



The knowledge level of nurses managing critically-ill and injured patients in Ashanti Region of Ghana

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ARTICLE INFO

Keywords:

Critically ill patients
District hospitals
Injured patients
Knowledge level
Nurses

ABSTRACT

Background: Shortages in the right cadres of human resources to manage health emergencies remain an acute problem especially in low- and middle-income countries. Efforts to address this challenge are dependent on the knowledge and competency of emergency nurses. We sought to determine the knowledge level of nurses in emergency management in the Ashanti Region of Ghana.

Methods: We used a cross-sectional, quantitative approach to evaluate knowledge about emergency care among 408 nurses working in wards and emergency units in 11 randomly selected district hospitals (6 public and 5 faith-based). Participants were purposively selected and examined on knowledge level using a structured questionnaire. The inclusion criteria were different cadres of nurses who had spent at least 6 months in the selected hospitals.

Results: Four hundred and eight nurses participated. Most were general nurses (73.1 %) or mid-wives (14.4 %), with few specialised in emergency nursing (3.9 %) or critical care nursing (1.6 %). Mean percentage correct on an objective 20 question test on emergency care was 59.8 %. Few (35.6 %) nurses felt that they had adequate knowledge to manage emergencies. Around half (52.5 %) had received training in managing critically ill and injured patients through continuing professional development and 46.6 % felt prepared to work at emergency units. But few (34.7 %) reported having adequate logistics to manage emergencies and fewer (32.2 %) had time off to access training opportunities. Predictors of reporting adequate knowledge to manage emergencies included: having received training in managing critically ill and injured patients ($p < .002$), feeling prepared to work at emergency units ($p < .001$), and having adequate logistics to manage emergencies ($p < .001$).

Conclusion: Most nurses did not feel that they had adequate knowledge to manage emergencies. This study has identified increased availability of continuing professional development on emergency care for nurses as a priority in Ghana.

African relevance

- Nurses at district hospitals in Ghana face many challenges to provide emergency care.
- Among the challenges is the requisite knowledge to manage emergency conditions.
- Nurses trained in emergency management have improved knowledge and competence.

- The gap in training and knowledge level of nurses could be addressed by collaborations.

Introduction

Nurses working in emergency units must have adequate knowledge for care of patients with emergency conditions [1,2]. Providing nurses the requisite knowledge through continuing professional development

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<https://doi.org/10.1016/j.afjem.2023.10.003>

Received 27 December 2022; Received in revised form 5 October 2023;

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promotes nurse autonomy and confidence in delivering emergency care [3]. Thus, improved knowledge improves the competence of nurses to attend to emergency conditions [4]. There is therefore the need for nurses who care for emergencies to acquire advanced knowledge and competences that can be translated into positive patient outcomes. Updating such knowledge and boosting the confidence of nurses through training is an important tool to achieve timely assessment and resuscitation of critically ill and injured patients [5,6]. This is especially the case as time is of the essence during an emergency for rural nurses [7]. To promote improved knowledge, it has been recommended that continuing professional development should be instituted regularly by hospitals [8].

Most of the literature on capacity for emergency nursing comes from high-income countries. These issues are even more critical in Africa. Nurses constitute the greatest proportion of the health workforce in Africa and are considered the backbone of the health delivery system [9]. They are usually the frontline staff and are strategically placed to receive patients, initiate resuscitation, and manage emergencies before the arrival of other practitioners [10]. Thus, nurses managing critically ill and injured patients should possess the needed skills and competence in managing emergencies [10,11]. Moreover, in Africa, concerns have been expressed about the quality of emergency nursing services rendered by newly qualified nurses [11]. Most emergency units are staffed with different cadres of nursing staff who have basic training in general nursing or midwifery but lack formal training in emergency nursing. Hence, they are limited in the clinical judgement and capabilities required for standard emergency nursing care [10].

