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The effects of new CPR guideline on attitude toward basic life support in Japan

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ABSTRACT

Background: There is no study regarding the influence of CPR (Cardiopulmonary Resuscitation) guideline renewal on citizen's attitude toward all BLS (Basic Life support) actions. **Methods and Results :** We conducted a questionnaire survey to new driver license applicants who participated in the BLS course at driving schools either before (Jan, 2007 - April, 2007) or after (Oct. 2007 - April, 2008) the revision of textbook. Upon completion of the course, participants were given a questionnaire concerning willingness to participate in CPR, early emergency call, telephone-assisted chest compression and use of an automated electric defibrillator. After the revision, the proportions of positive respondents to use of AED as well as to all the 4 scenarios significantly increased from 2331/3564 to 3693/5156 (Odds ratio (OR) = 1.34) and from 1889/3443 to 3028/5126 (OR = 1.18), respectively. However, the new guideline slightly but significantly augmented the unwillingness to make early call (236/3568 vs. 416/5283, OR = 0.83). Approximately 95% of respondents were willing to follow the telephone-assisted instruction of chest compression while approximately 85% were positive to their own initiative CPR. Multiple logistic regression analysis confirmed the results of mono-variate analysis, and identified previous CPR training, gender, rural area, and student as other significant factors relating to attitude. **Conclusions:** Future guidelines should emphasize the significance and benefit of early call in relation to telephone-assisted instruction of CPR or chest compression. The course instructors should be aware of the backgrounds of participants as to how this may relate to their willingness to participate.

Key words

cardiopulmonary resuscitation; attitude; bystander; chain of survival; guideline

1. INTRODUCTION

If in a situation where BLS is indicated, bystander should activate the emergency response system and initiate “chain of survival” promptly [1]. Early bystander cardiopulmonary resuscitation (CPR) significantly increases survival rates from out-of-hospital cardiac arrest [2.3]. Among the 4 links in “chain of survival”, initial three links (early access, early CPR and early defibrillation) have potential effects on the survival [4.5].

Various attempts have been made to improve the rate of bystander cardiopulmonary resuscitation (CPR) [6.7.8.9]. Although not all the callers accept the assistance, telephone-assisted CPR was recommended to increase the rate of bystander CPR and survival [10.11]. Early defibrillation is achieved by introduction of public access to AED (Automated External Defibrillator) [12].

Not only Citizen’s attitude toward CPR and AED but also the reasons why they are reluctant to initiate CPR and use the AED have been reported [13.14.15.16]. However, their willingness to make the early emergency call and to accept the telephone-assisted CPR remains to be studied.

Various educational courses conformed to Guidelines 2000 for cardiopulmonary resuscitation and cardiovascular care: international consensus on science (G2000) were held, including the mass CPR training events [6], targeted CPR training of family members of patients suffering from cardiovascular disease [7]. In Japan, new driver license applicants have been forced to take the 3-hour BLS training course at driving school since 1995. The course fee is 3500 yen and paid to the driving school. The number of participants is less than 10 per one instructor.

International Consensus on Cardiopulmonary Recommendations (CoSTR) [17] was announced in November 2005. The main characteristic of new consensus is simplification of its procedures. A favorite increase in the rate of survival has been reported after the guideline renewal [18]. The textbook of BLS training course at driving school was revised in July 2007 according to the changes in Japanese guideline based on the CoSTR. Since the textbook revision included the requisition of practical training for AED, more time was spent for the practical AED education after the revision. The simplification of the BLS algorithm may reduce the unwillingness to

BLS. However, no study regarding the influence of guideline renewal on citizen's attitude toward all BLS actions has been reported. In the present study, we studied whether the new guideline implementation may alter the attitudes of course participants to the BLS actions, and identified the factors which influence the attitudes.

2. METHODS

The present study was approved by a committee of Ishikawa Designated Driving School Association.

Respondents and setting

Respondents were new driver license applicants who participated in BLS training courses at 17 authorized driving schools in Ishikawa prefecture, Japan. The questionnaire was collected from all participants. Ishikawa prefecture has a population of 1.17 million residents, covers 4185 square km. The prefecture was divided into central (urban) and other 3 rural or semi-rural regions. Approximately 60% of the population was in the central region with an area of 1432 square km. All the fire departments have a dispatch system which provides a telephone-assisted instruction of CPR (chest compression). The BLS courses are held systemically by fire departments, the Japanese Red Cross Society, high schools and the driving schools.

