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Participation in Cardiopulmonary Resuscitation Courses by Pregnant Women and Parents of Infants and Young Children

Tsukigase Kyoko[1*], Sagisaka Ryo[2], Nakagawa Koshi[3], Tanaka Shota[1] and Tanaka Hideharu[1,3]

[1]*Research Institute of Disaster management and EMS, Kokushikan University, Japan.*

[2]*Chuo Univ. Department of Integrated Science and Engineering for Sustainable Society, Japan.*

[3]*Graduate School of Emergency Medical System, Kokushikan University, Japan.*

[*]Correspondence:
Tsukigase Kyoko, Nagayama 7-3-1, Tama-city, Tokyo, 206-8515, Japan, Tel/Fax : +81-42-339-7191.

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ABSTRACT

Background: *Parents with children must be able to provide the least amount of first aid and CPR in the case of emergency in children. However, it is unknown that whether the parents with child taking those courses or not. The aim of this survey was to understand the current attendance level of infants' CPR courses and their knowledge by expect mother and father.*

Methods: *Study design: The cross-sectional questionnaire study. Method: Online questionnaire for 3,700 mother and fathers with child (Group A) and 3,000 expects mother and father without child (Group B) were conducted from Jan 24,2019 to Jan 30,2019. The content of questionnaire included the history of taking adult or pediatric CPR courses, whether they feel confident in performing CPR on their own child, whether they wished to take a course in the future, and the ideal format, venue, length, and contents of a course. Statistical design: Chi-squared test for statistical analysis and adjusted odd ratios (AORs) with 95% confidence intervals (95% CIs) were calculated using multivariable logistic regression analysis.*

Result: *Among 6,700 people, a history of taking pediatric CPR courses were 19.3% in Group A and 7.9% in Group B, with the AOR was 2.48 (2.09–2.94: $p < 0.001$). 52.2% (1,930) of Group A answered "not confident" for performing CPR on their own child. The ratio of responders who wished to take pediatric CPR courses in the future was 76.0% (2,798) for Group A and 35.6% (1,067) for Group B, with the AOR was 5.01 (4.47–5.62: $p < 0.001$). Answers of the ideal course of venue was led by baby classes (1,737), of duration was 30 to 60 minutes (57.1%: 1,598) and of content was the use of an Automated External Defibrillator (2,200) was the most common.*

Discussion: *The ratio of people who have taken pediatric CPR courses was lower than those who have taken adult CPR courses whether they had children or not.*

Conclusion: *Future improvement of the infant CPR program based on the the learning needs of expect mother and father.*

Keyword

Infant CPR, Expect mother, CPR training.

Background

According to Ministry of Internal Affairs and Communications (2013) Current State of Emergency and rescue Operations by the Fire and Disaster Management Agency, the number of patients transferred by ambulances in 2017 was 5,736,086) [1], among which the number of infants and young children (<7 years old) was 278,674 (4.9%) [2]). In Japan's super-aging society, the proportion of infants and young children among the total number of patients transferred is not high. However, the number of deaths and severe cases is especially high for infants (1,839: 13.7%) and children (4,418: 1.7%), and the importance of prevention is being emphasized. Although the number of people taking Cardiopulmonary Resuscitation (CPR) courses for infants and

children is increasing [3]), the current perspective of parents, who are closest to these children, with regard to taking such courses is unclear. To develop future CPR courses for parents with young children, it is important to understand their learning needs and re-consider course programs.

Objectives

The objectives of the present study were to understand the current attendance levels of expected mother and father with infants taking CPR courses, survey their learning needs, and examine ideal course programs.

Study design

The cross-sectional questionnaire study

Methods

Method: Online questionnaire for 3,700 mother and fathers with child (Group A) and 3,000 expects mother and father without child (Group B) were conducted from Jan 24,2019 to Jan 30,2019.

The content of questionnaire included the history of taking adult or pediatric CPR courses, whether they feel confident in performing CPR on their own child, whether they wished to take a course in the future, and the ideal format, venue, length, and contents of a course.

