J Anesth (2014) 28:34–37
DOI 10.1007/s00540-013-1662-0

ORIGINAL ARTICLE

Attitudes toward automated external defibrillator use in Japan in 2011

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Received: 20 February 2013 / Accepted: 13 June 2013 / Published online: 10 July 2013

Abstract
Purpose Early use of an automated external defibrillator (AED) improves the chances of successful resuscitation and survival. We have surveyed Japanese individuals on their attitude towards using an AED if they witnessed a cardiac arrest and compared the results with those of our previous study in 2006.
Methods Participants were asked to complete questionnaires regarding their familiarity with the AED concept and their willingness to use AEDs.
Results A total of 2,527 high school students, teachers, medical nurses, and medical students completed the questionnaire; the characteristics of these individuals were not statistically different from those of the participants of our previous study. In total, 47 % of the high school students, 89 % of the teachers, 93 % of the nurses, and all of the medical students responded that they were familiar with the concept and use of AEDs. The percentages of high school students, teachers, and nurses indicating a familiarity with AEDs were significantly higher in the current study than in the 2006 study. In total, 73 % of the high school students, 87 % of the teachers, 98 % of the nurses, and all of the medical students surveyed in the current study claimed they would definitely use AEDs if required; these values were also significantly higher than those obtained in 2006.
Conclusions The number of Japanese individuals who are familiar with the concept of AEDs and who are also willing to use these devices was considerably higher in the current study than in the 2006 study. However, more Japanese individuals should be made aware of AEDs and become familiar with their use.

Keywords Cardiopulmonary resuscitation · AED · Automated external defibrillation

Introduction

Early defibrillation for victims of sudden cardiac arrest (SCA) improves the chances of successful resuscitation and survival [1, 2], and this has become increasingly feasible through the introduction of publicly accessible automated external defibrillators (AEDs) [3]. A previous study carried out by our group in 2006 showed that many Japanese individuals with a non-medical background—unlike medical personnel—are unwilling to use AEDs due to an unfamiliarity with the concept of AEDs and/or a lack of knowledge on how to use such a device [4]. The results of several studies have indicated that not only laypeople but also healthcare providers are reluctant to perform bystander cardiopulmonary resuscitation (CPR) [5–7].

The aim of the study reported here was to assess the current trend (i.e., in 2010) in the attitudes of Japanese individuals towards the use of AEDs upon witnessing SCA.

Methods

Data were collected in accordance with the National Guideline of Ethics for the Epidemiological Surveys (The Ministry of Health, Labor and Welfare, Japan). The study was approved by the Institutional Review Board of the Kanazawa University Graduate School of Medicine.

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Demographics of respondents

As in our previous reports [4–6], the respondents were habitants of Ishikawa, Japan, a prefecture with both urban and rural environments and a population of >1.1 million. The respondents were high school students, high school teachers, medical nurses, and medical students, as in our previous studies. All respondents were given a written questionnaire. High school students and teachers were chosen from the 12 schools that had been included in our previous studies; participants were chosen by the respective principals of the schools. All nurses were part of the full-time nursing staff at the 850-bed Kanazawa University Hospital and a 200-bed municipal hospital; the staffs of these hospitals had also been evaluated in our previous studies. The medical students were in the fourth year of a 6-year program of Kanazawa University School of Medicine.

Questionnaires

Respondents to the questionnaire were similar to those in our previous study [4] and were surveyed from May to July 2010. They were all asked to assume that they witnessed SCA and that there was no one else around who could help. Healthcare providers (medical nurses and medical students) were asked to respond in their non-professional capacity, that is, as lay citizens. The first section of the questionnaire focused on the respondent's age and previous CPR training. Subsequent questions targeted their knowledge of AEDs and any previous training on the use of an AED. Respondents were then questioned regarding their willingness to apply and operate an AED. If they declined to operate an AED, they were asked to choose a reason that best characterized their decision on witnessing SCA, including poor knowledge, poor skill, unwillingness to touch a stranger, and fear of hurting the patient.

Data analysis

Data on the respondent's previous CPR training and willingness to operate an AED in the study were compared with corresponding data from our earlier study (2006) and analyzed using Fisher's exact test and one-way analysis of variance (ANOVA) on ranks. When ANOVA detected a significant difference, post hoc testing was performed using Dunn's method. The level of statistical significance was defined as $P < 0.05$.

