



African Federation for Emergency Medicine
African Journal of Emergency Medicine

www.afjem.com
 www.sciencedirect.com



A model for emergency medicine education in post-conflict Liberia

Un modèle d'enseignement de la médecine d'urgence dans le Libéria d'après-conflit

Braden Hexom ^a, Emilie J.B. Calvello ^{b,*}, Christine A. Babcock ^b, Rachel Fowler ^c,
 Christian Theodosius ^d, James A. Sirleaf ^e, Simon Kotlyar ^f, Janis P. Tupesis ^g

^a Department of Emergency Medicine, Mount Sinai School of Medicine, New York, NY, United States

^b Department of Emergency Medicine, University of Maryland School of Medicine, Baltimore, MD, United States

^c Department of Emergency Medicine, The Warren Alpert Medical School of Brown University, Providence, RI, United States

^d Department of Emergency Medicine, New York Presbyterian/Columbia University College of Physicians & Surgeons, New York, NY, United States

^e Department of Emergency Medicine, University of Massachusetts Medical School, Worcester, MA, United States

^f Department of Emergency Medicine, Yale University School of Medicine, New Haven, CT, United States

^g Division of Emergency Medicine, University of Wisconsin School of Medicine & Public Health, Madison, WI, United States

Received 10 March 2012; revised 5 August 2012; accepted 11 August 2012

KEYWORDS

Liberia;
 Emergency medicine;
 Education

Abstract The specialty of emergency medicine (EM) remains largely underdeveloped in many parts of the world including Africa. Within West Africa the Liberian health care system was presented with incredible challenges in the immediate post conflict years. One significant challenge facing the country was the paucity of health care providers. In 2006, only 122 physicians were practising in Liberia (one for every 26,782 citizens), only 87 of them Liberian national physicians. The public health indicators in post conflict Liberia suffered as a result of the overburdened system. Many indicators placed Liberia as having the worst health survivability in the world. Significantly, morbidity and mortality associated with unaddressed emergent presentations remained high.

* Corresponding author. Address: Department of Emergency Medicine, University of Maryland School of Medicine, 110 South Paca, Sixth Floor, Suite 200, Baltimore, MD 21201, United States. Tel.: +1 410 328 8025.

E-mail address: ejbcalvello@umem.org (E.J.B. Calvello).

Peer review under responsibility of African Federation for Emergency Medicine.



Production and hosting by Elsevier

This article describes a unique paradigm for addressing the deficit in human capacity for emergency health care in the Republic of Liberia. This system was designed and supported by a consortium of academic medical centres in the United States working in conjunction with a local non-governmental organisation, Health Education and Relief Through Teaching (HEARTT). Since 2007, the consortium has delivered virtually uninterrupted emergency medical care and medical education at the largest teaching hospital in Liberia. The Liberian programme objectives included supervising and directing emergency medical care, providing a model for curriculum development, building capacity for medical education, and improving systems-based EM practice. The collaboration of multiple academic institutions in bringing emergency medical services and academic EM teaching to a post-conflict setting remains a unique model for introducing the development of acute care in a developing country.

© 2012 African Federation for Emergency Medicine. Production and hosting by Elsevier B.V. All rights reserved.

