

Emergency and critical care development in Ethiopia: a lot is achieved and yet further to go

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Introduction

The emergency care system is a continuum from prehospital care to definitive emergency facility care. It has the following components: accessing care, care in the community, care during transportation, and care on arrival at a receiving facility. It starts from the initial stages of the emergency care continuum, including emergency call numbers, dispatch of emergency personnel to the scene of an illness or trauma, and triage, treatment, and transport of patients by ambulances. (1) At the facility level, emergency room practice focuses on assessment, diagnosis, stabilization, and disposition of undifferentiated emergent and urgent medical and traumatic conditions. (2)

Emergency medicine is a new field of medicine that has developed in the past six decades in the United States, United Kingdom, and Canada. After this new field came into the picture, it had to pass through different steps to mature and prevail. These milestones included the beginning of academic programs, formation of a professional society, recognition of the specialty, and development of career structure. (3,4)

In the African context, in 2003, EM was added to the list of recognized specialties in South Africa and the African federation of emergency medicine, which was established in 2009. (2,5,6) It also started to grow at a faster rate in other African countries. In 12 African countries, there are 15 emergency medicine graduate programs for physicians. Some of the countries with emergency medicine are South Africa, Ethiopia, Tanzania, Sudan, Ghana, Egypt, Rwanda, Kenya, Malawi, Libya, and Mozambique. (6,7) In Ethiopia emergency medicine has been growing at a faster pace in the past decade. Emergency care has been there in all health facilities in the country since modern medicine started a century back but the current development is bringing a transformation to emergency and acute care in the country in an integrated manner.

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In Ethiopia, this initiative started at TikurAnbessa Specialized Hospital, School of Medicine, Addis Ababa University. The product of this work includes successful accomplishment of graduate programs in Emergency and Critical Medicine, Masters in Emergency and Critical Care Nursing, short courses in related areas both in adults and pediatrics for health care professionals and community members, successful incorporation and implementation of emergency medicine in the undergraduate curriculum; effective implementation of local and international partnerships geared towards emergency medicine development. The progress made at the academic hospital assisted the Ministry of Health (MOH) in planning, implementing, and scaling up of initiatives in emergency and critical care and related areas, including the establishment of prehospital care. (8,9,10) Finally, the Ethiopian society for emergency professionals (ESEP) was established.

The professional society's development was instrumental in strengthening networking, forging continuous professional development, and closely working with policymakers. (8) Although this discipline is growing fast, there are formidable challenges that patients, professionals, and hospital leaders are facing. Therefore, the growth, achievements, and challenges of Ethiopia's emergency and critical care discipline are described below. It includes the professionals' human resource growth and leadership roles, advances in prehospital and facility care emergency and critical care, disaster and COVID-19 pandemic handling, and emergency care system partnerships.

1. Establishment of emergency medicine and human resource growth

In the past decade, in Ethiopia, there has been significant effort and growth in emergency and

critical care. Among other important factors, the formation of an emergency medicine task force (EMTF) with core group physicians in Addis Ababa University, School of Medicine (AAUSOM) contributed a lot to this program's growth and development of the discipline. EMTF emergency medicine establishment proposal was accepted by AUSOM academic commission and a place was allocated for future emergency medicine at TikurAnbessa Specialized Hospital (TASH). In 2009, emergency medicine service unit was established at TASH, and it became emergency department (ED) in 2010 when graduate programs started. The EMTF, along with the University of Wisconsin and the University of Toronto, developed a curriculum and started two graduate programs. Furthermore, several universities from the USA and Africa were instrumental in the development of these programs following a catalytic role played by the American international health alliance (AIHA)-Twining center and people-to-people organization that had connected the new ED with several universities through the CDC/PEPFAR funding.

The two programs started in 2010 were emergency medicine for physicians, which is a 3 years program (later changed to emergency and critical care medicine), and emergency and critical care master's program for nurses, which is a 2 years program. In 2014, after stakeholders' need assessment and further consultations, the emergency medicine program was transformed to emergency and critical care medicine. The two most important reasons for the revision were, first, increased demand for emergency and critical care physicians by the FMOH that followed newly expanding ICUs, and second, the professionals' demand for broader career and alternative working environment. (8,9) It is noteworthy to mention that these academic programs were undertaken in consultation and with support from the ministry of health. FMOH was committed to

expanding emergency and critical care facilities and starting a prehospital care program.

