes. The requirements for delivering optimal healthcare with the existing resources include an increased ability for critical thinking and extensive knowledge in anatomy, physiology, hygienic principles and trauma care. Going forward, these concepts need to be developed and adopted locally by trainers and trainees. Unofficial out-

of-pocket payments and a high percentage of the nurses not receiving salary (71%), must also be addressed.

The major practice gaps observed were a lack of both teamwork and the autonomy that the individual nurse possessed within the emergency centre. An improved focus on how teams function will result in fewer errors, leading to improved health outcomes for the patients presenting in the emergency centre. To be able to change existing practices and further shape the emergency nursing role in the Sierra Leonean context, the knowledge and clinical practice must be strengthened. Upon achieving this, the way forward would ideally involve nurses capable of making and initiating nursing interventions on their own and making full use of their autonomy and decision making skills [14].

On a national level, the Sierra Leone Ministry of Health and Sanitation has outlined its vision of an adequate, well-managed and efficient system that will create a motivated healthcare workforce, which is fully empowered to provide equitable access and distribution of services leading to a healthy and productive Sierra Leone [22]. Efforts in the post-Ebola period should be made to actualise this vision, especially focusing on the development of specialist post-basic education. This will also adhere to the United Nations General Assembly resolution on global health and foreign policy, advocating the need for an "adequately skilled, well-trained and motivated health workforce" [23]. The fact that the majority of nurses in this study showed a positive attitude towards participating in educational activities outside normal working hours, despite not having a salary or having promises of any types of incentives for time used, shows the high importance of continuing education among the nurses.

The main limitation of the study is the fact that it was only conducted in a single centre, which makes the generalisation challenging. In addition, the assessment tool was new in the context of the hospital, and this might have impacted the recorded results of both the MCQ and self-assessment survey, though help and information was provided continuously throughout both processes. Finally, the researchers collected data contemporaneously and the presence of the investigators may have had an effect on performance but this was deemed the best method of obtaining reliable data, and the best possible needs assessment.

This assessment outlines the educational desires and knowledge level of the nurses working in the emergency centre at Connaught Hospital. The participants showed an overwhelming enthusiasm for additional education and were passionate about increasing their knowledge and skills in emergency nursing concepts and practice. It is clear that there is significant commitment to improve the quality of care provided at Connaught Hospital among these nurses. With training, this cadre of nurses has the potential to make a positive impact on health in Sierra Leone. This is a collective strength that should be leveraged. As Sierra Leone was declared Ebola free in December 2015, the country has now moved into the post-Ebola reconstructive phase. To improve skills and capacity of the current health workforce is a central priority for the post-Ebola recovery plan laid out by the Sierra Leonean Government [24]. This study provides important insights into existing knowledge and skill level at the largest hospital in the country, and makes a baseline for future educational interventions. To contribute towards building a resilient and responsive health system, further efforts should focus on the development of specialist training programmes delivered in hospitals and nursing schools in country.

Conflicts of interest

The authors declare no conflict of interest.

Dissemination of results

Results of this study were shared with nurses working at the emergency centre in Connaught by KSLP Emergency Centre Team in poster format and by WhatsApp group communication where all the nurses could see the results and datasets. Two of the nurses presented the findings for senior management in a hospital meeting. The results were also presented at ICEM 2016 in a poster format that was approved by the nurses.

Authors' contributions

HN and MK conceived the original idea. HN designed the tools. MK organised data collection. HN and MK carried out analysis of data. HN drafted the manuscript, MK revised it. HN and MK agreed upon the final version and both are accountable for all aspects of the work, which is appropriately investigated and resolved.

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