The groups divided as follows, In the Group A. Total 3,700 subjects, who were expect to first child (or people whose partner was pregnant) or parents of infants. In the Group B, total 3,000 adults without children (Group B), respectively. We categorized them to 4 age groups (20-29 yr, 30-39 yr, 40-49 yr, 50-59 yr). We administered an online questionnaire from January 24 to 30, 2019 regarding the history of taking adult or pediatric CPR courses, the venue for the courses, whether they feel confident in performing CPR on their own child, whether they wished to take a course in the future, and the ideal format, venue, length, and contents of a course. Regarding the handling of private information and research participation, the present study was conducted with the informed consent of the subjects.

Statistical design

We used Microsoft® Excel® to perform simple tabulation of data. We used the chi-squared test for statistical analysis and considered p-values < 0.05 as statistically significant. To examine the association between Group A and B, adjusted odd ratios (AORs) with 95% confidence intervals (95% CIs) were calculated using multivariable logistic regression analysis. It adjusted for potential confounders including sex, age group, and groups.

Results

For the present study, 6,700 subjects (2,324 males and 4,376 females) participated with ages ranging from 20 to 59 years (mean age of 34.2 years) The mean age of Group A was 32.3 years (20 to 58 years) with 824 males and 2,876 females. The mean age of Group B was 36.6 years (20 to 59 years) with 1,500 males and 1,500 females (Table 1). The residences of responders included 47 prefectures.

Table 1: Number, ages of subjects and CPR Course attendance history.

n, (%)		Group A*1 n=3,700	Group B*2 n=3,000	p-value	effect size*3
age, yr, (SD)	32.3	32.3 (5.8)	36.6 (10.5)	<0.001	0.52
age group	20-29 yr	1216 (32.9)	1000 (33.3)		
	30-39 yr	2059 (55.7)	1000 (33.3)		
	40-49 yr	402 (10.9)	500 (16.7)		
	50-59 yr	23 (0.6)	500 (16.7)	<0.001	0.23
sex, female		2876 (77.7)	1500 (50.0)	<0.001	0.01
pregnant		700 (18.9)	NA	NA	NA
CPR*4 Course attendance history (Adult)		2011 (54.4)	1037 (34.6)	<0.001	0.01
CPR Course attendance history (Pediatric)		715 (19.3)	238 (7.9)	<0.001	0.01

*1 Group A; Pregnant with their first child (or people whose partner was pregnant) or parents of infants
*2 Group B; Adults without children
*3 effect size: Continuous variable; Cohen's d, Categorical variables; Cramer'v
*4 CPR; Cardiopulmonary Resuscitation

To the question on the history of taking adult CPR courses, 45.5% of all subjects (3,048) took adult CPR courses before, and 54.5% (3,652) didn't. To the question on the history of taking pediatric CPR courses, 14.2% (953) took pediatric CPR courses before, and 54.5% (3,652) didn't. In the group comparison regarding the history of taking adult CPR courses (Group A: with children, Group B: without children), the results were as follows: Those with a history of taking adult CPR courses were 54.4% in Group A and 34.6% in Group B (Table 1), and Table 2 shows the results of logistic regression analyses. Those with a history of taking pediatric CPR courses were 19.3% in Group A and 7.9% in Group B (Table 1), and Table 3 shows the results of logistic regression analyses.

Table 2: Multivariable logistic regression analyses for the history of taking adult CPR courses.

		AOR*1	95% CI*2
sex	male	1.27	(1.14-1.42)
	female	ref	
age group	20-29 yr	ref	
	30-39 yr	0.66	(0.59-0.74)
	40-49 yr	0.45	(0.38-0.53)
	50-59 yr	0.52	(0.42-0.64)
group	Group A*3	2.31	(2.07-2.58)
	Group B*4	ref	

*1 AOR; adjusted odds ratio
*2 CI; Confidence Interval
*3 Group A; Pregnant with their first child (or people whose partner was pregnant) or parents of infants
*4 Group B; Adults without children

Table 3: Multivariable logistic regression analyses for the history of taking pediatric CPR courses.