Abstract La spécialité de la Médecine d'Urgence (MU) reste largement sous-développée dans de nombreuses régions du monde, notamment en Afrique. Au sein de l'Afrique de l'Ouest, le système de soins de santé du Libéria a été confronté à d'incroyables défis dans les années d'après-conflit. Un des défis de taille consistait en la pénurie de prestataires de soins de santé. En 2006, il n'y avait que 122 médecins en exercice au Libéria (1 pour 26 782 habitants), parmi lesquels seulement 87 étaient des médecins de nationalité libérienne. De façon significative, les taux de morbidité et de mortalité associés aux nouvelles présentations non traitées restaient élevés. Cet article décrit un paradigme unique visant à répondre à la pénurie en ressources humaines dans les soins de santé d'urgence dans la République du Libéria. Ce système a été conçu et soutenu par un consortium de centres médicaux universitaires aux Etats-Unis, travaillant de concert avec une organisation non-gouvernementale locale, Health Education and Relief Through Teaching (HEARTT). Depuis 2007, le consortium a dispensé de façon quasi-ininterrompue un enseignement en soins médicaux d'urgence et en médecine dans le plus grand hôpital universitaire au Libéria. Les objectifs du programme libérien étaient de superviser et de diriger les soins médicaux d'urgence, de fournir un modèle de programme d'enseignement, de renforcer les capacités d'enseignement de la médecine, et d'améliorer la pratique de la MU basée sur des systèmes. Cet article décrit le développement du programme basé sur les objectifs des services prioritaires au niveau local, la logistique de la formation des prestataires de soins santé d'urgence basés aux Etats-Unis dans ce contexte et la structure des interventions d'enseignement de la médecine mises en œuvre. En raison du contexte austère, de multiples difficultés sont apparues dans la mise en place d'un processus de suivi et d'évaluation qui saisisse des données objectives sur les résultats, ce qui a rendu très difficile une plateforme de recherche continue. Toutefois, la collaboration de multiples institutions universitaires dans la fourniture de services médicaux d'urgence et d'un enseignement universitaire en SMU dans un contexte d'après-conflit reste un modèle unique visant à introduire des ressources de soins aigus dans des pays en développement.

© 2012 African Federation for Emergency Medicine. Production and hosting by Elsevier B.V. All rights reserved.

African relevance

- Increasing local capacity for acute care should be one of the fundamental activities of any emergency care intervention.
- Local support and engagement is essential for any emergency training programme.
- Post conflict countries are often open to incorporating emergency care platforms in efforts to rebuild nascent health care systems.
- Emergency training programmes should include all levels of care providers within the hospital context.

- The implementation of an effective monitoring/evaluation plan prior to programme development is an essential element to determining the effectiveness of the intervention.

What is new?

- Liberia is one of the few African countries that incorporated emergency care into its initial Basic Package of Health Services.
- Inter-academic collaboration can be an effective method of robust country specific engagement.

- Emergency care provision in a post conflict country can be rapidly and sustainably delivered via foreign based academic centres and a national government partnership.
- Emergency care platforms can be leveraged to also expand specialty care in a variety of different disciplines.

Introduction

The specialty of emergency medicine (EM) remains largely underdeveloped in many parts of the world, including in the continent of Africa.¹ In many African countries, especially those considered post-conflict, acute medical care remains unavailable for large portions of the population.

This article discusses a unique paradigm for addressing the substantial deficit in human capacity for emergency health care in the Republic of Liberia. This multifaceted project was designed by, and is now supported by, a consortium of academic medical centres in the United States of America (US), working in conjunction with a local non-governmental organisation (NGO), Health Education and Relief Through Teaching (HEARTT). These two entities brought together academic emergency medicine faculty and residents from 10 institutions throughout the US (Table 1). Since 2007, the consortium has delivered virtually uninterrupted emergency medical care and medical education services at the John F. Kennedy (JFK) Medical Centre, the largest teaching hospital in Liberia, located in the capital, Monrovia.

Liberian health care system

The past 30 years of Liberian history have been marked by civil wars from 1989 to 1996 and again from 1999 to 2003, resulting in 250,000 human lives lost and more than 600,000 internally and externally displaced persons.² Following 6 years of stable leadership and heavy external investment, Liberia is emerging from its turbulent past with the support of a large United Nations peacekeeping and development effort, a more transparent and democratic government, and the commitment of more than 200 national and international NGOs. Immediately following the conflict, direct medical care was largely provided by international aid agencies. In recent years, the country has moved from its post-conflict challenges into a recovery phase characterised by the gradual withdrawal of international aid agencies, paradoxically resulting in fewer medical services contributing to the on-going gaps in service delivery.³ A well-developed National Health Plan (NHP) was drafted in 2007, which outlined a Basic Package of Health Services (BPHS) that was expected to

