

The Emergency Medical Services System of South Korea: The Present and Future of Emergency Medical Technicians

Hong-Seok Baek¹, Sang-Sub Park²

¹Dept. of Emergency Medical Technology, Daejeon University, 62 Daehak-ro, Dong-gu, Daejeon, 34520, Republic of Korea; ²Dept. of Emergency Medical Technology, ChungCheong University, 38 Wolgok-Gil Gangnae-Myeon, Heungdeok-Gu, Cheongju-Si, Chungcheongbukdo, 28171, Republic of Korea

ABSTRACT

Objectives: This study aimed to analyze the present and future of the work scope for emergency medical technicians (EMTs) in the South Korean emergency medical services system (EMSS). This is qualitative research with secondary data analysis based on literature review.

Method: This is qualitative research aimed at interpreting and understanding the meanings of social and cultural phenomena. It aimed to investigate the social phenomena—current situations—of the work scope for EMTs in EMSS and make suggestions for increasing the scope in a future-oriented way.

Result: As for the work scope for EMTs in South Korea, EMTs-Level 1 are in charge of airway intubation, laryngeal mask intubation, securing of an intravenous route, and medication (glucose injection against hypoglycemic coma, sublingual nitroglycerin against chest pain, a fixed amount of fluid infusion against shock, and bronchodilator inhalation against asthma exacerbation) in addition to those tasks of EMTs-Level 2. US EMTs-Paramedic are in charge of a wider range of tasks, including cardioversion and medication permitted in emergency, in addition to those tasks of EMTs-Basic and EMTs-Intermediate.

Conclusion: EMTs actually play insignificant roles in South Korean EMSS. While the number of new good-quality EMTs increases on an annual basis, the scope of their work has insignificantly been changed for the past 20 years. South Korea needs to reinforce systems and legislation that can give good-quality EMS appropriate for advanced EMSS.

Keywords: EMS, EMSS, EMT, In-hospital, Pre-hospital, Scope of work

Introduction

EMSS is divided into two stages: the pre-hospital stage at which medical service is provided outside hospital ^[1] and the in-hospital stage at which emergency medical service is provided in an emergency room ^[2]. Gomes et al^[3] suggested that EMSS provide efficient EMS

through on-site work, transportation, communication, and arrival at hospital. Sayed ^[4] suggested the need for manpower, facilities, and equipment so that EMSS could give medical service efficiently.

NHTSA ^[5] indicated that diagnosis and treatment in pre-hospital EMS was mostly performed by EMTs. Al-Shaqsi ^[6] suggested that paramedics play crucial roles as treatment providers in EMSS. It is EMTs who play central roles among human resources in EMSS ^[4,5,6].

EMTs need to give efficient first-aid in pursuit of a higher survival rate for first-aid patients in emergency. MOLEG ^[7] suggested that EMTs in South Korea be divided into EMTs-Level 1 and EMTs-Level 2. The United States has them divided into EMT-Basic, EMT-Intermediate, and EMT-Paramedic, which varies among states ^[8].

Corresponding Author:

Sang-Sub Park
Dept. of Emergency Medical Technology,
ChungCheong University,
38 Wolgok-Gil Gangnae-Myeon,
Heungdeok-Gu, Cheongju-Si,
Chungcheongbukdo, 28171, Republic of Korea
Email: woonseo@hanmail.net

MOLEG [7] notes that EMTs-Level 1 in South Korea are in charge of airway opening for cardiopulmonary resuscitation (CPR), securing of an intravenous route, breathing maintenance using a respirator, and medication (glucose injection against hypoglycemic coma, sublingual nitroglycerin against chest pain, fluid infusion against shock, and bronchodilator inhalation against asthma exacerbation) in addition to those tasks of EMTs-Level 2. EMTs-Paramedic in the United States are in charge of electrocardiogram (ECG), permissible drugs in emergency, esophageal intubation, airway intubation, and medication (hypoglycemic glucagon/50% glucose, sublingual nitroglycerin against chest pain, intravenous injection, intramuscular epinephrine against anaphylaxis, antagonist in case of drug overuse, nitrous oxide in case of pain, etc.), which varies among states [8,9].

The work scope for EMTs differs between the United States and South Korea, which is still at the elementary level. That is, EMTs in South Korea have difficulty in accessing professional first-aid on emergency sites or in medical institutions due to their limited tasks. Sun [10] contend that although EMTs play major roles in EMSS and remove the risk of death from people faced with the risk, they can shrink psychologically due to possible legal sanction caused by a narrow scope of tasks [10]. It is necessary to reflect on the realities of pre-hospital EMS and develop a plan for improving the tasks of EMTs to protect the people’s life in South Korea. This study aimed to investigate the tasks of EMTs in South Korean EMSS and help widen the scope of their tasks in a future-oriented way and improve EMS. It intended to provide basic data that could help widen the scope of EMTs’ work and revise EMSS-related legislation.