In Ghana, as in the rest of Africa, the different categories of nurses working in health facilities play an important role in the management of critically ill and injured patients. Due to the limited number of trained emergency nurses in most district hospitals in Ghana, general nurses often staff emergency units, with many working on various other wards in addition to the emergency unit. This can result in an inappropriate skill mix, posing a challenge to the effective management of critically ill and injured patients. Atakro et al. found several challenges faced by nursing staff in Ghana as they assumed duty in emergency departments, including inadequate resources, stressful nature of activities in the emergency unit and unpreparedness in terms of training [12]. Furthermore, inadequate staffing may lead to fatigue and job dissatisfaction as nurses carry out additional duties outside their job description [13]. However, adequate physical resources and logistics for work is a means to improve on the performance of nurses and patient outcomes [14].

Specifically, as regards knowledge and prior training in emergency care, in a study conducted in Ghana among registered nurses, majority had no formal training in emergency care, very few were knowledgeable in caring for critically ill patients, and only some had received training through workshops on emergency care [15]. Most expressed the need for periodic workshops for nursing staff to improve upon their knowledge before being assigned to emergency units [15]. Other studies from Ghana have confirmed the low level of training among general nurses for emergency care [16] and showed that most graduate with little formal training in managing critically ill or injured patients [17]. Rominski et al. evaluated the knowledge level of nurses at a hospital in Ghana and found that nurses scored low in questions on managing critically ill patients. These nurses expressed interest in acquiring knowledge and clinical expertise to render quality care to their patients, including managing meningitis, acute coronary syndrome, as well as more knowledge on advanced cardiac life support [3].

Aside from the above publications, there have been few studies looking at knowledge and training for emergency nursing in Ghana and there has been only one report in which cognitive knowledge on emergency care was objectively assessed [3]. Hence, the current study sought to assess knowledge of nurses managing emergency conditions through an objective test and to identify factors that impact the knowledge of nurses working in district hospitals.

Method

Setting and sampling

The healthcare setting in Ghana is categorised based on ownership, including government, quasi-government, religious missions (Christian Health Association of Ghana, CHAG) and private-for-profit [18]. In rural areas, the main hospitals providing emergency care are the district hospitals. Almost all district hospitals in Ghana are either government or CHAG. These serve similar populations and are similar in terms of size, staff composition, and services offered. All district hospitals have doctors in addition to nurses. Some hospitals have doctors based in the emergency unit, but not for 24 h. Nurses need to evaluate and initiate care for emergency conditions, often for long periods of time before doctors are available to come to the emergency unit. In this study we refer to emergency conditions as any medical condition of any diagnosis requiring time-sensitive care.

The study setting was the Ashanti Region which is the third largest of the sixteen administrative regions of Ghana. The Ashanti Region was chosen due to its central location in Ghana and the fact it is representative of multiple other neighbouring regions. There are 37 district hospitals in Ashanti Region all of which operate 24 h emergency services. Twenty-two of these are government hospitals run by the Ghana Health Service (GHS) while fifteen are faith-based (CHAG) [19].

The study adopted a quantitative approach. Cluster sampling was used for the selection of district hospitals in the Ashanti Region. Eleven district hospitals were selected, including six government and five faith-based hospitals. At each selected hospital, purposive sampling was used to select nurses to answer the questionnaire. All nurses who had spent at least six months at the selected hospitals were eligible. The principal investigator sought to administer the questionnaire to all such nurses present in the hospital at the time of the visit, which was usually during the day shift. As most district hospitals in Ghana have few trained emergency nurses, nurses on all other wards often spend periods of time working in the emergency unit. Hence, all nurses on any wards in the hospitals were eligible for this study.

Using OpenEpi, Version 3, a minimum sample size of 488 was estimated using an expected proportion of 50 % for the outcome variable (answer to question on whether the nurses felt that they have adequate knowledge level to manage emergencies) and 3 % as the acceptable margin of error. A 50 % proportion was used in the sample size calculations as this gives the largest sample size for a given level of statistical significance, and hence helps to maximize the chance of a successful study. A 3 % margin of error was chosen as this provides a high degree of rigor.