be provided at all medical facilities throughout the country (Table 2).⁴ Even in the early days of the country's health system recovery, the Ministry of Health and Social Work (MoHSW) included national prioritization for emergency care via the BPHS.⁵ The HEARTT core faculty was integral in moving forward with BPHS implementation via the creation of the Liberian Standard Treatment Guidelines for Emergency Care in the BPHS. In 2011, the BPHS was expanded under the National Health and Social Welfare Policy and Plan (NHSWPP) to the Essential Package of Health Services (EPHS). The current EPHS strives for an aggressive, more comprehensive health care delivery plan that also includes secondary and tertiary health care tiers. The specific goals of the EPHS as it relates to these tiers are presented in Table 3.⁶ At this project's inception, some provisions of the BPHS had been made widely available (e.g., malaria treatment). However, emergency health care, especially emergency obstetric care, trauma care, and life-saving paediatric care, remained inaccessible to many Liberians.⁷ The project, in partnership with the MoHSW, identified this key deficit of available emergency services, especially at the JFK Medical Centre. HEARTT was asked to provide the critical elements of the BPHS emergency care module at the JFK Medical Centre and to train medical personnel in the essentials of acute care. The objectives of this programme for Liberia and the US are listed in Table 4.

Training environment

Despite the conceptual advances fostered by the NHSWPP, infrastructure development and medical education in Liberia have been very slow to progress. In 2006, only 122 physicians were practising in the country (1:26,782 population), with only 87 of them being Liberian nationals.⁸ At the current time, Liberia has no graduate medical education programmes accredited by the West African College of Physicians and Surgeons. The only functioning medical school, AM Dogliotti School of Medicine, is gradually increasing its capacity to train new physicians. At the end of the most recent conflict, the medical school had only five full-time lecturers and had not been accredited.⁹ Since then, it has added teaching staff and gradually increased its numbers of graduates (Table 5).¹⁰ However, roughly half of the students who enter this school fail to graduate. The Tubman National Institute of Medical Arts was rebuilt in 2008 and continues to graduate nursing and physician assistant students. Seven other health professional training institutions are located throughout the country, but all suffer from outdated curricula, lack of faculty, and inadequate facilities. These institutions are gradually being rehabilitated through NGO partnerships and heavy foreign investment.

The JFK Medical Centre is the primary teaching hospital and the only tertiary care referral centre in Liberia. The hospital was founded in 1968 as a partnership between the US and

Table 1 Participating Institutions in the United States.

1. Yale University School of Medicine
2. Pritzker School of Medicine, University of Chicago
3. The Warren Alpert Medical School of Brown University
4. University of Massachusetts School of Medicine
5. University of Wisconsin School of Medicine and Public Health
6. University of Maryland School of Medicine
7. University of Washington School of Medicine
8. Mount Sinai School of Medicine
9. Stanford University School of Medicine
10. Harvard University School of Medicine

Table 2 Core components of the Basic Package of Health Services for Liberia.

- Maternal and new-born health
- Child health
- Reproductive and adolescent health
- Communicable disease control
- Mental health
- Emergency care

Table 3 2011 Essential Package of Health Services – Secondary and Tertiary Component.

- To establish a prioritized package of secondary and tertiary health service standards for all government and private health facilities
- To improve the referral system at all levels
- To set minimum requirements for staffing, equipment, drugs and medical supplies
- To give guidance for training programmes
- To improve efficiency, equity, accountability, and affordability

Table 4 Programme Objectives.*Liberia*

- Supervise and direct emergency medical care
- Provide a model for academic and didactic curriculum development
- Build capacity for undergraduate and graduate medical education
- Improve systems-based practices in emergency medicine

United States

- Formulate core didactic training for emergency medicine providers in tropical health and infectious disease, which are essential for work in developing countries
- Improve knowledge of delivery of emergency care in resource-limited settings
- Recruit and train emergency medicine residents in skills appropriate for work in resource-poor and post-conflict settings
- Build a multi-institutional collaborative network for academic initiatives in international health

Table 5 Current training statistics: expected number of graduates.