Method

1. Study desi: This study aimed to analyze the present and future of the work scope for EMTs in South Korean EMSS. It was based on the data from the National Fire Agency (NFA) [11] and the National Emergency Medical Center (NEMC) [12] and on literature review. This is qualitative research with secondary data analysis based on the data from NFA and NEMC and on literature review.

2. Actual state of EMTs: The actual state of new EMTs is as presented in Table 1. There were an average of 2,953 new EMTs on an annual basis: 1,319 EMTs-Level 1 (44.7%) and 1,634 EMTs-Level 2 (55.3%).

The gender ratio of new male and female EMTs-Level 1 was 54:46. That of new male and female EMTs-Level 2 was 89:11. The high gender ratio of EMTs-Level 2 is probably due to EMT qualification by firefighters working at fire stations[11,12].

NFA[11] reported that a total of 7,623 persons worked at NFA. EMTs-Level 1 (4,034; 52.9%) were slightly more likely to work at NFA than EMTs-Level 2 (3,589; 47.0%).

Table 1: Number of new EMTs in each year*

	EMT-Level 1			EMT- Level 2		
	Total	Male	Female	Total	Male	Female
2013	1,147	599	548	1,343	1,208	135
2014	1,210	666	544	1,598	1,425	173
2015	1,327	746	581	1,271	1,124	147
2016	1,371	739	632	1,625	1,432	193
2017	1,544	816	728	2,336	2,096	240
Mean	1,319	713	606	1,634	1,457	177

[12]NEMC, Emergency Medical Statistical Year Book, 2018

3. Procedure of research: This study covers new EMT status, EMT education programs, and the scope of EMTs’ tasks to investigate the whole scope of tasks for EMTs, who belong to the human resources in South Korean EMSS. Theme selection was followed by literature review, data collection, and result-obtaining.

This is qualitative research aimed at interpreting and understanding the meanings of social and cultural phenomena. It aimed to investigate the social phenomena—current situations—of the work scope for EMTs in EMSS and make suggestions for widening the scope in a future-oriented way.

In other words, this is qualitative research with secondary data analysis based on literature review. This study was approved by Institutional Review Board(IRB)(Human_006_20181130_2nd).

Result and Discussion

1. Work status for EMTs: The actual work status for EMTs is as presented in Table 2. NEMC [12] reported that there were a total of 10,541 EMTs: 6,177 EMTs-Level 1 and 4,364 EMTs-Level 2.

8,587 EMTs worked for 119 EMS and private EMS at the pre-hospital stage: 4,622 EMTs-Level 1 (53.8%) and 3,965 EMTs-Level 2 (46.2%). The differences in the number of EMTs between NFA^[11] and NEMC^[12] are due to the inclusion of those qualified both as a private transporter and as an EMT.

1,894 EMTs worked at emergency departments in emergency medical centers, hospitals, and others at the in-hospital stage: 1,495 EMTs-Level 1 (79.5%) and 399 EMTs-Level 2 (20.4%)

Table 2: Work status for EMTs

	Working Department	EMT-Level 1	EMT-Level 2	Total
Prehospital EMS	119 EMS	4,072 (47.4)	3,606 (42.0)	7,678 (89.4)
	Private EMS	550 (6.4)	359 (4.2)	909 (10.5)
	Subtotal	4,622 (53.8)	3,965 (46.2)	8,587 (100.0)
Hospital EMS	Emergency Department	925 (47.3)	38 (1.9)	963 (49.3)
	Hospital	498 (25.5)	147 (7.5)	645 (33.0)
	Others	132 (6.8)	214 (10.9)	346 (17.7)
	Subtotal	1,555 (79.5)	398 (20.4)	1,954 (100.0)
Total		6,177 (58.6)	4,364 (41.4)	10,541 (100.0)
[12] NEMC, Emergency Medical Statistical Year Book, 2018				

2. Scope of EMTs’ work(South Korea): The scope of EMTs’ work is as follows (South Korea). EMTs-Level 2 in South Korea are in charge of airway opening using an airway, removal of foreign body in oral cavity, basic life support(bls), oxygen administration, limb and spine fixation, external hemostasis and first aid for wounds, wearing of trauma air pants, automated external defibrillator, vital sign check, sublingual nitroglycerin against chest pain, and bronchodilator inhalation against asthma exacerbation^[7].

EMTs-Level 1 are in charge of airway intubation, laryngeal mask intubation, Scope of EMT-Level 2, securing of an intravenous route, and medication (glucose injection against hypoglycemic coma,

sublingual nitroglycerin against chest pain, a fixed amount of fluid infusion against shock, and bronchodilator inhalation against asthma exacerbation) in addition to those tasks of EMTs-Level 2^[7].

