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The Development of Sustainable Emergency Care in Ghana: Physician, Nursing and Prehospital Care Training Initiatives

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Abstract

Background—Ghana’s first Emergency Medicine residency and nursing training programs were initiated in 2009 and 2010, respectively, at Komfo Anokye Teaching Hospital in the city of Kumasi in association with Kwame Nkrumah University of Science and Technology and the Universities of Michigan and Utah. In addition, the National Ambulance Service was commissioned initially in 2004 and has developed to include both prehospital transport services in all regions of the country and Emergency Medical Technician training. Over a decade of domestic and international partnership has focused on making improvements in emergency care at a variety of institutional levels, culminating in the establishment of comprehensive emergency care training programs.

Objective—We describe the history and status of novel post-graduate emergency physician, nurse and prehospital provider training programs as well as the prospect of creating a board certification process and formal continuing education program for practicing emergency physicians.

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Discussion—Significant strides have been made in the development of emergency care and training in Ghana over the last decade, resulting in the first group of Specialist level EM physicians as of late 2012, as well as development of accredited emergency nursing curricula and continued expansion of a national EMS.

Conclusion—This work represents a significant move toward in-country development of sustainable, interdisciplinary, team-based emergency provider training programs designed to retain skilled healthcare workers in Ghana and may serve as a model for similar developing nations.

Keywords

Ghana; Emergency Medicine Residency; Emergency Nursing; EMS; training programs

INTRODUCTION

Emergency Medicine (EM) is considered to be a new specialty in comparison to internal medicine and surgery, and the creation of residency training programs in developing nations is a recent occurrence.^{1–4} Urbanization of populations across the developing world has led to a demographic shift from infectious disease to traumatic injury and cardiopulmonary disease, and has prompted increased interest in the development of emergency medicine and pre-hospital care.⁵ In the Ghana Ministry of Health report from 2010, 51% of the population now resides in urban areas. The physician to population ratio is 0.9:10,000 and the nurse to population ratio is 1:1,251. These factors, along with its classification as a low-middle income country (LMIC), make Ghana a representation of a developing nation.⁶ Prior to 2009, South Africa was the only sub-Saharan African nation that had initiated formal domestic EM physician training.⁴ Several challenges face further development given that there is no uniform international standard for what defines graduate medical education, specialty certification, or continuing education.⁵

THE ROLE of EMERGENCY MEDICINE IN GHANA

Ghana is a Sub-Saharan West African country whose population is disproportionately affected by injury secondary to limited resources for prevention and management of injury.^{7–8} One Ghanaian study specifically demonstrated the need for improvement in the delivery of emergency care, as tertiary healthcare facility patients experience significant delays and increased mortality compared to similarly injured U.S. patients.⁹ Lack of quality emergency care was widely recognized as early as 1997 and a national surgery conference supported development of improved trauma care and emergency services at major tertiary hospitals.¹⁰ Emergency care at that time was provided primarily by resident physicians drawn from internal medicine and surgery, and was associated with both significant treatment delays and inadequate clinical care.⁹ The process was accelerated when public awareness heightened following the 2001 collapse of the Accra Sports Stadium, in which 126 people died and countless others were critically injured.¹¹ The high mortality and morbidity associated with this mass casualty surge was likely exacerbated by a deficit of formally trained first responders and trained emergency physicians at receiving hospitals.

The University of Ghana College of Health Sciences and the University of Southern California Department of Emergency Medicine partnered in 2000, yielding an Annual Emergency Medicine Symposia focused on prehospital care and the management of trauma in cooperation with Korle-Bu Teaching Hospital in Accra.¹² Beginning in 2003, initial efforts were made in the development and implementation of the nation's first EM residency training program given the high proportion of traumatic injury and overall need for improvement in both prehospital and hospital-based emergency care.^{9,13} The year 2009 saw the construction of the National Accident and Emergency Centre (AEC) at Komfo Anokye Teaching Hospital (KATH) in Kumasi.¹¹

Given KATH's 25 year relationship with the University of Michigan, which included development of the country's first obstetrics and gynecology (ob/gyn) residency program, the Ghana Emergency Medicine Collaborative (GEMC) was the product of partnerships formed between KATH; Kwame Nkrumah University of Science and Technology (KNUST); the Ghana College of Physicians and Surgeons (GCPS), Ministry of Health; the University of Michigan Department of Emergency Medicine; and the University of Utah Section of Emergency Medicine.¹⁴ In 2009, a post-graduate training program in EM was initiated at KATH, with specific emphasis on providing high quality, locally-driven program development intended to retain trained emergency physicians.

