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## Short paper

# Follow-up on volunteer responders dispatched for out-of-hospital cardiac arrests: Addressing the psychological and physical impact



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### Abstract

**Introduction:** Smartphone technology is increasingly used to engage lay people as volunteer responders in resuscitation attempts. Attention has recently been drawn to how resuscitation attempts may impact bystanders. Attempting resuscitation in out-of-hospital cardiac arrests (OHCA) may be an overwhelming experience and, in some cases, difficult to cope with. We developed a volunteer responder follow-up program to systematically measure the psychological and physical impact on volunteer responders dispatched for OHCA.

**Methods and Results:** The nationwide Danish volunteer responder program dispatches volunteer responders for presumed cardiac arrests. 90 min after notification of a potential nearby cardiac arrest, all volunteer responders receive a survey, and are asked to self-report their mental state of mind after the event. The volunteer responders are also asked to disclose any physical injury they sustained in relation to the event. Volunteer responders who report severe mental effects are offered a defusing conversation by a trained nurse. Between 1 September 2017 and 31 December 2022, the Danish volunteer responder program has alerted 177,866 volunteer responders for 10,819 presumed cardiac arrest alerts. Of 177,866 alerted volunteers responders, 62,711 accepted the alarm. In the same period, 7,317 cancelled their registration. From January 2019 to 31 December 2022, a total of 535 volunteer responders were offered a defusing consultation.

**Conclusion:** The Danish volunteer responder follow-up program is carried out to assess the psychological and physical risks of responding to a suspected OHCA. We suggest a survey-based method for systematic screening of volunteer responders that allow volunteer responders to report any physical injury or need of psychological follow-up. The person providing defusing should be a trained and experienced healthcare professional.

**Keywords:** Out-of-hospital cardiac arrest, First responders, Volunteer responders, Psychological impact, Resuscitation

## Introduction

Numerous programs have been developed across the world to alert people to nearby out-of-hospital cardiac arrest (OHCA). The alerts guide volunteer responders to retrieve a nearby defibrillator and to assist in cardiopulmonary resuscitation (CPR).<sup>1</sup> Dispatching volunteer responders for OHCA resuscitation is warranted by The International Liaison Committee on Resuscitation, the European Resuscitation Council, and the American Heart Association.<sup>2–5</sup> Observational studies have shown that the presence of volunteer responders increase bystanders' engagement in CPR and early defibrillation.<sup>6</sup>

Recently, attention has been drawn to how resuscitation attempts may impact bystanders. This has led to a growing concern about the

mental risks for volunteer responders.<sup>7</sup> Studies of lay responders' mental state after taking part in OHCA-resuscitation show low levels of psychological distress, both short and long-term.<sup>8–10</sup> However, an attempt to save a life is often chaotic and stressful, and reality is quite different from the clinical settings and structured environments of CPR training courses.<sup>11–13</sup> A scientific statement from the American Heart Association calls for further research on the topic, and highlights the lack of recommendations or guidelines for support to bystanders who have been involved in an OHCA event.<sup>14</sup> Volunteer responder programs typically do not prepare volunteer responders through training, and the responders are expected to cope with their own psychological aftermath themselves. However, there are a number of beneficial effects of debriefing bystanders.<sup>15</sup> Recently, a Lay Responder Support Model was introduced suggesting methods to reduce distress caused by resuscitation attempts.<sup>7</sup> Despite guideli-

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nes that emphasize the value of involving volunteers in cardiac arrests, safety matters regarding physical and psychological well-being for the involved parts must be concerned.

The aim of this paper is to share our views on how to systematically follow up on volunteer responders who have been alerted to an OHCA.

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## Methods

### *The Danish volunteer responder system*

The Danish volunteer responder program was implemented in September 2017 in the Capital Region of Denmark and became nationwide in 2020. The system dispatches volunteers to nearby OHCA through a smartphone application. To register as volunteer responder, one must be 18 years or older. There are no requirements regarding professional background. It is highly recommended, but not mandatory to have completed CPR training before signing up. Yet 98% of volunteer responders report to be CPR trained, and more than half report completed training in the latest 2 years before registration.<sup>6</sup>

In case of a nearby cardiac arrest, volunteer responders are alerted through the app to quickly locate an AED and bring it to the patient to assist in resuscitation before an ambulance arrives.<sup>7</sup> When a cardiac arrest is suspected, the emergency dispatch centre simultaneously alerts up to 20 volunteer responders in a radius of five kilometres. When they receive an alert, the volunteer responder can either accept or reject it. The app provides directions to the nearest AED and to the patient. No sensitive personal information concerning the patient in cardiac arrest is disclosed. Volunteer responders are not alerted for suspected traumatic OHCA, unsafe environments or suicide.

