

# Psychological Conflicts in Bystander Cardiopulmonary Resuscitation for Out-of-Hospital- Cardiac-Arrest

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**Aim:** Bystander cardiopulmonary resuscitation (CPR) plays an important role in saving the lives of out-of-hospital cardiac arrest (OHCA) patients. Although many factors have been suggested as barriers to performing CPR, the psychological processes and factors related to bystander CPR have not been sufficiently evaluated. The aim of this study was to analyze and describe the psychological processes in bystander CPR through detailed interviews.

**Method:** We planned a mixed-method study and qualitative research was conducted by means of semi-structured interviews of bystanders who had encountered OHCA as the first step. Data from the interviews regarding the “CPR process” and “factors related to the CPR process” were analyzed inductively.

**Results:** We assessed 16 OHCA cases encountered by 14 bystanders. Five categories, comprising “motives for lifesaving,” “facilitators for CPR,” “barriers for CPR,” “knowledge and experience,” and “OHCA situation and its circumstances,” and 19 concepts were generated. Although all bystanders intended to save the individual’s life when they encountered an OHCA, all of them had experienced psychological conflict between whether they should perform CPR or not.

**Implication:** Therefore, as countermeasures for the reported conflicts, CPR training courses including preparation of psychological stress, dispatcher instruction over the phone, and AED’s voice advice, will be important to encourage bystanders to perform CPR in real OHCA settings.

Bystander performance of immediate cardiopulmonary resuscitation (CPR) and defibrillation with an automated external defibrillator (AED) plays a key role in saving the lives of out-of-hospital-cardiac-arrest (OHCA) patients (Nolan et al., 2015). However, it has been shown that more than half of OHCA patients do not receive bystander CPR (Ambulance Service Planning Office of Fire and Disaster Management Agency, 2018; Benjamin, et al., 2017; Gräsner, et al., 2016), and only 2%–5% of them receive defibrillation by AED (Ambulance Service Planning Office of Fire and Disaster Management Agency, 2018; Benjamin, et al., 2017). Many factors have been

suggested to account for the low proportion of bystander CPR; these include a lack of knowledge, complexity of the CPR technique (Sasson, et al., 2013), fear of disease contraction (Taniguchi, Sato, Fujita, Okajima, & Takamura, 2012), anxiety about harming the patient, concern regarding potential lawsuits (Shams, et al, 2016), and confusing situation within the emergency setting (Robert, et al., 2006). In addition, sex (Matsui, et al 2019), religious or cultural factors, race, and regionality have also been reported as CPR obstructers (Sasson, et al., 2012). As to facilitating factors in performing CPR, experience with CPR training increases CPR in the emergency setting

three-fold (Tanigawa, Iwami, Nishiyama, Nonogi, & Kawamura, 2011).

Despite these previous studies, little is known about how a bystander perceives an emergency and the factors that facilitate and obstruct their performance of CPR in a real-life OHCA scene. To increase the proportion of bystander CPR, it is important to assess these factors and construct a theoretical model of the process of bystander CPR on the basis of the experiences of bystanders who have encountered OHCA.

The aim of this study was to analyze and describe the psychological processes involved in bystander CPR, as determined through detailed interviews.

## Methods

### Study Design

We used a mixed-method sequential explanatory design; this involved the collection and analysis of qualitative and quantitative data in two consecutive phases. As a first step in this mixed-method study, we conducted a series of semi-structured interviews, followed by inductive analysis.

### Participants and Sampling

Participants were Japanese laypersons aged  $\geq 18$  years living in Japan who had encountered an OHCA of presumed intrinsic origin, for which chest compression, rescue breathing, or AED were performed by the participant or others. People with mental health issues were excluded from interviews due to the potential harm from recalling any stress from the OHCA experience. Mental health history was self-reported. Intrinsic origin was defined as cardiac arrests that did not originate from trauma, drowning, drug overdose, asphyxia, exsanguinations, or any other external causes.

