

Policy suggestions to educate and produce outstanding paramedics in Korea[†]

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우수한 1급 응급구조사 인력 양성 및 배출을 위한 정책 제안[†]

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= 국문초록 =

연구 목적: 본 연구는 우수한 1급 응급구조사 인력 양성 및 배출을 위해 응급구조사의 역량을 도출하여 교육제도를 재정립하고 국가시험 및 자격제도를 개선하기 위한 정책 제안을 하고자 하였다.

연구 방법: 본 연구는 전문가 회의 및 설문지를 이용하였다. 설문 자료는 교육 전문가(응급구조학과 대학교수)와 현장 전문가(소방 119구급대원 및 병원에 근무하는 1급 응급구조사) 총 277명으로부터 수집되었으며, 자료수집 기간은 2016년 9월 7일부터 9월 20일까지였다. 수집된 자료는 SPSS 22.0을 이용하여 분석하였다.

연구 결과: 1급 응급구조사 교육과정 강화를 위해 표준교육과정안으로 총 27과목 94학점을 제안하였고 1급 응급구조사의 핵심역량 9가지를 도출하였다. 국가 자격시험은 필기시험 과목을 통합하는 방안과, 실기시험에 시나리오형의 문제를 추가하고, 실기를 절차대로 수행하는 단순실기시험에 낙제기준(critical criteria)를 적용하며, 실기시험은 통과/실패만 결정하는 것을 제안하였다. 또한 1급 응급구조사의 보건의료적 업무특성을 반영하여 자격은 면허로 바꾸는 것을 제안하였다.

결 론: 본 연구 결과를 토대로 표준교육과정 운영으로 핵심역량을 갖추고 배출된 인력들이 신뢰성 있는 국가시험제도를 통해 자격을 취득하고 1급 응급구조사로서 전문성을 강화할 수 있는 자격관리제도가 선순환을 이룰 때 우리나라 응급의료서비스의 질적 수준이 향상될 것이다.

국문중심단어: 1급 응급구조사, 교육과정, 직무 역량, 면허, 한국

= Abstract =

Purpose: With the purpose of educating and producing outstanding paramedics by enhancing their competencies, this study aimed to make policy suggestions to re-establish the education system and improve the national examination and the certification scheme.

Methods: This study used focus group interviews and questionnaires to collect data. Totally, there were 277 subjects, including experts from the education and field. Data were collected from September 9 to 20, 2016, and analyzed using SPSS 22.0.

Results: To strengthen the curriculum of paramedics, this study suggested 27 courses with 94 credits as the standardized curriculum and derived 9 core competencies of paramedics. For the national examination, this study suggested consolidating written test subjects, adding scenario questions to practical tests, and applying critical criteria to simple practical tests that performs a procedure, grading these tests on a pass/fail basis. In addition, this study suggested converting certification into license, reflecting paramedics' healthcare job characteristics.

Conclusion: The quality of emergency medical services in Korea will improve when those with core competencies that originated from the standardized curriculum based on the results of this study acquire their certification through the national test scheme, and the certification management system creates a virtuous cycle to further enhance paramedics' professionalism.

Keywords: Paramedics, Curriculum, Core competency, License, Korea

I. Introduction

In order to produce personnel to properly respond to various types of emergencies such as disasters and accidents across the country, department of emergency medical services was created in universities in 1995 and the department began educating paramedics. Due to an increase in cardiovascular and cerebrovascular patients and deaths and severe trauma patients, the need for emergency medical personnel who could perform emergency medical service before the patients arrive the hospital or inside the emergency room (ER) of the hospital was reflected in healthcare personnel policies, and as a result, 15,371 paramedics have been produced thus far [1].

Recently, the types of accidents are becoming more diversified in accordance with progress in science and society, and the types of disasters are also changing. As the population ages and the distribution of occurred diseases changes, it changes paramedics' job description. In addition, paramedics' professionalism and diversity required by society has changed the education or academic system of educational institutions which train paramedics. In other words, department of emergency medical services, which began in 2-year colleges in 1995, was re-organized into 3-year colleges or 4-year universities in 2001 and started developing talents who were adequate to perform professional tasks [2]. The paramedic national test consists of written and practical

tests, and a paramedic applicant should acquire 60% or higher out of 290 points to earn his or her certification [3].