		AOR*1	95% CI*2
sex	Male	1.05	(0.89-1.23)
	Female	ref	
age group	20-29 yr	ref	
	30-39 yr	0.88	(0.76-1.03)
	40-49 yr	0.52	(0.40-0.67)
	50-59 yr	0.37	(0.23-0.58)
child	Group A*2	2.48	(2.09-2.94)
	Group B*4	ref	

*1 AOR; adjusted odds ratio
*2 CI; Confidence Interval
*3 Group A; Pregnant with their first child (or people whose partner was pregnant) or parents of infants
*4 Group B; Adults without children

The five-point scale responses to the question about parental confidence in performing CPR on their own child, obtained only from Group A, showed that the most common answer was "not confident" at 52.2% (1,930), followed by "not very confident" at 26.0% (962), "neither" at 11.0% (408), "somewhat confident" at 7.9% (293), and "confident" at 2.9% (107) (Figure 1). The relationship between the history of Adult CPR courses and confidence levels showed that those with a history of taking Adult CPR courses had significantly more confidence (Figure 2).

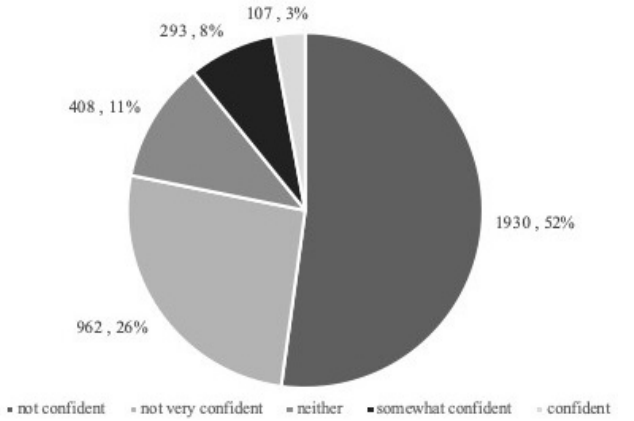
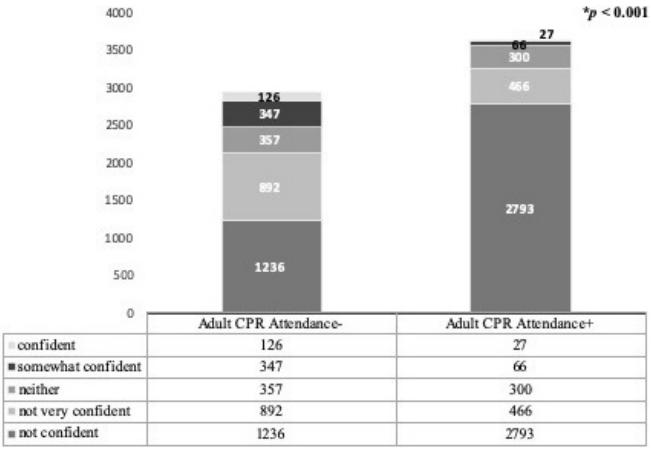


Figure 1: The confidence in performing CPR on their own child.



	Adult CPR Attendance-	Adult CPR Attendance+
confident	126	27
somewhat confident	347	66
neither	357	300
not very confident	892	466
not confident	1236	2793

Figure 2: The relationship between the history of Adult CPR courses and confidence levels.

The ratio of responders who wished to take pediatric CPR courses in the future was 85.8% (3,865), and the comparison between groups showed that such ratio was 75.6% (2,798) for Group A and 35.6% (1,067) for Group B. Table 4 shows the results of logistic regression analyses.

Table 4: Multivariable logistic regression analyses for wished to take pediatric CPR courses in the future.