We carried out purposive sampling in order to select participants. We approached an individual who had encountered an OHCA through several means: 1) direct request, 2) introduction by a CPR

educator, 3) providing flyers to the trainees of the CPR training organized by Osaka Life Support Association, Toyonaka City Fire Department and Japanese Red Cross Society Kyoto branch, and 4) introduction by emergency medical services personnel at the scene in Toyonaka City.

### Data Collection

Semi-structured interviews were held in a small and quiet meeting room or at the interviewee's office; the interviews involved open-ended questions related to the participants' experience at the OHCA scene. Privacy was protected in all locations, and interviews were conducted individually. The interviews began with the broad question "Please tell me your experience at the OHCA scene." Following this, the remaining questions covered the reasons for performing CPR: "Why did you do, or did not do CPR?," factors influencing the participant's performance: "What affected your performance of CPR at the OHCA scene?," and the participant's feelings at the OHCA scene: "Please tell me your feelings when you met the OHCA patient or when you performed CPR." One specified researcher (IS), a registered nurse who was trained in scientific interviews, conducted the interviews, recorded them using a voice recorder, and took notes for the interviews. The median length of interviews was 36 minutes and the shortest and longest interviews were 26 minutes and 61 minutes, respectively. The interviews and inductive analyses were conducted from October 2014 to May 2015.

### Data Analysis

Recorded interviews were transcribed and analyzed inductively. The themes of the analysis were "CPR process" and "factors related to the CPR process." First, the interviewer extracted a context corresponding to the study theme from the transcription of each interview. Second, the interviewer generated several concepts by abstracting some contexts focus on interpreting why the particular contexts were focused and why those contexts were implicated. Third, the concepts were linked to other similar concepts,

and the interviewer reviewed how they were mutually related. The concepts were categorized on the basis of this repeated data review (Miles, Huberman, & Saldaña, 2013).

To assure the credibility and validity of the analysis, another researcher (TO), with experience in qualitative analysis, repeated the same process independently and the concepts generated by both researchers were unified. Whenever any difference in the concepts arose along the process, the two analysts participated in a discussion until a consensus was reached. The processes of data collection and analysis were performed iteratively until new concepts were no longer generated. Following the generation of the concepts, two other researchers (CN and TI), with expertise in the resuscitation field, joined the discussion. A diagram was created to explain the relationships among all of the concepts and categories used to describe the process of CPR.

### **Ethical Considerations**

All procedures were conducted according to the Declaration of Helsinki (64th World Medical Association 2013). Written informed consent was obtained from all participants before the interview began. All of the interview audio records were eliminated after the transcription. Although all transcripts were anonymized, we created a list that linked the participants' identifiers to the study ID number used to identify the participants' data. All transcript data and the list were stored separately in a locked room using a flash memory device. This study was approved by the Ethics Committee of Kyoto University Graduate School of Medicine.

## **Results**

### **Characteristics of Participants**

A total of 14 bystanders participated in the interview process; since two of the bystanders had encountered OHCA's twice, 16 cases in total were included in the analysis. Seven participants were recruited by direct request, five were introduced by the CPR educator, one was recruited through a

CPR training course, and one applied for the study as a result of introduction by the Toyonaka City Fire Department at the OHCA scene.

Table 1 shows the characteristics of the 14 participants among the 16 cases. The age of participants ranged from 19 to 62 years and 13 of the participants were males. We evaluated those who took the initiative in CPR (11 cases) and those did not perform CPR by themselves (five cases). Among the 16 cases, two cases had not taken a CPR training course previously. The relationships between the participants and the OHCA patients were as follows: stranger (7), station employee and passenger (2), teacher and student (2), acquaintance (3), and family member (2). None of the interviews were interrupted by major psychological stress.

### **Basis for Concepts**

We developed five categories from 19 concepts from the analysis (Table 2). Figure 1 shows the relationships between the categories and concepts. All participants had a feeling of "motives for lifesaving" when they encountered an OHCA.

