

# Early CPR and defibrillation by laypersons in out-of-hospital cardiac arrest: process evaluation from a perspective of EMS personnel in the region of Twente [NL]



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## **Abstract**

### *Aim*

The goal of this study was to evaluate the process of a project whereby laypersons provide early emergency medical care and assistance in out-of-hospital cardiac arrest from the perspective of EMS personnel in order to identify problems and possible improvements.

### *Methods*

In March 2008 the EMS Ambulance Oost [NL] implemented an alert system with at this moment approximately 6000 volunteers. After dispatching two ambulances to a suspected cardiac arrest, the system alerts all volunteers in a radius of 1000 meters of the victim to provide early CPR and early defibrillation. After arriving of EMS personnel a cooperation with laypersons could follow.

A paper-based questionnaire was send to the home address of 149 employees of the EMS; 82 specialized nurses and 67 drivers of which 27 were instructor external education. The questionnaire focused on the experiences of EMS personnel with laypersons on site concerning the following aspects: number of laypersons on site, quality of layperson's skills concerning CPR and use of AED, communication between EMS personnel and laypersons and within the organization and general opinion of the project.

### *Results*

The response in this study was 38,9%; 58,6% were specialized nurses and 41,4% were drivers, 22,4% of these specialized nurses and drivers were also instructors external education. EMS personnel graded the project on a scale from 1 to 10 with a 7,7.

More than half of the EMS personnel mentioned that sometimes or mostly there were either too many (70,6%) or no (68,4%) laypersons on site and a majority (75,9%) experienced 5 to 8 laypersons on site as too many.

Quality of laypersons' skills concerning CPR and use of AED by laypersons was according to the opinion of EMS personnel in general good. With respect to the aspect communication between EMS personnel and laypersons, laypersons were respectful, friendly, accepted EMS personnel authority and were easily corrected. Information that EMS personnel needed was communicated by laypersons or could be gathered easily by asking specific questions.

After the resuscitation, EMS personnel could provide aftercare. The most common way of providing aftercare was expressing gratitude to laypersons. About half of the EMS personnel said that they never told laypersons about the special website or gave a business card in order to provide aftercare in a later stage.

The dispatch center of the EMS did not always notify whether laypersons were alerted to EMS personnel, but this was desired by 83,9% of the EMS personnel. A majority of EMS personnel (61,9%) also desired recognizability of laypersons on site.

Most often problems relating to technical procedures concerning the resuscitation by laypersons (47,4%) and problems relating to aftercare (43,9%) were experienced by EMS personnel, but only a minority communicated these problems within the EMS.

### *Conclusions*

Overall EMS personnel were positive about laypersons who provided or assisted in emergency medical care for victims with out-of-hospital cardiac arrest. Improvements could be made on the following aspects: number of laypersons on site, communication between EMS personnel and laypersons on site, aftercare for laypersons provided by EMS personnel and communication within the EMS. Therefore can be recommended a leaflet for laypersons with clear information about a maximum of laypersons on site, how to act on site and to communicate with EMS personnel. Also agreements, communicated to EMS personnel by the EMS, can be recommended about providing aftercare, notification of alarming laypersons by the dispatch center and recognizability of laypersons on site. Also EMS personnel should be encouraged to communicate experienced problems with laypersons on site. These recommendations could lead to a better cooperation and a better way of providing care, which could lead to a higher survival of out-of-hospital cardiac arrest victims.

*Keywords:* Cardiopulmonary resuscitation (CPR); Automated external defibrillator (AED); Defibrillation; Emergency medical services (EMS); Out-of-hospital cardiac arrest (OOH-CA); Laypersons; Text message alert

## Introduction

According to a study about survival of resuscitation outside the hospital, every week 300 Dutch citizens go into sudden cardiac arrest (1). This study shows that overall survival of a resuscitation outside the hospital increased from 9,1% (1995-1997) to 16,6% (2005-2006) and that this rate could be increased to 25% if an automated external defibrillator (AED) is used in every case. Survival rates after a sudden cardiac arrest decline every minute if no medical assistance is provided (1). A faster start-up of medical assistance is needed to increase the survival rate.

Bystanders who witness a sudden cardiac arrest could play a central role in a faster start-up of medical assistance. The 'chain of survival' describes four key links to optimize survival in out-of-hospital cardiac arrest, namely early access (calling the emergency number), early cardiopulmonary resuscitation (CPR), early defibrillation and early advanced care (2-3).

Literature suggests strengthening the chain of survival, by reducing the response time interval through increasing the use of bystander CPR and to consider or improve first responder programs and public-access defibrillation (PAD) (3-6). In first responder programs police officers and firefighters have an AED and can act as first responders. In PAD programs trained volunteers in public facilities witness a sudden cardiac arrest, call the emergency number and perform early CPR/early defibrillation (4-6). AED use in first responder programs or by trained laypersons is safe and effective but annual training and recertification of laypersons is needed (7-10). Capato et al. found that an emergency layperson-integrated service was associated with a significantly higher long-term survival of cardiac arrest victims (11).

Nowadays it is possible to send text messages for public emergency warnings (12). This way of alarming can also be used in case of out-of-hospital cardiac arrest victims outside a public facility for a faster start-up of early CPR and early defibrillation.

In 2008 the EMS of Twente [NL] starts an intervention program whereby laypersons, alerted by a text message via their mobile phone, provide medical assistance in out-of-hospital cardiac arrest in the rural area of Twente. The intervention covers a widespread area and is thus not just a public facility. Volunteers are trained in resuscitation skills and the use of an AED. If a sudden cardiac arrest is suspected by the dispatch center, two ambulances are dispatched and laypersons are alerted through a text message and asked to go to the victim. The more volunteers live or work in the surrounding area, the more text messages are sent. Therefore too many laypersons could show up on site (13). Personnel of the emergency medical service (EMS) who arrive on site can meet one or more laypersons and will perform specialized resuscitation (14). During the resuscitation, cooperation with laypersons will happen more often. EMS personnel have to communicate with laypersons during the resuscitation. After the necessary treatments have been applied, aftercare can be provided to the laypersons to evaluate the performed resuscitation. Each component of this intervention has to be as efficient and as adequate as possible. This creates an optimal design of the process of EMS personnel which aims to eventually lead to an optimal gain in survival rate in the end.

The focus of many scientific studies regarding first responder programs or public-access defibrillation (PAD) programs is concerned with the effect on survival and not on how to improve the process of the program (4, 8, 10-11, 15-16). PAD programs in these studies do not describe the process of alarming volunteers and are only implemented in public facilities. Furthermore EMS is often only associated in studies to arrival time after notification at the dispatch center instead of focusing on the process on site between laypersons and EMS personnel (15). A parallel study about a process evaluation of laypersons who provide emergency medical assistance to out-of-hospital cardiac arrest victims, via a text message alert, shows that laypersons could assist EMS personnel in over 50% of the cases, thus an optimal design is needed (17). Therefore it is important to ask about the experiences of EMS personnel with laypersons.

Aim of this study is to determine the experiences of EMS personnel concerning the number of laypersons on site, quality of laypersons' skills concerning CPR and use of AED, communication between EMS personnel and laypersons on site and communication within the organization. Finally their general opinion of the project whereby laypersons provide emergency medical assistance in order to optimize the process with laypersons is asked. Bottlenecks and improvements from the perspective of EMS personnel are identified through an evaluation, with the intention to generalize the results to other EMS centers who would like to implement such a project.

