

Recognition of Medical Direction in Emergency Medical Service Personnel in Jeju

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Abstract

The purpose of this study was to investigate the recognition of medical direction in emergency medical service personnel in Jeju. The survey, which contained basic characteristics and 10 questions on medical direction using a five-point Likert scale, was conducted in 180 subjects. The sample included 156 men (86.7%), and the mean age was 37.1 ± 6.1 years. On comparing qualification license according to gender, it was found that most men were first responders (48.1%), while most women were nurses (62.5%), showing a significant difference ($p < 0.001$). The need for medical direction in emergency situations was 4.5 ± 0.6 in men, and 4.8 ± 0.4 in women ($p = 0.026$). In addition, the prediction degree of medical direction was 3.7 ± 0.7 in men, and 4.0 ± 0.4 in women, showing a significant difference ($p = 0.017$). There were differences of recognition of medical direction according to qualification license. EMT-basics and first responders exhibited a relative lack of professionalism, had higher scores on the need for medical direction during transportation, expectation of and satisfaction regarding medical direction, and efficacy of medical direction while handling severely ill patients. However, they had lower scores in the prediction and accomplishment of medical direction. In contrast, EMT-intermediates and nurses showed higher scores on the expectation of and satisfaction regarding medical direction. In conclusion, based on the experience and qualification license of the emergency medical service personnel, establishment of different educational programs and medical direction systems should be considered, to improve the recognition of medical direction in the community.

Keywords: *medical direction, recognition, emergency medical service*

1. Introduction

The Emergency Medical Service (EMS) system manages facilities, equipment, and personnel to provide rapid and effective emergency medical services to patients in certain communities. The EMS can be divided into the pre-hospital steps, in which proper first aid is provided, and rapid and safe transport is emphasized, and the hospital steps, in which emergency physicians provide intensive treatment and stabilize patients in the emergency room.

To set up an efficient EMS system in a community, it is essential to strengthen the EMS personnel's abilities and improve the quality of emergency department treatment. In addition, special cooperation is necessary to connect the effective step-by-step treatment from the pre-hospital field to a hospital emergency room. Emergency physicians should guide and control paramedics on scene or during transport to provide proper first aid, and EMS personnel have to provide accurate information about patients or their situations to prepare for proper treatment in the emergency room.

Medical direction plays an important role in this cooperation between physicians and EMS personnel and can be classified into direct and indirect control. Direct (on-line) control is the real-time interaction between a physician and the field provider, through which the emergency physician can communicate with the EMS personnel about patients' conditions and guide or order them proper management, thus enabling the field EMS personnel to provide more appropriate first aid to patients. Indirect (off-line) control includes protocol development, personnel education, prospective and retrospective patient care review, and quality improvement processes, which can help EMS personnel to perform a standardized protocol efficiently.

However, sometimes indirect control cannot provide a solution because there are many complicated and difficult cases in various pre-hospital field situations. Therefore, recently, direct control has been applied to provide the guidance for proper response on the field and during transport in most communities. In addition, some management should be performed to ensure that rules and regulations are followed with patients in specific conditions.

In Jeju Island, the headquarters of 119 fire rescuer service and emergency physicians of major hospitals have performed direct control based on the request of 119 EMS personnel. However, no survey has examined the recognition of medical direction in EMS personnel in Jeju, who requested for this direct medical control.

Understanding the awareness of medical direction in 119 EMS personnel and identifying ways to improve the quality of medical direction based on the analysis would help improve the EMS system in the community and achieve desirable outcomes for emergent patients. Therefore, we investigated the recognition of medical direction in 119 EMS personnel in the Jeju island.

2. Methods

The subjects included 180 EMS personnel in Jeju island, including 119 firemen rescuers. The participants responded to a survey containing items on basic characteristics such as gender, age, work and career details, and type of qualification license, and ten questions on medical direction.