#### **Motives for lifesaving**

The first category included the two naturally evoked thoughts when facing an OHCA.

##### ***Desire to save a person's life***

When a participant encountered the OHCA, they had a natural desire to rescue the patient. This feeling is deemed to originate from humanity.

"I think if someone collapses in front of us, everyone wants to save the person." [Case 7]

##### ***The sense of duty to save a life***

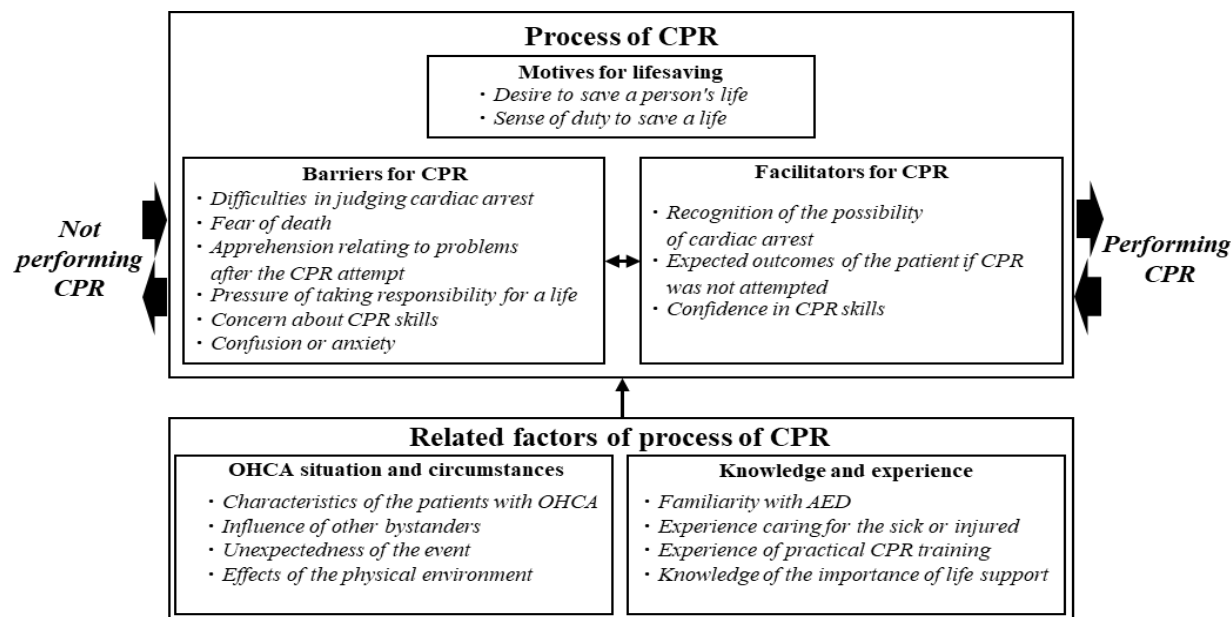
Seven participants had a sense of duty to lifesaving based on their beliefs or jobs. Schoolteachers, sports trainers, and station attendants had especially strong motivation for lifesaving.

"I always ask people to perform CPR when they encounter a cardiac arrest situation. So, I should not withdraw from a cardiac arrest situation." [Case 1]