PROGRAM DESCRIPTIONS

Resident Physician Training Program

In 2009 the GCPS accepted a proposal for a three-year EM Residency program, whose graduates would become Members in the Faculty of Emergency Medicine. The initial curriculum was accepted that summer and a class of seven Medical Officers was selected based on application strength, available funding, and entrance examination score with training commencing in October 2009. **In 2010, a Faculty Board of Emergency Medicine was created to guide domestic specialty development and oversight. In 2012, there were 17 residents distributed across three classes and the inaugural class graduated.

During the first two years, the Ghana Ministry of Health provided funding for KATH resident positions. However, since that time rural district hospitals, where individual residents spent their first post-graduate year prior to residency, have been required to sponsor trainees financially, with the understanding that each Emergency Physician will return to that institution upon completion of the training program. Assuming that district-level funding remains available for sponsorship, this system will reinforce the distribution of EM-trained clinicians throughout the country and to rural areas in particular. Although the total number of applicants has continued to increase each year, actual class size remains limited by funding resource availability at both the national and district levels.

In addition, there continues to be growing regional interest in EM training and development of clinical services throughout West Africa. Several Nigerian applicants have expressed interest in attending the KATH training program. However, at the current time there is a tuition requirement for non-Ghanaian residents and no annual salary is provided. One means of potentially remedying this issue is formal recognition of EM as a specialty, requiring

dedicated post graduate training at the regional level within the continent. Such endorsement by the West African College of Physicians and Surgeons would presumably encourage a multinational EM training effort; countries throughout the region could sponsor training in Ghana followed by return home for in-country EM education and clinical service development.

University of Michigan-based U.S. faculty have been in-country 6–10 months per year, providing oversight in addition to a UK-trained Ghanaian national who practiced emergency medicine in the United Kingdom for over 10 years before returning to serve as Consultant and Head of the Directorate. Between 2009–2012, seven senior residents from the University of Michigan were onsite for one-month rotations, providing clinical services, resident teaching, and participation in clinical research activities. This broadened further in 2012 to include participation by several senior residents from various other U.S.-based EM residency programs. In 2009, the University of Utah provided an on-site emergency ultrasound course and both institutions have hosted Ghanaian senior medical student rotations in the U.S.

An additional expectation of the KATH residency program is that trainees pursue a clinical research project in partnership with supervising faculty. Projects have focused on a broad array of topics, including stroke epidemiology, injury prevention, and EMS system development. Residents have presented their work at several international meetings, including the 2012 International Conference on Emergency Medicine in Dublin, Ireland and the African Conference on Emergency Medicine in Accra, Ghana.

Primary goals of the EM residency program include evaluation of an appropriate body of knowledge as well as identification of knowledge gap deficiencies in such a way that they can be addressed to facilitate trainee success. The current resident physician evaluation process at KATH includes a comprehensive written examination administered at the time of the interview. The residents also undergo an exit examination prior to training program completion. Specific training components include didactic lectures twice weekly, opportunistic bed side teaching, low fidelity simulation sessions, elective clinical rotations to acquire relevant competencies (e.g., in anesthesiology, critical care, general surgery, trauma, orthopedics, pediatrics, and OB/GYN), practical skills workshops, case-based psychomotor tasks, and workshops focused on research and scientific writing. Residents also undertake month-long EM electives in developed world facilities, such as the University of Michigan Hospital in Ann Arbor, MI, USA and Hurley Medical Center in Flint, MI, USA, in order to gain exposure to cutting edge technology and see firsthand the organization and workflow of a modern ED.¹¹

