Self-Rated Quality of Emergency Cardiovascular Care Knowledge and Pre-Hospital Emergency Care Willingness among Medical Staffs:a Questionnaire Sur Vey Study

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Abstract: Objective: to evaluate the self-rating of mastery of emergency cardiovascular care (ecc) knowledge and the willingness of performing pre-hospital ecc among medical staffs.methods: a total of 739 medical staffs working at 10 medical institutions were evaluated using a questionnaire. This questionnaire evaluated demographics, job characteristics, knowledge about ecc, knowledge about first aid in general, and willingness perform ecc. Results: self-rated score of mastery of ecc knowledge among the 739 subjects was 3.05±0.729/5. it was positively correlated with their mastery degree of first-aid knowledge. Subjects with higher scores were more willing to participate in various pre-hospital emergencies care ($p<0.05$); 82.7-97.8% subjects showed positive attitudes towards participating in ecc training and popularization. In multivariate analysis, the willingness to take part in pre-hospital ecc was influenced by the nature of the hospital ($p=0.019$), the department ($p=0.002$), previous aha bls or acls training ($p<0.001$), interest ($p<0.001$), and the self-rated score of ecc knowledge ($p=0.01$).conclusion: the self-rated score of ecc knowledge was moderate. Medical staffs had higher willingness to participate in pre-hospital ecc, ecc knowledge training, and popularization.

1. Introduction

In 1956, safar and elam proposed mouth-to-mouth resuscitation and in 1960, kouwenhoven [1] put forward the concept of closed chest cardiac massage. Soon after, the american heart association (aha) issued the first cardiopulmonary resuscitation (cpr) instructions. Since then, cpr rescued thousands of patients and became one of the basic first-aid techniques for cardiac arrest and dying patients [2-4]. Nonetheless, low rate of successful resuscitation is still a global concern [5-7]. There are significant differences among the survival rates of cardiac arrest out-of-hospital in various emergency medical services [8,9], strongly suggesting that survival rate could be improved and that the rescuers' skills are an important factor involved in these differences. A previous study in belgium showed that only a few schoolteachers felt competent in cpr and were willing to teach it [10]. On the other hand, another study revealed that there was no association between knowledge about stroke and the willingness to call for emergency for stroke in the general population [11].

The self-assessed quality of knowledge in cpr might affect the willingness of healthcare staffs to work in departments where cpr might be needed. Therefore, this study aimed to evaluate the cardiovascular knowledge of medical staffs in different levels of medical institutions and their willingness to perform pre-hospital emergency cardiovascular care (ecc).

2. Material and Methods

2.1 Subjects

Questionnaires were issued at 10 medical institutions in Ningbo city (table 1) from june to august

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2014. enrollment criteria were: 1) medical staff with full-time medical education background and practicing qualifications; 2) working at tertiary hospital clinical departments (including nursing department, medical section); 3) work experience of at least 6 months at clinical departments; and 4) willing to participate in the study. Exclusion criterion was: working at administrative department.

Table 1 List of the 10 Hospitals in Ningbi City

Hospital number	Institution name	Number of subjects	Hospital category	Hospital level
1	Ningbo Treatment Center Lihuili Hospital	84	General	Tertiary A
2	Ningbo First Hospital	80	General	Tertiary A
3	Ningbo No.2 Hospital	86	General	Tertiary A
4	The Affiliated Hospital of School of Medicine of Ningbo University	74	General	Tertiary A
5	Yinzhou Hospital	76	General	Tertiary B
6	Ningbo Women & Children's Hospital	99	Specialized	Tertiary A
7	The second hospital of Yinzhou District	55	General	Tertiary B
8	Chinese PLA 113 hospital	62	General	Tertiary A
9	Traditional Chinese Medicine Hospital	72	General	Tertiary A
10	Ningbo Mingzhou Hospital	51	General	Tertiary B

This study was approved by the ethics committee of the Ningbo College of health sciences. Informed consent was obtained from each subject.