After the first batch graduated, they started to work in university hospitals. Without any delay, the graduates from AAUSOM started the second graduate program at Saint Paul Millennium Medical College (SPMMC). SPMMC established Addis Ababa Burn Emergency and Trauma (AaBET) hospital, a newly established emergency care center to improve patients' care and where most of the EMCC residency training is placed. Currently, there are 5 universities with emergency and critical care specialty program (AAU, SPMMC, Jimma University, Haromaya University, and Hawassa University) and 4 universities with MSc. program (AAU, SPMMC, Haromaya University, and Hawassa University). There are 100 physicians and 280 MSc. nurses that graduated from the two senior schools. (Table 1) The graduates are

working in Addis Ababa and the regional hospitals. Almost all 10 EDs in AA public hospitals are handled by EM physicians and the EDs of 10 hospitals in the region, namely Harar, Jima, Gonder, Bahardar, Asela, Dila, Adama, Hawasa, Nekemte, Mekele, and Hosana are managed by emergency and critical care physicians. Public ICU services also grew from less than 10 a decade ago to more than 70 in Addis Ababa and regional hospitals. MCM, which is a private hospital in Addis Ababa, has 3 EMCC physicians covering the EDs and ICUs 24 hours a day, while there are other private hospitals with part-time coverage of EDs and ICUs by EMCC physicians. SPMMC also started other trainings related with emergency and critical care like respiratory therapy and paramedic MSc. Programs. In addition, there is BSc. in emergency critical care nursing program at 10 universities and emergency medical technicians' trainings at vocational schools.

Table 1: Emergency and critical care human resource production from different universities, January 2023

	Graduate Specialists	EMCC	EMCC residents currently on training			
			RI	RII	RIII	TOTAL
AAU	63		25	20	12	57
SPMMC	37		21	28	19	68
Jima University			10	9	3	22
Haromaya University			4	5		9
Hawassa University			5			5
Total	100		65	62	34	160
	Graduates from masters in EMCC		EMCC nursing currently on training			
			1 st year	2 nd year		
AAU	282		29	9		38
SPMMC*(critical care)	25		27	12		39
Haromaya University			6	-		6
Hawassa University			6	6		12
Total	307		68	27		95

2. Facility emergency and critical care setup

Prior to the training of specialist emergency and critical care physicians in Ethiopia, untrained staff in emergency care undertook the management of emergency units. The care of urgent cases often took place in the corridor, where there were no areas defined specifically for triage, stabilization, or resuscitation; oxygen might not have been available. As discussed in the aforementioned topics, modern integrated emergency care started with the establishment of 20 bed emergency services unit (EMSU) at TikurAnbessa specialized Hospital (TASH) in 2009. Since then, the following chains of milestones that started to change the situation of facility emergency care happened:

Firstly, MOH restructuring categorized hospital responsibilities into three areas: ambulatory care, inpatient services and emergency services. Recently the FMOH-ECCD developed ED levelling document that categorized EDs into basic, intermediate and tertiary care, which helps with the monitoring and supportive supervision. This resulted in FMOH and stakeholders to become actively engaged in supporting the development of emergency and critical services.

Secondly, mutual relation developed between FMOH and emergency care professionals that enhanced the system development. Emergency professionals started to be heard by the ministry, which positioned them to be engaged in policy making.

Thirdly, emergency and critical care professionals' leadership roles through identification of gaps, planning, and advocacy are playing a significant shift in creating better resources, including human resource, physical space, and infrastructure development, medical equipment, supplies, and emergency drugs.

ED infrastructure and space is neglected issue although ED is a vital interface between the

community and the wards. Traditionally, better attention was given to OPDs, inpatient wards, and other units, but the concept of the physical space in the ED and patient flow had been neglected. It was challenging to start and lead emergency service in such a scenario. Consequently, emergency service at all tertiary centers has been significantly overcrowded, causing staff dissatisfaction and discontent from patients and their families. It also leads to medical errors and safety concerns. (10) Therefore, in Ethiopia, emergency professionals are working with hospital management to have new structures with better space and flow map with good access to laboratory, imaging services, pharmacy and ICU. Emergency flow map should contain triage, resuscitation, observation and treatment area, and adequate waiting areas. In addition, based on the need, it can have acute care unit, short stay, or intermediate ward. The design should also consider proper procedure rooms, adequate working stations, isolation rooms, storage and utility areas, and staff zone. In this regard, many hospitals are paying attention to adequate emergency rooms in their construction and repurposing existing structure. The new emergency medicine building under construction at TASH and the new functional repurposed building at AaBET hospital are some of the examples. (11)

Since emergency care professionals have come to the system, one important area that is improving is planning and advocacy activities to get emergency equipment, supplies, and medications. These efforts have resulted in better availability of equipment and medications and is utterly different from the old ERs. Different ERs depending on their standards, have equipment like oxygen face masks, airways, LMAs, ambubags of different sizes, intubation kits, ventilators, portable ultrasounds, portable X rays, and crash carts with resuscitation drugs.