Practicing Physicians: Continuing Medical Education

A key issue will be continued development of in-country designed evaluation tools that periodically address an accepted body of knowledge required for competent clinical practice as well as aspects that are unique to the practice climate and populations served. However, there is currently no EM-specific Continuing Medical Education (CME) or credentialing framework in place for certification, longitudinal learning, or continued clinical development. There is currently a framework for Continuing Professional Development

(CPD), which is supervised by the Ghana Medical and Dental Council (GMDC), that mandates acquisition of certified activity points for continued annual registration and licensure. However, there is a need to refine this process further and develop an EM-specific framework. It is possible that an American Board of Emergency Medicine (ABEM) style written and oral board evaluation framework will be feasible in the future. At the current time, the certification process for inclusion as a member of the GCPS requires two written examinations and an oral examination administered by faculty from Anesthesia, Surgery, Emergency Medicine, and a foreign Emergency Physician (South Africa).

One particular challenge will be the in-country creation of written and case-based examination elements that reflect the region-specific body of knowledge required of Consultant-level EM physicians in Ghana, including major trauma, infectious disease, and common non-communicable diseases such as hemorrhagic stroke and diabetic emergencies. The program itself is an opportunity to research and document the true burden of acute diseases in the country. As the practice of EM continues to advance and data systems are created, this information can then be used to develop a region-specific body of knowledge. Another consideration is the necessity for continuous learning and practice development with a subsequent re-certification examination at some point in the future. Activities similar to the Lifelong Learning and Self Assessment (LLSA) reading lists, CME online activities, and institution-specific Quality Assurance (QA) evaluations may provide a preparatory framework culminating in written re-certification examinations occurring at fixed intervals. In the future, the expectation would be that these activities would be designed and administered by Emergency Physicians. However at this point in the development of the specialty in Ghana, it may be necessary to have significant input from the Ghana College of Physicians and Surgeons in cooperation with partner institutions to ensure a focus on in-country development of evaluation materials.

Emergency Nursing Training Program

The role of emergency nursing is evolving across Africa, as detailed by several reports from Rwanda, Malawi, and South Africa.^{15–18} Historically, nursing education programs in Ghana provided no formal instruction in emergency care. In 2010, a needs-assessment survey was conducted at KATH in conjunction with the University of Michigan School of Nursing. Results suggested that Ghanaian nurses identified strongly with an interest in learning new methods of patient care and implementing new technologies, leading to an initial training model established by KNUST.¹⁹

A 12-month intensive program was initially created and contained didactic, clinical and simulation laboratory-based learning components. A series of thirty modules have since been developed using adapted Certified Emergency Nurse (CEN) examination review materials and South African emergency nursing training curricula as the initial foundation. Furthermore, nursing experts from established emergency nursing programs in South Africa continue to provide input on all key aspects, including content review, program delivery, evaluation procedures, learning methodologies, contextual issues, and overcoming barriers to implementation.

A system for formative and summative evaluation is in place to ensure teaching objectives and program goals are met. A “train the trainer” model is also in place and it is expected that exemplary students will assist with program delivery with an ultimate goal of assuming leadership roles. The program received formal accreditation from KNUST in September of 2012 and an accreditation review by the Nurses and Midwives Council of Ghana (NMC) is currently underway.

Development of Prehospital Services and Training

In order to address the large and growing prehospital burden of death and disability due to traumatic and non-traumatic acute illness, the government commissioned the National Ambulance Service (NAS) in 2004. While each region of Ghana currently has a part-time NAS Regional Medical Coordinator responsible for managing Emergency Medical Services (EMS) operations and providing regional medical oversight, the administrative and operational authority rests in the nation’s capital, Accra.