2.2 Method

Subjects in 10 third class a and b hospitals in ningbo city were investigated and 800 questionnaires were issued: 70% to nurses and 30% to doctors in each hospital. The subjects in the cardiovascular, intensive care unit (icu), and emergency room (er) were surveyed. Questionnaires were issued with the proportion that 15% of staffs with senior title, 35% of intermediate title, and 50% of junior title.

The questionnaire was self-made and included personal information (department, job post, educational background, professional title, experience, whether they had aha ecc training, professional knowledge or interest, etc.), ecc knowledge test, and willingness to participate in pre-hospital emergency care and training. The ecc knowledge test included the knowledge points in the 2010 american heart association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care [12]. The ecc test included 10 choice questions (7 about basic life support and 3 about advanced life support). The participation in pre-hospital emergency care and training willingness were assessed using self-evaluation of emergency knowledge (1-5 scores scale rating) and willingness to take part in the aha ecc training.

The content validity of the questionnaire was reviewed by five specialists in related fields and the cvi was 0.883. thirty subjects filled the questionnaire using a convenience sampling method. Spss 18.0 (ibm, armonk, ny, usa) was used to examine internal consistency. Cronbach's α value was 0.749.

2.3 Data Analysis

All questionnaires were numbered and checked. A database was established. SPSS 18.0 (IBM, Armonk, NY, USA) was used for statistical analyses. Data are presented as mean ± standard deviation or frequencies, as appropriate. Data were analyzed using the chi-square test, the Student's t test, Pearson correlation analysis, and logistic regression analysis, as appropriate. Two-sided P-values <0.05 were considered significant.

3. Results

3.1 Characteristics of the Subjects

A total of 800 questionnaires were issued and 739 valid questionnaires were collected, for a recovery rate of 92.4%. The study included 557 subjects (75.4%) from tertiary A hospitals and 182 subjects (24.6%) from tertiary B hospitals; 608 (82.3%) were female and 131 (17.7%) were male; age ranged from 19 to 57 years (mean age: 31.3±7.1 years); and the work experience ranged from 1 to 40

years (mean: 8.6±7.5 years).

Subjects were classified according to their willingness to perform emergency treatments in out-of-hospital situations, and the self-rated score of ECC knowledge was higher in the strong willingness group (3.16±0.71 vs. 2.84±0.72, P<0.001) (Figure 1). Surprisingly, a higher proportion of subjects in the strong willingness group had in reality low scores of ECC knowledge (Table 3). Similar results were observed when the subjects were classified according to their willingness to perform emergency treatments when meeting a patient with coronary heart disease or stroke (Figure 2 and Table 4), and when considering the willingness to perform CPR for patients with cardio-respiratory arrest (Figure 3 and Table 5).

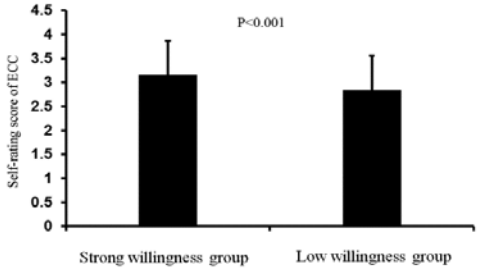

Fig.1 Comparison of Self-Rated of Subjects with Different Willingness to Perform Emergency Treatment in out-of-Hospital Situations.

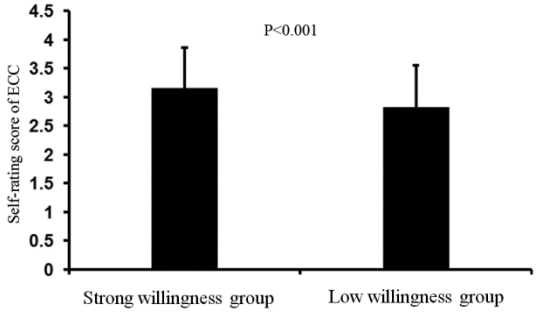

Fig.2 Comparison of Self-Rated Results of Subjects with Different Willingness to Perform Emergency Treatment When They Meet Patients with Coronary Heart Disease or Stroke.