3. Leadership and public health management

The graduates have served in different Leadership positions starting from FMOH emergency and critical care directorate director to CEO levels at hospitals. For instance, currently, there are two medical schools' Deans (Hawassa medical school, Hawassa University, and Harar medical school, Haromaya University). The EMCC graduates are serving as department heads in all EDs they work in, and ICU heads in some hospitals. In many COVID-19 centers, emergency and critical care professionals were the first to face and lead the complex clinical as well as the public health aspects of the pandemic. These professionals open and manage new EDs, ICU, and isolation and treatment centers in outbreak-pandemic scenarios. The leadership role of the professionals weighs very much compared to the age of the profession. These make need assessment, planning, implementation, and monitoring, as well as surveillance concepts, very important to these professionals. Therefore, it is evident that public health as well as leadership and management skills, are much needed, though they are not addressed well in undergraduate or graduate studies.

4. The prehospital care

In the past decade, cognizant of the need for prehospital care, FMOH has exerted significant efforts on the development and expansion of ambulance service. Before 2010, ambulance service was being provided only by Ethiopian Red Cross Society.

Since 2010, the FMOH has allocated fund that was enhanced by additional community mobilization efforts, and as of 2020, it purchased about 4300 ambulances. Except for Addis Ababa, where nurses operate, EMTs are providing care in the ambulance in the rest of the country. As of 2020, out of 2081 EMTs that were trained, 1089 were at work. The attrition of these new human resources is higher

due to vague career structure and poor motivating system.

In most regions, ambulance driving is not a special profession and has no special standards for the driver; hence, any driver can be employed. This is an area where new drivers come, develop good driving skills and leave for better employment elsewhere; transferring the ambulance again to a new driver creates a vicious cycle. In the FMOH, there was an attempt, not realized yet, to make the EMT professionals capable of driving ambulances in addition to the patient's care. In this initiative, it was planned to improve EMTs career, create a better incentive system and retain the profession with good care to the vehicle itself.

In addition to the human resource challenges, the system is not well developed. Some system elements that should be developed in the future include developing a clear dispatch center, centralized call numbers, a quality assurance mechanism, medical oversight, and a sustainable financial management system. By doing so, the public will develop trust, and ambulance service will shift from the current maternal emphasis to all emergency care.

ERCS and private ambulance services are additional prehospital service providers operating in the country. Ethiopian Red Cross Society (ERCS) delivers ambulance and first aid services with 308 ambulances in its 215 ambulance stations. Regional/Zonal branches and Wereda coordination office strengthen their emergency response capacity and deliver Ambulance and First aid services for any emergency call, providing free-of-charge service for 24 hrs. Trained youth volunteers and professional volunteers support ambulance and First Aid services. ERCS is working on the development of a national ambulance service to transform from an emergency transport service to a coordinated prehospital emergency ambulance service. (13) Tebita, the first private ambulance system operating in Ethiopia, has more

than 20 ambulances, including advanced-level and remote-location ambulance services.

5. Disaster and COVID-19 response

Emergency health care system and professionals' response to different man-made conflicts and COVID-19 response has been well established. In August 2018, FMOH established the disaster medical assistance team (DMAT) and response system. This system responded to several man-made conflicts and COVID-19 responses. The achievements of DMAT include basic training on disaster response that was cascaded to 678 multi-disciplinary professionals; engagement in Metekel and Asosa, Benishangu- Gumuz region conflict in 2018, Jijiga conflict response in 2018; response to the Ethiopian Airplane crash in 2019; COVID 19 response starting from 2020. It has also engaged in Tigray-Amhara-Afar regions mass causality responses following the internal conflict incidents since October 2020. The FMOH and the professionals have done exemplary tasks, but the challenge is that there is no clear DMAT structure that puts its sustainability in jeopardy. (11, 14)

The covid-19 response has been a challenge as well as an opportunity for the emergency care system and professionals. It helped stakeholders give better attention to the whole system of emergency care, from prehospital care to the intensive care unit. It became an opportunity to get equipment from simple ones to ventilators. For instance, the number of ventilators has more than doubled, and critical care beds have grown from 300 to 537. (15)