**Table 1. Characteristics of the participants**

Case	Age (years)	Sex	Occupation	Performance of CPR by Bystander	Experience of CPR Training Course Before Encountering OHCA	Relationships between Patients and Participants
1, 2	59	Male	Manufacturing	Yes	Yes	Family member
				Yes	Yes	Acquaintance
3	30	Male	Sales	Yes	Yes	Stranger
4	23	Male	Student	Yes	Yes	Stranger
5	50	Male	Sports trainer	Yes	Yes	Stranger
6	60	Male	Teacher	Yes	Yes	Teacher and student
7	30	Male	Station attendant	Yes	Yes	Station employee and passenger
8	62	Male	Manager	No	Yes	Family member
9	46	Male	Unknown	No	No	Stranger
10	36	Male	Teacher	No	Yes	Teacher and student
11	19	Male	Student	Yes	Yes	Stranger
12	19	Male	Student	No	Yes	Acquaintance
13, 14	42	Male	Manager	No	No	Acquaintance
				Yes	Yes	Stranger
15	25	Male	Student	Yes	Yes	Stranger
16	26	Female	Station attendant	Yes	Yes	Station employee and passenger

CPR: cardiopulmonary resuscitation, OHCA: out-of-hospital cardiac arrest



**Figure 1. Process of bystander CPR and related factors**

Bold text indicates the category and normal text indicates the concept. A two-way arrow (↔) shows conflicting feelings between “Barriers for CPR” and “Facilitators for CPR.” The upward bar from the “Related factors of the process of CPR” indicates that these factors affect the “Process of CPR.”

CPR indicated cardiopulmonary resuscitation, OHCA: out-of-hospital cardiac arrest, AED: automated external defibrillator.

### Facilitators for CPR

The second category included the reasons behind the participants’ willingness to perform CPR. The category included three concepts.

#### ***The recognition of the possibility of cardiac arrest***

Participants were able to recognize a cardiac arrest from the symptoms of patients (e.g. agonal breathing, apnea, and pale facial appearance) or OHCA situation (e.g. if other bystanders retrieved an AED), and initiate CPR following the identification of a cardiac arrest.

“I watched a video of agonal breathing in a CPR training course. Therefore, I instantly recognized that.” [Case 4]

“Students had already delivered an AED. This was because I think, they might have recognized the cardiac arrest. Thanks to them, I was able to recognize the possibility of cardiac arrest.” [Case 10]

#### ***Expected outcomes of the patient if CPR was not attempted***

The participants performed CPR, as they believed that neglect of the collapsed individual would have a negative outcome.

“If I do not do anything, when the worst comes to the worst, he will die. This was a great reason to do the CPR.” [Case 5]

#### ***Confidence in CPR skills***

Participants who possessed CPR skills had enough confidence to perform CPR. This confidence was mainly generated by the CPR simulation training.

“I had confidence in my CPR skills because I had taken part in a CPR training course already. This is why I got involved in the cardiac arrest situation.” [Case 3]

#### **Barriers for CPR**

Even participants who had motives for rescue felt a major psychological burden when they met the

**Table 2. List of categories, concepts, and interview cases**

Category	Concept	Interview Cases
Motives for lifesaving	<i>Desire to save a person's life</i>	1, 3, 4, 7, 9, 12, 13, 15
	<i>Sense of duty to save a life</i>	1, 2, 5, 6, 8, 10, 11, 15
Facilitators for CPR	<i>Recognition of the possibility of cardiac arrest</i>	1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 13, 14, 15
	<i>Expected outcomes of the patient if CPR was not attempted</i>	4, 5, 15
	<i>Confidence in CPR skills</i>	3, 4, 5, 7, 11, 16
Barriers for CPR	<i>Difficulties in judging cardiac arrest</i>	4, 5, 12, 15
	<i>Fear of death</i>	3, 9, 10, 14, 15
	<i>Apprehension relating to problems after the CPR attempt</i>	3, 11, 15
	<i>Pressure of taking responsibility for a life</i>	4, 5, 9, 10, 13, 14
	<i>Concern about CPR skills</i>	2, 5, 6, 7, 9, 10, 12, 13, 14
Knowledge and experience	<i>Confusion or anxiety</i>	3, 4, 5, 6, 8, 9, 10, 14, 15, 16
	<i>Familiarity with AED</i>	7, 9, 14, 16
	<i>Experience caring for the sick or injured</i>	6, 7, 13, 15, 16
OHCA situation and circumstances	<i>Experience of practical CPR training</i>	1, 3, 4, 5, 7, 9, 11, 12, 15, 16
	<i>Knowledge of the importance of life support</i>	1, 2, 3, 5, 10, 15
	<i>Characteristics of the patients with OHCA</i>	7, 9, 14, 15, 16
	<i>Influence of other bystanders</i>	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13, 15
	<i>Unexpectedness of the event</i>	1, 3, 4, 8, 9, 11, 15, 16
	<i>Effects of the physical environment</i>	1, 3, 4, 5, 11, 16