Even though paramedics, who are produced through a 3-year or 4-year curriculum in university and then the national test, provide professional emergency medical service to patients, they are certified, not licensed, and hence it places some limitations on enhancing their professionalism.

This study aims to re-establish the education system to develop paramedics' core competency, to explore changes to ensure that the national test scheme reflects paramedics' job competencies, and to review whether a "certification" is acceptable in consideration of paramedics' job duties.

II. Methods

1. Study design

This study is a descriptive study that conducted focus group interview (FGI) and questionnaire surveys to propose policies to educate and produce outstanding paramedic.

2. Subjects and Procedure

To derive paramedic core competencies and examine the details of the questionnaires, this study performed basic questionnaire surveys and focus group interview on September 3 and 8, 2016 with 29 experts with 3 years or more of experience (university-16, fire department-6, and hospital-7). Based on

the results, this study established questions in the questionnaire about whether to agree with paramedic core competency, opinions on proposed common courses in the curriculum, whether to introduce the paramedic certification evaluation scheme, written and practical tests in the national test, and the certification (license) scheme.

The questionnaires for this study sent emails to professors related to emergency medical services at once and then collected their answers. For paramedics in 119 Fire Department and hospital, to make sure that graduates of this research team's university and other subjects were distributed evenly in regions, this study handed out questionnaires to 2 universities in Gyeongsang Province, to which no member of the research team belonged, explained to them, and collected their questionnaires back only from those who gave their approval voluntarily. The data were collected from September 9 to 20, 2016, and 277 copies in total were collected from 83 education experts (professors related to emergency medical services), 194 field experts (100 paramedics in 119 Fire Department, and 92 paramedics in hospital, and 2 paramedics in other area).

3. Data analysis

Using SPSS 22.0, the survey data were analyzed in terms of frequency and percentage. The qualitative data collected through FGIs were categorized and the themes were extracted through content analysis.

4. Ethical approval

The questionnaire survey was conducted with approval of the institutional review board (IRB) of Kongju National University (KNU_IRB_2016-06).

III. Results

1. Improving the paramedic education system

1) Job core competencies

Based on two paramedic job analyses in 2001 and 2013 and expert meetings, this study derived 9 core competencies for paramedics: 1. Vocational responsibility competency, 2. Communication and cooperation competency, 3. Emergency telecommunications competency, 4. Emergency patient evaluation competency, 5. Professional emergency medical service competency, 6. Disaster and safety management competency, 7. Transport and ambulance operation competency, 8. Medical assistance competency, and 9. Self-development competency. More than 90% of the questionnaire subjects agreed with 9 core competencies and 35 abilities <Table 1>.

2) Suggesting the standardized paramedic curriculum and job competency matrix related to curriculum courses

Based on the analysis results of curriculum tables of 17 4-year universities and 21 3-year colleges and the questionnaire survey results [4], this study proposed a standardized

Table 1. Agreement with paramedics' job-based core competencies in respondents (N=277)