EMS personnel were divided into one of four qualification licenses, *i.e.*, first responders, emergency medical technician basic (EMT-B), EMT intermediate (EMT-I), and EMT nurse. First responders are trained to perform limited life-saving interventions such as cardiopulmonary resuscitation (CPR), spinal immobilization, hemorrhage control, and use of an automated external defibrillation (AED). EMT-Bs are trained to take care of immediate life-threatening emergencies and perform more detailed interventions such as oxygen administration, CPR, AED use, hemorrhage control, extrication, immobilization, and assistance in using some of the patients' own medications. EMT-Is are trained to perform more comprehensive care and additional interventions such as intravenous insertion, basic electrocardiogram interpretation, and administration of some medication under the direct medical control. EMT nurses are EMS personnel who have a nursing license.

The questionnaire items about medical direction included the need and request of medical direction during transportation, decision of medical direction depending on the patients' severity, request of medical direction in an emergent situation, need for medical control under conflict of destination, expected degree and satisfaction of medical direction, effectiveness of medical direction while handling severely ill patients, and prediction degree and accomplishment of medical direction. Each question was rated on a five-point Likert scale ranging from one (strongly disagree) to five points (strongly agree).

The Stata version 10.0 was used for data analysis. Basic characteristics of the subjects were analyzed by an independent student t-test, a Fisher's exact test, and a ranksum test. The Difference in the awareness regarding medical direction between genders was

analyzed using an independent student t-test, and that between qualification licenses was analyzed using an ANOVA. In addition, strength consensus measurement and multivariate ordered logistic regressions were performed. The statistical significance threshold was 0.05.

3. Results

3.1. Basic Characteristics of the Subjects

The subjects included 156 men (86.7%). Their age ranged from 25 to 52 years, and mean age was 37.1 ± 6.1 years. Further, the mean age was 37.1 ± 6.6 years in men and 36.6 ± 9.4 years in women, with no significant group differences. In age distribution, 97 subjects (53.9%) were in their thirties, 64 (35.6%) were over their forties, and 19 (10.6%) were in their twenties, showing no difference between men and women. The 50 percentile rank (p50) was 5 years in men, and 10 years in women, indicating a significant difference ($p=0.035$).

Among the types of qualification license, first responders were the most common, with 75 subjects (41.6%), followed by EMT-I (50 subjects, 27.8%), EMT-B (38 subjects, 21.1%), and EMT nurses (17 subjects, 9.4%). As shown in Table 1, a comparison between genders revealed that first responders were the most common in men (48.1%), whereas EMT nurse were the most common in women (62.5%), showing a significant difference ($p<0.001$).

Table 1. Demographic Background of the Survey Participants (N=180)

	Male (n=156)	Female (n=24)	Total (n=180)	p-value
Age (years): mean (SD)	37.1 (6.6)	36.6 (9.4)	37.1 (6.1)	0.704*
Age category(years): n (%)				0.657**
20-29	16 (10.3%)	3 (12.5%)	19 (10.6%)	
30-39	86 (55.1%)	11 (45.8%)	97 (53.9%)	
≥ 40	54 (34.6%)	10 (41.7%)	64 (35.6%)	
Work career (years):p50 (p25, p75)	5 (3, 10)	10 (3, 13)	6 (3, 10)	0.035***
Qualification license: n (%)				<0.001**
EMT-intermediate	43 (27.6%)	7 (29.2%)	50 (27.8%)	
EMT-Basic	36 (23.1%)	2 (8.3%)	38 (21.1%)	
First responder	75 (48.1%)	0 (0%)	75 (41.6%)	
Nurse	2 (1.3%)	15 (62.5%)	17 (9.4%)	

*independent student t-test
**Fisher's exact test
***ranksum test

3.2. Recognition of Medical Direction

The score on the request for medical direction in an emergent situation was the highest: 4.5 ± 0.6 , followed by the decision for medical direction depending on the patients' severity, effectiveness of medical direction in handling severely ill patients, and accomplishment of medical control, with an average score of 4.3 ± 0.7 , 4.2 ± 0.8 , 4.0 ± 0.6 , respectively. In contrast, the score on the request for medical direction during transportation was the lowest at 3.5 ± 0.8 , as shown in Table 2.