CPR: cardiopulmonary resuscitation, OHCA: out-of-hospital cardiac arrest

OHCA patient. This category consisted of the following six concepts.

#### ***Difficulties in judging cardiac arrest***

In a real cardiac arrest situation, it is very difficult for bystanders to judge whether the collapsed person is in cardiac arrest. For example, they were not able to identify abnormal breathing as a symptom of cardiac arrest or they felt a pulse in pulseless patients while checking pulse. And then they identified sounds from patient's mouth as normal breathing while performing chest

compression. Therefore, the participants wavered between performing CPR or watching.

“Some bystanders said that the patient might be breathing. And then, I feel great anxiety and could not continue to do CPR.” [Case 4]

#### ***Fear of death***

When a participant saw the collapsed person, who turned completely pale and opened their eyes wide, he/she was exposed to a fear of death.

“The collapsed patient is rapidly entering serious condition. This is the fear or anxiety for me and other laypeople.” [Case 10]

### ***Apprehension relating to problems after the CPR attempt***

Participants were apprehensive about the prospect of problems resulting from their CPR attempts; these included, infectious diseases, unsuccessful CPR, possibility of lawsuit, and disruption of their own schedule.

“A man collapsed suddenly in front of me. If I rescue him, I will be late for my next appointment. I could not decide what to do.” [Case 15]

### ***Pressure of taking responsibility for a life***

Participants felt strong pressure because they felt responsible for the life of the collapsed individual.

“In the cardiac arrest situation, I felt enormous pressure because I was in charge of the OHCA patients’ life.” [Case 14]

### ***Concern relating to CPR skills***

Nine participants did not have enough confidence in their CPR skills to even perform simple chest compressions or use an AED. In 14 cases, participants received CPR training before they encountered an OHCA.

“I did not have enough confidence about mouth-to-mouth ventilation. Too much or too little?” [Case 5]

“I think I could do appropriate chest compression, but I do not know precisely the combination of number of chest compressions and number of ventilations. So, I felt anxiety during CPR.” [Case 11]

### ***Confusion or anxiety***

Participants lost their presence of mind when faced with the sudden collapse of an individual. Participants got upset easily, especially in cases wherein the person who collapsed familiar with the participants.

“Confused.... time stands still there. ...for a moment. I panicked and stopped completely.” [Case 10]

“I intuitively thought I did not know what I should do during the CPR. I was panicked the whole time.” [Case 4]

### ***Knowledge and experience***

The participants’ knowledge and experience with cardiac arrest included, not only those acquired in the CPR training courses but also the actual experience of caring for patients. The concepts in this category both facilitated and obstructed the process of CPR.

### ***Familiarity with AED***

Participants who used an AED in real OHCA situations had some familiarity with AED. They understood that AED is easy for anyone to use and that it automatically analyses cardiac rhythm and provides verbal directions to the user. On the other hand, participants who had never learned how to use an AED dreaded using it.

“AED existed in my mind as a last resort. I don’t know what was going through my head in the moment, but AED existed in my life. This is the reason that I used the AED.” [Case 16]

“I cannot judge whether a collapsed patient is suffering from cardiac arrest because I’m not a healthcare provider. Therefore, when I meet a collapsed person, I’ll try to use the AED first.” [Case 7]

### ***Experience in caring for the sick or injured***

Prior experience of taking care of individuals requiring first aid helped the participants to stay calm and make a positive decision.