Core competency	Ability	Agree	Disagree
		n (%)	n (%)
1. Vocational responsibility competency		267 (97.8)	6 (2.2)
2. Communication and cooperation competency		259 (95.2)	13 (4.8)
3. Emergency telecommunications competency	3.1 Ability to identify the situation	274 (98.9)	3 (1.1)
	3.2 Ability to identify the patient's state	276 (99.6)	1 (0.4)
	3.3 Ability to manage the situation	268 (97.1)	8 (2.9)
	3.4 Ability to direct emergency medical service	267 (96.4)	10 (3.6)
	3.5 Ability to use medical directions via telecommunications	274 (98.9)	3 (1.1)
4. Emergency patient evaluation competency	4.1 Ability to evaluate the situation	277 (100.0)	0 (0.0)
	4.2 Ability to classify disease severity	275 (99.3)	2 (0.7)
	4.3 Ability to make the first assessment	277 (100.0)	0 (0.0)
	4.4 Ability to make the second assessment	274 (99.3)	2 (0.7)
	4.5 Ability to identify the patient's disease history	272 (98.6)	4 (1.4)
5. Professional emergency medical service competency	5.1 Ability to perform CPR	277 (100.0)	0 (0.0)
	5.2 Ability to treat trauma patients	276 (99.6)	1 (0.4)
	5.3 Ability to treat internal medicine patients	273 (98.6)	4 (1.4)
	5.4 Ability to perform advanced cardiac life support	277 (100.0)	0 (0.0)
	5.5 Ability to perform advanced trauma life support	275 (99.3)	2 (0.7)
	5.6 Ability to perform infant and child emergency treatment	274 (98.9)	3 (1.1)
	5.7 Ability to handle special emergency situations (the elderly, those with mental illness, those with behavior disorder)	275 (99.6)	1 (0.4)
6. Disaster and safety management competency	6.1 Ability to respond to disasters	271 (97.8)	6 (2.2)
	6.2 Ability to classify disease severity during the disaster	275 (99.3)	2 (0.7)
	6.3 Ability to perform emergency medical service during the disaster	273 (98.6)	4 (1.4)
	6.4 Ability to respond to special disasters	266 (96.0)	11 (4.0)
7. Transport and ambulance operation competency	7.1 Ability to manage infections	275 (99.3)	2 (0.7)
	7.2 Ability to transport the emergency patient	275 (99.3)	2 (0.7)
	7.3 Ability to use wired and wireless telecommunications	260 (93.9)	17 (6.1)
	7.4 Ability to manage the ambulance	268 (96.8)	9 (3.2)
	7.5 Ability to hand the patient over	273 (98.6)	4 (1.4)
	7.6 Ability to manage the patient's information	264 (95.3)	13 (4.7)
8. Medical assistance competency	8.1 Ability to monitor the patient	270 (97.5)	7 (2.5)
	8.2 Ability to perform emergency medical service in the hospital	274 (98.9)	3 (1.1)
	8.3 Ability to provide medical assistance in the hospital	267 (96.4)	10 (3.6)
9. Self-development competency	9.1 Ability to give emergency medical service education	272 (98.2)	5 (1.8)
	9.2 Ability to manage oneself	261 (94.2)	16 (5.8)
	9.3 Ability to maintain professionalism	274 (98.9)	3 (1.1)
	9.4 Ability to communicate	265 (95.7)	12 (4.3)
	9.5 Ability to perform administrative works for emergency medical services	251 (90.6)	26 (9.4)

paramedic curriculum with increasing disaster management 2 credits to 3 credits by focus group interview. For the standardized curriculum, this study suggested 27 courses in total with 94 credits: 2 general education courses, 6 basic medicine courses, 3 advanced emergency medical service - general courses, 2 emergency patient management courses, 9 advanced emergency medical service - specific courses, 1 law course, 1 medical assistance

course, and 3 field practice courses.

An expert panel meeting was held to review the standardized draft curriculum and a “job competency matrix based on the standardized curriculum for paramedics” was developed. Following a public hearing, further revisions were introduced and the final draft of the curriculum was confirmed <Table 2>.

Table 2. The standardized paramedic curriculum and job competency matrix related to curriculum courses

Category	No	Courses	Credit (Period)	Core competency										
				1*	2*	3*	4*	5*	6*	7*	8*	9*		
General education	1	Biomedical ethics	3	○				○			○			
	2	Communication and interpersonal relationship	3	○	○	○	○	○	○	○	○	○	○	○
Basic medicine	3	Anatomy	3				○	○					○	
	4	Physiology	3				○	○					○	
	5	Pathology	3				○	○					○	
	6	Emergency pharmacology	2				○	○					○	
	7	Public health	2							○				
Advanced emergency medical service-general	8	Medical terms	3		○	○	○	○					○	
	9	Introduction of medical emergency service	3	○	○	○				○	○		○	
	10	Patient rescue and transport	2	○	○	○		○	○	○				
Emergency patient management	11	Disaster management	3	○	○	○				○	○			
	12	Emergency patient management	6	○	○		○						○	
Advanced emergency medical service-specific	13	Emergency patient assessment	3	○	○	○	○						○	
	14	Advanced trauma life support	6	○	○		○	○					○	○
	15	Advanced cardiac life support	6	○	○		○	○					○	○
	16	Electrocardiogram	3				○	○					○	○
	17	Internal medicine advanced emergency medical service	6	○	○		○	○					○	
	18	Basic life resuscitation	2	○	○		○	○					○	○
	19	Advanced airway management	3	○	○		○	○					○	
Advanced emergency medical service-specific	20	Infant and child emergency medical service	3	○	○		○	○					○	
	21	Emergency medical service for the elderly, those with mental illness, those with behavior disorder	2	○	○		○	○					○	
	22	Integrated simulation I, II	6	○	○	○	○	○	○	○	○	○	○	○
Law	23	Emergency medical service laws	3	○						○	○			
Physician assistance	24	Physician assistance	6	○	○		○	○				○	○	