Data collection and analysis

Data were collected through administration of questionnaires in July and August 2020. The questionnaire included questions on demography, professional qualifications, rank, and a section to test the cognitive knowledge in emergency care. The structured questionnaire was developed in English and was administered by the principal investigator supported by three trained research assistants. Opinions of experts knowledgeable in nursing care were sought when developing the questionnaire. The questionnaire was pretested among 20 nursing staff at a district hospital. The questionnaire was fine-tuned using the comments received and lapses identified prior to its administration to the study participants.

Assessment of knowledge included 20 multiple choice questions adopted from Lippincott's Q&A Certification Review Book [20] and Brunner & Suddarth's Textbook of Medical-Surgical Nursing [21]. Experts and peers in emergency nursing were tasked to assess relevance of questions to emergency nursing in Ghana. Questions that were not relevant were deleted. Some of the remaining questions were re-worded to be more understandable in the Ghanaian context, but most questions

did not require revision. The results of the Cronbach's alpha coefficient test of variables after incorporating the views of the experts were 0.801 using Statistical Package for Social Sciences (SPSS). With this, the reliability of the measurements was confirmed to produce stable and consistent results of the study [22].

Prior to the commencement of data collection, approval was obtained to use the district hospitals from the Regional Health Directorate. Consent forms were sent to the nurse managers through their administrators prior to data collection. Permission was sought from the in-charges at the wards. Nurses who satisfied the inclusion criteria and who consented to the study were recruited. The purpose of the study was adequately explained to them and they were informed that participation in the study was voluntary. Data were collected anonymously with no identifying information and at the participants' convenience, in order not to disrupt nursing activities.

Multivariable logistic regression was used to determine the relationship of the outcome variable (self-reported feeling of having adequate knowledge to manage emergencies) to independent variables. Variables chosen for inclusion as independent variables were characteristics of the nurses' training and experience that were felt likely to contribute to their knowledge. Data were processed and analysed using SPSS version 25. Ethical clearance for the study was obtained from the Committee for Human Research, Publications and Ethics of the Kwame Nkrumah University of Science and Technology.

Results

Demographic characteristics

A total of 488 questionnaires were distributed and 430 were returned. Twenty-two of these provided minimal data and were not considered valid for analysis. The study was based on the 408 completed questionnaires for a response rate of 84 %. The sample size of 408 respondents resulted in an estimated margin of error of 4 %, which was slightly higher than the originally planned 3 %. Participants were primarily female, under 40 years of age, had secondary education, and diplomas, as shown in Table 1. These demographic characteristics are similar to the population of nurses in Ghana more generally.

Nursing background characteristics

Participants' nursing ranks ranged from Enrolled Nurses to Deputy Chief Nursing Officers as shown in Table 2. Enrolled Nurses provide basic nursing care to patients under the supervision of Registered Nurses. Senior Staff Nurses supervise junior staff while both Nursing Officers and Senior Nursing Officers provide supervisory roles. Principal Nursing Officers provide leadership for the nursing team and Deputy Chief Nursing officer is the highest-level nurse management position and a member of the clinical leadership team. Most were general nurses (73.1 %) or mid-wives (14.4 %), with few specialised in emergency nursing (3.9 %) or critical care nursing (1.6 %). The rest were specialised in other fields, but details were not indicated.

Most participants felt that they had inadequate knowledge in managing emergencies (Table 2). Around half had received training in managing critically ill and injured patients through continuing professional development. Just under half felt prepared to work at emergency units. But few reported that they had adequate logistics (i.e. equipment and consumables) to manage emergencies and less than a third had time off to access training opportunities.

The knowledge level in managing critically-ill and injured patients

Table 3 shows the knowledge level of nurses based on the multiple-choice test. Questions covered the range of medical, surgical and trauma related emergencies. Some questions had high frequency of correct responses while others had very low percentage correct. Each participant

Table 1
Demographic characteristics.