## Methods

A paper based survey was conducted to explore the process of the alarm system whereby laypersons provided emergency medical care in out-of-hospital cardiac arrest from a perspective of EMS personnel.

### *Setting*

Ambulance Oost, the EMS for the region Twente [NL] serves 640.000 inhabitants and has its own dispatch center. The EMS has 149 paramedics employed (08/07/2010).

In March 2008 the EMS implemented the alert system involving approximately 6000 volunteers. The majority of these volunteers have trained their CPR skills and use of an AED via a course of the EMS. The other volunteers have followed a course elsewhere or were health professionals of other organizations who were allowed to perform early CPR and early defibrillation.

The alarming process starts at the dispatch center. Laypersons who live or work in a radius of 1000 meters of the victim receive a text message and decide for themselves whether to go to the victim or not. Notification of the dispatch center to EMS personnel does not always include whether laypersons are alerted. On site laypersons perform early basic CPR or early defibrillation. At arrival EMS personnel takes over the responsibility of the laypersons, but through a collaboration laypersons can keep massaging the victim whereby EMS personnel can perform advanced life support.

### *Study population*

The study units were 149 paramedics of the EMS; 82 specialized nurses with a nursing degree level 5 (bachelor level) and 67 drivers who took an internal course about providing emergency medical aid. Fifteen specialized nurses and 12 drivers were also instructor external education. Instructors external educations provided courses whereby laypersons trained CPR and use of AED skills. All 149 employees received a questionnaire at home, including a stamped return envelope. In order to keep the response rate high the questionnaire was announced via intranet of the EMS a week before. After two weeks a reminder was sent to them via mail and after five weeks an e-mail was sent by the manager of acute care of the EMS. The overall response was 38,9%: 34 specialized nurses and 24 drivers returned the questionnaire and were included in the present study.

### *The questionnaire*

Through purposive sampling five semi-structured interviews were held with three specialized nurses and two drivers, one specialized nurse and one driver were also instructor external education. Gathered qualitative data were used to construct a questionnaire.

The final questionnaire focused on the experiences of EMS personnel with laypersons since the implementation of the project in March 2008. The questionnaire contained 37 questions on four aspects. These aspects were: number of laypersons on site (including 7 items, see table 2), quality of laypersons' skills concerning CPR and use of AED (including 4 items, see table 3), communication was split up in communication between EMS personnel and laypersons on site (including 12 items, see table 4), communication afterwards whereby EMS personnel could provide aftercare to laypersons

(including 6 items, see table 5) and communication within the EMS (including 15 items, see table 6 and 7). The last aspect consisted of a general opinion about the project as a whole (including 5 items, see table 8).

The questionnaire consisted of open-ended and closed questions. For statements the Likert- scale index was used whereby respondents could indicate the degree of agreement or the degree of occurrence. Other closed questions included multiple choice answers.

The validity of this questionnaire was established by 'face validity' through several experts within our research group and the manager of acute care of the EMS. The questionnaire was pre-tested by four people who were interviewed, in order to optimize the questionnaire.

#### *Statistical analysis*

Statistical analyses were conducted using SPSS software version 18.0 (SPSS, Inc., Chigago, IL, USA). Descriptive statistics were used to define numbers, means and percentages. A factor analysis was performed to provide more insight in the structure of the dataset concerning communication. Through a reliability analysis the Cronbach's Alpha is calculated for four item sets; concerning quality of performed CPR and AED use by laypersons ( $\alpha$  0,91), communication construct attitude ( $\alpha$  0,89) and the construct communication during resuscitation ( $\alpha$  0,73) and aftercare provided by EMS personnel ( $\alpha$  0,42).



## Results

### *Population characteristics*

Table 1 shows that 58 employees of the EMS (38,9%) returned the questionnaire, the majority was male (80,4%) and more specialized nurses (58,6%) than drivers (41,4%) participated. Thirteen (22,4%) instructors who provided CPR and AED training for laypersons were included. The average number of years of employment was 10,0 (n=47).

Table 1  
Characteristics of study population (N=58)

	N	%
Sex (N=56)		
Male	45	80,4
Female	11	19,6
Function (N=58)		
Specialized nurse	29	50,0
Driver	16	27,6
Instructor (specialized nurse)	5	8,6
Instructor (driver)	8	13,8
	Mean	SD
Average age in years (N=46)	43,7	6,8
Average years of employment (N=47)	10,0	6,7

### *Number of laypersons on site*

In the six months before distributing the questionnaire the majority of the EMS personnel estimated to have had 1-3 (36,2%) or 4-6 (44,8%) cases of out-of-hospital cardiac arrest victims, see table 2. More than half of EMS personnel mentioned that sometimes or mostly there were either too many (70,6%) or no (68,4%) laypersons on site. The majority of the EMS personnel (75,9%) considered the presence of 5 to 8 laypersons as too many. About one fifth of the EMS personnel indicated that sometimes or mostly a surplus of laypersons resulted in a situation that laypersons actually stood in the way (20,7%) or were sent home (24,1%). Even though EMS personnel did not always meet laypersons on site, when asked if CPR was performed at arrival more often than before the start of the project, the majority agreed.

Table 2  
Experienced CPR cases and number of laypersons on site (N=58)

	<b>0 times</b>	<b>1-3 times</b>	<b>4-6 times</b>	<b>7-9 times</b>	<b>10-12 times</b>	<b>&gt;12 times</b>	<b>Valid N</b>
Experienced CPR cases in past six months	3 (5,2%)	21 (36,2%)	26 (44,8%)	3 (5,2%)	4 (6,9%)	1 (1,7%)	58
Average percentage of cases with laypersons experienced	<b>0-25%</b> 19 (34,5%)	<b>26-50%</b> 18 (32,7%)	<b>51-75%</b> 15 (27,3%)	<b>76-100%</b> 3 (5,5%)			55
Surplus of laypersons present	<b>Never (1)</b> 6 (10,3%)	<b>Rarely (2)</b> 11 (19,0%)	<b>Sometimes (3)</b> 31 (53,4%)	<b>Mostly (4)</b> 10 (17,2%)	<b>Always (5)</b> -	<b>Mean</b> 2,8	58
No laypersons present	3 (5,3%)	15 (26,3%)	34 (59,6%)	5 (8,8%)	-	2,7	57
Laypersons stood in the way	22 (38,6%)	23 (40,4%)	11 (19,0%)	1 (1,7%)	-	1,8	57
Laypersons were sent home cause of surplus	31 (53,4%)	13 (22,4%)	14 (24,1%)	-	-	1,7	58
Opinion of what is considered as too many laypersons on site	<b>1-4 persons</b> 6 (10,3%)	<b>5-8 persons</b> 44 (75,9%)	<b>9-12 persons</b> 7 (12,1%)	<b>13-16 persons</b> 1 (1,7%)	<b>&gt;16 persons</b> -		58

*Quality of laypersons' skills of performed CPR and use of AED*

Table 3 shows that the quality of CPR performed, the use of AED, the action upon AED instructions and the placement of AED electrodes by laypersons was generally good, according to the opinion of EMS personnel. A minority of 3,6% of EMS personnel disagreed with the statement that AED electrodes were placed correctly.