Field Practice	25	Clinical field practice (I)	3 (4 weeks)	○	○	○	○	○
	26	Clinical field practice (II)	3 (4 weeks)	○	○	○	○	○
	27	Clinical field practice (III) †	3 (4 weeks)	○	○	○	○	○
	28	Emergency medical service field practice	3 (4 weeks)	○	○	○	○	○
Total			94(3-year course) / 97(4-year course)					
Core competencies	1*	Vocational responsibility competency						
	2*	Communication and cooperation competency						
	3*	Emergency telecommunications competency						
	4*	Emergency patient evaluation competency						
	5*	Professional emergency medical service competency						
	6*	Disaster and safety management competency						
	7*	Transport and ambulance operation competency						
	8*	Medical assistance competency						
	9*	Self-development competency						
†	3-year	course: optional						
	4-year	course: required						

2. Improving the national paramedic examination

Korea's national paramedic examination consists of written and practical tests. The written test is comprised of 230 points in total: basic medicine (30 points), emergency patient management (40 points), advanced emergency medical service-general (30 points), emergency medical service law (20 points), and advanced emergency medical service-specific (110 points). The practical test is 60 points in total and made up of 3 subjects in practical 1 (30 points), 9 subjects in practical 2 (20 points), and physical health (abdominal muscle strength) (10 points). The applicant randomly chooses 1 item in practical 1 and 1 item in practical 2 to take the test.

This study surveyed expert comments on

the relevance of the national test (written and practical tests) to paramedic job duties. The expert comments on the written test's relevance to paramedic job duties showed that 48.2% of education experts "agreed" and 16.9% of them "strongly agreed" while 39.2% of field experts "agreed" and 18.9% of them "strongly agreed". About the practical test's relevance on paramedic job duties, on the other hand, 38.6% of education experts "agreed" and 9.6% of them "strongly agreed" while 38.1% of field experts "agreed" and 12.1% of them "strongly agreed". Overall, the survey results demonstrated that the national test was relevant to paramedic job duties <Table 3>.

1) Suggestion to improve the written test

39% of the experts agreed to the sugges-

Table 3. National test relevance to paramedics job performance

(N=277)

Level		Education expert		Field expert		Total	
		Written test	Practical test	Written test	Practical test	Written test	Practical test
Strongly disagree	n	—	1	—	1	—	2
	%	—	1.2	—	.5	—	.7
Disagree	n	9	9	14	26	23	35
	%	10.8	10.8	7.2	13.4	8.3	12.6
Neither agree nor disagree	n	20	33	69	69	89	102
	%	24.1	39.8	35.6	35.6	32.1	36.8
Agree	n	40	32	76	74	116	106
	%	48.2	38.6	39.2	38.1	41.9	38.3
Strongly agree	n	14	8	35	24	49	32
	%	16.9	9.6	18.0%	12.4	17.7	11.6
Total	n	83	83	194	194	277	277
	%	100.0	100.0	100.0	100.0	100.0	100.0

tion to consolidate the current 5 subjects in the written test, while 28.9% “disagreed” to this idea and the rest said they were not decided. In regards to the number of consolidated subjects, 43.9% said they preferred 3 subjects (advanced emergency medical service—general, advanced emergency medical service—specific, and emergency patient management), 20.8% 2 subjects (advanced emergency medical service—general and advanced emergency medical service—specific), and 15.6% 2 subjects (advanced emergency medical service and basic medicine).