“I had experienced taking care of a slightly injured patient, so I thought naturally I had to approach the collapsed patient and care for him.” [Case 6]

### ***Experience of practical CPR training***

Participants without experience in participatory simulation CPR training did not consider that they

could perform CPR, even if they had listened to a lecture on CPR.

“Yes, practicing CPR skills in the training course made me perform CPR in the real situation.” [Case 4]

“If I had had CPR training, I might have started the CPR with confidence.” [Case 9]

### ***Knowledge of the importance of life support***

All the participants had knowledge of the efficacy of CPR and AED use for OHCA patients. Although this knowledge prompted the participants to perform CPR by themselves, it also made them feel immense psychological pressure when performing CPR.

“I knew the survival rate was very low with 5 minutes since collapse. I think 1 or 2 minutes is very important.” [Case 11]

“I knew chest compression is important. On the other hand, for this reason, I thought, if I stop compressions, he will die.” [Case 4]

### **OHCA situation and circumstances**

The OHCA situation and circumstances either encouraged or discouraged CPR and included four concepts. Characteristics of the patients with OHCA: Influence of other bystanders: Unexpectedness of the event: Effects of the physical environment.

### ***Characteristics of the patients with OHCA***

This concept refers to the OHCA patients' characteristics such as age, sex, and facial hue (eg pale). They affected the participants' action in the OHCA situation. Participants hesitated to perform CPR for a person of the opposite sex and for an infant.

“If the patient were a child, I may injure him with my CPR because his body would be immature.” [Case 15]

“I didn't feel difficult to put the pad of AED because the patient is male.” [Case 7]

### ***Influence of other bystanders***

It was considered that the presence of other bystanders around the participant might affect the participants' behavior. Participants and other bystanders could either work cooperatively or fail to collaborate due to differences in policy or technique. A strong dependence on the participant by other bystanders was perceived as a burden by the participant.

“Other bystanders simultaneously said, ‘you might want to do it this way’ or ‘you might want to do it that way,’ because they also wanted to save the life. Therefore, there were many different opinions. But I could not follow all suggestions. Thus, I thought it was very important for me to perform CPR with confidence.” [Case 7]

### ***Unexpectedness of the event***

Although the participants knew that an OHCA could occur anytime, anywhere, and to anyone, they were upset because they did not expect the occurrence of sudden cardiac arrest.

“He suddenly fell down in the bathroom. I was talking with him while we were taking a bath. When I took my eyes off him, he suddenly collapsed.” [Case 2]

### ***Effects of the physical environment***

The effects of the physical environment refers to the location of the OHCA and the availability of medical equipment in the situation. A small space without medical equipment (including AED) restricted lifesaving activities. Contrariwise, the presence of medical equipment supports lifesaving, especially an AED's verbal directions, and prompts bystanders to use the AED and perform CPR.

“I was panicked on the scene, but the AED repeated a message until I attached the pads. When I could hear the guidance of the AED, I understood what I had to do.” [Case 3]

## **Discussion**



We built a framework of the process for bystanders to perform CPR as well as the factors facilitating or obstructing bystander CPR in real OHCA settings. All bystanders who encountered an OHCA experienced conflicts before performing CPR; these conflicts recurred repeatedly even after they had started CPR. Furthermore, these conflicts were modified by factors such as knowledge or experience of the participants, including experience of practical CPR training or knowledge of the importance of life support. Elucidation of the conflicts and their modifiers would be considered important in encouraging bystanders to perform CPR.