Questionnaires

We gave questionnaires upon completion of the course. The questionnaires included age group of respondents, gender, residential area, occupation, experience of previous BLS training, and the duration between present and the most recent BLS training courses. We asked questions regarding their willingness to perform BLS actions in 4 hypothetical scenarios of emergency scene related to the initial three links in "chain of survival" (Table 1). Respondents were instructed to choose the option that they would do if actually faced with the situation. The multiple choices included both positive and negative actions. When they selected negative actions, they were instructed to select the multiple choices for reason or to write free comments. The questionnaires were made in accordance to guidelines for the Law Concerning the Protection of Personal Information.

BLS course revision and Study period

The study period consists of the first term of Jan, 2007 to April, 2007 before the revision of textbook and the second term of Oct, 2007 to April 2008 after the revision. The revision of textbook included an immediate initiation of chest compression after 2 rescue breathings and a requisition of practical training for AED. A face-shielding device and the textbook were provided to all attendants at the beginning of course. In some schools, a video instruction program was introduced. The BLS course in the driving school is guaranteed the Japanese Red Cross Society and the Japan Foundation for Emergency Medicine.

Statistical analysis

We analyzed the data using JMP ver.6 (for Windows, SAS institute). *Chi*-square test was applied for mono-variate analyses. We used multiple regression analysis to confirm the effect of guideline renewal and to elucidate the factors relating to attitude. We considered the difference or effect to be significant when *p* value is less than 0.05.

3. RESULTS

Number of respondents

The total numbers of respondents were 3580 before revision of textbook and 5310 after the revision. However, not the all respondents answered to all questions we provided. When the data was analyzed, we excluded the respondents who gave no answer to a scenario or information we needed.

Comparison of backgrounds and characteristics of respondents between the two terms (Table 2)

Majority of participants had ages of 17 (the youngest age at the driving school) to 29 years in both terms. There were significant but small differences in age, residential area and occupation between the two terms. The knowledge of how to use the AED increased from 40.3% to 50.5 % after the textbook revision. There was no significant difference in the experience of BLS training between the two terms. However, when analyzed only in the respondents with experience of previous BLS training, a higher proportion of the respondents had participated in the other BLS training courses within three years in the pre-revision term, compared with the post-revision term.

Comparison of willingness to BLS actions between the two terms (Table 3)

There was no significant difference in the proportion of respondents who were willing to perform their own initiative CPR between pre-revision and post-revision terms. The proportions of respondents who selected the chest-compression only CPR were 14.3% before the revision and 14.3% after the revision. The proportion of respondents who were willing to perform chest compression following telephone-assisted instruction was approximately 95% in both terms. The proportion of respondents taking other actions than emergency call was slightly but significantly higher in the post-revision term than in the pre-revision term. The major action that these respondents answered to take was calling their neighbors, friends or home doctor. After the revision, the proportions of positive respondents to the AED use and all the 4 scenarios significantly increased.

Characteristics and backgrounds of respondents relating to attitudes to BLS actions (mono-variate analysis)

We totaled the respondents of two terms and mono-variate analysis to elucidate the factors relating to attitude toward four scenarios (Table4). At least in one of the 4 scenarios, all the factors in characteristics and backgrounds of participants were significantly associated with positive attitude.

Factors Relating to the Attitudes (multivariate analysis)

We performed a multiple logistic regression analysis to confirm the effect of textbook revision and to identify other independent factors relating to attitude or willingness (Table 5). The independent factors associated with the positive attitudes to the all four scenarios were revision of the guideline, BLS training experience and students. Renewal of guideline was an independent factor associated with positive attitude to the AED use and negative attitudes to early call. Increased experience of previous CPR training was an independent factor associated with willingness to perform one's own initiative CPR and use the AED. Female was an independent factor associated with willingness to perform telephone-assisted chest compression and unwillingness to make early emergency call and use the AED. The respondents living in rural area was an independent factor relating to willingness to perform their own initiative CPR. The student as occupation was an independent factor associated with willingness to perform their own initiative CPR and use the AED.