Year of graduation	MD/MB ChB	RN/BSc nursing	Certified midwives	Physician assistants
2006	13	104	37	41
2007	4	43	36	53
2008	12	49	38	43
2009	17	43	N/A	42
2010	20	N/A	N/A	N/A

Adapted from Liberia, Ministry of Health and Social Welfare. Emergency human resources for health plan (2007–2011). Monrovia: MHSW; 2007. Emergency Human Resources Plan, MHSW.

the Republic of Liberia. Prior to the first Liberian civil war, the 600-bed hospital served as one of the primary referral centres in West Africa. However, since that time, budget cuts, debt burden, and attrition of trained hospital staff have exacted a heavy toll on its human resource capacity. The medical centre remains the primary training facility for most Liberian medical professionals, including medical students, interns, physician assistants, and nurses. The MoHSW, Human Resources for Health, has established goals for a number of medical care providers per population, based on current and projected capacity of the medical centre and adapted from the hospital staffing model of the World Health Organization (Table 6).

Even though the country's only medical school has reopened, significant challenges remain in the quality of education and supervision provided to trainees. Very few physicians in Liberia have achieved credentialed board certification. Most physicians graduate medical school, complete a 1-year rotating internship, and begin practice in a variety of community settings. Any specialty development must be pursued abroad in countries such as Ghana or Nigeria, from which most trainees do not return. The low number of certified specialists also contributes to the paucity of clinical and didactic medical education programmes, especially in subspecialty disciplines.

Like most other Liberian hospitals, the JFK Medical Centre initially concentrated on the core disciplines of medicine, paediatrics, obstetrics, and surgery, focusing on the first four

Table 6 Ratio of medical care providers to population.

	2006 data	2011 target
Physicians	1:36,781	1:16,327
Registered nurses	1:7729	1:5915
Certified midwives	1:10,774	1:4969

Adapted from Liberia, Ministry of Health and Social Welfare. Emergency human resources for health plan (2007–2011). Monrovia: MHSW; 2007. Emergency Human Resources Plan, MHSW.

components of the BPHS. To address the fifth component—emergency care—the JFK Medical Centre administration and Ministry of Health and Social Welfare approached HEARTT to devise a system to provide direct medical care to patients in the medical centre's emergency centre (EC) and to supervise US and Liberian resident trainees. The provisions of the BPHS emergency care module served as the guiding principle for intervention (Table 7). The original intent of the project was to provide direct medical care to fill the access gap in emergency services. At the same time, HEARTT medical providers began to develop educational modules to train Liberian providers in the principles of acute care. The long-term project

Table 7 Current barriers to training.

- Inadequate infrastructure in training institutions
- Weak capacity of trainers
- Lack of accreditation, outdated curricula, and lack of standardization of programmes
- Lack of subsidies and other logistics to manage schools
- Inadequate or weak and under-resourced professional/regulatory bodies

Adapted from Liberia, Ministry of Health and Social Welfare. Emergency human resources for health plan (2007–2011). Monrovia: MHSW; 2007. Emergency Human Resources Plan, MHSW.

Table 8 Core topics of medical student lecture series.

- ABCs/resuscitation
- General assessment of the critically ill patient
- Hypertensive crisis/cerebrovascular accident/seizure
- Asthma
- Diabetic ketoacidosis
- Malaria
- Sepsis
- Chest pain
- Congestive heart failure/pulmonary oedema
- Abdominal pain
- Shock/sepsis
- Neurologic emergencies/coma

proposal included provisions to expand the training of emergency care to district hospitals in addition to the JFK Medical Centre. The initial interventions were successful, but expansion to the district level proved more difficult (see later discussion).

Clinical environment

Prior to HEARTT's involvement at the JFK Medical Centre, the single-room ED was overseen predominantly by nurses and physician assistants, with an "on-call" system of physician notification for cases deemed to be acute. A single attending internal medicine physician, often covering both male and female inpatient wards, conducted intermittent rounds in the ED to identify patients in need of immediate care management, inpatient admission, or specialty consultation, as it was available. Delays in care were significant, no formal triage system was in place, physicians were rarely present, and the acuity of patients' illnesses often went undetermined.