Through the use of a plug adapter AED electrodes of one type of AED could be connected to the monitor of EMS personnel and this is done mostly (10,3%) or always (17,2%) by EMS personnel [data not shown]. So AED electrodes do not have to be pulled off. Routine change in order to use the plug adapter if possible was desired by a small majority (53,5%), a quarter was neutral [data not shown].

Table3  
Quality of laypersons' skills concerning CPR and use of AED (N=58)

	Disagree (1)	Relatively disagree (2)	Neutral (3)	Relatively agree (4)	Agree (5)	Do not know / n.a.*	Mean	Valid N
Laypersons follow AED instructions in general well**	-	-	2 (3,8%)	10 (18,9%)	41 (77,4%)	5	4,7	58
In general, laypersons are able to use the AED well**	-	-	3 (5,7%)	10 (18,9%)	40 (75,5%)	2	4,7	55
Laypersons are in general able to place AED electrodes well**	-	2 (3,6%)	1 (1,8%)	14 (25,0%)	39 (69,6%)	2	4,6	58
In general, the quality of given CPR by laypersons is well (placing hands/ rhythm/ breathing air into the victim)	-	-	6 (10,7%)	30 (53,6%)	20 (35,7%)	2	4,3	58

\*Do not know/n.a.is considered as missing in percentages and mean

\*\*Cronbach's alpha 0.91

*Communication between EMS personnel and laypersons on site*

Table 4 presents the items related to the communication with laypersons on site. With respect to the attitude of laypersons it was shown that laypersons were generally respectful and friendly, laypersons accepted EMS personnel authority and were easily corrected. The majority of the EMS personnel could mostly keep the laypersons calm (87,3%). Laypersons shared the information that was desired by the EMS personnel (60,0%) on their own initiative most of the times, and if not, desired information was received by asking specific questions (77,5%). About half of the EMS personnel neither agreed nor disagreed if information was communicated clearly or completely by laypersons. Most of the time laypersons did not need extra instructions regarding CPR and if necessary, it did not take effort to give extra instructions to laypersons.

Table 4  
Communication between EMS personnel and laypersons on site (N=58)

	Disagree (1)	Relatively disagree (2)	Neutral (3)	Relatively agree (4)	Agree (5)	Mean	Valid N
<i>Attitude</i>							
Laypersons accept EMS personnel authority*	-	-	7 (12,3%)	20 (35,1%)	30 (52,6%)	4,4	57
Laypersons are respectful*	-	-	8 (14,0%)	22 (38,6%)	27 (47,4%)	4,3	57
Laypersons are friendly*	-	-	8 (14,0%)	24 (42,1%)	25 (43,9%)	4,3	57
Laypersons are easily corrected*	-	1 (1,9%)	8 (14,5%)	23 (41,8%)	23 (41,8%)	4,2	55
<i>Communication during resuscitation</i>							
Can mostly manage to keep laypersons calm**	1 (1,8%)	-	6 (10,9%)	32 (58,2%)	16 (29,1%)	4,1	55
Get quickly desired information by asking specific questions**	1 (1,9%)	2 (3,8%)	9 (17,0%)	33 (62,3%)	8 (15,2%)	3,9	53
Laypersons know what is expected of them after EMS arrival**	-	2 (3,6%)	19 (34,5%)	22 (40,0%)	12 (21,8%)	3,8	55
Laypersons tell mostly by themselves the needed information**	-	12 (21,8%)	10 (18,2%)	27 (49,1%)	6 (10,9%)	3,5	55
Laypersons communicate information clearly**	-	4 (7,3%)	26 (47,3%)	23 (41,8%)	2 (3,6%)	3,4	55
Laypersons are complete in giving information**	-	11 (20,0%)	29 (52,7%)	13 (23,6%)	2 (3,6%)	3,1	55
Laypersons need too much extra instructions regarding CPR**	8 (14,3%)	27 (48,2%)	20 (35,7%)	-	1 (1,8%)	2,3	56
It takes effort to give instructions to lay persons**	14 (25,9%)	31 (57,4%)	4 (7,4%)	4 (7,4%)	1 (1,9%)	2,0	54

\* Cronbach's alpha 0.89

\*\* Cronbach's alpha 0.73

*Providing aftercare by EMS personnel*

Table 5 shows all items related to the communication process whereby EMS personnel could provide aftercare for laypersons after the resuscitation. The table shows that 29,2% of the drivers always stayed behind to provide aftercare to laypersons if possible, a small majority (58,4%) stayed sometimes or mostly behind. Expressing gratitude to laypersons was the most common way to provide aftercare by specialized nurses and drivers, this was done mostly (42,1%) or always (54,4%). About half of EMS personnel said that they never told laypersons about the website for laypersons or gave a business card in order to be able to provide aftercare in a later stage. If circumstances would allow it, sometimes (51,9%) or mostly (24,1%) a short evaluation was held.

The majority of EMS personnel (60,7%) [data not shown] agreed that the second driver should stay behind to provide aftercare if possible. A reason why this may not be possible was that the second driver has to take the victim's family members to the hospital.

Table 5  
Aftercare provided by EMS personnel (N=58)

	Never (1)	Rarely (2)	Some- times (3)	Mostly (4)	Always (5)	Mean	Valid N
Expressing gratitude to laypersons*	-	-	2 (3,5%)	24 (42,1%)	31 (54,4%)	4,5	57
Second driver provides aftercare	2 (8,3%)	1 (4,2%)	7 (29,2%)	7 (29,2%)	7 (29,2%)	3,7	24
Having short conversation with evaluation*	4 (7,4%)	6 (11,1%)	28 (51,9%)	13 (24,1%)	3 (5,6%)	3,1	54
Too little time to express gratitude laypersons*	7 (12,7%)	9 (16,4%)	27 (49,1%)	10 (18,2%)	2 (3,6%)	2,8	55
Indicate laypersons about the website*	26 (46,4%)	8 (14,3%)	10 (17,9%)	9 (16,1%)	3 (5,4%)	2,2	56
Giving business card*	27 (51,9%)	11 (21,2%)	8 (15,4%)	5 (9,6%)	1 (1,9%)	1,9	52

\* Cronbach's alpha 0.42

*Communication within the EMS*

With respect to the start of the project, table 6 shows that the majority of the employees (71,2%) was informed via a member of the project group, mainly via intranet of the EMS and through an e-mail newsletter. No other way of informing was desired by 79,1% of the EMS personnel and 19,0% had no opinion.

Based on table 6 it can also be said that EMS personnel was not always notified by the dispatch center about whether laypersons were alarmed or not. Nevertheless, the majority of the EMS personnel (83,9%) wished to know if laypersons were alerted. Main reasons were that EMS personnel knew about the possibility of laypersons present and that bystanders might be laypersons who are involved in the project of the EMS.

Although laypersons involved in the project could not be distinguished from other bystanders, a majority of EMS personnel (61,9%) agreed that laypersons should be recognizable [data not shown].