Table 2. Scores on the Items on the Recognition of Medical Direction using a Likert Scale*

	Question Items	Low (%)	Neutral (%)	High (%)	Mean (range 1-5)	SD**
1	Medical direction would be necessary during transportation	1.7	23.9	74.4	3.9	0.7
2	I demand for medical direction during transportation	11.7	35.6	52.8	3.5	0.8
3	I decide the need for request of medical direction depending on the severity of the situation	1.7	5.0	93.3	4.3	0.7
4	I would request for medical direction in an emergent situation	0.6	3.3	96.1	4.5	0.6
5	I would request for medical direction under conflict of destination	13.9	24.4	61.7	3.7	1.0
6	My expectation of medical direction is high	8.3	31.7	60.0	3.6	0.8
7	I am satisfied about the medical direction received	8.9	23.3	67.8	3.7	0.8
8	Medical direction would be helpful	3.3	11.1	85.6	4.2	0.8
9	Medical direction would be reasonable	5.0	23.9	71.1	3.7	0.7
10	Accomplishment of medical direction	3.3	10.0	86.7	4.0	0.6

*Likert scale (1=strongly disagree, 5=strongly agree)

**SD: standard deviation

3.3. Comparison of Medical Direction Awareness Between Genders

The score on the request for medical direction in an emergent situation was 4.5 ± 0.6 in men and 4.8 ± 0.4 in women, indicating a significant difference ($p=0.026$). In addition, the score on the prediction degree of medical direction was 3.7 ± 0.7 in men and 4.0 ± 0.4 , again indicating that the score was significantly higher in women ($p=0.017$). There were no significant differences between men and women on the other eight items, as shown in Table 3.

Table 3. Gender-Based Differences in the Recognition of Medical Direction According to Scores on the Likert Scale*

Question Items	group	Low (%)	Neutral (%)	High (%)	Mean (range 1-5)	SD**	P-value***
1 Medical direction would be necessary during transportation	Male	0.6	25.0	74.4	3.9	0.7	0.407
	Female	8.3	16.7	75.0	3.8	0.8	
2 I demand for medical direction during transportation	Male	12.8	35.3	51.9	3.4	0.8	0.376
	Female	4.2	37.5	58.3	3.6	0.7	
3 I decide the need for request of medical direction depending on the severity of the situation	Male	1.3	5.1	93.6	4.3	0.6	0.531
	Female	4.2	4.2	91.7	4.3	0.7	
4 I would request for medical direction in an emergent situation	Male	0.6	3.8	95.5	4.5	0.6	0.026
	Female	0.0	0.0	100.0	4.8	0.4	
5 I would request for medical direction under conflict of destination	Male	12.8	25.0	62.2	3.7	0.9	0.976
	Female	20.8	20.8	58.3	3.7	1.1	
6 My expectation of medical direction is high	Male	9.0	29.5	61.5	3.6	0.8	0.623
	Female	4.2	45.8	50.0	3.5	0.7	
7 I am satisfied about the medical direction received	Male	8.3	21.8	69.9	3.7	0.8	0.133
	Female	12.5	33.3	54.2	3.5	0.8	
8 medical direction would be helpful	Male	3.8	10.3	85.9	4.2	0.8	0.714
	Female	0.0	16.7	83.3	4.1	0.7	
9 medical direction would be reasonable	Male	5.8	26.9	67.3	3.7	0.7	0.017
	Female	0.0	4.2	95.8	4.0	0.4	
10 accomplishment of medical direction	Male	3.8	10.3	85.9	4.0	0.6	0.253
	Female	0.0	8.3	91.7	4.1	0.5	

*Likert scale (1=strongly disagree, 5=strongly agree)