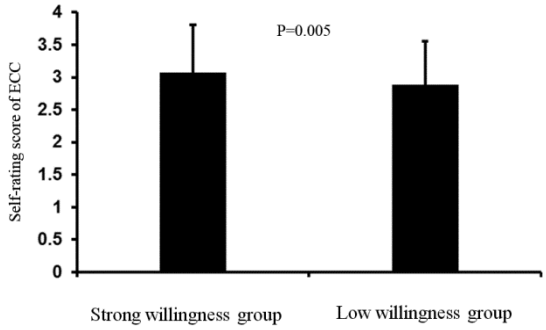

Fig.3 Comparison of Self-Rated Results of Subjects with Different Willingness to Perform External Chest Compression When They Meet Patients with Cardio-Respiratory Arrest.

In the strong willingness group, 363 women (49.1%) and 87 men (11.8%) were willing to perform emergency treatments (two situations: 1) willing to perform ECC when they meet patients with coronary heart disease or stroke; and 2) willing to use external chest compression for patients suffering cardio-respiratory arrest). A total of 170 subjects (23.0%) had received AHA BLS or ACLS training.

In the low willingness group, 249 women (33.7%) and 40 men (5.4%) were willing to conduct emergency treatments (only one situation or neither). Among them, 61 (8.3%) had received AHA BLS or ACLS training (Table 2).

Table 2 Characteristics of the Subjects

Demographic characteristics	N (%)	Strong willingness group (willing to attempt CPR in two situations), n (%), n=450	Low willingness group (willing to attempt one or neither), n (%), n=289	P
Sex				
Female	612 (82.8)	363 (80.7)	249 (86.2)	0.053
Male	127 (17.1)	87 (19.3)	40 (13.8)	
Age (years)				
≤25	179 (24.2)	115 (25.6)	64 (22.2)	0.029
26-35	399 (54.0)	226 (50.2)	173 (59.8)	
36-45	125 (16.9)	81 (18.0)	44 (15.2)	
≥45	36 (4.9)	28 (6.2)	8 (2.8)	
Hospital level				
Tertiary A	557 (75.4)	316 (70.2)	241 (83.4)	0.000
Tertiary B	182 (24.6)	134 (29.8)	48 (16.6)	
Hospital category				
Specialized	99 (13.4)	48 (10.7)	51 (17.6)	0.007
General	640 (86.6)	402 (89.3)	238 (82.4)	
Department				
ICU, emergency, cardiology	234 (31.7)	125 (27.8)	109 (37.7)	0.005
Other departments	505 (68.3)	325 (72.2)	180 (62.3)	
Working years				
≤1	116 (15.7)	73 (16.2)	43 (14.9)	0.475
>1-5	228 (30.9)	137 (30.4)	91 (31.4)	
>5-10	193 (26.1)	115 (25.2)	78 (27.0)	
>10-20	143 (19.4)	83 (18.9)	60 (20.8)	
>20	59 (8.0)	42 (9.3)	17 (5.9)	
Education degree				
College or below	230 (31.1)	133 (29.6)	97 (33.6)	0.033
Bachelor	427 (57.8)	257 (57.7)	170 (59.5)	
Master or above	77 (10.4)	57 (12.7)	20 (6.9)	
No data	5 (0.7)			
AHA BLS or ACLS training				
Yes	231 (31.3)	170 (37.8)	61 (21.1)	0.000
No	508 (68.7)	280 (62.2)	228 (78.9)	
Interest level to their major				
Strong interest	79 (10.7)	61 (13.6)	18 (6.2)	0.000
Interest	550 (74.4)	346 (76.8)	204 (70.6)	
Less interest/no interest	110 (14.9)	43 (9.6)	67 (23.2)	
Occupation				
Doctor	195 (26.4)	136 (30.7)	59 (20.4)	0.006
Nurse	542 (73.3)	312 (69.3)	230 (79.6)	
No data	2 (0.3)			
Professional title				
High	105/739(14.2)	76 (16.9)	29 (10.0)	0.033
Intermediate	234/739(31.6)	137 (30.4)	97 (33.6)	
Primary	400/739(54.2)	237 (52.7)	163 (56.4)	

Table 3 Comparison of Self-Rated Scores of Subjects with Different Willingness to Perform Emergency Treatment in out-of-Hospital Situations.