Table 6  
Communication between EMS personnel and the EMS (N=58)

	N	%
<i>Involvement in the project of laypersons</i>		
Informed about the project by		
Supervisor	8	15,4
Employee of the project group	37	71,2
Other colleague	7	13,5
Missing	6	
Informed through		
Intranet of AO	52	89,7
E-mail/newsletter	23	39,7
Presentation of project group	12	20,7
Local newspaper	12	20,7
Other	6	10,3
Other way of informing desired		
Yes	1	1,7
No	46	79,3
No opinion	11	19,0
<i>Notification of dispatch center to EMS personnel</i>		
Dispatch center notifies EMS personnel of alarming laypersons		
Never	9	16,1
Rarely	11	19,6
Sometimes	17	30,4
Mostly	12	21,4
Always	7	12,5
Dispatch center should notify alarming of laypersons		
Yes	47	83,9
Because of knowing the possibility of laypersons present	31	53,4
Because of knowing that bystanders might be laypersons	30	53,6
Because of knowing that alarming is not forgotten by dispatch center	15	26,8
Other	4	7,1
No	9	16,1
Because of too much extra information in notification	1	1,8
Because of expecting that dispatch center alarms laypersons, so lay persons could be expected on site	9	16,1
Other	1	1,8

*Communication of problems concerning laypersons within the EMS*

Table 7 shows how often problems with laypersons occurred according to EMS personnel and how often these problems were communicated to a supervisor within the organization. Problems related to technical procedures in the resuscitation by laypersons (47,4%) and aftercare (43,9%) were experienced most often by EMS personnel. But only a minority of the EMS personnel who experienced a problem with laypersons (25,9% of 47,4% for problems related to technical procedures and 36,0% of 43,9% for problems related to aftercare) communicated these problems within the EMS.

The questionnaire also included the question if CPR and AED courses for laypersons should be adjusted regularly on findings of EMS personnel, the majority (79,3%) of EMS personnel agreed [data not shown], but as shown in table 7, problems are not communicated within the organization that often.

Table 7  
Occurrence of problems with laypersons and communicating these problems within the EMS (N=58)

		Valid N	Never	Occasionally	Sometimes	Regular	Always	Mean
Technical procedures	I	57	30 (52.6%)	18 (31.6%)	9 (15.8%)	-	-	1.63
Attitude towards EMS personnel	I	57	38 (66.7%)	14 (24.6%)	5 (8.8%)	-	-	1.42
Communication	I	56	32 (57.1%)	20 (35.7%)	4 (7.1%)	-	-	1.50
Authority	I	57	42 (73.7%)	13 (22.8%)	2 (3.5%)	-	-	1.30
Aftercare	I	57	32 (56.1%)	13 (22.8%)	10 (17.5%)	2 (3.5%)	-	1.68
Technical procedures	II	27	20 (74.1%)	4 (14.8%)	-	2 (7.4%)	1 (3.7%)	1.52
Attitude towards EMS personnel	II	19	13 (68.4%)	3 (15.8%)	2 (10.5%)	-	1 (5.3%)	1.58
Communication	II	24	16 (66.7%)	7 (29.2%)	-	-	1 (4.2%)	1.46
Authority	II	15	8 (53.3%)	4 (26.7%)	2 (13.3%)	-	1 (6.7%)	1.80
Aftercare	II	25	16 (64.0%)	5 (20.0%)	2 (8.0%)	2 (8.0%)	-	1.60

I: Occurrence of occurred problems with laypersons on site

II: Occurrence of communicating within the organization of occurred problems

*General opinion*

On average the EMS personnel was positive about the project and graded it with a 7,7 on a scale from 1 to 10 (table 8). Only a minority (8,6%) experienced colleagues who were negative about the project. Positive aspects experienced by EMS personnel were a faster start up of CPR and in some cases a faster start up of defibrillation. More skilled people were on site with whom a faster start up of advanced life support could be made and according to a minority of EMS personnel (17,2%) victims of an out-of-hospital cardiac arrest have a higher chance of survival through this project.

Despite these positive remarks some aspects could be improved according to EMS personnel. These spontaneously elicited remarks included; clear information about role allocation, clear agreements about providing aftercare by EMS personnel, communication in general, laypersons should know how many laypersons on site would be sufficient in order to avoid a surplus of laypersons around the victim and laypersons must be fully aware of the importance of parking their bicycles and cars in such a way that an ambulance could come as close as possible to the victims' location.

Table 8  
General opinion of project of alerting laypersons in out of hospital cardiac arrest (N=58)

	N	%
<i>Opinion of colleagues concerning the project with laypersons</i>	58	
Negative	5	8,6
Neutral	19	32,8
Positive	34	58,6
<i>General experience of given medical care by laypersons</i>	57	
Unpleasant	1	1,8
Neutral	8	14,0
Pleasant	48	82,8
<i>Given grade of the project with laypersons</i>		
5	1	1,7
6	2	3,4
7	19	32,8
8	30	51,7
9	6	10,3
Average	7,7	
<i>Positive points of the project with laypersons*</i>		
Faster start up resuscitation (CPR)	33	56,9
More adequate persons who provide aid and can support EMS personnel	14	24,1
Higher chance of survival	10	17,2
Faster start up of defibrillation	5	8,6
<i>Points for improvement of the project with laypersons*</i>		
Agreements concerning aftercare	9	15,5
Knowing when enough laypersons are present	5	8,6
Clear information about role allocation on site	5	8,6
Recognizability of laypersons on site	4	6,9
Communication in general	3	5,2
Concerns of privacy of the victim	3	5,2
Vehicles of laypersons stood in the way	2	3,4

\*Given answers of open-ended question

## Discussion

In this study the process whereby laypersons are alarmed via a text message, in order to provide emergency medical assistance in out-of-hospital cardiac arrest, was evaluated from a perspective of EMS personnel. Elements of this process are clustered into different aspects. The results show that with respect to the number of laypersons on site, a majority of EMS personnel sometimes or mostly experiences a surplus or no laypersons on site. According to EMS personnel the quality of performed CPR and AED-use by laypersons is generally good. With respect to communication the attitude of laypersons is generally experienced as good, as well as the communication during resuscitation whereby information about the victim is shared. After the resuscitation the majority of EMS personnel thanks the laypersons as a way of providing aftercare, and about half of EMS personnel said that they never told laypersons about the special website. Communication within the EMS is generally good, EMS personnel did not want to be informed about the project through any other way than via the EMS intranet or e-mail newsletter. EMS personnel would like to hear from the dispatch center if laypersons are also alarmed, this notification is however not always given. Problems with laypersons on site occurred occasionally and were never or occasionally communicated within the organization. Overall EMS personnel graded the project on a scale from 1 to 10 with a 7,7 and a faster start up of resuscitation is experienced than before the start of the project.

A project whereby laypersons are alerted via a text message to provide emergency medical care in out-of-hospital cardiac arrest implemented by the EMS Ambulance Oost has, to the best of our knowledge, not been implemented elsewhere outside the Netherlands. PAD programs already exist for several years and are often implemented in public facilities whereby trained responders do not receive an alarm via the dispatch center, but the facility's own emergency plan is used (8-10, 15). Only two scientific studies describe a project whereby ambulatory services operated by associations of volunteers in urban and rural area are alarmed via the dispatch center (11, 18). Main goal of these studies was to determine survival of out-of-hospital cardiac arrest or neurologic outcome of the victim instead of evaluating the process of communication and cooperation between trained laypersons and EMS personnel. The project of the EMS Ambulance Oost is unique in different ways. First of all, it has its origin in a rural area. In rural areas the community is closely involved with each other and EMS arrival times are relatively long. Secondly, each civilian in Twente [NL] can become a layperson after following a CPR and use of an AED course. Third, the dispatch center notifies nearby living or working laypersons via a text message and laypersons can decide by themselves whether to go or not.