**SD: standard deviation

***Independent student-t test

3.4. Comparison of Medical Direction Awareness According to the Qualification License

The score on the need for medical direction during transportation was 3.7 ± 0.7 , 3.9 ± 0.8 , 4.1 ± 0.6 , and 3.8 ± 0.6 , in the EMT-Is, EMT-Bs, first responders, and EMT nurses,

respectively($p=0.015$). Similarly, the scores on the expected degree of medical direction were 3.3 ± 0.8 , 3.6 ± 0.6 , 3.7 ± 0.8 , and 3.5 ± 0.7 ($p=0.047$) in the EMT-Is, EMT-Bs, first responders, and EMT nurses, respectively, indicating a significant difference according to the type of qualification license. Other scores showing significant differences were satisfaction with medical direction (3.4 ± 0.9 , 3.7 ± 0.6 , 3.9 ± 0.8 , 3.6 ± 0.7 , respectively; $p=0.003$), effectiveness of medical direction in handling severely ill patients (4.0 ± 0.8 , 4.1 ± 0.7 , 4.4 ± 0.7 , 4.1 ± 0.8 , respectively; $p=0.031$), expected degree of medical direction (4.0 ± 0.7 , 3.7 ± 0.6 , 3.5 ± 0.7 , 4.1 ± 0.2 , respectively; $p<0.001$), and accomplishment of medical direction (4.1 ± 0.5 , 3.8 ± 0.6 , 4.0 ± 0.7 , 4.2 ± 0.4 , respectively; $p=0.025$). There were no significant differences according to types of qualification license in the other four items, as shown in Table 4.

Table 4. Differences in the Recognition of Medical Direction According to Qualification License Based on Scores on the Likert Scale*

Question Items	group	Low (%)	Neutral (%)	High (%)	Mean (range 1-5)	SD**	p-value***
1 Medical direction would be necessary during transportation	EMT-I	6.0	26.0	68.0	3.7	0.7	0.015
	EMT-B	0.0	34.2	65.8	3.9	0.8	
	First aid	0.0	16.0	84.0	4.1	0.6	
	Nurse	0.0	29.4	70.6	3.8	0.6	
2 I demand for medical direction during transportation	EMT-I	10.0	40.0	50.0	3.4	0.7	0.816
	EMT-B	13.2	36.8	50.0	3.4	0.8	
	First aid	12.0	30.7	57.3	3.5	0.8	
	Nurse	11.8	41.2	47.1	3.4	0.8	
3 I decide the need for request of medical direction depending on the severity of the situation	EMT-I	2.0	4.0	94.0	4.5	0.7	0.072
	EMT-B	0.0	10.5	89.5	4.2	0.6	
	First aid	1.3	2.7	96.0	4.3	0.6	
	Nurse	5.9	5.9	88.2	4.1	0.7	
4 I would request for medical direction in an emergent situation	EMT-I	0.0	2.0	98.0	4.6	0.5	0.273
	EMT-B	0.0	5.3	94.7	4.4	0.6	
	First aid	1.3	4.0	94.7	4.4	0.6	
	Nurse	0.0	0.0	100.0	4.6	0.5	
5 I would request for medical direction under conflict of destination	EMT-I	16.0	30.0	54.0	3.6	1.0	0.64
	EMT-B	18.4	18.4	63.2	3.6	1.0	

		First aid	10.7	22.7	66.7	3.8	0.9	
		Nurse	11.8	29.4	58.8	3.7	1.0	
		EMT-I	14.0	34.0	52.0	3.3	0.8	
6	My expectation of medical direction is high	EMT-B	5.3	34.2	60.5	3.6	0.6	0.047
		First aid	6.7	26.7	66.7	3.7	0.8	
		Nurse	5.9	41.2	52.9	3.5	0.7	
		EMT-I	20.0	22.0	58.0	3.4	0.9	
7	I am satisfied about the medical direction received	EMT-B	2.6	28.9	68.4	3.7	0.6	0.003
		First aid	5.3	20.0	74.7	3.9	0.8	
		Nurse	5.9	29.4	64.7	3.6	0.7	
		EMT-I	4.0	22.0	74.0	4.0	0.8	
8	medical direction would be helpful	EMT-B	2.6	7.9	89.5	4.1	0.7	0.031
		First aid	2.7	6.7	90.7	4.4	0.7	
		Nurse	5.9	5.9	88.2	4.1	0.8	
		EMT-I	2.0	16.0	82.0	4.0	0.7	
9	medical direction would be reasonable	EMT-B	5.3	18.4	76.3	3.7	0.6	<0.001
		First aid	8.0	37.3	54.7	3.5	0.7	
		Nurse	0.0	0.0	100.0	4.1	0.2	
		EMT-I	0.0	8.0	92.0	4.1	0.5	
10	accomplishment of medical direction	EMT-B	5.3	15.8	78.9	3.8	0.6	0.025
		First aid	5.3	10.7	84.0	4.0	0.7	
		Nurse	0.0	0.0	100.0	4.2	0.4	