Reasons for unwillingness

Practical skill evaluation followed by advices for further improvement was made in the BLS course. Nevertheless, major reasons for unwillingness or reluctance to perform their own initiative CPR were fears of their insufficient knowledge and imperfect performance of CPR, which may reflect, at least in part, their intention that they would not like to take responsibility for their actions in those practical scenes. Major reasons for reluctance to perform telephone-assisted chest compression were lack of confidence for cardiac arrest. Major reason for unwillingness to make an early call was lack of confidence. Major reasons for unwillingness to use the AED were no experience to use and fear of imperfect performance of the AED use.

4. DISCUSSION

One of the characteristics of new guideline based on the ILCOR consensus 2005 is simplification. A recent study from Oslo, Norway reported a favorite increases in the rates of survival after guideline renewal [19]. However, no study regarding the influence on citizen's attitude toward all BLS actions has been reported. The simplification of CPR algorithm may reduce the unwillingness to BLS and CPR.

We elucidated a proportional increase in respondents with positive attitude to all the 4 scenarios and the AED use after the renewal of guideline. However, we did not find any proportional change in attitude to one's own initiative CPR or telephone-assisted chest compression. Approximately 15% of respondents had unwillingness to perform their own initiative CPR even though questionnaires were given immediately after the BLS training course. Unfortunately, the proportion of respondents taking other actions than early emergency call slightly but significantly increased after the revision.

In coincidence with previous reports from Michigan and Japan [15,16], the main reasons why the respondents are reluctant to perform CPR were fears of poor knowledge and imperfect performance of CPR. In contrast to reports from Singapore, Los Angeles and Arizona [6,20,21], fear of contracting an infectious disease was not the major reason. In the present study, only 14% of respondents selected chest compression as a resuscitation method to a stranger polluted with blood. Although a face-shielding device was provided in the BLS training course, this finding may reflect the lack of fear contracting an infection in Japan, that has been reported previously [16].

The main reason why the respondents are reluctant to make an early call was lack of confidence for cardiac arrest, which may reflect their intension that they would like to entrust the judgment to other senior persons.

Approximately 95% of respondents answered that they will follow the telephone-assisted instruction of CPR, while approximately 85% of respondents were willing to perform their own initiative CPR. It has been reported that implementation of telephone-assisted chest compression is effective to increase the rate of bystander CPR [11]. The result of present study may support the usefulness of dispatch-assisted CPR in Japan. The early call may augment the effect of telephone-assisted chest compression, since the interval of collapse to initiation of CPR is largely prolonged by the delayed emergency call. In the present study, the proportion of respondents taking other actions than early call was shown to increase slightly after the revision. The significance of early call should be more emphasized in relation to the telephone-assistance in the BLS training course.

The proportion of respondents who are willing to use AED was obviously increased (64.4% to 71.5%). In Japan, the citizens have been legally allowed to use AED without training since July of 2004. The number of AED installed in public facilities has increased [URL: <http://mhlw-grants.niph.go.jp/niph/search/NIDD00.do>]. The number of reports for successful resuscitation by citizens who use the AED has been increasing. Since the textbook revision included the requisition of practical training for AED, more time was spent for the practical AED education after the revision. The respondents after the revision might have had more chances to have the AED training in the previous BLS course at high school. However, approximately 30% of the respondents retained negative attitudes toward the use of AED. These negative attitudes may be attributed to several causes including lack of enforcement of “good Samaritan law”, differences in operation among the AED equipments commercially available and few chances to touch the AED. It may be necessary to spend a sufficient time for the driver’s license applicants to be aware of use of AED.

We elucidated independent factors related to the attitudes. It is interesting that female was negative to early call and the use of AED but they were more obedient to telephone-assisted chest compression, compared with male. The global gender gap

report by World Economic Forum (Hausmann R, Tyson LD and Zahidi S) shows that Japan has a large gender gap in society [<http://www.weforum.org/pdf/gendergap/report2009.pdf>]. A gender gap in attempting CPR has been reported from Japan [14.19]. The instructors in BLS course should be aware of this gender gap. As reported previously [15.16.18], the experience of BLS training is one of independent factor relating to willingness to perform their own-initiative CPR. However, it is not an independent factor relating to positive attitude to early call, telephone-assisted CPR or the AED use. This may reflect the problem of BLS course where most of time is spent to teach how to perform CPR.

This study is based on the survey for new driver license applicants who participated in compulsory BLS courses. The compulsory education of BLS is conducted in high schools [19]. These educational systems were introduced in Japan as a consequence of persuasive argument by several associations related to resuscitation. These systems have been generally accepted on humanitarian grounds in Japan. However, it remains to be clarified whether these systems are effective to improve the rate of bystander CPR and the outcome of out-of-hospital cardiac arrests.