The immediate challenges to implementing significant systems change in this environment included the development of professional rapport with the services already in place at the JFK Medical Centre. Having US-based providers making medical decisions and initiating care in the ED required sensitivity to cultural norms and a deference to the Liberian physicians who had long-term experience in this setting. The educational components of the project were deferred during the first year, in order to promote interdisciplinary medical care and collaboration among the US and Liberian staff. The overwhelming medical need—the product of high volume, high morbidity and mortality rates, and few emergency medical providers—required that more time be devoted to acute medical care rather than to the project's educational objectives during the first year. During this phase of the project, the team focused on systems improvement processes rather than educational interventions. Only after building professional respect over a period of several months was it possible to introduce the educational component.

Due in part to these initial capacity-building endeavours by HEARTT, the EC at the JFK Medical Centre is now divided into a medical ward and surgical/trauma ward. The triage room is staffed by an experienced nurse and a physician assistant and employs a three-level, colour-coded system of triage. Patients triaged to need emergent care are seen by HEARTT residents or Liberian interns. Ancillary services available in the EC include 24/7 nursing and tech support. Laboratory testing is rudimentary and typically limited to urinalysis, malaria smear, haemoglobin, and pregnancy tests. Following a systems change that moved the pharmacy directly into the EC, a wide

spectrum of emergency medications became available for immediate use during the assessment of critically ill EC patients. Diagnostic imaging is limited to plain radiographs, which are often of poor quality. Portable bedside EM physician-directed ultrasound is becoming increasingly available, as are digital X-ray machines. This essential equipment was obtained via donation from partnering institutions or governments. In such a resource-constrained environment, ultrasound has proved invaluable as a diagnostic adjunct for virtually all medical and trauma presentations.¹¹

Domestic educational programme

Over the past 20 years, interest in global health opportunities among medical students and residents has been increasing. In 2001, one fifth of graduating US medical students stated that they had participated in an international/global health training experience during medical school, up from 5% in 1984.^{12,13} In 2010, this number had increased to 30.8%.¹⁴ Participation in global health electives during training exposes medical students to different disease pathology, teaches them to work in resource-limited settings, increases their cultural sensitivity and communication skills, and gives them an increased awareness of community and public health issues.^{15–18} Despite this increased interest among trainees, little has been done in the standardization of these experiences. Often, residency programme directors are charged with identifying the educational merit of global health electives without having first-hand knowledge of the experience. Given this fact, the authors sought to establish the JFK Medical Centre as a graduate medical education training site with an established set of clinical objectives, site evaluations, and application procedures.

The training site at the medical centre provides a robust graduate medical education/global health experience for US-based residents. The rotation provides a significant opportunity for senior EM residents to broaden their knowledge of tropical medicine, delivery of emergency medicine in resource-constrained environments, supervision of graduate and undergraduate trainees, and post-conflict reconstruction. Senior US-based EM residents (PGY 3 and 4) provide academic supervision in the ED (Table 9). Residents rotate in 4- to 8-week blocks, with scheduled overlap for transitioning teams. Senior faculty from the various US academic medical centres rotate monthly to provide additional supervision and support to the project. This provides the well-structured, continuous presence of a senior supervisor in the ED almost

Table 9 US based resident participation by year.

Year	PGY III	PGY IV	Total
2008	9	9	18
2009	13	10	23
2010	9	9	18
2011	14	7	21
2012	7	7	14
Total	52	42	94

year round. Continuity of academic emergency medicine was a guiding principle towards meeting the objectives of this project.

The project development team faced a significant challenge in preparing US-based resident physicians to deliver appropriate in-country medical care. For most residents, the setting of a post-conflict nation with limited resources was the most austere medical setting in which many had ever practised. Residents were selected after extensive screening and evaluation by faculty and programme leaders. Previous exposure to tropical medicine or other global health settings was a prerequisite. Prior to the rotation, US-based residents were required to attend an annual 3-day, pre-departure seminar that covered tropical medicine, health care delivery in resource-poor settings, cultural competency, and Liberian health metrics. Over the course of 3 years of administering this conference, an online curriculum was developed (www.hearttliberia.org) that included pre- and post-departure readings from peer-reviewed sources as well as a resident discussion forum. These materials expanded upon the conference didactics and provided additional references for health care personnel working in Liberia without ready access to other sources.