		AOR*1	95% CI*2
sex	Male	0.82	(0.73-0.92)
	Female	ref	
age group	20-29 yr	ref	
	30-39 yr	1.05	(0.93-1.19)
	40-49 yr	0.88	(0.74-1.04)
	50-59 yr	0.74	(0.60-0.92)
child	Group A*2	5.01	(4.47-5.62)
	Group B*4	ref	

*1 AOR; adjusted odds ratio
*2 CI; Confidence Interval
*3 Group A; Pregnant with their first child (or people whose partner was pregnant) or parents of infants
*4 Group B; Adults without children

The desired venue for Group A (multiple answers accepted: the number of effective responses was 2,798) was led by baby classes (1,737), followed by infant checkups (1,670), fire stations (1,163), parenting classes (995), local communities (930), the Japanese Red Cross Society (634), workplace (348), DVD (149), online (118), and others (12) (Figure 3). Other venues mentioned included nursery schools/kindergartens, government offices and community children centers etc. (Table 5).

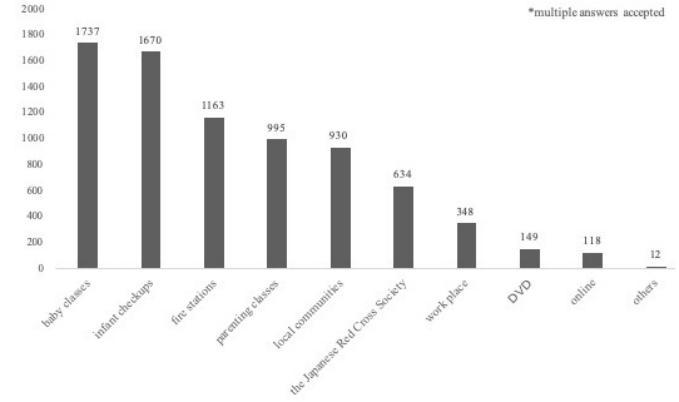


Figure 3: The desired venue for Group A.

Table 5: The desired other venue for Group A.

Venue	n
Nursery schools/kindergartens	6
Anywhere	2
The place which is easy to access with the good instructor	1
City centers	1
Community Children's Center	1
Company events	1
Total	12

The ideal course duration in Group A was 30 to 60 minutes (57.1%: 1,598), 30 minutes or less (33.0%: 922), 60 to 90 minutes (7.8%: 219), 90 to 120 minutes (1.8%: 43), and 120 minutes or longer (0.6%: 16; Figure 4).

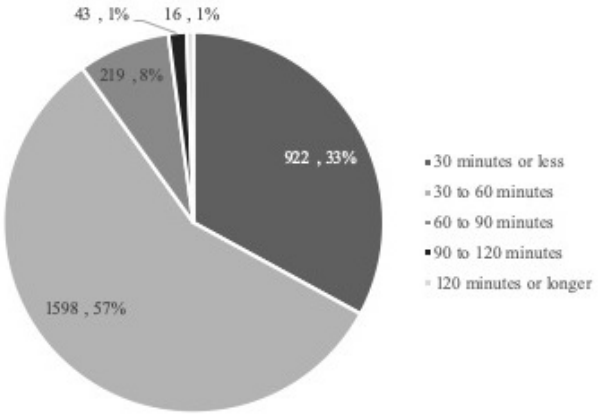


Figure 4: The ideal course duration in Group A.

Regarding the ideal course content in Group A (multiple answers accepted; the number of effective responses was 2,798), the use of an Automated External Defibrillator was the most common (2,200), followed by rescue breathing (2,131), knowledge on CPR (2,025), first aid for injuries (1,982), chest compressions (1,911), choking (1,891), first aid for illnesses (1,739), accident prevention (1,554), and others (Figure 5). Other responses are shown in Table 6.

