

EDITORIAL

Volunteer Responders Should Not Be Overlooked During the Night

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Automated external defibrillators (AEDs) play a growing part in early defibrillation for out-of-hospital cardiac arrest (OHCA), more and more in use in places of high expected use and by first responders such as fire fighters and police.^{1,2} However, around 70% of all OHCA occur in residential areas, whereas most AEDs are found in public places that hardly contribute to defibrillation of patients at home.^{3,4} Increasingly, systems using volunteer citizen responders are set up across the world,^{5,6} increasing the benefit of early cardiopulmonary resuscitation (CPR) and AEDs also to the patients at home.^{7,8}

See Article by Mottlau et al.

Throughout the years, studies proved that this strategy can work, as CPR and defibrillation before emergency medical services (EMS) arrival increases.⁷⁻¹¹ Studies that actually proved that these volunteer rescuers with AEDs increase survival for patients with an OHCA are scarce.^{12,13}

We can imagine a “chain of volunteer responders” and identify where the weakest links are in this chain, aimed at early defibrillation. This “chain of volunteer responders” can be described as follows: dispatcher recognition → identifying volunteers and AEDs available for dispatch → accepting the alert by the volunteer → reaching and retrieving the AED → arrival before EMS → start CPR and defibrillate. It is important to understand how each step of this chain works and

influences the effectiveness of subsequent steps and ultimately survival.

Some links of this “chain of volunteer responders” have been studied. The first link, recognition of a possible cardiac arrest by the dispatcher, remains sub-optimal. In a recent study this was estimated at 73%, confirming many earlier studies.¹⁴ Obviously, any volunteer system that must be triggered by the dispatcher can work only if the dispatcher recognized the need for resuscitation in the first place. Sondergaard et al found a strong inverse relationship between the distance from the patient to the nearest AED and probability of use: when the AED distance increased from <100 to >200 m, the probability that the AED could be used to defibrillate decreased from 22% to 2.5%.¹⁵ Similarly, we found an inverse relationship between density of volunteer rescuers and AEDs around the patient and the time interval between the call to the dispatch center and the first shock: with increasing density, shock delay decreased from median 11 minutes to median 8 minutes.¹¹ Retrieving an AED is severely hampered (in particular in the evening and night) if the AED is not accessible 24/7 but resides in a shop or office that is closed during evenings, nights, and weekends.¹⁶

It was not well studied whether alerting volunteer responders would be different during the day compared with the night or during weekdays compared with the weekend. There are volunteer responder systems that do not alert volunteer responders during the night.^{10,17} But is that the correct strategy? There are 2 studies that found that alerting volunteer responders during

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the night is still effective.^{11,18} However, as all systems are different, it is uncertain if that also applies with a different system in a different country.

In this issue of the *Journal of the American Heart Association (JAHA)*, Mottlau et al attempted to find an answer.¹⁹ They studied citizen responder availability according to time of day and day of week and the possible differences in accepting the call, in AED retrieval and involvement in the actual resuscitation attempt as main markers of their arrival before EMS, performing basic life support and AED defibrillation if at least 1 citizen responder arrived before EMS. The study was performed during a 12-month period in 2017 and 2018. Outcomes on volunteer response were assessed from an online survey that was sent automatically to all activated responders 90 minutes after the call.

Approximately 3460 citizen responders were alerted for a true OHCA. From these, ~1620 (47%) responded to the alert. Of these, a surprisingly high proportion of 86.3% completed the online survey, making selection bias of survey responders a minor problem.

From the average 16 volunteers alerted in each call, volunteer responders more often accepted the alert in the evening (mean 4.8), compared with daytime (mean 3.7) and nighttime (mean 1.8). Also, in the weekend (mean 4.3) volunteer responders accepted more often than on a weekday (mean 3.4). This resulted in a significant different proportion of OHCA with at least 1 volunteer responder who arrived before EMS: at daytimes (43%), in the evening (50%), and at night (26%). They observed no significant difference according to time of day and day of week in bystander CPR or bystander defibrillation when at least 1 volunteer responder arrived before EMS.

The authors conclude that although fewer volunteer responders accepted and responded to the alert at night, still in 26% of the cases in which the volunteer responder system was activated a volunteer responder arrived before EMS, and their contribution was substantial enough to justify alerting volunteer responders during the night. Based on this study and what already was known from literature,¹¹ we can support their conclusion.

The study of Mottlau et al adds new information to the knowledge that volunteer responders indeed arrive on scene and contribute to the efforts in addition to the EMS in treating OHCA. However, the study does not sufficiently clarify what precisely their added contribution was, mainly because in the paper there is no distinction between “real” bystanders giving CPR and defibrillating with a local available AED and CPR and defibrillation by a dispatched citizen responder with a more remote collected AED. As 81% of the included OHCA were situated in a residential location, one might assume that the great majority of the administered AED defibrillation shocks indeed came from AEDs brought by a citizen responder, but that assumption cannot be confirmed in this study.

One of the remarkable findings in Mottlau’s study is the low proportion of rescuers who did not accept the call at nighttime. Although the survey did not ask for reasons, the authors suggest that the alerted rescuers did not hear the alarm because their mobile phone was switched off or in silent mode. This may be correct, but we can think of a more down-to-earth reason: the willingness to get out of bed and rush to an emergency may be less than at daytime. The possibility to interrupt the silent mode of the mobile phone is an option that requires careful consideration before implementing. A volunteer has no duty to respond and his or her privacy must be respected. One must assume that in the default the mobile phone is not in silent mode, even at night and there may be a reason to switch to silent mode.

Widening the circle of volunteers that can be alerted increases the number of rescuers, but the chance that the rescuers who are now “caught” in the circle actually arrive in time to contribute decreases with increasing distance to the patient. There is even a risk that arriving on scene and always seeing an ambulance already present may diminish motivation to participate in a future alert. The best way to increase the number of volunteers and AEDs included in a call is not to widen the circle but to increase the density of volunteers and AEDs in residential areas. In our setting in the Netherlands we have shown that shortening response times to defibrillation is possible until at least 2 AEDs per km² and at least 10 volunteers per km² are available before a possible saturation effect is observed.¹¹ This is an ongoing effort that may well remain worthwhile pursuing.

This study confirms again the great potential and added value of alerting volunteer responders to OHCA patient. It must not be forgotten that a volunteer responder system by itself should be only a part of the total response system for OHCA cases. Not only EMS and volunteer responders should be alerted but also other first responders as police and fire fighters can play an important role and are already widely used as part of the response strategy.^{2,20} Previous research showed that volunteer responders are working as an addition to other first responders and not as a replacement.¹¹ Therefore, volunteer responders should be considered as a part of the whole response strategy.

ARTICLE INFORMATION

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Disclosures

None.

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