Although this project is unique, resemblances are found in literature with respect to quality of performed CPR and AED use by trained laypersons. According to the EMS personnel the CPR skills and AED use are generally good. Different studies show that, based on the opinion of instructors, large majorities of trained laypersons retained core skills of CPR and AED use through 1-1,5 years after training (7, 19-22). This is in line with this project since laypersons need to attend a yearly recertification course. If laypersons fail to do this, their subscription will be removed from the database. In the present study not only instructors but also other EMS personnel were asked about the quality of



CPR skills and AED use by laypersons on site, and not during a simulated resuscitation but in a real life situation.

### *Limitations*

Interpretation of this study should be done with some caution because of a relatively low response. The questionnaire was sent early July, beginning of the holiday period, this could have influenced the low response. Employees were given six weeks to send back the questionnaire or ask for a new copy. After two weeks a reminder via mail was sent and after five weeks a reminder via e-mail followed. The length of the questionnaire could also have played a role in the motivation to complete the questionnaire. EMS personnel might have been tired of filling in questionnaires since around the same period a job satisfaction survey was held.

Different groups within the study population can be distinguished. Response divided by sex shows that 36% of the males responded and 46% of the females. Of the specialized nurses 42% responded, 36% of the drivers and 48% of the instructors [data not shown].

Instructors have more experience with laypersons because of contact moments during CPR and AED courses or during recertification courses. Because of these extra contact moments instructors could be more positive about the project. In this study however, the results of the instructors did not differ very much from the results of the nurses and drivers. Therefore it may be assumed that this possible bias does not apply here.

Years of employment could also have biased the results: relatively new employees could have less experience with laypersons and thus different opinions than colleagues with more experiences, and therefore decided not to fill out the questionnaire. Study population characteristics show that in this study the average years of employment was 10,0, with a standard deviation of 6,7. It may therefore be assumed that a relatively heterogeneous group of employees was involved, which helps avoid this possible bias.

Finally it is possible that only employees who are extremely positive or negative about the project are motivated to respond. According to the given grade by EMS personnel about the project, the majority was positive. This could indicate that employees who feel negative about the project did not participate, but it may also simply indicate that EMS employees generally are positive about the project.

### *Recommendations*

Despite the above mentioned limitation some improvements can be recommended in order to create a more optimal design of the process for EMS personnel, which could lead to an even better cooperation between EMS personnel and laypersons. Therefore the following aspects can be improved: number of laypersons on site, communication between EMS personnel and laypersons and communication within the EMS.

According to EMS personnel (75,9%) 5 to 8 laypersons on site are experienced as too many. Theoretically a maximum of four laypersons on site can be considered as enough. One person will perform heart massage on the victim and another person can breathe air into the victim. Four laypersons should switch tasks every two minutes (23). Therefore it is recommended that if four

laypersons are present, the fifth can tell to other arriving laypersons that a sufficient number of laypersons is present. Information about a maximum of laypersons on site can be given at a training course for laypersons or through a leaflet.

Parallel to this study a process evaluation was performed from the perspective of laypersons to identify problems and potential improvements of this project (17). The study shows that per alert on average 11 laypersons came into action. Recently the EMS reduced the radius of alerting laypersons from 1000 to 500 meters, in order to alarm less laypersons each time. At least 30 laypersons will be alarmed, if not, the radius will first be enlarged to 750 meters and then to a 1000 meters. To overcome the problem of too many or no laypersons on site, research can be done on the possibility of a layperson confirming going to the victim, via a text message to the dispatch center.

Another recommendation can be made with respect to the aspect communication. Information about communication between laypersons and EMS personnel during resuscitation can be given on forehand at a training course or after subscription via mail. Information via mail can be given through a leaflet for laypersons with information concerning role allocation if EMS personnel arrives, an example of a case can be described, what to do if enough laypersons are already present and which information is desired from laypersons by EMS personnel. Volunteers who do not have to follow a course at the EMS center in order to subscribe because a similar course is followed elsewhere, get a clear idea of the interaction with EMS personnel and hierarchical positions on site. This leaflet can also have an extra note regarding the privacy of the victim and on how to park vehicles so that the ambulance will have a clear way.

After the resuscitation EMS personnel could provide aftercare for laypersons before leaving. At the moment no protocol or clear agreement exists. An additional question in the questionnaire was if this would be desirable. According to 58,6% of the EMS personnel a protocol or clear agreement is desired [data not shown], this could give extra structure in the process between laypersons and EMS personnel concerning aftercare. Therefore it can be recommended that two ways of providing aftercare are communicated with EMS personnel. A short version of expressing gratitude for the input of the laypersons and giving a business card with general contact data and a link to the special website for laypersons where aftercare can be requested. A more extensive version can include a short conversation by one person of the EMS personnel or the second driver stays behind if possible. A short version is needed if the victim and family members need to be transported to the hospital or if the second ambulance is needed elsewhere.

Communication within the EMS is split up in involvement of the project, communication between laypersons and the dispatch center of the EMS and communication of problems concerning laypersons. It is remarkable that EMS personnel is informed via intranet or a newsletter via e-mail about the project and no other way of informing was desired. Currently new employees get a presentation of the content of the project with laypersons. According to EMS personnel it is desirable that the dispatch center notifies if laypersons are alarmed, this is not always done by the dispatch center. It is recommended that the EMS communicates to EMS personnel through a clear agreement

that the dispatch center always alarms laypersons if possible and no further notification to EMS personnel is necessary.

Notification of alarming laypersons by the dispatch center might be desired because laypersons are not recognizable. This study revealed that according to EMS personnel laypersons should be recognizable on site. An explanation could be to distinguish well trained volunteers, bystanders and family members. However it is difficult to make laypersons recognizable, because putting a vest on will take too much time and is not always near at hand. A button or a bracelet is simple to wear in a bag and easy to put on for laypersons, but has to be always carried around. A better option might be that at arrival EMS personnel judge if laypersons who are resuscitating also will be capable to assist in further medical assistance, irrespective of their status as volunteer within the project or as bystander. Afterwards aftercare could be provided to the persons who assisted in providing medical care.

Problems, concerning technical procedures, attitude towards EMS personnel, communication, authority and aftercare, with laypersons on site are occasionally experienced by EMS personnel and not always communicated within the EMS. Despite that these problems occur occasionally, through communicating these problems within the EMS, the EMS will be able to create a better process design for the project.

*Conclusion*

Overall it can be concluded that EMS personnel are generally positive about the project whereby laypersons provide emergency medical care in out-of-hospital cardiac arrest. Still the project could be improved on the following aspects: number of laypersons on site, communication between EMS personnel and laypersons on site, aftercare for laypersons provided by EMS personnel and communication within the EMS. In order to improve these aspects recommendations could be made: a leaflet with clear information for laypersons about a maximum of laypersons on site, and how to act on site and to communicate with EMS personnel, an agreement within the EMS about providing aftercare, an agreement about notification of alarming laypersons by the dispatch center and an agreement about recognizability of laypersons. Also EMS personnel should be encouraged to communicate experienced problems with laypersons on site. Through improvements an optimal process can be created for a better cooperation which can increase survival of the victim. Another type of study is necessary to see if overall survival of out-of-hospital cardiac arrest can be increased with trained laypersons who are alerted via a text message.