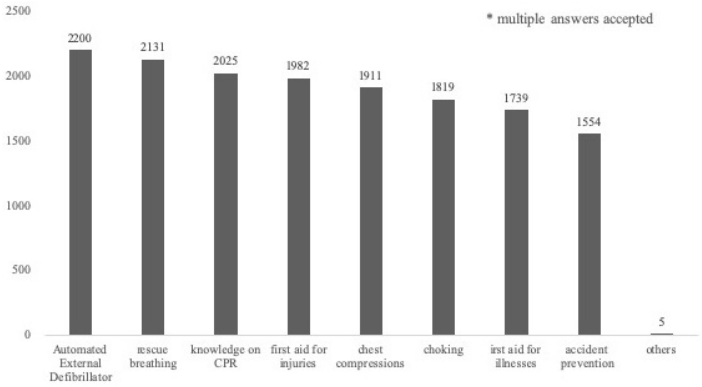


Figure 5: The ideal course content in Group A.

Table 6: The ideal other course content in Group A.

Content	n
Accidental ingestion	1
Anything related children	1
Prioritize	1
Difference between child and adult	1
Necessary preparation when happened an accident	1
A tooth break	1
Unknown	2

Regarding reasons to avoid attending pediatric courses in Group A (multiple responses accepted; the number of effective responses was 902), the most common response was the lack of time (47.6%: 429), followed by not having a venue nearby (31.%: 280), doubt regarding its effectiveness (11.5%: 104), no sense of necessity (9.3%: 84), already took a course (7.2%: 65), not interested (6.4%: 58), and others (2.3%: 21; Figure 6). Other reasons to avoid taking a course are shown in Table 7.

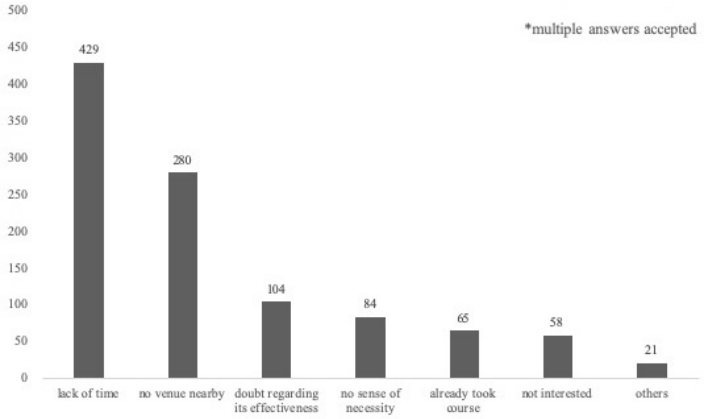


Figure 6: Reasons to avoid attending courses.

Table 7: Other reasons to avoid attending courses in Group A.

Reason	n
Medical person	7
No opportunity	3
Didn't know it	2
Already know	1
Scared	1
Cannot do it	1
Don't think that should go regularly	1
Just gave birth	1
Own health problem	1
Instructor	1
Other family can do	1
Don't know where it held	1
Total	21

Discussion

In the question on the first aid conducted by City A in 2016, among 540 effective responders, 433 said they had taken a CPR course (80.2%). In contrast, only 55 had taken a course that included mainly pediatric CPR (10.2%), which is similar to the response for the present study; thus, the number of people who took pediatric CPR courses was less than those who took adult CPR courses [4].

When comparing the groups in regards to the wish to take pediatric CPR courses, Group A had significantly higher values. A reason for this may be that those in Group A perceive pediatric CPR as something that may actually become necessary. Alternatively, they take pediatric CPR courses personally.

However, the reasons for not desiring pediatric CPR courses included the lack of necessity (572: 29.6%) and lack of interest (406: 21.0%) which scored high for Group B; thus, it suggests that those in Group B did not perceive pediatric CPR as something that

would affect them personally.

Therefore, to effectively distribute pediatric CPR courses, it is desirable to target parents during pregnancy, when interest is heightened, or those with children. However, according to the report by Omori et al. [5], parental outings often face barriers associated with: the transit system, opportunities for activities, activities related to outings, time limitations where a parents' schedule is restricted due to children's activities, the use of parenting support services, and information acquisition such as outing and parenting support services, and so on. Actually, in the present survey, the most common response to the reason for not wanting to take pediatric CPR courses was "lack of time"; thus, it is not desirable to conduct pediatric CPR courses that take a long time at a venue that requires long travel. Based on the responses to the question on the ideal course duration, 60 minutes is the most appropriate.