*Likert scale (1=strongly disagree, 5=strongly agree)

**SD: standard deviation

***ANOVA test

4. Discussion

The first aid provided by 119 EMS personnel in the scene can be considered as the beginning of the emergency patient care in which they require professional help from emergency physicians to ensure appropriate patient management. In a report on pre-hospital treatment provided by 119 paramedics, basic measurement of patient's vital sign was performed in 30% cases, while the initial assessment of unstable or severely ill

patient was insufficient, and proper implementation of aid was less than 10% [1]. In addition, compared with resident doctors in emergency rooms, paramedics' identification of patient symptoms was significantly different, especially in terms of systemic, neurological, and psychiatric symptoms [2]. Thus, patient assessment and proper treatment of 119 EMS personnel in the field showed realistic difficulties and limitations, which emphasized the need for proper medical direction, including direct and indirect medical control.

The indirect medical control program using analysis of rescue activity reports could improve primarily fidelity of activity reports, increase proper classification of patients, and increase the frequency of pre-hospital management [3]. However, satisfaction of the indirect medical control program was different between first responders and nurses, and it showed no relation with the increase of direct medical control [4].

Important cases such as pregnant patients, traffic accidents, gas accidents, and drug intoxications, and any situation requiring interventions such as cardiopulmonary resuscitation, oxygen administration, airway establishment, respiration support, and cervical immobilization could be considered to need medical direction. These patients accounted for about 50% of total emergent patients. However, request of medical direction was reported to be less than 5% in one study [5]. On the other hand, the duration to arrive at the hospital from the scene tended to be correlated with the number of requests for medical direction in severely injured patients [6].

To promote medical direction, it is essential that pre-hospital EMS personnel are forced to request medical direction while handling special patients, by establishing clear rules and regulations regarding the same. Qatar introduced a physician medical direction and quality assurance program in 2007, which improved clinical indicators and overall quality of care. Intravenous catheter insertion in unstable cases increased from 67% to 92%, and EMS administration of aspirin to patients with suspected ischemic chest pain improved from 2% to 77% [7]. In addition, after firemen rescuers were controlled under strict medical directions over 4 months in Paris, France, pre-hospital management of stroke seemed to be feasible and effective for patients with stroke, with improved access to thrombolysis [8].

Patient symptoms that made paramedics request medical direction were known to include shortness of breath, chest pain, altered consciousness, pain, dizziness, and nausea and vomiting. However, enough information about patient's condition was not delivered to physicians during medical direction [9]. One study showed that the request for medical direction in regional areas was three times more common than that in metropolitan areas, and emergency medicine physicians were superior to the other medical physicians with reference to efficiency in delivering medical direction [10]. Experience of medical control in women, in 29-year-old and younger professionals, and in EMT-I personnel appeared to be high, indicating differences based on the characteristics of the EMS personnel [11, 12].

Further, in the present study, female EMS personnel had superior experience and expertise, which reflected in the differences in the recognition of medical direction. In addition, nurses and EMT-I personnel showed a high prediction degree and accomplishment of medical direction, whereas low expected degree and satisfaction of the same. These differences according to the qualification license suggested that conventional medical direction is not likely to influence experienced and specialized EMS personnel.

In conclusion, based on the experience and qualification license of the EMS personnel, establishment of different medical direction programs should be considered, to improve the EMS system in the community.

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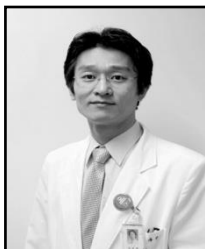
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