Topics for improvement:
<ul style="list-style-type: none"> <li>• Number of laypersons on site</li> <li>• Communication between EMS personnel and laypersons on site</li> <li>• Providing aftercare by EMS personnel for laypersons</li> <li>• Communication within the EMS</li> </ul>

Recommendations that can be done by the EMS Ambulance Oost:
<ul style="list-style-type: none"> <li>• A leaflet with information about a maximum of laypersons on site, the interaction with EMS personnel and hierarchical positions on site</li> <li>• An agreement about providing aftercare in a short way via a business card with the link to the special website for laypersons or via a more extensive way through a conversation to evaluate the resuscitation can be communicated to EMS personnel.</li> <li>• An agreement about notification of alarming laypersons by the dispatch center can be communicated to EMS personnel.</li> <li>• An agreement about recognisability of laypersons can be communicated to EMS personnel.</li> <li>• Encourage EMS personnel to communicate experienced problems with laypersons</li> </ul>

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## Appendix 1: Questionnaire

Datum \_\_\_\_\_

Geslacht  man  vrouw

Leeftijd in jaren \_\_\_\_\_

Functie \_\_\_\_\_ [Meerdere antwoorden mogelijk]

Ambulance verpleegkundige

Ambulance chauffeur

Instructeur

Dienstjaren bij Ambulance Oost \_\_\_\_\_

*U kunt bij elke vraag het antwoord aankruisen dat bij uw mening past of zoals u het ervaart. Als u twijfelt kies dan het best passende antwoord. Kruis één antwoord aan tenzij anders aangegeven.*

### 1. De hulpverlening bij een vermoedelijke hartstilstand.

#### 1.1 Algemeen

##### 1. Hoe vaak heeft u de afgelopen 6 maanden een reanimatie gehad als ambulance medewerker?

- 0 keer [Ga door naar vraag 3]
- 1-3 keer
- 4-6 keer
- 7-9 keer
- 10-12 keer
- Meer dan 12 keer

##### 2. In hoeveel procent van de gevallen waren hierbij lekenhulpverleners aanwezig?

- 0 -25%
- 26-50%
- 51-75%
- 76-100%

##### 3. Hoe ervaart u de lekenhulpverlening ter plaatse in het algemeen?

- | Zeer onprettig           | Onprettig                | Neutraal                 | Prettig                  | Zeer prettig             |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

##### 4. Heeft u het gevoel dat er bij aankomst vaker dan voor de start van het project gereanimeerd wordt?

- Ja
- Nee
- Weet niet

##### 5. Hoe staan uw collega's in het algemeen tegenover de lekenhulpverlening?

- | Zeer negatief            | Negatief                 | Neutraal                 | Positief                 | Zeer positief            |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

##### 6. Ervaart u een verschil tussen het platteland en de steden in de zorg verleend door lekenhulpverleners?

- Ja, in de stad wordt er adequater gehandeld dan op het platteland
- Ja, op het platteland wordt adequater gehandeld dan in de stad
- Nee
- Weet niet/Geen mening
- Anders, namelijk: \_\_\_\_\_

## 1.2 Situatie ter plaatse

### 7. In welke mate bent u de volgende omstandigheden ter plaatse tegengekomen?

Kruis bij elk van de onderstaande stellingen aan hoe vaak de omstandigheid is voorgekomen.

	Nooit	Zelden	Soms	Meestal	Altijd
a. Er waren <u>teveel</u> lekenhulpverleners aanwezig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Er waren <u>geen</u> lekenhulpverleners aanwezig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. De lekenhulpverleners liepen in de weg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. De lekenhulpverleners gedroegen zich <u>niet</u> netjes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Lekenhulpverleners zagen zelf dat er <u>genoeg</u> mensen aanwezig waren en zijn uit zichzelf vertrokken	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Ik heb weleens lekenhulpverleners naar huis gestuurd, omdat er <u>teveel</u> waren	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Lekenhulpverleners kenden hun plaats in de hulpverlening niet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(De ambulance verpleegkundige is immers eindverantwoordelijk en heeft de regie in handen.)

### 8. Wat ervaart u als teveel lekenhulpverleners?

- 1-4 personen
- 5-8 personen
- 9-12 personen
- 13-16 personen
- Meer dan 16 personen, namelijk: \_\_\_\_\_ personen

### 9. Is volgens u de rolverdeling tussen ambulance medewerkers en lekenhulpverleners altijd duidelijk?

- Ja
- Nee
- Weet niet

Indien nee kunt u toelichten waardoor dit komt: \_\_\_\_\_

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### 10. Vindt u dat er vanuit Ambulance Oost duidelijke informatie over deze rolverdeling verspreid moet worden onder lekenhulpverleners?

- Ja
- Nee
- Geen mening

Indien ja kunt u een voorbeeld geven op welke manier dit het beste kan: \_\_\_\_\_

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### 1.3 Kwaliteit van de lekenhulpverleners

#### 11. Wat vindt u in het algemeen van de kwaliteit van de lekenhulpverleners?

Kruis bij elke subvraag aan in welke mate u het eens bent met de stelling.

	Oneens	Vrij mee oneens	Neutraal	Vrij mee eens	Eens	Weet niet/ N.v.t.
a. Ik ervaar de gegeven reanimatie van een goede kwaliteit (Plaatsen v.d. handen/ritme/beademing)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Stickers van de AED worden op de goede plek geplakt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. De instructies van de AED worden goed opgevolgd	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. De AED wordt op de goede manier gebruikt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Lekenhulpverleners weten wat er van ze verwacht wordt als er ambulance medewerkers arriveren	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Lekenhulpverleners hebben teveel extra instructie nodig m.b.t. het reanimeren	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Lekenhulpverleners laten zich makkelijk corrigeren	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Lekenhulpverleners accepteren mijn gezag	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Lekenhulpverleners zijn respectvol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Lekenhulpverleners zijn vriendelijk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k. Lekenhulpverleners zijn stressvol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### 12. Indien u wil zou u hieronder uw antwoord(en) in de vorige vraag kunnen toelichten.

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#### 13. Maakt u indien mogelijk gebruik van de verloopstekker om de AED stickers te koppelen aan de ambulance monitor?

Nooit	Zelden	Soms	Meestal	Altijd
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### 14. Routine verandering tot het gebruik van de verloopstekker (indien mogelijk) is wenselijk. (In plaats van de AED stickers er direct af te trekken.)

Oneens	Vrij mee oneens	Neutraal	Vrij mee eens	Eens
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### 15. Wat vindt u van het samenwerkingsverband waarbij lekenhulpverleners hartmassage blijven uitvoeren, zodat u kunt starten met de advanced life support?

Zeer onprettig	Onprettig	Neutraal	Prettig	Zeer prettig
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 1.4 Communicatie met lekenhulpverleners

### 16. Wat vindt u in het algemeen van de communicatie met de lekenhulpverleners?

Kruis bij elke subvraag aan in welke mate u het eens bent met de stelling.