Limitation

In the present study, we did not analyze the parameters for participants' attainment of BLS actions or skills since the attainment was comprehensively evaluated in a non-quantitative manner (as it was accepted or not) in this BLS course. Thus, it is unclear if the quality of BLS actions was improved by the guideline revision. However, this study is based on a large survey with high number of respondents exceeding 8000. We believe that obtained results are reliable and helpful for the future revision of guidelines.

Most of respondents were in an age bracket of 17 (the youngest age at the driving school) to 29. Approximately 83% of the respondents were high school or college students, who might have had a chance to receive BLS training during class. Thus, the results of present study may not reflect the entire population of Ishikawa prefecture or Japan.

We did not evaluate the quality of instruction in BLS training program. However, new instructors of BLS course in driving school are certificated after they take lecture

provided by emergency medical directors for 3 days and practical training given by BLS directors of Japan Red Cross Society for 3 days and then they pass both written and practical examinations. When the guideline was changed, they took the lecture and practical training of new guideline for 6 hrs. They were re-qualified after passing the written and practical examinations. Therefore, the quality of instruction seemed to be maintained during the study period.

5. CONCLUSION

We showed the renewal of guideline increase the proportion of positive respondents to AED use and all the BLS actions. However, it failed to improve the unwillingness to early call, one's own initiative CPR or telephone-assisted chest compression. The future revision of guideline and textbook should include the emphasis of significance and benefit of early call associated with telephone-assisted instruction of CPR. The course instructors should be aware of the backgrounds of participants relating to their willingness.

6. CONFLICTS OF INTEREST STATEMENT

We have no conflicts of interest to disclose.

7. ACKNOWLEDGEMENTS

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Table 1 Scenarios and choices

Scenarios	Choices
1. A 30-year-old woman collapsed in front of you. She has no breathing and appears to be in cardiac arrest. She has blood on her face. What do you do after calling an ambulance?	<ul style="list-style-type: none"> a) Chest compression and mouth-to-mouth ventilation* b) Chest compression only* c) Do nothing d) Other
2. You found an unknown man collapsed on the floor. He had no response. He was abnormally breathing. When you called 119, commander assisted you to keep on pushing the center of chest. What do you do?	<ul style="list-style-type: none"> a) Compress the center of chest* b) Do not compress c) Other
3. One of your families complained of a sudden chest pain and became unresponsive. He or she is breathing. What do you do first?	<ul style="list-style-type: none"> a) Call 119* b) Call family, friend or neighbors c) Call his or her home doctor d) Other
4. There is a man with cardiac arrest. AED is in the neighborhood. What do you do?	<ul style="list-style-type: none"> a) Use the AED* b) Do not use the AED c) No idea

* choice(s) for positive attitude or willingness

Table 2 Characteristics and backgrounds of respondents

Characteristics and backgrounds		Term		<i>p</i> -value	Odds ratio
		Before	After		
		revision % (n)	revision % (n)		
Age	17-29 years	96.4 (3444)	95.4 (5058)	0.014	1.313
	30-69 years	3.6 (127)	4.6 (245)		
Gender	male	52.2 (1863)	53.7 (2849)	0.16	
	female				
Residential area	Urban area	48.0 (1687)	58.6 (3084)	<0.001	
	Rural area	37.5 (1317)	33.5 (1764)		
	Other	14.5 (508)	7.9 (416)		
Previous BLS training	None	48.0 (1706)	48.9 (2584)	0.343	
	Once	36.4 (1296)	36.5 (1925)		
	Twice	10.8 (384)	9.6 (509)		
	3 times or more	4.8 (171)	5.0 (262)		
Years after the last BLS training course	Within 3 years	81.9 (1385)	77.1 (1953)	<0.001	1.346
	Over 3 years	18.1 (306)	22.9 (581)		
Occupation	Student	86.8 (3066)	80.7 (4252)	<0.001	1.571
	Non-student	13.2 (468)	19.3 (1020)		
knowledge of how to use the AED	Yes	40.3 (1402)	50.5 (2616)	<0.001	1.514
	No	59.7 (2080)	49.5 (2563)		

BLS, basic life support; AED, automated external defibrillator

Table 3 Comparison of respondents' attitude toward the 4 scenarios between the two terms