Whether pediatric CPR courses could be held at "baby classes" and "infant checkups" is mentioned often in response to the question on the ideal venue for courses. If such venues were available, stating that, "there is no venue close by" as a reason for not wanting to take the course could be eliminated. However, as of September 2019, there is no municipality in Tokyo prefecture that offers a pediatric CPR course during infant health checkups. When a pediatric CPR course was proposed at the city department in charge of infant checkups near the university, they responded that it was difficult to implement, since the wait time for infant checkups is long, and adding to the time for such a course would be burdensome for guardians.

Therefore, we plan to implement a 60-minute pediatric CPR course and 90-minute child CPR course in collaboration with the Community Children's Center to be held at baby classes or local community centers, for which there was much interest as venues for pediatric CPR courses. We also plan to provide childcare. The budget was provided by the Community Children's Center (and the city) such that participation is free. Since parents regularly bring their children to the Community Children's Center, it would be easy to attract participants. The Community Children's Center has an environment that is conducive to participation, which is an important element.

Based on the results of the questionnaire, the most requested program contents included the use of the AED, CPR, and artificial respiration. Regarding the use of AED, we considered including items associated with the differences between children and adults because troubleshooting becomes necessary when the subjects are children.

According to the causes of death listed in the vital statistics of the Ministry of Health, Labor and Welfare [6], accidents rank third for infants and second for 1 to 9-years-olds, and among accidents [7], suffocation, drowning, and car accidents are the most common. Therefore, items such as accident prevention and CPR that include artificial respiration must be included in the program. The course that includes both adult and pediatric CPR offered by the Tokyo Fire Department [8] and The Japanese Red Cross Society [9] takes 8 hours, while specialized pediatric CPR courses offered by Nonprofit Organization [10] take about 2-3 hours.

The program we are examining presently takes 60 minutes for the pediatric CPR course and 90 minutes for the child CPR course. We practice with real-time feedback mannequins, which have proven to have high educational effects in a previous study by Tanaka et al. [11], while aiming to provide a short course that is highly effective.

The 60-minute infant and 90-minute child CPR course programs that were examined and designed in the present study are shown in table 8 and table 9 for reference.

Table 8: The 60-minute infant CPR course programs (for reference).

Time (min)	Contents
15	Lecture: Infant accident prevention and risk of cardiac arrest
4	Scene safety/ Check responsiveness/ Call for help/ Check infant's breathing
6	Chest compression
5	Open the airway/ Rescue breathing
5	CPR*1 (one person/ two persons)
5	Automated External Defibrillator
5	Choking
10	Scenario Training
5	Q&A

*1 CPR; cardiopulmonary resuscitation.

Table 9: 90-minute child CPR course program (for reference).

Time (min)	Contents
25	Lecture: Child accident prevention and risk of cardiac arrest
4	Scene safety/ Check responsiveness/ Call for help/ Check infant's breathing
6	Chest compression
5	Open the airway/ Rescue breathing
5	CPR*1 (one person/ two persons)
10	Automated External Defibrillator
10	Choking/ Drowning
10	Head injuries
10	Scenario Training
5	Q&A

*1 CPR; cardiopulmonary resuscitation.

Conclusion

The ratio of people who have taken pediatric CPR courses was lower than those who have taken adult CPR courses whether they had children or not. The ratio of those who wished to take pediatric CPR courses was significantly higher among those who are pregnant (or those who have a pregnant partner) or parents of young children compared to adults without children.

We examined the program based on the results of the learning needs of those who are pregnant (or those who have a pregnant

partner) or parents of young children. In future, we plan to examine confidence levels of performing pediatric CPR and educational effects following the implementation of this program.

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