NAS has seen tremendous operational, programmatic, and educational growth since 2004. It has expanded its geographical service area from seven ambulance stations distributed among three regions in 2004, to 100 ambulance stations distributed over all ten regions of the country as of October 2012 (Personal Communication, NAS Director, Sept 2012). The cadre of NAS prehospital providers grew from approximately 50 to 700 between 2004–2012.^{20–22} Due to poor citizen knowledge of NAS, limited infrastructure and resources, and long mission times, NAS ambulances perform only 8,000 patient transports annually, about 70% of which are inter-facility transfers. Acute injuries and obstetric emergencies comprise the most frequently transported case types.^{20–22} As NAS matures and gains resources, long-term plans include further penetration into each district of Ghana, thereby attaining more effective geographic and population coverage, especially to the most underserved rural areas.

Prehospital Provider Training Program

NAS internally trains Emergency Medical Technicians (EMTs) at two ranks: EMT-basic (EMT-b) and EMT-advanced (EMT-a), equivalent to USA EMT-basic and EMT-intermediate, respectively. Twelve-month international standard curricula have been adapted for each training level. The programs are similarly structured and divided into modules, with nine months of classroom didactics plus skills laboratories, six weeks of hospital-based clinical rotations, and six weeks of ambulance ride-along experiences. Classroom didactics and skills laboratories are delivered primarily by non-EMS, non-EM physician Specialists from various Ghanaian health sciences schools due to the lack of in-country EMS educators or experts in prehospital medicine. This minimizes the effectiveness of prehospital-specific education received by EMTs. To remedy this, plans are underway to train several NAS EMTs overseas as EMS educators, and also to formally integrate the KATH EM resident physicians and faculty into the NAS prehospital educational program as educators and course directors.

EMT Training Program Evaluation and Continuing Education

Graduation requires that EMTs pass a cognitive examination, however there is currently no formal psychomotor or affective assessment. To compensate for the lack of a structured

continuing medical education (CME) program, personnel have received intermittent refresher training from visiting EMS professionals, including basic life support and basic trauma life support (Personal Communication, NAS Medical Director, May 2012).

NAS works closely with a Ghanaian national who is a U.S.-trained emergency physician and EMS expert to formally develop the structure and function of the agency, with primary focus on improvement of education and delivery of quality prehospital care. Formal assessments of NAS EMT knowledge, attitudes, practice, and skills were conducted in 2011 and 2012. EMT-b providers scored approximately 74.5% of essential basic trauma knowledge when compared with World Health Organization (WHO) essential criteria, indicating the need for more robust prehospital trauma-specific initial and continuing education²³. Several modifications are in various stages of implementation to facilitate the continuous assessment and improvement of the NAS EMT curriculum, including: 1) the creation of a Scope of Practice document for each EMT level, 2) implementation of a national Quality Assurance and Improvement program designed to identify deficits in knowledge and sub-optimal prehospital practices via periodic review of patient care documentation, and 3) a structured CME initiative. Additional curricular modifications include more structured clinical rotation and field-training experiences with clearly defined cognitive, psychomotor and affective objectives.

DISCUSSION

Significant strides have been made in the development of emergency care and training in Ghana over the last decade, resulting in the production of the first group of Specialist level EM physicians as of late 2012. Several major challenges face the development of emergency care, including time needed to build a so called *critical mass* of at least ten fellowship-trained EM Consultants required for adequate in-country trainee supervision, bedside residency teaching, and continued development of the educational program and board certification and CME processes.⁴ Ideally, there would also be 40 residents distributed among at least two residency programs. As of late 2013, there were only 11 residency trained Specialist level EM physicians in the entire country.

There has been considerable emphasis placed on the implementation of a competency-based educational program for physicians, nurses, and prehospital providers that will require continued development of a multi-faceted approach comprised of didactics, low fidelity simulation-based education, clinical teaching, and research. In addition, given that EM physicians often practice in large urban medical centers, additional measures will be needed in order to properly address the massive workforce geographic deficits identified by the WHO-sponsored Joint Learning initiative.²⁴

In a LMIC the resources necessary to create academic medical training centers are generally concentrated in urban areas. However, several graduates of the KATH residency program plan to return to their home regions in order to develop emergency care services and training programs in rural areas served by district hospitals. Subsequent graduates will likely return to practice in the district hospitals that sponsored their residency training, as previously described. With specific regard to development of rural emergency care, the Systems