2) Suggestion to improve the practical test

(1) Results of the survey about how to improve the practical test

47.3% of the respondents said the simple performance test and the scenario test should go in tandem with one another as a way to

improve the practical test, and 28.5% said scenario questions for around 10 minutes based on cases should be developed <Table 4>.

(2) Suggestion to set critical criteria

In regards to applying critical criteria to simple performance (a procedure-based practical test) in the practical test, the majority 83.1% of the experts-87.5% of the education experts and 81.3% of the field experts-said critical criteria should be put in place <Table 5>.

3) Suggestions for determining the passing standard for the national paramedic examination

An expert survey was conducted to identify the written and practical test criteria to determine the passing standard for the national paramedic examination. The results showed that the majority (62.6%) of the experts responded that “the passing standard

Table 4. Survey on improvement of the practical test (N=277)

Comments for improvement	Education expert		Field expert		Total	
	n	%	n	%	n	%
1. Maintain the status quo (simple performance) ; Randomly select 1 out of 3 subjects in practical 1 and 1 out of 9 subjects in practical 2	11	13.3	21	10.8	32	11.6
2. Test all the 3 subjects in practical 1 and all the 9 subjects in practical 2 (simple performance)	7	8.4	23	11.9	30	10.8
3. Simple performance + scenario-based test ; Practical 1 is a scenario-based test. Practical 2 is simple performance, a test that randomly selects subjects.	40	48.2	91	46.9	131	47.3
4. Scenario-based test ; Develops scenario-based questions for within 10 minutes based on cases	20	24.1	59	30.4	79	28.5
5. Others	5	6.0	0	–	5	1.8
Total	83	100.0	194	100.0	277	100.0

Table 5. Survey on critical criteria for subjects in the practical test (N=272)

Setting critical criteria	Education expert		Field expert		Total	
	n	%	n	%	n	%
Agree	70	87.5	156	81.3	226	83.1
Disagree	10	12.5	36	18.8	46	16.9
Total	80	100.0	192	100.0	272	100.0

should be set according to a pass/fail basis for the practical test and a raw score for the written test.” Specifically, 71.6% of experts in education and 58.7% of field experts responded that the passing standard should be determined by a written test only <Table 6>.

3. Improving the paramedic certification scheme

About paramedics’ certification, 254 education and field experts, 92.7% of 274, said that certification should “change to license”

in response to the question whether to “convert certification into license” <Table 7>.

About the reason why certification should convert into license, many experts said “paramedics’ scope of work amounts to medical service” and “they are experts who perform invasive emergency medical service that treats life”. Some respondents said, “Since they are qualified with a certification, illegal certifications are produced in large numbers, reducing the quality of emergency medical service” <Table 8>.

Table 6. Expert survey on improvement measures for determining passing criteria for the national examination (N=275)

Comments for improvement	Education expert		Field expert		Total	
	n	%	n	%	n	%
Maintain current standards	23	28.4	78	42.0	101	36.7
Grade practical test on pass/fail basis and grade written test by scores	28	34.6	66	34.0	94	34.2
Grade practical test on pass/fail basis; grade written test by scores; and expand opportunities for taking the practical test	30	37.0	48	24.7	78	28.4
Others	–	–	2	1.0	2	0.7
Total	81	100.0	194	100.0	275	100.0

Table 7. Converting the paramedic certification scheme into the license one (N=274)

Response	Education expert		Field expert		Total	
	n	%	n	%	n	%
Agree	75	27.4	179	65.3	254	92.7
Disagree	0	–	4	1.5	4	1.5
Undecided	6	2.2	10	3.6	16	5.8
Total	81	29.6	193	70.4	274	100.0