### *The volunteer responder survey*

After being notified of a presumed cardiac arrest, all volunteer responders receive a validated survey questionnaire (Appendix 1). The survey is sent after 90 min in a text message and is accessed through a direct link. The validation process of the survey has been described in detail elsewhere.<sup>16</sup>

The volunteer responder survey comprises questions about how the volunteer responders reached the patient and whether they performed CPR/used a defibrillator. At the end of the survey, volunteer responders are asked to rate their self-perceived mental effects, from 'not at all' to 'very much'. This scale is used since there are no validated tools to measure immediate psychological impact following a specific event.<sup>17</sup> Finally, volunteer responders are asked to report any physical injury they sustained during the mission.

### *Follow-up on volunteer responders*

Volunteer responders who report 'very much' regarding mental effects in the survey are contacted for 'defusing' by a trained nurse no more than 48 h after the report. Further, volunteer responders are offered defusing if they indicated that the patient was below the age of 18. Finally, volunteer responders who reported in the survey they would like a consultation to discuss the event are contacted. The follow-up setup has been implemented under the supervision of a psychologist with experience in defusing. Defusing focus on the volunteer responders' own narratives and experiences and was developed with inspiration from Critical Incident Stress Debriefing.<sup>18</sup>

During the conversation, volunteer responders are initially asked to talk freely about their experience. The volunteer responder is

encouraged to provide a brief description of the experience from his/her own point of view. Secondly the nurse asks questions about the experience, diving into details the volunteer responder has raised herself, e.g., "How did you feel about performing CPR?", "Do you remember your most prominent thought in the situation?", "Have you been able to sleep and eat since the event?". The conversation transitions from thoughts to feelings and emotions. The volunteer responder is encouraged to talk about his/her experience with family and friends without disclosing any sensitive information. Volunteer responders are encouraged to voice any doubts or uncertainties about their experience, because one of the most frequently recurring topics during these conversations is the responder's fear of causing the patient harm.

If the nurse decides that the responder needs a supplementary assessment by a trained psychologist, the volunteer responder is asked to contact his/her General Practitioner (GP) for further referral. Volunteer responders are instructed to inform the volunteer responder program when they have scheduled their GP. All volunteer responders who do not reply to the survey are contacted to evaluate any physical or psychological impact.

### *Ethics and approval*

The Danish volunteer responder program was assessed by the local ethics committee and accepted without the need for further approval (Journal nr.: 17018804). All volunteer responders gave consent to be contacted in terms of research and follow-up.

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## Results

From 1 September 2017 to 31 December 2022, the Danish volunteer responder program has alerted 177,866 volunteer responders nationwide for 10,819 presumed cardiac arrests. Characteristics of a representative sample of OHCA are included in Table 1. Of 177,866 alerted volunteers, 62,711 (35.3%) accepted the alarm. In the same period, 7,317 (4.1%) cancelled their registration.

From January 2019 to 31 December 2022, a total of 535 volunteer responders took part in a 'defusing' conversation (Fig. 1). This number includes volunteers who reached out on their own via our e-mail system desiring a follow-up.