Characteristics	Frequency, n = 408	Percentage
Health Facility		
Public n = 222		
Facility 1	42	10.3
Facility 2	42	10.3
Facility 6	40	9.8
Facility 7	39	9.6
Facility 9	37	9.1
Facility 11	22	5.4
Faith-Based/CHAG n = 186		
Facility 3	30	7.4
Facility 4	43	10.5
Facility 5	36	8.8
Facility 8	45	11.0
Facility 10	32	7.8
Gender, n = 404		
Male	110	27
Female	294	73
Age, n = 400		
18–29	193	48.25
30–39	182	45.5
40–49	17	4.25
50–59	8	2
Education, n = 380		
Tertiary*	78	19.7
Secondary*	302	76.5
Professional Qualification, n = 401		
Certificate	65	16.2
Diploma	247	61.6
Degree	83	20.7
Masters	6	1.5

* Secondary education is equivalent to high school. Tertiary implies university.

**Missing values excluded for calculation of percentage. Missing values: gender (4), age (8), education (28), professional qualifications (3).

had a score of percent correct for all of the questions in the test. The mean value for this percent correct for all questions was 59.8 %.

Logistic regression on predictors of knowledge level of nurses to manage emergency conditions

We evaluated the factors that influence the self-report by nurses of having adequate knowledge level to manage emergencies using multivariable logistic regression (Table 4). Only 133 nurses (35.6 %) had indicated YES on this question (Table 2). Independent predictors of self-reporting adequate knowledge included feeling prepared to work in the emergency unit, reporting having adequate logistics to manage emergencies, and having receiving training in managing critically ill/injured patients (Table 4).

Discussion

This study sought to determine adequacy of knowledge for management of emergencies by nurses in Ghana, as well as assessing factors associated with adequacy of knowledge. Knowledge was assessed by an objective test and by self-report. On the objective test, some of the areas in which nurses scored very high included: Signs and symptoms of meningitis, using airway, breathing and circulation (ABC) as a resuscitation tool, stopping external bleeding and managing blood transfusion reaction. Areas on which nurses scored very low included: management of respiratory distress, managing tension pneumothorax and using the Glasgow Coma Scale to determine the severity of head-injured patients.

The findings from the logistic regression show that feeling prepared to work at the emergency unit had a strong relationship with self-reported feeling of having adequate knowledge level to manage emergency conditions. Thus, nurses who felt prepared to work at emergency units were more knowledgeable than other colleagues. However, it is

Table 2
Nursing background characteristics.

Characteristics	Frequency	Percentage
Rank		
EN ¹	71	18.1
SN/SM ²	174	44.4
SSN/SSM ³	51	13.0
NO/MO ⁴	62	15.8
SNO/SMO ⁵	27	6.9
PNO/PMO ⁶	6	1.5
DCNO/CNO ⁷	1	0.3
Prepared to work at emergency unit		
No	206	53.4
Yes	180	46.6
Total	386	100
Time off to access training opportunities		
No	255	67.8
Yes	121	32.2
Total	376	100
Adequate logistics to manage emergencies		
No	252	65.3
Yes	134	34.7
Total	386	100
Adequate knowledge in the management of emergencies		
No	241	64.4
Yes	133	35.6
Total	374	100
Received training in managing emergency		
No	178	47.5
Yes	197	52.5
Total	375	100

Missing values: rank (16), prepared to work (22), time off (32), adequate logistics (22), adequate knowledge (34), received training (33).

- ¹ Enrolled Nurses.
- ² Staff Nurse/Staff Midwife.
- ³ Senior Staff Nurse/Senior Staff midwife.
- ⁴ Nursing Officer/Midwifery officer.
- ⁵ Senior Nursing Officer/Senior Midwifery Officer.
- ⁶ Principal Nursing Officer/Principal Midwifery Officer.
- ⁷ Deputy Chief Nursing Officer/chief Nursing Officer.

possible that both the question on self-reported adequate knowledge and the question on preparedness to work in the emergency unit both reflect similar factors, such as overall confidence in managing emergencies. This finding affirms the findings of Wolf et al. [11] where nurses in Africa assigned to emergency units during clinical training acquired capabilities to effectively manage critically-ill and injured patients.