Improvement at District Hospitals and Regional Training of Emergency Care (sidHARTE) program was developed in 2010 via a joint initiative between the Ghana Ministry of Health and Columbia University's Mailman School of Public Health. Among other activities, sidHARTE created a modular curriculum for the express purpose of improving care in resource-limited rural areas that is aimed at training midlevel emergency care providers in partnership with district hospital leadership.²⁵

In conclusion, the GEMC, NAS, and KATH/KNUST training programs to date have been designed to provide a pathway to increase the number of domestic-trained emergency physicians, nurses, and prehospital providers in Ghana with the goal of retaining these trainees within the country in order to improve access, delivery, and quality of emergency care. Although a multitude of challenges remain, this effort represents the nation's first post-graduate emergency physician and emergency nursing training programs that are growing alongside a rapidly developing national EMS system. Ultimately, there is hope that continued development and implementation of the multi-disciplinary training programs in Ghana described above will facilitate collaborative growth of each field, thereby leading to improvement in emergency care delivery at multiple levels and patient outcomes. Furthermore, Ghana's classification as a LMIC render it a representation of developing nations in general with regard to infrastructure, resource limitation and patient acuity; lessons learned here may be readily transferrable to its regional neighbors as well as other LMIC in Africa and abroad.⁶ This work represents a significant move toward in-country development of sustainable, interdisciplinary, team-based emergency provider training programs designed to retain skilled healthcare workers in Ghana, and may serve as a training model for other developing nations.

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ARTICLE SUMMARY

Why is this topic important?

Prior to the development of dedicated emergency physician, nursing, and prehospital provider training programs in Ghana, tertiary healthcare facility patients experienced significant delays in care and increased mortality compared to similarly injured U.S. patients.

What does this study attempt to show?

This work details the in-country development of sustainable, interdisciplinary, team-based emergency provider training programs designed to retain skilled healthcare workers in Ghana, and may serve as a training model for other developing nations.

What are the key findings?

Significant strides have been made in the development of emergency care and training in Ghana over the last decade, resulting in the production of the first group Specialist level Emergency Medicine (EM) physicians as of late 2012, accreditation of an emergency nursing training program, and rapid expansion of the Emergency Medical System (EMS) to all ten districts of the country.

How is patient care impacted?

Continued development and implementation of the emergency provider training programs we describe will facilitate collaborative growth of each field, thereby leading to improvement in emergency care delivery at multiple levels in Ghana.

Table 1

Timeline of physician, nursing and prehospital care program development in Ghana (KATH = Komfo Anokye Teaching Hospital; KNUST = Kwame Nkrumah University of Science and Technology; sidHARTE = Systems Improvement at District Hospitals and Regional Training of Emergency Care).

Program Implemented	Contributing Institution(s)	Date
Annual Emergency Medicine Symposia established, <i>Accra, Ghana</i>	- University of Ghana College of Health Sciences - Korle-Bu Teaching Hospital - University of Southern California	2000
National Ambulance Service established	- Ghana Ministry of Health	2004
- Seven stations located in three geographic regions	- Ghana National Fire Service of the Ministry of the Interior	
- 50 prehospital providers		
Ghana Emergency Medicine Collaborative (GEMC) established	- KNUST - KATH - University of Michigan - University of Utah	2007
Construction of the National Accident and Emergency Centre <i>Kumasi, Ghana</i>	- Government of Ghana - KATH - GEMC	2009
Inaugural KATH EM residency class starts three-year training program	- GEMC	2009
Faculty Board of Emergency Medicine established	- Ghana College of Physicians and Surgeons	2010
sidHARTE established	- Ghana Ministry of Health - Columbia University	2010
Emergency Nursing Training Program established	- KNUST - KATH - University of Michigan	2010
National Ambulance Service expands to 100 Stations nationwide with 700 prehospital providers	- Ghana Ministry of Health - Ghana National Fire Service of the Ministry of the Interior	2012
Graduation, first class of residency-trained KATH Specialist level EM physicians	- GEMC	2012