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## Discussion

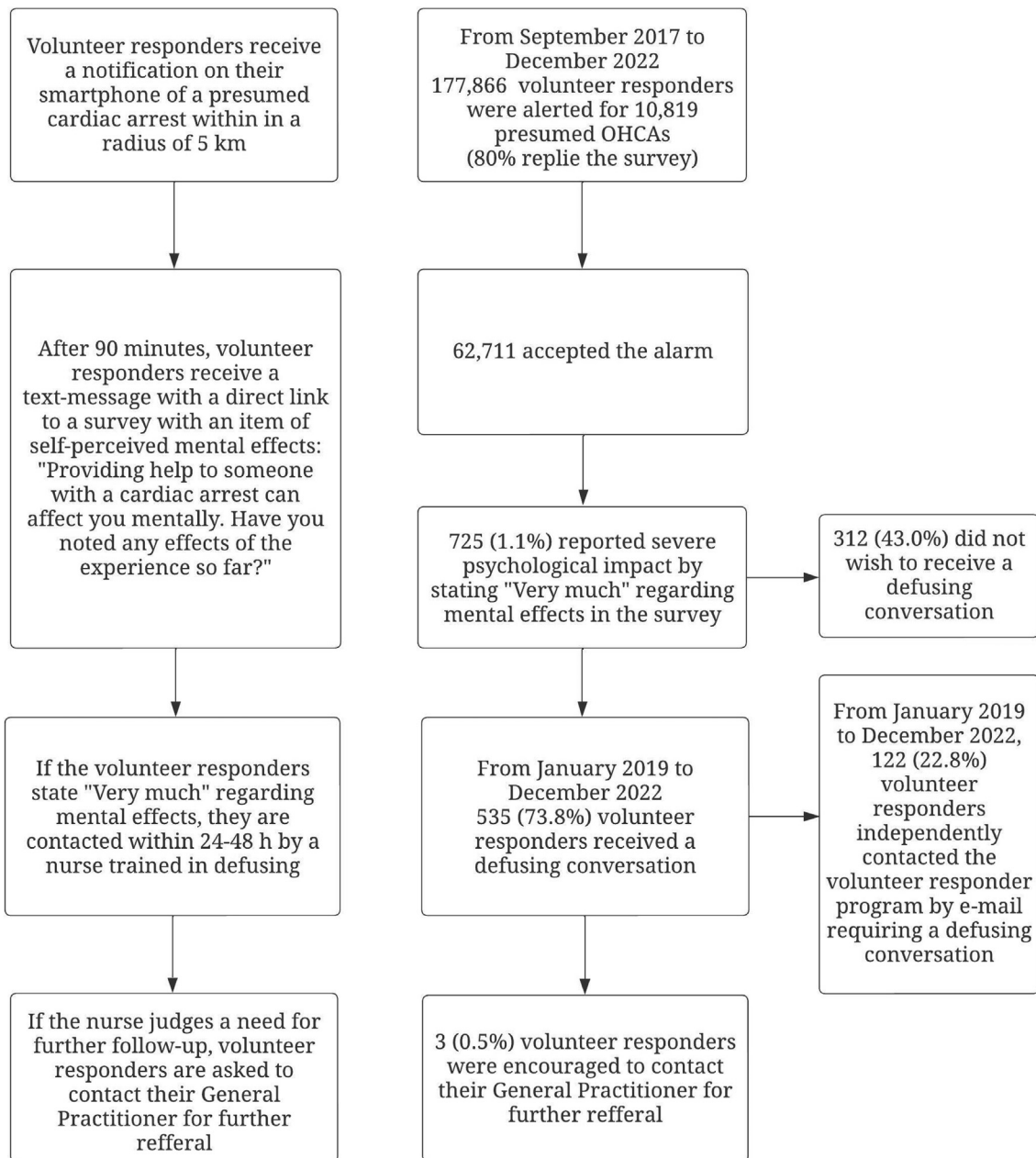
This study provides detailed information about the Danish volunteer responder program and the continuous follow-up on volunteer responders who have been dispatched to OHCA. Numerous campaigns have been launched to recruit volunteers for the Danish program. It has been shown that people mainly join due to intrinsic factors such as a desire to do good.<sup>19</sup> Recruitment campaigns often appeal to such intrinsic factors with slogans as "You can save a life". A qualitative study examined people's reasons for joining a volunteer responder program.<sup>19</sup> The authors found that volunteer responders were motivated to participate based on a desire to make a contribution to the community and the satisfaction in 'saving a life'.<sup>12</sup> However, being involved in a cardiac arrest situation may differ from volunteer responders' initial expectations. Engaging in resuscitation, facing a collapsed person and family members in crisis is a potentially psychologically demanding situation. A number of studies have examined how lay people experience being dispatched for