	Groups	Strong willingness group (n=450), n (%)	Low willingness group (n=289), n (%)	P
Self-rated score of ECC knowledge	High (4-5)	116 (25.8)	39 (13.5)	<0.001
	Low (0-3)	334 (74.2)	250 (86.5)	

Table 4 Comparison of Self-Rated Scores of Subjects with Different Willingness to Perform Emergency Treatment When They Meet Patients with Coronary Heart Disease or Stroke.

	Groups	Strong willingness group (n=462)	Low willingness group (n=277)	P
Self-rated score of ECC knowledge	High score group (4-5)	119 (25.8)	36 (13.0)	<0.001
	Low score group (0-3)	343 (74.2)	241 (87.0)	

Table 5 Self-Rated Scores of Subjects with Different Willingness to Perform External Chest Compression When They Meet Patients with Cardio-Respiratory Arrest.

	Groups	Strong willingness group (n=600)	Low willingness group (n=139)	P
Self-rated score of ECC knowledge	High score group (4-5)	137 (22.8)	18 (12.9)	0.010
	Low score group (0-3)	463 (77.2)	121 (87.1)	

3.2 Correlation of the Self-Rated Score and Ecc Knowledge

Among the 739 subjects, the highest self-rated score of ECC knowledge was 5, the lowest score was 1, and the mean score was 3.05±0.73. On ECC knowledge score, the mean ECC knowledge score (7.53±1.52) of subjects with a self-rated score of 4-5 was higher than that (7.15±1.44) of subjects with a self-rated score of 1-3 (P<0.05). Pearson correlation analysis indicated that the correlation coefficient between the self-rated score and ECC knowledge was r=0.097 (P=0.008).

3.3 Multivariate Analysis

In the logistic regression model, the willingness to take part in pre-hospital ECC was influenced by the nature of the hospital (general vs. specialized, P=0.019), the department (ICU, ER, and cardiology vs. other, P=0.002), previous AHA BLS or ACLS training (yes vs. no, P<0.001), interest (P<0.001), and the self-rated score of ECC knowledge (P=0.01) (Table 6).

Table 6 Multivariate Analysis of the Willingness to Perform Cpr in an Emergency Situation

Parameters	OR	95%CI	P
Hospital level			
Tertiary A	0.679	(0.446,1.034)	0.071
Tertiary B			
Hospital nature			
General	0.543	(0.325,0.906)	0.019
Specialized			
Department			
ICU, emergency, cardiology	0.565	(0.393,0.812)	0.002
Other department			
Age (years)			
≤25	1.293	(0.503,3.326)	0.594
26-35	0.658	(0.271,1.599)	0.356
36-45	0.660	(0.258,1.688)	0.386
≥45			
Education degree			
College or below	0.497	(0.220,1.122)	0.092
Bachelor	0.673	(0.338,1.341)	0.269
Master or above			
AHA BLS or ACLS training			
Yes	2.059	(1.397,3.035)	<0.001
No			
Interest level			
Strong interest	4.038	(1.981,8.233)	<0.001
Interest	2.692	(1.713,4.230)	<0.001
Less interest/no interest			
Occupation			
Doctor	1.174	(0.730,1.887)	0.508
Nurse			
Self-rating score of ECC knowledge			
4-5	1.808	(1.153,2.835)	.010
0-3			

OR: odds ratio; 95%CI: 95% confidence interval.

3.4 Willingness to Participate in Training and to Popularize the Training

Most subjects considered that CPR training was necessary for hospital staffs (97.8%), will participate in AHA BLS or ACLS training (91.6%), will participate in first aid teams and popularize training (82.7%), and consider that popularize ECC knowledge in the general population is necessary (96.5%) (Table 7).