In Ethiopia, the first and immediate response to COVID-19 pandemic was given by emergency professionals. ESEP prepared the first COVID-19 response course that other health professionals joined later. In collaboration with FMOH and other stakeholders, ESEP also organized a short-term COVID-19 critical care course that resulted in the training of 2500 professionals. The first professionals who donned (put on) and doffed

(took off) the protection and treated the first COVID-19 case were emergency medicine doctors and nurses who were also members of DMAT. The competency and emotional and mental preparedness helped kick off the daunting task of COVID-19 care and became models for other professionals. Furthermore, emergency professionals played a significant role in the leadership of COVID-19. The FMOH clinical advisory team had many members from emergency medicine and was chaired by emergency medicine physician. Addis Ababa and the regions' emergency professionals led as team members and chairs in hospitals and regional health departments. (16,17)

In Addis Ababa, there were (and still are) three ambulance operators, the AA Fire and Emergency Service, the Red Cross Ambulance Service, and Tebita, a small private ambulance company. Moreover, every health center and hospital now have a dedicated ambulance for maternal and obstetric emergencies. The Addis Ababa Fire and Emergency Service is the largest service and now has seven branches in Addis Ababa.

6. Ethiopian Society of Emergency and Critical Care professionals (ESEP)

Ethiopian society of emergency professionals (ESEP) was established in 2012 but changed to Ethiopian society of emergency and critical care professionals in 2018. The composition of ESEP is unique: members were drawn from graduates of emergency and critical care physicians, emergency and critical care nursing masters, and paramedics. It is also a member of AFEM and IFEM. Cognizant that emergency care is team work, the society accepted this diverse group of professionals so that team function can be manifested in the society as well. Since its establishment, it has worked to fulfill the following objectives:

1. Promote alliance among emergency and critical care professionals practicing in different parts of Ethiopia and advocate for their rights.

2. Contribute its share in the expansion of emergency services in Ethiopia and work with the responsible government bodies to develop relevant policies and strategies.

3. Ensure emergency and critical care professionals' competency through advising on curriculum standards and providing continuing professional development (CPDs).

4. Develop funding capacity and conduct research on issues related to emergency and critical care development, conduct national, regional, and continental as well as international conferences, trainings, seminars, and continuing professional development meetings on emergency care.

5. Establish a working relationship with regional, continental as well as global sister associations.

ESEP has a successful collaboration with FMOH and other national and international stakeholders. It has conducted many successful projects like training COVID-19 ICU professionals. However, ESEP has many opportunities to grow and advance. Some areas of improvement include strengthening its different chapters like nursing, physicians, graduating students and even medical students. Regional chapters with defined roles will strengthen and cement the society.

7. National and International Partnerships

National

In the development of emergency and critical care system, the contribution of in-country collaborations is immense in policy formulation, resource identification, and human resource production. The main actors which worked together towards this goal include MOH, AAUSOM, SPMMC, fire and emergency prevention and rescue authorities, Addis Ababa Red Cross and the Ethiopian Red Cross Society, Private ambulance organizations, police departments, road safety authority, the Armed Forces General Hospital, Ethiopian Airlines, and other civil aviation

organizations. Among all these, the partnership with FMOH has been a special one.

It is known that the ministry of health provides policy, supports implementation, and has monitoring and evaluation roles. Emergency and critical care professionals have closely engaged in policy advisorship, development of standards, and preparation of curricula, training materials and guidelines. The National integrated emergency medicine training Module (NEMTM) and short course ICU modules were among many modules developed for the training of professionals. Similarly, curricula and training materials were developed for nurses providing ambulance service in Addis Ababa and emergency medicine technicians in the regions. The professionals are keen to support and work with the ministry and the regional health departments and even are engaged in regular monitoring and supportive supervisions. The exemplary mutual relationship between the ministry, regional health department, and the professionals has developed trust, efficient and effective resource utilization, and better health services output and outcome.