Results

Response rate and demographics

Of the 810 nurses and 101 medical students, 683 (84.3 %) and 92 (91.1 %), respectively, completed the questionnaires. The mean ages of the nurses and medical students were 34 and 22 years, respectively, and there were no significant differences in mean age between the nurses/medical students in the present study and those in our previous studies (Table 1). Among the high school students participating in the present study, 29, 61, and 10 % were in the first, second, and third years respectively, of a 3-year program; these values were not significantly different from those of our previous studies. Moreover, no significant

Table 1 Characteristics of respondents

Years	2010	2006	*P*
High school students			
Number	1,522	2,230	
First year (%)	29	30	0.862
Second year (%)	61	60	0.894
Third year (%)	10	10	0.911
Male (%)	51	48	0.334
High school teachers			
Number	230	319	
Age (mean ± SD)	44/12	42/12	0.314
Male (%)	63	61	0.338
Medical nurses			
Number	683	451	
Age (mean ± SD)	34/7	32/8	0.662
Male (%)	3	3	0.894
Medical students			
Number	92	179	
Age (mean ± SD)	2/1	22/2	0.872
Male (%)	69	79	0.051

SD Standard deviation

Table 2 Previous cardiopulmonary resuscitation training of respondents in 2010 (our previous study in 2006)

Study sub-groups	Previous CPR training (%)			
	None	Once	Twice	>Three times
High school students	42 (41)	33* (38)	15 (15)	10* (6)
High school teachers	5* (15)	22 (25)	33* (24)	40* (35)
Medical nurses	2 (4)	25 (27)	33 (32)	40* (37)
Medical students	1 (1)	7* (19)	28* (39)	65* (41)

* $P < 0.05$ vs. our previous study in 2006

CPR Cardiopulmonary resuscitation

differences were noted between the sex of each respondent category between the present and previous studies.

Approximately 70 % respondents had received CPR training more than once (Table 2). The number of high school students who had undergone previous CPR training in the present study was not significantly different from that in our previous studies. In contrast, the number of high school teachers who had undergone previous CPR training was significantly higher in our present study. In addition, the percentages in all groups that had undergone CPR training more than three times were significantly higher in our present study than in our previous ones.

Knowledge of AEDs and willingness to use AEDs

Among the 2,527 participants, 47 % of high school students, 89 % of teachers, 93 % of nurses, and all medical students responded that they were familiar with the concept and the use of AEDs. With respect to high school students, teachers, and nurses, these rates were significantly higher than those obtained in 2006 (Fig. 1). However, the percentages of high school students and teachers with knowledge of AED use were significantly lower than those of healthcare providers, and significantly fewer high school students than teachers were familiar with AEDs. Moreover, 13 % of high school students had no knowledge at all of AEDs; this percentage was significantly lower than that found in our previous study.

Among all participants, 73 % of high school students, 87 % of teachers, 98 % of nurses, and all medical students claimed they would definitely use AEDs if required; the percentages of high school students, teachers, and nurses were significantly higher in 2010 than in 2006 (Fig. 2). However, high school students were significantly less willing to use an AED than all other groups. Moreover, 21 % of high school students and 12 % of teachers who had received CPR training more than once were still reluctant to operate an AED.

Reasons for not operating an AED

Most of the reasons given for the stated reluctance to operate an AED were similar in both the 2010 and 2006 studies. The most common reason cited for not operating an AED, cited by 85 % of respondents, was a lack of knowledge regarding the concept of AEDs or how to use them. The second most common concern, cited by approximately 25 % of respondents with a non-medical background, was the belief that chest compression had to be performed before an AED can be used. Interestingly, 8 % of the laypeople (all teachers) who declined to operate an AED did so because of the fear of legal liability. Considerably fewer participants who declined to operate an AED mentioned being concerned about infectious diseases (3 %) or removing a stranger's shirt (2 %).

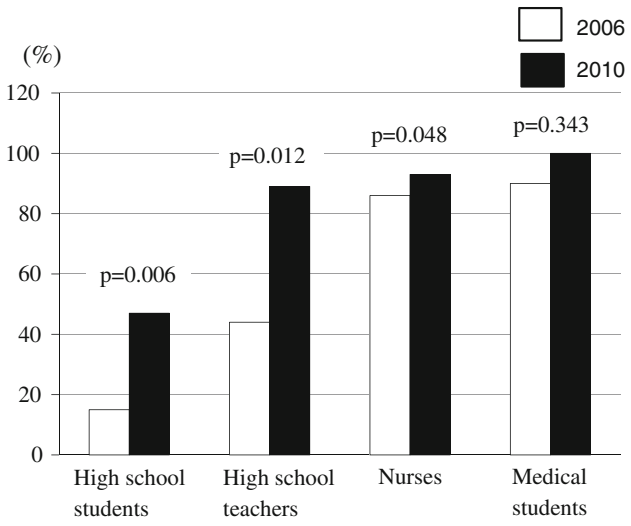

Fig. 1 The rates as which high school students, teachers, nurses, and medical students in the studies (2010 vs. 2006) responded that they were familiar with the concept and use of automatic external defibrillators (AEDs)