Scenarios	Term		<i>p</i> value	Odds ratio
	Before renewal	After renewal		
1. One's own initiative CPR, % (n)				
Do	86.3 (3076/ 3563)	84.9 (4485/ 5280)	0.073	
Do not	13.7 (487 / 3563)	15.0 (795 / 5280)		
2. Telephone-assisted chest compression, % (n)				
Do	94.8 (3374/ 3556)	94.7 (4996/ 5275)	0.877	
Do not	5 (183 / 3556)	5 (279 / 5275)		
3. Early call , % (n)				
Do	93.5 (3338/ 3568)	92.0 (4867/ 5283)	0.02	0.827
Do not	6.4 (236 / 3568)	7.8 (416 / 5283)		
4. Use of AED, % (n)				
Do	64.4 (2331/ 3564)	71.5 (3693/ 5156)	<i>p</i> <0.001	1.340
Do not	35.6 (1233/ 3564)	28.4 (1457/ 5156)		
All scenarios, %(n)				
Positive	54.9 (1889/ 3443)	59.1 (3028/ 5126)	<i>p</i> <0.001	1.178
Negative	45.1 (1543/ 3443)	40.9 (2098/ 5126)		

CPR, cardiopulmonary resuscitation

Table 4 Characteristics and backgrounds of respondents relating to positive attitude
(mono-variate analysis)

Characteristics and backgrounds	Scenarios								All Scenarios (n=8362)	
	One's Own Initiative CPR (n*=8617)		Telephone - assisted chest compression (n=8607)		Early 119 call (n=8623)		Use of AED (n=8412)		Do (%)	<i>p</i> value
Do (%)	<i>p</i> value	Do (%)	<i>p</i> value	Do (%)	<i>p</i> value	Do (%)	<i>p</i> value	Do (%)		
Age										
17-29	85.5	0.116	94.8	0.980	92.6	0.121	68.9	0.198	57.4	0.723
30-69	82.5		94.8		94.8		65.3		56.4	
Gender										
Male	85.9	0.170	93.7	<0.001	93.4	<0.01	70.1	<0.01	57.9	0.310
Female	84.9		96.2		91.9		67.1		56.8	
Residential area										
Urban	84.2	<0.001	94.8	0.841	92.5	0.089	66.4	<0.001	55.2	<0.001
Rural	87.4		94.8		92.5		71.6		59.4	
other	85.5		95.2		94.5		71.3		61.3	
Previous BLS training										
none	77.6	<0.001	94.7	0.183	92.3	0.611	63.6	<0.001	53.2	<0.001
once	87.0		95.4		92.3		71.3		59.1	
twice	88.0		94.3		92.7		76.3		62.6	
3 times or more	92.1		93.3		94.0		83.8		74.0	
Occupation										
student	86.0	<0.001	95.0	0.194	92.6	0.521	69.7	<0.001	58.0	<0.01
non-student	82.5		94.2		93.1		63.8		53.9	

Table 5 Factors associated with positive attitude to BLS actions (multiple logistic regression analysis)

	Odds ratio (C.I)				
	Scenario				All scenarios (n*=8362)
	One's Own Initiative CPR (n*=8617)	Telephone- assisted chest compression (n*=8607)	Early 119 call (n*= 8623)	Use of AED (n*= 8412)	
Guideline renewal	0.929 (0.819-1.052)	0.982 (0.804-1.196)	0.753 (0.631-0.896)	1.422 (1.291-1.564)	1.233 (1.126-1.349)
Times of previous BLS training	2.105 (1.663-2.680)	0.833 (0.595-1.177)	1.132 (0.884-1.623)	2.732 (2.277-3.278)	2.092 (1.776-2.457)
Female	0.891 (0.789-1.006)	1.712 (1.402-2.100)	0.805 (0.682-0.949)	0.843 (0.767-0.926)	0.943 (0.864-1.030)
Rural area	1.265 (1.038-1.540)	0.911 (0.667-1.242)	0.820 (0.620-1.078)	1.112 (0.955-1.297)	1.008 (0.876-1.160)
Student	1.229 (1.034-1.445)	1.226 (0.928-1.599)	1.013 (0.788-1.289)	1.320 (1.150-1.515)	1.201 (1.053-1.370)

C.I., confidence interval

* number of respondents analyzed.