While in Liberia, residents were supervised by volunteer US-based EM faculty or by the emergency medicine director at the JFK Medical Centre. Residents received standardised evaluations from faculty members regarding their performance and completed an extensive post-rotation interview upon their return. While all attempts were made to provide the essential training prior to departure and a solid post-return debriefing process, one limitation of the programme has been the inability to ascertain whether these interventions had the intended effect of objectively increasing proficiency. To date, the monitoring and evaluation of the project has not provided enough data to determine whether the preparatory conference didactics and materials assisted US-based providers in their transition to this difficult setting. Future programmes would benefit from a more robust evaluation process.

Liberian educational programme

Nursing education

In the early phase of development, the HEARTT project encountered few Liberian students and postgraduate trainees. The Liberian medical school was graduating only a few students a year and thus there were few physician trainees to staff the EC. The core group of generalist nurses who staffed the EC did not have advanced training in emergency nursing. Since the bulk of EC patient assessment, resuscitation, and on-going care were provided by these nurses, they became the logical first cadre of care providers targeted for educational training.

HEARTT faculty created a curriculum of nursing education seminars dedicated to emergency nursing skills. Nursing education in Liberia is directed towards training general nurses, with little subsequent specialised training. The nursing lectures, led by EM resident physicians, focused initially on airway, breathing, and circulation (the ABCs), altered mental status, severe pain and dangerous fever. The core resuscitative skills covered in this in-service curriculum emphasised syndromic recognition of critical illness based on accepted best practices, with guidance from the Integrated Management of Adolescent and Adult Illness and the Integrated Management of Childhood Illness.^{19,20} The nurses were trained not only to recognise critical illness but also to take actions normally initiated by a physician. Based on observations, training in these protocols often proved essential to patient survival when physician availability was limited.

The nursing education sessions were well received by the nurses and the hospital administration. A challenge that remains, however, is how to incentivize nurses to attend and complete the training. Several proposals such as incentive pay and promotion have been suggested to reward nurses who acquire these advanced skills, but they have not yet been enacted. As with the domestic educational components, the educational project is limited by the lack of objective data upon which to determine whether the educational interventions have had the desired positive effects on patient outcomes.

Undergraduate medical education

At the outset of the HEARTT programme, medical student coverage in the ED was intermittent because of small class sizes while the AM Dogliotti School of Medicine worked to increase its capacity. Now, class sizes have increased, and student presence in the EC has led to a more robust level of academic teaching. In addition to providing direct clinical care, medical students participate in an emergency medicine grand rounds lecture series. A core set of 12 lectures is presented annually to senior medical students at the AM Dogliotti School of Medicine (Table 8). These lectures are incorporated into the weekly didactic internal medicine curriculum, although topics invariably cover surgical and obstetric emergencies as well. Lectures have been crafted to serve dually as general instruction on the core elements of acute medical care, as well as on the practical application of these elements using the resources and pharmaceuticals available at the JFK Medical Centre. Lecture formats tend to emphasise the correlation of physical examination findings with the physiologic basis of disease in order to enhance diagnostic capabilities in a resource-limited setting. Proposed treatment algorithms are empiric, when appropriate, and fashioned after the BPHS and the *MSF Clinical Guidelines Diagnostic and Treatment Manual*.²¹ An on-going goal is to gradually incorporate the material into end-of-year qualifying examinations to meet student graduation requirements. The challenge has been to make emergency care a standard part of the medical school curriculum, delivered by HEARTT faculty on an on-going basis. Once emergency care becomes standard within the curriculum, outcome-based evaluation of these educational interventions may be determined through either written examination or OSCE-type testing environments.

Postgraduate medical education

Graduate medical education has yet to be fully defined in Liberia, although it is a pressing priority of the medical school and the MoHSW. After graduating from medical school, Liberian students are eligible to do a 1-year rotating internship. First-year interns rotate through surgery, obstetrics/gynaecology, paediatrics, and internal medicine. Given optimal staffing patterns, rotating Liberian interns spend 1 or 2 months in the EC, supervised by US-based EM residents. The EM rotation is included in the internal medicine rotation, although interns get additional daily experience during their surgical rotation as they take call in the trauma centre. During their rotations, interns are expected to manage their assigned centre (the medical EC or trauma EC) while supervising medical student exams, notes, and presentations. HEARTT senior residents act as attending physicians during the rotation, supervising the interns, helping to manage difficult cases through bedside teaching, and supervising procedures performed by Liberian interns. Teaching rounds led by HEARTT residents are held daily.