3. Scope of EMTs’ work(US): The scope of EMTs’ work is as follows (US). US EMTs-Basic are in charge of basic life support, cervical & spinal fixation, splint application, airway & breathing management, pulsation and oxygen measurement, medication (oral glucose against hypoglycemia, aspirin against chest pain etc) and automated external defibrillator. EMTs-Intermediate are in charge of basic life support, intravenous injection, application of trauma air pants, esophagobronchial intubation, multi-Lumen airways, endotracheal intubation, medication (50% glucose, antagonist in case of drug overuse, sublingual nitroglycerin against chest pain, intravenous injection, intramuscular epinephrine against anaphylaxis, nitrous oxide in case of pain etc) and automated external defibrillator in addition to those tasks of EMTs-Basic. EMTs-Paramedic are in charge of a wider range of tasks, including cardioversion and medication(inhaled – beta agonist & bronchodilator, Anticholinergic for dyspnea and wheezing, permissible drugs in emergency etc) permitted in emergency, in addition to those tasks of EMTs-Basic and EMTs-Intermediate^[8,9,13,14].

In the United States, the scope of work varies among states^[8,9,13,14]. EMT categorization also varies among states. ASTHO^[8] reported that Florida divided them into EMTs and paramedics; Georgia divided them into cardiac technicians, EMTs, and paramedics; Idaho divided them into emergency medical responders, EMTs, advanced EMTs, and paramedics; and Mississippi divided them into EMS drivers, EMTs-Basic, EMTs-Intermediate, EMTs-Paramedic, and EMTs-Paramedic Critical Care.

This division differs from the South Korean EMT division—EMTs-Level 1 and EMTs-Level 2—which was suggested by MOLEG^[7] along with the institutional differences in the scope of work.

4. Elements of performance for EMTs at pre-hospital stage in EMSS: The elements of performance for EMTs at the pre-hospital

stage in EMSS are as follows. The elements of performance for EMTs at the pre-hospital stage in EMSS include the number of EMTs-Level 1 and EMTs-Level 2 per the whole population and the EMT occupancy rate. The four stages—system introduction, quantitative growth, qualitative growth, and advanced system operation—which were suggested by MOHW and KOFIH ^[15] cover no first-aid based on the increase in the scope of work for EMTs. Since these tasks are related to emergency medical service requiring a doctor's medical guidance, it seems to imply an aspect of medical guidance at the stage of advanced system operation rather than an increase of EMTs' tasks.

- 5. Present and future of EMTs:** MOLEG ^[7] reports that EMTs in South Korea are divided into EMTs-Level 1 and EMTs-Level 2. ASTHO ^[8] reports that US EMTs are divided into two (EMTs and paramedics) to five (EMS drivers, EMTs-Basic, EMTs-Intermediate, EMTs-Paramedic, and EMTs-Paramedic Critical Care) categories, which varies among states.

NHTSA ^[5] notes that the scope of EMS management in the United States varies among provinces and states. However, the tasks of EMTs who play key roles in EMS are improved through revision. To do this, efforts are made to improve EMS and widen the scope of EMTs' tasks through various types of research on agenda for the future of EMS ^[5], reinforcement of the roles of EMS ^[8], standardization of EMS education ^[9], and EMS models ^[13, 14].

In South Korea, four stages—system introduction, quantitative growth, qualitative growth, and advanced system operation—were presented through the process of EMSS establishment suggested by MOHW and KOFIH ^[15]. Another attempt was made to improve EMS by dividing EMSS into pre- and in-hospital stages. However, while EMS generally had constructive contents, EMTs were under legally poor conditions. In other words, there was a poor device for institutional improvement. While the South Korean EMSS has been improved significantly since the establishment of the Emergency Medical Services Act in 1995, EMTs have failed to perform their duties well.

According to the legal interpretation by MOLEG ^[7], EMTs have never been qualified for advanced life support (ALS) due to legally limited tasks in emergency. Since the establishment of the Emergency Medical Services Act in 1995, they have failed to provide ALS.

Poor legislation can cause EMTs to avoid positive first-aid in emergency due to possible legal problems. Such avoidance is also expected to be found in relation to medication. Limited tasks can possibly cause some risks, not giving full consideration to the characteristics of EMS. The current EMS system fails to widen the scope of tasks for EMTs and the limited scope of their tasks can be fatal to people's life. It is therefore necessary to determine if the current limited scope of tasks for EMTs is reasonable in pursuit of the better future of EMSS. It is hoped that better legislation will be made in pursuit of improvement in EMSS and first-aid patients' survival. The improvement in the scope of tasks for EMTs is expected to realize first-aid at the level of advanced EMSS in case of emergency. Under the current emergency medical services act, it is necessary to adjust the scope of work not requiring doctors' medical guidance in emergency or to reinforce doctors' medical guidance.

Conclusion

EMTs actually play insignificant roles in South Korean EMSS. While the number of new good-quality EMTs increases on an annual basis, the scope of their work has insignificantly been changed for the past 20 years. South Korea needs to reinforce systems and legislation that can give good-quality EMS appropriate for advanced EMSS. It is necessary to widen the legitimate scope of work and reinforce on-site medical guidance. Under the current emergency medical services act, it is necessary to adjust the scope of work not requiring doctors' medical guidance in emergency or to reinforce doctors' medical guidance. It is hoped that efficient settlement of EMSS will give a chance to raise the level of EMS centered on EMTs for the people in South Korea

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Conflict of Interest: Nil

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