Having adequate logistics to manage emergencies was also strongly associated with having self-reported adequate knowledge. Thus, nurses who have the needed logistics for work, especially at emergency units, felt about 3 times more likely to have adequate knowledge in emergency care. The study supports a similar finding in Iran by Rivaz et al. [14] which acknowledged the importance of adequate physical resources and logistics for work as a means to improve on the performance of nurses and patient outcomes. The correlation of adequate logistics and self-reported adequate knowledge may have several meanings, including that hospitals that had adequate logistics might also have invested more in training the nurses for emergency care or might be bigger hospitals with better capabilities overall.

Having received training in managing critically ill and injured patients was also significantly associated with having adequate knowledge. Thus, nurses who have received training in managing emergencies are more likely to be knowledgeable in emergency care. This supports a similar finding by Canzian et al. [6] which found that participants trained in Advanced Trauma Care for Nurses (ATCN) reiterated the relevance of the course to their clinical practice in Canada.

The one factor in the logistic regression that was not associated with self-reported adequate knowledge was having time off to access training opportunities on emergency care. This contradicts a finding by Fairchild

Table 3
Knowledge level of nurses in caring for critically-ill and injured patients.

Knowledge	Frequency	Percentage correct
Crystalloid and blood as treatment for hypovolemic shock	324	79.4
Tachycardia associated with dyspnea	197	48.3
Criteria for Glasgow Coma Scale score of 11–13	154	37.7
High flow oxygen as the first step in the treatment of allergic reaction	41	10
Normal saline as fluid to use when administering blood	308	75.2
Airway, breathing, circulation as the first step in the assessment of trauma patients	327	80.1
Kernig's sign	355	87
Treatment of partial-thickness burns	200	49
Initial treatment of suspected myocardial infarction	270	66.2
Primary treatment of open wound	165	40.4
Direct pressure as an initial intervention in external bleeding	340	83.3
Needle decompression as treatment for tension pneumothorax	109	26.7
Stop the transfusion as first step in transfusion reaction	362	88.7
Maintaining the patient on nil per os status for pre-operative management of appendicitis	323	79.2
Treatment of seizures	230	56.4
Treatment of diabetic ketoacidosis	217	53.2
Priorities in management of multisystem trauma	202	49.5
Motor vehicle accidents as the most common cause of chest trauma	276	67.6
Organs injured in abdominal trauma	216	52.9
Providing and documenting care within accepted standards	266	65.2

*Questions with especially high or especially low percentages correct are shown in bold.

Table 4
Predictors of knowledge level of nurses who manage emergency conditions.

Predictors	OR	95 % CI	ρ
Were you prepared to work at the emergency unit?	2.539	1.521 4.239	<0.001
Time off to access training opportunities	1.200	.690 2.089	.518
Adequate logistics to manage emergencies	2.816	1.694 4.681	<0.001
Received training in managing critically ill/ injured patients	2.261	1.344 3.805	<0.002
Constant	.153		<0.001

OR: Odds ratio; CI: confidence interval. Overall Model Evaluation & Goodness-of-Fit Statistics: $\chi^2 = 57.566, p < .001$ with $df = 4$; Wald test $\chi^2 = 19.642, p < .001, df = 1$; Hosmer & Lemeshow Goodness-of-fit test: $\chi^2 = 6.035, p = .419, df = 6$.

et al. [7] which found limited time schedule of nurses due to workload as a major challenge of rural nurses in accessing continuing nursing education in the United States.

This study contributes to the ongoing debate regarding knowledge acquisition and sustenance of nurses working in emergency units and methods to promote their autonomy and confidence in delivering emergency care [3,5,6]. The study findings are in line with similar findings which suggest that improved knowledge improves the competence of nurses to attend to emergency conditions [4]. Thus, the results from the study affirm the relevance of nursing education through training on emergency management. A major consequence of these findings is the need to promote greater availability of continuing education /continuing professional development on emergency care for nurses in district hospitals in Ghana.