	Oneens	Vrij mee oneens	Neutraal	Vrij mee eens	Eens
a. Het lukt me meestal om de lekenhulpverleners rustig te houden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Het kost me moeite om lekenhulpverleners goede instructies te geven	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Het lukt me meestal om van de lekenhulpverleners snel de gewenste informatie (zie figuur1) te krijgen door gerichte vragen te stellen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. De lekenhulpverleners vertellen meestal uit zichzelf de informatie (zie figuur1) die ik nodig heb	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. De lekenhulpverleners kunnen de informatie (zie figuur1) duidelijk overbrengen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. De lekenhulpverleners zijn volledig in het geven van informatie (zie figuur1)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. In cursussen of een informatie folder moet er aandacht besteed worden aan het geven van deze informatie	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Lekenhulpverleners moeten duidelijk herkenbaar zijn, zodat je weet met wie je te doen hebt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- ◆ Hoe ze het slachtoffer hebben aangetroffen
- ◆ Hoelang er niets gedaan is
- ◆ Hoelang ze al bezig zijn
- ◆ Wanneer de AED is aangesloten
- ◆ Wat de instructies waren van de AED
- ◆ Of de AED geschokt heeft

Figuur 1: Informatie omtrent lekenhulpverlening

## 2. Melding

### 17. Meldt de meldkamer aan u of er lekenhulpverleners zijn gealarmeerd?

Nooit                      Zelden                      Soms                      Meestal                      Altijd

### 18. Moet de meldkamer aan u melden of er lekenhulpverleners zijn gealarmeerd?

- Ja, want:                      [Meerdere antwoorden mogelijk]
- Dan weet ik dat er mogelijk lekenhulpverleners aanwezig zullen zijn.
- Dan weet ik dat de omstanders die aanwezig zijn, wellicht lekenhulpverleners zijn.
- Dan weet ik dat dit niet is vergeten door de meldkamer.
- Anders, namelijk: \_\_\_\_\_
- \_\_\_\_\_

- Nee, want:                      [Meerdere antwoorden mogelijk]
- Dit is teveel extra informatie in de melding.
- Ik ga ervan uit dat dit door de meldkamer gedaan wordt en weet dat ik dan lekenhulpverleners ter plaatse kan verwachten.
- Anders, namelijk: \_\_\_\_\_
- \_\_\_\_\_

### 3. Nazorg

#### 19. Kruis bij elke subvraag aan in welke mate onderstaande aspecten voorkomen bij vertrek ter plaatse.

	Nooit	Zelden	Soms	Meestal	Altijd	N.v.t.
a. Ik bedank de lekenhulpverleners voor hun inzet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b. Als <u>tweede</u> chauffeur blijf ik achter om nazorg te verlenen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Ik geef een visite kaartje	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d. Ik wijs de lekenhulpverleners op de website	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
e. Ik houd een kort gesprekje waarin ik hetgeen heeft plaatsgevonden evalueer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
f. Ik heb te weinig tijd om de lekenhulpverleners te bedanken	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

#### 20. Kruis bij elke subvraag aan in welke mate u het eens bent met onderstaande stellingen.

	Oneens	Vrij mee oneens	Neutraal	Vrij mee eens	Eens
a. De afspraken met betrekking tot de nazorg zijn duidelijk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Ik vind dat er een protocol moet komen met betrekking tot de nazorg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Indien mogelijk zou de <u>tweede</u> chauffeur de taak op zich moeten nemen om achter te blijven en nazorg te verlenen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. De trainingen zouden regelmatig moeten worden aangepast op basis van bevindingen van ambulance medewerkers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 4. Feedback

#### 21. Hoe vaak hebben zich problemen voorgegaan met lekenhulpverleners met betrekking tot:

	Nooit	Enkele keer	Soms	Regelmatig	Altijd
a. technische handelingen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. de houding tegenover ambulance medewerkers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. de communicatie	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. het gezag	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. de nazorg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. iets anders, namelijk: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### 22. Hoe vaak heeft u problemen die zijn voorgevallen met lekenhulpverleners doorgegeven binnen Ambulance Oost met betrekking tot:

	Nooit	Enkele keer	Soms	Regelmatig	Altijd
a. technische handelingen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. de houding tegenover ambulance medewerkers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. de communicatie	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. het gezag	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. de nazorg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. iets anders, namelijk: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### 23. Krijgt u vanuit Ambulance Oost feedback op hetgeen u doorgeeft?

Nooit	Zelden	Soms	Meestal	Altijd
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**24. Acht u dit wenselijk?**

- Ja [Ga door naar vraag 25]
- Nee [Ga door naar vraag 26]
- Geen mening [Ga door naar vraag 26]

**25. Hoe zou u feedback willen ontvangen?**

[Meerdere antwoorden mogelijk]

- Via een persoonlijk gesprek met mijn leidinggevende
- Via een persoonlijk gesprek met een medewerker binnen Ambulance Oost die zich bezig houdt met het project  
(Stimulering Lekenhulpverlening Platteland)
- Per e-mail
- Telefonisch

**5. Betrokkenheid bij het project vanuit Ambulance Oost**

**26. Door wie bent u geïnformeerd over het project Lekenhulpverlening?**

- Leidinggevende
- Medewerker/collega van het project (Lekenhulpverlening)
- Andere collega

**27. Hoe bent u geïnformeerd over het project Lekenhulpverlening?**

[Meerdere antwoorden mogelijk]

- Intranet van Ambulance Oost
- E-mail/Nieuwsbrief
- Presentatie van de projectgroep
- Lokale krant
- Anders, namelijk: \_\_\_\_\_

**28. Had u op een andere manier geïnformeerd willen worden?**

- Ja, namelijk: \_\_\_\_\_
- Nee
- Geen mening

**29. Was voor u, na de informatie verkregen te hebben, duidelijk wat het project Lekenhulpverlening inhoudt?**

- |                          |                          |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Helemaal<br>onduidelijk  | Onduidelijk              | Neutraal                 | Duidelijk                | Helemaal<br>duidelijk    |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**30. Bent u betrokken geweest bij de opzet van dit project?**

- Ja [Ga door naar vraag 32]
- Nee [Ga door naar vraag 31]

**31. Indien nee, had u graag betrokken willen zijn bij de opzet van het project?**

- Ja
- Nee

**32. Is er -nadat het project is gestart- naar uw mening gevraagd over ervaringen met het project tot dan toe?**

- Ja [Ga door naar vraag 34]
- Nee [Ga door naar vraag 33]
- Weet niet [Ga door naar vraag 34]

**33. Indien nee, had u graag uw mening willen geven?**

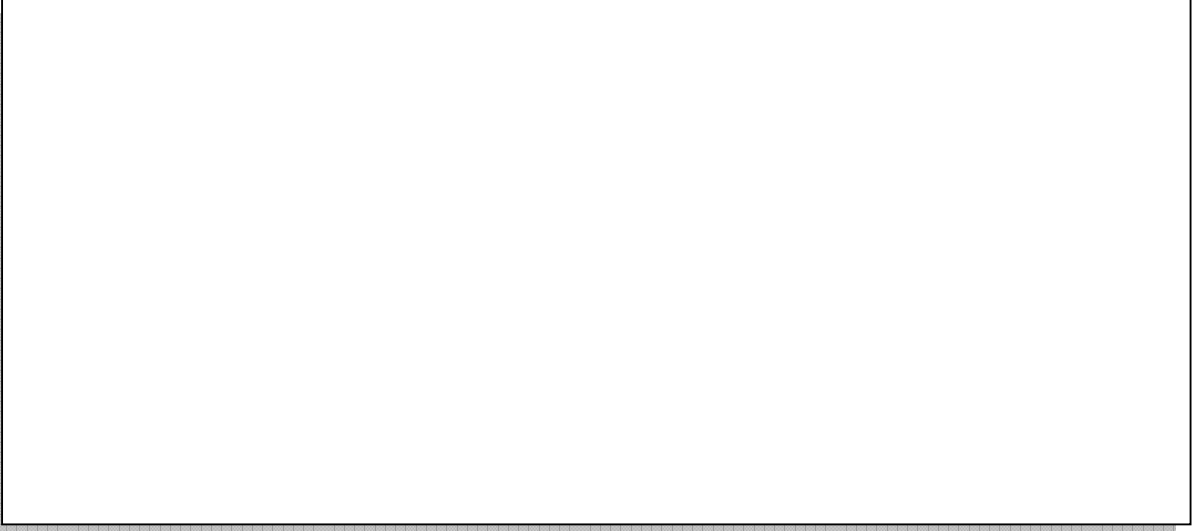
- Ja
- Nee

## 6. Afsluiting

34. Kunt u een rapportcijfer geven over de lekenhulpverlening in het algemeen?

1    2    3    4    5    6    7    8    9    10

35. Wat zijn voor u de meest positieve punten m.b.t. de lekenhulpverlening?

A large, empty rectangular box with a thin black border, intended for the respondent to write their answer to question 35. The box is positioned below the question and above question 36.