**Table 1 – Out-of-hospital cardiac arrest characteristics in the period 2020–2021, n = 4,519\*.**

Out-of-hospital cardiac arrest characteristics in the period 2020–2021, n = 4,519*		Missing
Age, median (Q1, Q3)	74 (63,81)	128
Sex, male (%)	2,887 (65.7)	127
Bystander witnessed	1,886 (42.3)	65
Private home	3,397 (76.5)	77
Ambulance response, mean time in minutes (SD)	7.9 (4.9)	46
Bystander CPR*	3,154 (70.8)	66
Bystander defibrillation	357 (8.0)	71

\*Out-of-hospital cardiac arrests from the Central, Northern and Southern regions of Denmark in the period 2020–2021.

\*\*Cardiopulmonary resuscitation.



**Fig. 1 – Volunteer responder follow-up flow chart.**

OHCA.<sup>12,13,20,21</sup> Descriptions such as feeling and sensing the smell of the patient as well as recurring visions of the collapsed body were frequent among lay persons who had performed CPR.<sup>13,21,22</sup>

Psychological follow-up on volunteer responders may reduce potential psychological consequences that might arise from the experience by letting the volunteer responders share their thoughts and gain support. We found that 22.8% of volunteer responders who received defusing had proactively contacted the volunteer responder program for defusing purposes. This percentage emphasizes the need for immediate access to follow-up to receive guidance in processing the experience. Further studies are needed to establish the most appropriate time frame for measuring psychological impact, as some volunteer responders may experience a delayed onset of mental effects. A study examining immediate psychological impact on volunteer responders found healthcare educated volunteer responders to report lower levels of psychological impact compared to non-healthcare professionals.<sup>8</sup> Non-healthcare educated volunteer responders may be less equipped to manage the mental effects of their experiences.

Very limited work has been carried out on debriefing or defusing of lay responders. One study found debriefing to provide coping skills among lay people involved in OHCA.<sup>15</sup> A qualitative study found the psychological impact of performing CPR was reduced among lay rescuers when they shared their experience and received positive feedback.<sup>23</sup> While no studies have been carried out on the effects of debriefing or defusing smart-phone dispatched volunteer responders, several studies call for a support mechanism.<sup>24,25</sup>

We propose to systematically measure the mental effects on volunteer responders, and to offer a defusing conversation to ease the potential negative psychological effects. This defusing should be performed by a trained healthcare person with communicative skills and practical experience from the field, because many volunteer responders tend to ask questions specifically relating to their resuscitative efforts.

Psychological debriefing is traditionally conducted as a group session.<sup>26</sup> It is important to mention that our follow-up is not a critical incident stress debriefing session. Debriefing has been criticized.<sup>27</sup> One of the critic's concerns debriefing of people who are not distressed, who could become distressed if they are forced to recall their experience. Further, debriefing has not been found to prevent the onset of post-traumatic stress disorder.<sup>28</sup> There is a need for further research on the effectiveness of defusing and debriefing volunteer responders to clarify the potential benefits of immediate defusing interventions.

Finally, there is a risk of physical injury, since volunteer responders need to travel quickly to reach the person in cardiac arrest. Our survey invites volunteer responders to describe any degree of physical injury they may have suffered. Further, the volunteer responder program includes an insurance that covers physical injuries, such as the need of physiotherapy.

It is a limitation of the study that it in terms of the Danish data protection legislation was not possible to follow up on volunteer responders who deleted their registration.

## Conclusion

The Danish volunteer responder follow-up program is carried out to monitor the safety measure of psychological and physical risks following dispatch to a suspected OHCA. We suggest a method for systematic screening of volunteer responders by using a survey that lets

responders report any physical injury or need of psychological follow-up. The person providing psychological follow-up should be a trained health-care professional who has experience within the field.

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## Credit Author Statement

Astrid Rolin Kragh drafted the manuscript. Mads Tofte Gregers contributed to the design of the study. Linn Andelius contributed with critical revision of the study. Persia Shahriari contributed with critical revision of the study. Sofie Kjærholm contributed with critical revision of the study. Anders Korsgaard contributed with critical revision of the study. Fredrik Folke contributed to the design and the concept. Carolina Malta Hansen contributed with critical revision of the study and the design and concept of the study.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.resplu.2023.100402>.

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