This study suggested that most bystanders waver between “Incentives for performing CPR” and “Disincentives for performing CPR” during the resuscitation process. Our findings were consistent with previous studies indicating that bystanders experienced fear, loneliness, and a sense of powerlessness in the emergency situation (Axelsson et al., 2000) and that providing CPR was emotionally challenging for all participants (Mathiesen et al., 2016), even in bystanders who performed CPR. Most bystanders might feel a psychological burden, which when overcome, allows them to successfully perform CPR. Although, a previous clinical study reported that only 20% of bystanders felt a major mental burden in OHCA situations (Riegel et al., 2016), the attendees of clinical trials might have more readiness to encounter an OHCA than usual lay rescuers. The frequency and strength of psychological burden felt on the scene would depend on a number of factors, such as geographical region, culture, or educational level. We are planning to do additional quantitative study to evaluate the impact of these factors.

Although the psychological aspect is an important factor in overcoming the impediments to bystander CPR, currently, many CPR training courses do not include a psychological aspect, instead focusing on the acquisition of medical skills. Considering the bystanders’ psychological

conflicts, we should educate the trainees on mental preparedness in order to relieve bystanders from their fears and anxiety, even in highly pressured situations. For example, a CPR training course which focuses on building confidence in CPR skill in addition to learning the correct technique of CPR; or informing that most bystanders feel psychological conflicts before performing CPR in a real OHCA setting but the conflicts could be overcome, may be effective.

This study also suggested that OHCA situations and circumstances could affect the rescuers’ behaviors. First, as to the effect of the physical environment, the guidance of an AED helped bystanders to recognize a cardiac arrest and perform CPR. A previous study demonstrated that AEDs could facilitate people to perform CPR and use an AED effectively even if they did not have any CPR training experience, and the effectiveness of them was different by the AED’s guidance. (Mosesso et al., 2009). Although most participants in our study had participated in CPR training courses and been trained in the use of AEDs, the AEDs’ verbal guidance was helpful for bystanders to recognize a cardiac arrest and perform CPR. Improvement in the verbal and visual guidance (e.g., illustration on AEDs) would encourage more bystanders to perform CPR and use the AED correctly.

Second, lay-rescuers were strongly influenced by the presence of other bystanders and their words and deeds. A leading bystander could both facilitate and obstruct the rescuer’s practice of CPR and bystanders could help each other and perform better care in general. A previous study reported that, compared with a single rescuer, the presence of multiple rescuers increased the likelihood of both CPR and survival in OHCA (Nishi, et al. 2013). In an emergency setting, when more bystanders recognize the emergency and work together, the fear accompanying the lifesaving procedures is reduced (Fischer, et al., 2011). Therefore, efforts to increase the bystander who can cooperate with each other in real OHCA

settings by distributing importance of bystander CPR reduce the burden of each bystanders and contribute to increase bystander CPR.

Dispatcher-assisted CPR is also likely to be an effective intervention for inducing bystanders to start CPR as previous study demonstrated (Rea, Eisenberg, Culley, & Becker, 2001). Since the conflict process continued in the bystanders even after they started CPR, the dispatcher should hold the line and provide CPR instruction continuously until the paramedics arrive. Continuous instructions from the dispatcher over the phone, while the bystander performs CPR, has the potential to reduce the time without chest compressions (Birkenes et al., 2014) and improve survival.

### Limitations

This study has limitations. First, as only cases for which either participants themselves or other bystanders performed CPR were included, the psychological conflicts in cases wherein CPR was not performed remain unknown. We need other additional approaches to include them. Second, although over 70% of OHCA occur in private spaces (Girotra, et al., 2016 ; Iwami et al., 2003; Ong et al., 2015), the present study did not include cases occurring in one's home. The psychological process of CPR in cases where family members witnessed cardiac arrest would be different and further studies involving OHCA occurring in private spaces are required to fully elucidate these processes.

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### Conclusions

All bystanders who encountered an OHCA had conflicting feelings relating to their attempt to perform CPR at the OHCA scene. As counter measures for the conflicts, CPR training courses including preparation of psychological stress, dispatcher instruction over the phone, and AED's voice advice, will be important to encourage bystanders to perform CPR in real OHCA settings.

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### Conflict of Interests

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