Of the educational programmes instituted by HEARTT, the postgraduate medical education component has been the most variable. As there is a critical shortage of Liberian interns, they are frequently reassigned to services that are in most need. This often means that the trainees are sent to other training hospitals. Therefore, no standardised curriculum has been implemented in a consistent way and no data exist on its effect. It is anticipated that, as the medical school expands its graduating classes and the cohort of interns stabilizes, a more consistent application of the emergency medicine curriculum for postgraduates can be implemented.

Challenges

With little funding and few highly trained providers, the JFK Medical Centre remains in an early development phase of reconstruction. Frequent breakdowns in supply chains lead to shortages of critical materials, including antibiotics, opiates, oxygen, and even gloves. Mortality rates from malaria, injury, malnutrition, infectious disease, and cardiovascular disease remain high. Documentation is often incomplete, leading to clear barriers to data collection and epidemiologic research. At the behest of the JFK Medical Centre and the MoHSW, the project successfully met its objectives of establishing emergency medical care services at the hospital and introducing medical educational curricula across a wide spectrum of health care providers. However, objective data on the effects of these interventions are necessarily scant given the substantial constraints. Under these austere conditions, it is unclear whether the presence of HEARTT physicians has had any effect on either medical care, skills transfer and retention, or long-term medical knowledge among personnel at the medical centre.

The greatest persistent challenge remains in the establishment of an effective monitoring and evaluation programme as well as the development of a robust research platform. By definition, decreases in morbidity and mortality rates are multi-factorial, requiring a coordinated effort beyond EC care. The challenges of monitoring patient outcomes in such a setting with extremely limited data-gathering capacity remain substantial. Despite many attempts, the difficulty in actualising an

effective monitoring and evaluative programme has also hampered our ability to move forward with plans to conduct acute care research. The failure to establish either of these platforms at the onset of the programme is the single greatest lesson learned from the project. However, the primary goal of the consortium project was to augment and support academic teaching in emergency medicine. In regard to this primary goal, the consortium has been very successful in providing virtually uninterrupted care and teaching for several years. Our hope is that this model of delivering emergency care and medical education, through a coordinated consortium of academic medical centres, can be replicated in similar settings in the future.

Future directions

The HEARTT project has expanded its model of supporting academic medicine by introducing similar curricula in other departments at the JFK Medical Centre, most notably in paediatrics. During the past year, paediatrics faculty members and residents have had an increased presence in the hospital. Academic faculty members have rotated in orthopaedics and obstetrics/gynaecology. HEARTT has been asked by the Ministry of Health and Social Welfare to expand its educational programme in emergency care to district-level hospitals. The collaboration of multiple academic institutions in bringing emergency medical services and academic EM teaching to a post-conflict setting remains a unique model for introducing emergency medicine in a developing country.

Acknowledgments

We would like to acknowledge the administration, faculty, and staff of the JFK Medical Centre, The Tubman National Institute of Medical Arts, and the AM Dogliotti School of Medicine in Monrovia, Liberia, for their active participation in this project. Without their tremendous effort, this work would not have been possible. We thank Althea Sherman and the rest of the leadership of *Health Education and Relief Through Teaching* (HEARTT) for their continued administrative support. Finally, we thank the people of the Republic of Liberia for welcoming and supporting us in our unique role in the Liberian health care system.

The manuscript was copyedited by Linda J. Kesselring, MS, ELS, the technical editor/writer in the Department of Emergency Medicine at the University of Maryland School of Medicine.