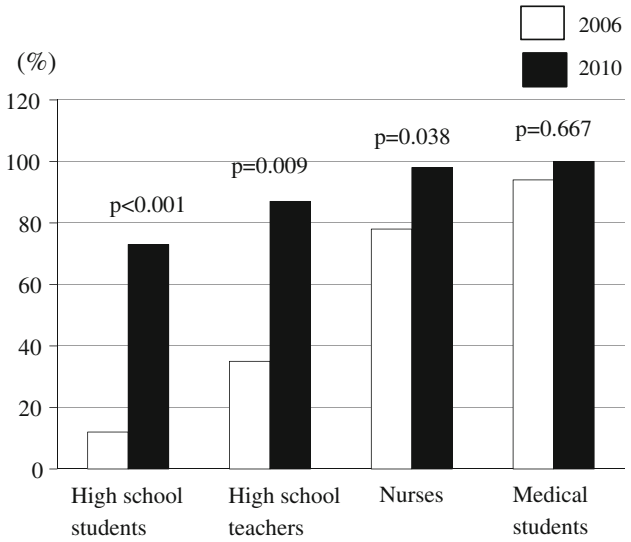

Fig. 2 The rate of the willingness of high school students, teachers, nurses, and medical students to use an AED if required

Discussion

The effectiveness of CPR and early defibrillation for victims of SCA are important factors in improving the chances of successful resuscitation and survival [1, 2]. The American Heart Association [3] Guidelines recommend CPR and immediate defibrillation for ventricular fibrillation of short duration, such as that witnessed in SCA. Successful

resuscitation and survival of the victim is far less likely without CPR and early resuscitation. Several reports show that a knowledge of the use of AEDs is one of the factors associated with willingness to attempt CPR [6, 8] and that the lack of this knowledge and skill in using an AED is an important factor in public reluctance to perform CPR [9]. Our previous study in 2006 showed that many Japanese individuals with a non-medical background were unwilling to operate AEDs because they had no knowledge of the concept of AEDs or of the use of AEDs, in contrast to medical personnel. These findings suggest that many high school students and teachers in Japan would have been unwilling to attempt CPR in 2006. The importance of AED and bystander CPR has in recent years became widely recognized in Japan. Therefore, we conducted the present study to assess the current trend (i.e., in 2010) in the attitudes of Japanese people towards using AEDs if they witnessed SCA.

Among the respondents to our 2010 questionnaire, many high school students, most high school teachers, and most medical people claimed they knew how to use AEDs and were willing to operate an AED. The percentages of high school students, teachers, and nurses so reporting were significantly higher in the 2010 survey compared to the 2006 survey.

We also found that the number of previous CPR training courses taken by students and teachers was significantly higher than that reported in our previous study. However, 21 % of high school students and 12 % of teachers who had received CPR training more than once were still reluctant to operate an AED. The results of the present study indicate that the main reason for this unwillingness among high school students and teachers was the fear that their knowledge of the concept AEDs or their working knowledge of AEDs was poor, similar to the 2006 results. This finding suggests that the CPR training courses they had taken may not be effective and that these courses may not provide sufficient information on operating an AED, leading to the possibility that current CPR training programs are not sufficiently effective and may need to be revised.

As in 2006, the lack of public education remains an obstacle that may impede public access to defibrillation programs. In Japan, the Health Policy Bureau of the Japanese Ministry of Health, Labor, and Welfare announced on July 1, 2004 that the use of AEDs by general citizens is legal because the situation is unexpected and the use is not repeated. However, our study showed that 8 % of the laypersons (all teachers) in our study who declined to use an AED did so because of the fear of legal liability. It may therefore be important to improve public education on legal liability and AED use.

To facilitate an accurate comparison between the 2006 and 2010 studies, the participants in the 2010 study came from the same schools and hospitals as those in the 2006 study. It is possible that some of the high school teachers and nurses took part in both studies. This may have affected the statistical analysis of the current study and as such possibly be a limitation to this study. Further investigation into the Japanese attitudes towards the operating AEDs is therefore needed.

In summary, we have demonstrated that among our study cohort many high school students, most high school teachers, and most medical people were aware of how to use AEDs and were willing to operate such a device. The numbers of such high school students, teachers, and nurses were significantly higher in 2010 than in 2006. These findings suggest that the number of non-medical Japanese people familiar with the concept of AEDs and also willing to use them was considerably higher in 2010 than in 2006. Our results indicate the importance of raising the awareness of Japanese individuals with non-medical backgrounds to the concept of AEDs and the need to learn how to use them.

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