Limitations

The study has several limitations. First, the most objective assessment of competence would have been direct observation of clinical

practice without the awareness of the participant. A multiple-choice test can assess cognition, but not actual practice. Even within these limits, a 20-question test is very brief. A longer test would have been more comprehensive, but was not practical within the time allotted for answering the questionnaire. Second, the selection of hospitals was done randomly and thus the hospitals chosen are likely representative of other hospitals in Ashanti Region. They may be less representative of hospitals elsewhere in Ghana. On the whole, however, district hospitals throughout Ghana have similar levels of staffing and capabilities. Third, in terms of sampling within the chosen hospitals, we sought to engage all eligible nurses present at the time of the study. Nurses not sampled would be mainly those who work on night shifts or weekends. To the extent that these nurses might be different than those on day shifts, excluding these nurses could have introduced bias into the study. Finally, bias may have been introduced by using a heterogeneous cadre of nurses rather than a smaller group of nurses who primarily work in the emergency unit.

Conclusion

Only one third of nurses felt that they had self-reported adequate knowledge to manage emergencies. Around half had received some training in emergency care, but very few (around 5%) had specialization in critical care or emergency nursing. These shortcomings were reflected in the low scores on the objective knowledge test on emergency care. The study concludes that there is a gap in training and knowledge level of nurses working in emergency units in Ghana. Increased availability of specialised training should be a future priority. Most nurses at district hospitals in Ghana rotate through different wards, including the emergency unit. Hence, another priority is assuring that all nurses have a certain minimum level of knowledge in emergency care. Increased availability of continuing professional development in emergency care is thus a major priority for future development of emergency care in Ghana. The specific questions that had very low scores on the cognitive test in this study likely represent topics that are problematic and should be emphasized in future training. Topics such as management of respiratory distress, management of tension pneumothorax, and using the Glasgow Coma Score to determine the severity of head-injured patients should be better emphasized both in nursing school curriculum and in refresher courses on emergency nursing. The topics that had high correct responses should be factored into training programs organised for continuous professional development in the hospitals.

Dissemination of results

Results from this study have been shared with the faculty members at the Kwame Nkrumah University of Science and Technology and the Regional Director of Health Services in the Ashanti Region. There are also plans to present the findings at regional, national and international conferences.

Authors' contribution

The authors contributed as follows to the conception or design of the work; the acquisition, analysis, or interpretation of data for the work; and drafting the work or revising it critically for important intellectual content: AKK contributed 50%, DA, JA, PAB, CM each contributed 10% while PD and AKE each contributed 5%. All authors approved the version to be published and agreed to be accountable for all aspects of the work.

Funding

This study was funded in part by a grant from the US NIH (D43

TW007267). The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

Declaration of Competing Interest

The authors declared no conflicts of interest.