Appendix A. Short answer questions

Test your understanding of the contents of this case report (answers can be found at the end of the regular features section)

1. Which is NOT an essential element for quality expatriate resident participation in post conflict setting?
 - a. Access to Liberian and US based mentors
 - b. Focused education at a pre-departure training symposium
 - c. Understanding of high cost diagnostic modalities only used in the US

- d. Context specific educational content available on a website
 - e. Selection of senior residents with excellent independent clinical skill sets
2. Challenges to implementation of effective emergency care in countries with challenged health systems include:
 - a. Lack of approach to triage
 - b. Limited diagnostic resources
 - c. Lack of training among nurses and physicians about emergency conditions
 - d. Paucity of data collection that allows gathering of quantitative impact measure
 - e. All of the above
 3. The best method for rapidly increasing emergency care capacity in post conflict countries includes:
 - a. Spontaneous expatriate volunteers
 - b. Isolated independent emergency centres
 - c. Training health care workers not supported by the current health system
 - d. Recognition of national priorities coupled with a locally driven training plan
 - e. Both A & B

References

1. Doney MK, Macias DJ. Regional highlights in global emergency medicine development. *Emerg Med Clin North Am* 2005;**23**(1): 131–3.
2. United Nations. *Common country assessment for Liberia: consolidating peace and national recovery for sustainable development*. Monrovia, Liberia: United Nations; 2006.
3. Lee PT, Kruse GR, Chan BT, Massaquoi MB, Panjabi RR, Dahn WT, Gwenigale WT. An analysis of Liberia's 2007 national health policy: lessons for health systems strengthening and chronic disease care in poor, post-conflict countries. *Global Health* 2011;**7**:37.
4. Liberia, Ministry of Health and Social Welfare. *National health plan (2007–2011)*. Monrovia: MHSW; 2007.
5. Liberia, Ministry of Health and Social Welfare. *The basic package of health and social welfare services*. Monrovia: MHSW; 2007.
6. Liberia, Ministry of Health and Social Welfare. *Essential package of health services: secondary and tertiary care*. Monrovia: MHSW; 2011.
7. Kruk ME, Rockers PC, Williams EH, Varpilah ST, Macauley R, Saydee G, Galea S. Availability of essential health services in post-conflict Liberia. *Bull World Health Organ* 2010;**88**:527–34.
8. Liberia, Ministry of Health and Social Welfare. *Emergency human resources for health plan (2007–2011)*. Monrovia: MHSW; 2007.
9. Challoner KR, Forget N. Effect of civil war on medical education in Liberia. *Int J Emerg Med* 2011;**4**:6.
10. Liberia, Ministry of Health and Social Welfare. *Assessment of health training institutions in Liberia*. Monrovia: MHSW; 2007.
11. Kotlyar S, Moor CL. Assessing the utility of ultrasound in Liberia. *J Emerg Trauma Shock* 2008;**1**(1):10–4.
12. AAMC. *AAMC Medical School Graduation Questionnaire*. Association of American Medical Colleges; 1984.
13. AAMC. *AAMC Medical School Graduation Questionnaire*. Association of American Medical Colleges; 2001.
14. AAMC. *AAMC Medical School Graduation Questionnaire*. Association of American Medical Colleges; 2010.
15. Ramsey A, Haq C, Gjerde C, et al. Career influence of an international experience during medical school. *Fam Med* 2004;**36**(6):412–6.
16. Jeffrey J, Dumont R, Kim G, et al. Effects of international health electives on medical student learning and career choice. Results of a systemic literature review. *Fam Med* 2011;**43**(1):21–8.
17. Bauer TA, Sanders J. Needs assessment of Wisconsin primary care residents and faculty regarding interest in global health training. *BMC Med Educ* 2009;**9**:36.
18. Sawatsky A, Rosenman D, Merry S, et al. Eight years of the Mayo International Health Program: What an international elective adds to resident education. *Mayo Clin Proc* 2010;**85**(8):734–41.
19. World Health Organization. *Integrated management of adolescent and adult illness*. Geneva, Switzerland: World Health Organization Publications; 2005.
20. World Health Organization. *Integrated management of childhood illness*. Geneva, Switzerland: World Health Organization Publications; 2001.
21. Medecins Sans Frontieres. *Clinical guidelines: diagnosis and treatment manual*. 7th ed. Paris, France: Medecins Sans Frontieres; 2007.