International

Human resource production has been the central catalyst in the country's emergency and critical care development. Many international universities assisted these efforts, but University of Wisconsin and University of Toronto were the main contributors to the early programs started in AAUSOM. CDC and American international health alliance supported UW partnership through PEPFAR funding that ended in 2016 (18). University of Toronto emergency medicine partnership is under the umbrella of Toronto Addis Ababa Academic collaboration (TAAAC). Initially, the TAAAC-EM's focus was on assisting residency program education, but now there is a strategic shift to capacity building of the faculty in fellowships, leadership, research, and other relevant areas; furthermore, the partnership is still

active. (19) Ethiopian diaspora organizations like Ethiopian North American Professionals Association (ENAPA) and People to People(P2P) also played a role in linking with international organizations and volunteer professionals. In addition, WHO is the main collaborator with the FMOH at the system level. There are important activities carried out in partnership over the past five years. These include emergency care system assessment (ECSA), Global Emergency and trauma Initiative (GETI), and introduction of trauma registry at major city hospitals, and introduction of WHO Basic Emergency Care (BEC) course for first-line providers. To date, there have been 2525 healthcare workers trained in BEC at a total of 155 woredas (districts) and 714 healthcare centers across Ethiopia. (11)

8. Lessons learned and challenges

Lessons learned

Over the last 10 years, emergency and critical care service delivery has expanded significantly. For this success, the key facilitators have been the commitment of university hospitals to produce higher and intermediate level emergency and critical care human resource and initiating ambulance workers trainings in the regional centres. FMOH played an active role in planning and implementing the expansion and development of human resources, strengthening emergency units and ICUs, providing ambulances, and setting up trauma, burn, and poison centres. In addition, the role of international partners was crucial in the development of the new disciplines.

In the Ethiopian context, the biggest lesson learned in the development of the new discipline is the power of collaboration. In the early years, AAUSOM has taken a very proactive stance in describing the nature of the problems to the FMOH through the EMTF. Later, both AAUSOM and SPMMC were crucial in planning and implementing the training courses that were essential to ensuring adequate numbers and

competence of the staff providing emergency and critical care services. The training and service delivery took exponential growth as four additional regional universities opened graduate programs. It is easy to visualize that Ethiopia is on the right track to becoming one of the African countries to be self-reliant and support the regional growth of this vital human resource. The leadership of the FMOH has been crucial in setting the policy direction nationwide, securing the necessary resources, and ensuring that all the essential components of a comprehensive emergency and critical care systems are in place.

Challenges and recommendations

Poor emergency care system

While the country has registered amazing growth in terms of ambulance volume prehospital care system is not yet strong. Ambulances primarily provide service to maternal causes and facility-facility transfer, but there is no timely response to the actual emergency and trauma patients at the scene. FMOH and all stakeholders should evaluate the prehospital care system and come up with practical solutions starting from leadership and governance, communication and dispatch system, ambulance workforce and its internal setup.

Poor patients flow

Most of the tertiary center EDs are overcrowded, with prolonged stays blocking access to newly coming unstable patients. In that case, the very reason that emergency care system is created is defeated. Besides, it causes dissatisfaction among patients and staff and leads to medical errors having safety concerns. The main reasons for this deadly challenge among others are poor inpatient turnover; inpatient team requiring completion of investigation and settled diagnosis to admit patients; high burden of palliative cases that inpatient team doesn't want to admit; and finally, human factors with delayed consultation, response, or delayed decision. To tackle these problems, emergency department should closely

work with all stakeholders in the hospitals and the management team should support the flow process by enforcing protocols and conducting quality improvement works.

Under-resourced EDs

Shortage of equipment, supplies, and emergency drugs is the other challenge. Emergency care is resource intensive care as new unstable cases and those patients stay for observation and treatment deplete the resources. ED leaders and professionals should thoroughly plan to close this gap. It's important to diversify the source of equipment and supplies as more than government sources is needed. In addition, avoiding wastage of resources and equipment damage through preventive maintenance and good management has to be emphasized.

Staff dissatisfaction

Many unpublished studies showed that there is significant dissatisfaction and burnout of emergency professionals. Among many reasons, some of the causes are:

Firstly, for overburdened professionals working in high-risk environments, there is no commensurate benefit package or remuneration. Secondly, there is no clear or robust career opportunity, while there are easy fellowship possibilities in other clinical disciplines. Thirdly, as it is a new specialty in some hospitals, there is no strong support from the administration and other specialists.

In conclusion, emergency and critical care development has significant growth in the country but there are substantial gaps that have to be narrowed through time. Hence, there should be strong and persistent advocacy and communication with all relevant stakeholders to solve these problems. In addition, emergency and critical care professionals working in hospitals have to work closely with their management and other professionals to solve internal problems,

while policy level issues can be addressed collaboratively using ESEP platform.

Conflict of Interest

The author declares there is no conflict of interest.

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