Table 7 Willingness to Participate in Training about Pre-Hospital Emergency Care and to Popularize Training

Project	Willingness	N (%)
Necessity of pre-hospital emergency care training for medical staff	(Very) necessary	723 (97.8)
	Unsure/not necessary	16 (2.2)
Participation in AHA basic life support training	Definitely will/will	677 (91.6)
	Not sure/(definitely) will not	62 (8.4)
Participation in first aid team and popularize training	Definitely will/will	611 (82.7)
	Not sure/(definitely) will not	127 (17.2)
	Lack	1 (0.1)
Necessity of popularize first aid knowledge and skills in the general population	(Very) necessary	713 (96.5)
	Unsure/not necessary	26 (3.5)

4. Discussion

The aim of the present study was to evaluate the self-rating of mastery of ECC knowledge and the willingness of performing pre-hospital ECC among medical staffs.

Results showed that the self-rated score of mastery of ECC knowledge among the 739 subjects was 3.05±0.729/5. It was positively correlated with their mastery degree of first-aid knowledge. Subjects with higher scores were more willing to participate in various pre-hospital emergencies care; 82.7-97.8% subjects showed positive attitudes towards participating in ECC training and popularization. In multivariate analysis, the willingness to take part in pre-hospital ECC was influenced by the nature of the hospital (P=0.019), the department (P=0.002), previous AHA BLS or ACLS training (P<0.001), interest (P<0.001), and the self-rated score of ECC knowledge (P=0.01). Therefore, the self-rated score of ECC knowledge was moderate. Medical staffs had higher willingness to participate in pre-hospital ECC, ECC knowledge training, and popularization.

Self-rating of subjects with willingness to participate in pre-hospital emergency in various situations was higher than that of unwilling subjects. The study showed that 62.4-81.1% subjects wanted to offer ECC to people in need of ECC in out-of-hospital situations. Bandura's triadic reciprocal determinism suggests that an individual is both a product and a builder of its environment [13]. Individuals will choose the environments that could effectively respond to their needs and avoid the environments they feel they could not control when facing different situations. Once the individual select an environment, the environment would react according to his behavior and personality development. Therefore, whether subjects choose to participate in out-of-hospital ECC in different situations depends on their judgment that whether their first-aid ability could improve the emergency environment. In turn, subjects should improve their knowledge and skills in order to improve their capacity to cope with these situations.

In this study, medical staffs held positive attitudes towards receiving ECC training and popularizing the training. The study revealed that most (97.8%) subjects acknowledged special training about ECC, and 91.6% of subjects were willing to take AHA basic life support courses. In addition, 96.5% of subjects considered that it was necessary to popularize the training, and 82.7% of subjects were willing to participate in first-aid medicine professional team to promote the popularization. The results reflected that the subjects attached great importance to ECC knowledge and skills, and acknowledged the pre-hospital ECC concept. It reflected the expectation of medical staff for improving the success rate of pre-hospital ECC, which is much lower in China than in developed countries [14].

The quality of ECC education, CPR guidelines, and the chain of survival all contribute to patient survival [15]. The AHA suggests practicing while watching a video as the standard teaching resource,

using the provided video for teaching and the instructors guiding the students to operate following the pace of the video, which should correct the operating methods to avoid influencing training quality due to different instructors [16]. Previous studies has shown that ECC training is a significant contributor to willingness to perform ECC [17,18].

This study showed that the self-rating score of ECC knowledge acquisition among medical staffs was moderate. It was positively correlated with their emergency knowledge degree. Subjects with higher score would prefer to offer various pre-hospital emergencies care. Most medical staffs showed positive attitudes towards participating in ECC training and popularization. Effective training methods could promote the mastery of ECC knowledge. Therefore, we suggest that training organizations should apply the AHA-recommended training methods to improve training effects [16].

The present study is not without limitations. Indeed, it was performed in a single city in China and it might not represent the situation in the whole country and between countries. In addition, only one specialized hospital was included. A nationwide survey should be undertaken to validate these findings.

In conclusion, the self-rated score of ECC knowledge was moderate. Medical staffs had higher willingness to participate in pre-hospital ECC, ECC knowledge training, and popularization.

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