36. Wat zijn voor u duidelijke verbeterpunten m.b.t. de lekenhulpverlening?

A large, empty rectangular box with a thin black border, intended for the respondent to write their answer to question 36. The box is positioned below the question and above the page footer.

37. Heeft u nog overige opmerkingen?

**Bedankt voor het invullen van deze vragenlijst!**

**UNIVERSITEIT TWENTE.**



## Appendix 2: Dutch abstract

### **Proces evaluatie onder ambulance medewerkers naar de ervaringen en tevredenheid over het project lekenhulpverlening**

Sinds maart 2008 worden er lekenhulpverleners gealarmeerd bij een melding van een acute hartstilstand, in het kader hiervan is er in opdracht van Ambulance Oost en de Universiteit Twente onderzoek gedaan naar de ervaringen en tevredenheid onder ambulance verpleegkundigen en ambulance chauffeurs. (Een soortgelijk onderzoek is ook gedaan onder de lekenhulpverleners.)

#### *Doel*

Het doel van deze studie was om het proces waarbij lekenhulpverleners vroege spoedeisende medische hulp verlenen en assisteren bij een hartstilstand buiten het ziekenhuis te evalueren vanuit het perspectief van de ambulance medewerkers om problemen en mogelijke verbeterpunten te identificeren.

#### *Methoden*

In maart 2008 heeft Ambulance Oost een alarmeringssysteem geïmplementeerd met op het moment ongeveer 6000 vrijwilligers. De meldkamer stuurt eerst twee ambulances op pad naar een slachtoffer met een mogelijke hartstilstand, daarna wordt direct het alarmeringssysteem gebruikt om lekenhulpverleners die in een straal van 1000 meter van het slachtoffer wonen of werken te alarmeren via een sms, om vroege reanimatie en defibrillatie te verlenen. Na het arriveren van de ambulance medewerkers zal er een samenwerking met de lekenhulpverleners volgen.

Een enquête is verstuurd naar de woon adressen van alle 149 ambulance medewerkers van Ambulance Oost waaronder; 82 verpleegkundigen en 67 chauffeurs. In totaal waren er 27 ambulance medewerkers die ook instructeur externe opleidingen waren. De enquête richtte zich op de ervaringen van ambulance medewerkers met lekenhulpverleners ter plaatse verdeeld in de volgende aspecten: aantal lekenhulpverleners ter plaatse, kwaliteit van de vaardigheden van lekenhulpverleners met betrekking tot de reanimatie en het gebruik van de AED, communicatie tussen ambulance medewerkers en lekenhulpverleners en communicatie binnen de organisatie Ambulance Oost en de algemene mening over het project.

#### *Resultaten*

De respons in deze studie was 38,9%; 58,6% waren verpleegkundigen en 41,4% waren chauffeurs, 22,4% van de verpleegkundigen en chauffeurs was tevens instructeur externe opleidingen. Het project werd gewaardeerd met een 7,7 op een schaal van 1 tot 10.

Meer dan de helft van de ambulance medewerkers gaf aan dat soms of meestal er of teveel (70,6%) of geen (68,4%) lekenhulpverleners ter plaatse waren en een meerderheid (75,9%) ervaart 5 tot 8 lekenhulpverleners ter plaatse als teveel.

Kwaliteit van de vaardigheden van lekenhulpverleners met betrekking tot de reanimatie en het gebruik van de AED was volgens de expertise van ambulance medewerkers in het algemeen goed. Met betrekking tot de communicatie tussen ambulance medewerkers en lekenhulpverleners waren lekenhulpverleners respectvol, vriendelijk, accepteerde de autoriteit van ambulance medewerkers en

lekenhulpverleners waren eenvoudig te corrigeren. Informatie die gewenst is door ambulance medewerkers werd gecommuniceerd door lekenhulpverleners of werd eenvoudig verkregen door het stellen van specifieke vragen.

Na de reanimatie kan er nazorg verleend worden door de ambulance medewerkers, de meest voorkomende manier is het bedanken van de lekenhulpverleners. Ongeveer de helft van de ambulance medewerkers zei lekenhulpverleners nooit op de speciale website te wijzen of een visitekaartje te geven om het verlenen van nazorg uit te stellen tot een later stadium.

De meldkamer van Ambulance Oost melde niet altijd of lekenhulpverleners gealarmeerd waren aan de ambulance medewerkers, maar dit was wel gewenst bij 83,9% van de ambulance medewerkers. De meerderheid van de ambulance medewerkers (61,9%) wensten ook dat lekenhulpverleners ter plaatse zichtbaar moeten zijn.

Problemen met betrekking tot de technische handelingen van de reanimatie door lekenhulpverleners werden het meest ervaren door ambulance medewerkers (47,4%), maar een minderheid (25,9%) hiervan communiceerde deze problemen door binnen de organisatie.

### *Conclusie*

Geheel genomen waren de ambulance medewerkers positief over lekenhulpverleners die spoedeisende medische hulp verlenen of assisteren bij slachtoffers met een hart stilstand buiten het ziekenhuis. Verbeteringen kunnen gedaan worden op de volgende aspecten: aantal lekenhulpverleners ter plaatse, communicatie tussen ambulance medewerkers en lekenhulpverleners ter plaatse, nazorg voor lekenhulpverleners verleend door ambulance medewerkers en communicatie binnen de organisatie Ambulance Oost. De volgende aanbevelingen kunnen gedaan worden met betrekking op deze aspecten: een duidelijke informatie folder voor lekenhulpverleners waarin staat dat een maximum aantal lekenhulpverleners ter plaatse gewenst is en waarin besproken wordt hoe te gedragen ter plaatse en hoe te communiceren met ambulance medewerkers. Daarnaast kan Ambulance Oost duidelijke afspraken over het verlenen van nazorg door ambulance medewerkers, over het melden van de alarmering van lekenhulpverleners aan ambulance medewerkers door de meldkamer en over de herkenbaarheid van lekenhulpverleners ter plaatse, door communiceren met ambulance medewerkers. Ook moeten ambulance medewerkers aangemoedigd worden om ervaren problemen met lekenhulpverleners door te communiceren binnen Ambulance Oost. Deze aanbevelingen kunnen leiden tot een betere samenwerking en een betere manier van het verlenen van zorg, wat kan leiden tot een hogere overlevingskans voor slachtoffers met een hartstilstand buiten het ziekenhuis.