Table 8. Reasons for conversion of paramedics' certification to license

Reasons	Education expert		Field expert		Total	
	n	%	n	%	n	%
Paramedics' scope of work amounts to medical service.	56	11.0	141	27.6	197	38.6
Paramedics are experts who perform invasive emergency medical service that save one's life.	53	10.4	131	25.7	184	36.1
It is needed to make things fair for paramedics in comparison with medical professionals and medical technicians, who receive a license.	40	7.8	82	16.1	122	23.9
Others	1	0.2	6	1.2	7	1.4
Total	150	29.4	360	70.6	510	100.0

*Multiple answers allowed

IV. Discussion

In order to enhance paramedic's competences for expanded job duties as required by the contemporary society, it would be one of the most important roles to standardize the curriculum in different universities, develop new education courses that keep up with today's world, and educate and produce paramedics so that they could be equipped with specialized job competencies. Thus far, the second paramedic job analysis was conducted in 2013 [5], that is, the paramedic job was categorized into 10 duties, 57 tasks, 240 task elements. Based on these analyses, this study set forth "1. Vocational responsibility competency and 2. Communication and cooperation competency" as core competences for required general education courses and "3. Emergency telecommunications competency, 4. Emergency patient evaluation competency, 5. Professional emergency medical service competency, 6. Disaster and safety management competency, 7. Transport and ambulance operation competency, 8. Medical assistance competency, and 9. Self-development competency" as core competences for major courses. In addition, based on the standardized curriculum developed by analyzing the curriculums of 17 4-year universities and 21 3-year colleges that produce paramedics [4], this study derived the "core competencies matrix" of job duties for subjects in the standardized paramedic curriculum. This would be significantly meaningful in that it lays the foundation for

universities and colleges that produce paramedics to operate their curriculum based on the standardized curriculum and core job competencies.

While both education and field experts answered yes to the question whether written and practical tests in the national test are relevant to paramedic job duties, it would be needed to make the written test more focused on practical competencies and problem solving and to consolidate the current 5 subjects into fewer ones.

The current passing standard for the practical test is a score of 60% or higher of the total score. However, previous studies have suggested that criteria should be set whereby the applicant fails the test if a seriously decisive error is found for any test item [6]. In the US, critical criteria have been suggested for the practical test items in national examination for paramedics whereby the applicant fails if he or she fails to "secure an IV line" and "perform endotracheal intubation" within a given time limit or cannot explain the practice of body substance isolation prior to venipuncture [7]. In the present study, 87.5% of experts in education and 81.3% of field experts agreed on establishing failing criteria.

Therefore, the practical test needs to expand the number of evaluated subjects required on the field and develop scenario-based performance subjects. For the practical test, it would be equally needed to set critical criteria in the simple performance test among other protocols so that evaluation

criteria are put in place to ensure an appropriate level of difficulty in the national test.

Paramedics are the personnel who are at the forefront in performing works to ensure the health and safety of people. Given their significance that they are providing invasive emergency medical service that treats life, their current certification needs to convert into a license. In this rapidly changing emergency medical service environment, it would be needed to establish a quality refresher education system and to manage paramedics' qualification so that paramedics could continue to learn the latest knowledge and views instead of staying where they are.

If a reasonable and appropriately difficult national test makes sure a certification is given to those who could fully tap into their potential based on the standardized education system as suggested in the aforementioned results of this study, it would greatly contribute to nurturing and producing paramedics who are extraordinary in their ability to adapt to the situation on the site. When the paramedic education system, the national test scheme, and the certification management system create a virtuous cycle, it would improve the quality of emergency medical service in Korea.

V. Conclusion

With the purpose of educating and producing outstanding paramedics by enhancing their competencies, this study

aimed to make policy suggestions to re-establish the education system and improve the national examination and the certification scheme.

This study suggested 27 courses with 94 credits as the standardized curriculum and derived paramedics' 9 core competencies. For the national examination, this study suggested consolidating written test subjects, adding scenario questions to the practical test, and applying critical criteria to the simple practical test that performs a procedure, grading practical test on pass/fail basis. This study also suggested converting certification into license, reflecting paramedics' healthcare job characteristics.

In conclusion, the quality of emergency medical services in Korea would improve when those with core competencies produced from the standardized curriculum based on the results of this study acquire their certification through the national test scheme, and the certification management system creates a virtuous cycle to further enhance paramedics' professionalism.

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