References

- [1] Evans L, Kohl D. Mission impossible? Educating an emergency nurse. *J Emerg Nurs* 2014;40(3):253–6. <https://doi.org/10.1016/j.jen.2013.03.004>.
- [2] Valdez AM. So much to learn, so little time: educational priorities for the future of emergency nursing. *Adv Emerg Nurs J* 2009;31(4):337–53. <https://doi.org/10.1097/TME.0b013e3181bc571>.
- [3] Rominski S, Bell SA, Yeboah D, Sarna K, Hartney H, Oteng R. Skills and educational needs of accident and emergency nurses in Ghana: an initial needs analysis. *Afr J Emerg Med* 2011. <https://doi.org/10.1016/j.afjem.2011.08.004>.
- [4] Kienlin S, Nytrøen K, Stacey D, Kasper J. Ready for shared decision making: pretesting a training module for health professionals on sharing decisions with their patients. *J Eval Clin Pract* 2020. <https://doi.org/10.1111/jep.13380>.
- [5] Ireland S, Cross R, Decker K, Mitra B. Perceptions of an educational programme for registered nurses who work at non-major trauma services in Victoria, Australia: the nursing emergency eXternal trauma programme. *Australas Emerg Nurs J* 2017;20(3):131–8. <https://doi.org/10.1016/j.aenj.2017.05.002>.
- [6] Canzian S, Nanni J, McFarlan A, Chalklin K, Sorvari A, Barratt L, Blanchette SA, Li Y, Topolovec-Vranic J. Application and evaluation of knowledge retention related to advanced trauma care for nurses (ATCN) course content: a preliminary study. *J Trauma Nurs* 2016;23(4):202–9. <https://doi.org/10.1097/JTN.0000000000000216>.
- [7] Fairchild R, Everly M, Walters L, Bauer R, Laws S, Anderson L. Rural nurses' continuing education needs: a U.S. multi-site survey reveals challenges and opportunities. *J Nurs Educ Pract* 2012.
- [8] Weeks K, Coben D, Lum G, Pontin D. Developing nursing competence: future proofing nurses for the changing practice requirements of 21st century healthcare. *Nurse Educ Pract* 2017. <https://doi.org/10.1016/j.nepr.2017.08.020>.
- [9] Cunningham C, Brysiewicz P, Sepeku A, White L, Murray B, Lobue N, Sawe H. Developing an emergency nursing short course in Tanzania. *Afr J Emerg Med* 2017; 7(4):147–50. <https://doi.org/10.1016/j.afjem.2017.08.002>.
- [10] Brysiewicz P. Emergency nurses: an essential component of emergency care in Africa. *Afr J Emerg Med* 2011. <https://doi.org/10.1016/j.afjem.2011.05.003>.
- [11] Wolf L, Brysiewicz P, LoBue N, Heyns T, Bell SA, Coetzee I, Papa AM, Augustyn J, Eeden I, Sepeku A, Pho A, Qampi M, Hangula R. Developing a framework for emergency nursing practice in Africa. *Afr J Emerg Med* 2012;4(2):174–81. <https://doi.org/10.1016/j.afjem.2012.09.001>.
- [12] Atakro CA, Ninnoni JP, Adataro P, Gross J, Agbavor M. Qualitative inquiry into challenges experienced by registered general nurses in the emergency department: a study of selected hospitals in the Volta region of Ghana. *Emerg Med Int* 2016. <https://doi.org/10.1155/2016/6082105>.
- [13] Atakro CA, Gross J, Sarpong T, Armah E, Akuoko CP. Qualitative inquiry into registered general nurses' experiences in the emergency centre. *Afr J Emerg Med* 2017;8(1):16–20. <https://doi.org/10.1016/j.afjem.2017.08.007>.
- [14] Rivaz M, Momennasab M, Yektatalab S, Ebadi A. Adequate resources as essential component in the nursing practice environment: a qualitative study. *J Clin Diagn Res* 2017;11(6):IC01–4. <https://doi.org/10.7860/JCDR/2017/25349.9986>.
- [15] Atakro C.A. The lived experiences of nurses in the emergency department: a study in selected hospitals in the Volta Region of Ghana. Thesis submitted to the School of Nursing and Midwifery, of the College of Health and Allied Sciences, University of Cape Coast, 2015.
- [16] Osei-Ampofo M, Oduro G, Oteng R, Zakariah A, Jacquet G, Donkor P. The evolution and current state of emergency care in Ghana. *Afr J Emerg Med* 2013;3(2):52–8. <https://doi.org/10.1016/j.afjem.2012.11.006>.
- [17] Bell SA, Oteng R, Redman R, Lapham J, Bam V, Dzomecku V, Yakubu J, Tagoe N, Donkor P. Development of an emergency nursing training curriculum in Ghana. *Int Emerg Nurs* 2014;22(4):202–7. <https://doi.org/10.1016/j.ienj.2014.02.002>.
- [18] GHR. Ghana human resources for health country profile. Ghana: Ministry of Health; 2011. Available at, <https://www.hrhresourcecenter.org/node/3733.html>.
- [19] Health facility in Ghana. Location of health facilities disaggregated by region, district, town, type and ownership. 2020; Retrieved on 2nd June 2019 from <http://data.gov.gh/dataset/health-facilities-ghana>.
- [20] Lippincott's Q & A Certification Review. Emergency nursing. 2nd edition. Lippincott Williams and Wilkins. A Wolters Kluwer Company 2013.
- [21] Brunner L, Suddarth D, Smeltzer S. Brunner & Suddarth's textbook of medical-surgical nursing. Philadelphia: Lippincott Williams & Wilkins; 2008.
- [22] Carmines EG, Zeller RA. Reliability and validity assessment. SAGE Publications, Inc; 1979. <https://doi.org/10.4135/9781412985642>.