

Resuscitation of Out-of-Hospital Cardiac Arrest Victims in Lebanon: The Experience and Views of Prehospital Providers

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Abstract

Background: The survival rate of out-of-hospital cardiac arrest (OHCA) victims in Lebanon is much lower than those seen internationally. In this study, we examined the attitudes and practices of prehospital providers in resuscitation. **Methods:** We devised a cross-sectional survey with questions adopted from the literature including a study out of Lebanon. Questionnaires were mailed to 300 volunteers who were recruited from 10 centers of local emergency medical services (EMS). **Results:** A total of 258 questionnaires were returned (86% response rate). Most participants (>80%) were younger than 30 years, and males (60%). Over half reported witnessing up to 10 arrests per year, with 72.5% reporting prehospital return of spontaneous circulation in <6% of cases. Futile resuscitation was frequently (91%) practiced. Participants believed resuscitation should be withdrawn when prolonged (55.4%) or in the presence of advanced directives (34.1%) or terminal illness (27.5%). Reported resuscitation challenges were related to the reaction of witnesses (70.1%), to delay in calling EMS (84.4%), and to traffic delays (30%). Participants recommended training lay persons in resuscitation (79%), training prehospital providers in advanced airway management (68.2%) and intravenous skills (60.1%), providing medications in ambulances (57.7%), and adjusting traffic laws (52%). **Conclusion:** Prehospital providers in Lebanon face several challenges in their resuscitation practices. A multi-faceted strategy to improve resuscitation practices is needed in Lebanon. In addition to policy development, structural changes should be put in place for improved outcomes in OHCA victims.

Keywords: Emergency medical services, out-of-hospital cardiac arrest, practices, prehospital, resuscitation

INTRODUCTION

Survival rates of out-of-hospital cardiac arrest (OHCA) victims up to hospital discharge vary a lot, including up to 19% in Finland, depending on the health-care system and emergency services in the country, as well as on how survival rates are measured.^[1,2] In Lebanon, an overall survival rate of 5.5% at hospital discharge, has been previously reported^[1] good neurologic outcome was present in only 45.4% of survivors.^[1] Many factors related to the arrest victims and emergency services predict survival rates. The American Heart Association set guidelines for resuscitation of OHCA victims.^[3] These guidelines were based on studies that showed that return of spontaneous circulation (ROSC), cardiac rhythm, availability of a witness at the time of arrest, and availability of defibrillation at the scene predicted the chance of survival of patients with out-of-hospital cardiac arrest.^[4]

There is no national policy in Lebanon that guides resuscitation practices and no national regulation of existing emergency

medical services (EMS). Emergency care is provided at the basic life support level by a number of organizations that vary in their level of training in resuscitation. Detailed resuscitation practices in the prehospital field have not been described to date in Lebanon. A previously published Internet survey of emergency physicians in Lebanon^[5] identified factors contributing to the emergency physicians' decisions related to initiation and discontinuation of resuscitation in emergency departments (EDs). Findings suggest that resuscitation is mainly initiated based on the physiologic criteria; however, withdrawal of resuscitation is greatly influenced by the

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wishes of the victim's family. In addition, the practice of resuscitation in futile medical situations was quite prevalent in EDs across Lebanon: 62.9% of surveyed ED physicians reported conducting over 10 attempts of futile resuscitation in the 3 years preceding the survey.^[5]

Examining the perspective of prehospital providers in the OHCA care is important since they represent the first medical contact with the victims. Studies in the West suggested that prehospital providers prefer withholding resuscitation in cases of futile situations, end-of-life situations, or in the presence of advance directives.^[6,7] Yet deciding to stop resuscitation is challenging to prehospital providers, as this may be beyond their scope of practice.^[8] Online medical control or having prehospital providers consult with an emergency physician for cases where they believe resuscitation to be futile can be helpful.^[9] The presence of resuscitation guidelines, especially in terms of criteria for withdrawal of cardiopulmonary resuscitation (CPR) is also helpful.^[6,8,10] Studies examining this topic are scarce in the Middle East. One study out of Turkey examined the perspective of prehospital providers regarding patients refusing treatment.^[11] In that study, participants expressed respecting patients' right to refuse treatment; however, in cases where the patient's medical condition was deemed critical or the patient was not mentally fit for decision-making, they stated that treatment decisions should be the prerogative of the physician.^[11] Resuscitation practices by prehospital providers are therefore influenced by the health-care system and its resources and by the availability of resuscitation guidelines. Most of the research was conducted in developed countries where EMS systems are more organized and guidelines for resuscitation practices exist. Empirical evidence on current field resuscitation practices is missing in Lebanon. This study examines the perspective of prehospital providers on resuscitation practices to inform and shape policy development related to resuscitation of OHCA victims in Lebanon.

METHODS

Sample and procedure

This study used a descriptive survey design. The target population included volunteers of one of the main EMS agencies in Lebanon with over 46 emergency centers and 1500 active volunteers. The survey targeted a convenient sample of 300 volunteers.

Following approval from the Institutional Review Board of the American University of Beirut and of the EMS agency administration, potential participants were recruited from 10 centers distributed all over the country, with a balanced representation of urban and rural areas (6 urban and 4 rural). After meeting with the directors of the centers and informing them about the study, 30 surveys were sent in envelopes along with a cover letter to each center, totaling 300 surveys. The cover letter explained the purpose, procedure, benefits and harms associated with participation, and the voluntary nature of

participation. Participants were instructed to return completed questionnaires to a sealed box placed in each center within 2 weeks. Questionnaires were collected after 2 weeks. A total of 258 completed surveys were returned, with a response rate of 86%.

Research instrument

The self-administered questionnaire was developed for this study based on the literature and considering the context of EMS in Lebanon. Demographic questions addressed age, gender, years of experience in emergency services, service region (urban or rural), and type of service (administrative, field). Additional survey items included nine multiple choice questions about withholding and withdrawing resuscitation in the prehospital setting, problems, and challenges that prehospital volunteers face in their practice, their estimation of survival rates of OHCA victims, and recommendations related to improvement and to a national policy on resuscitation. The survey items were evaluated by two emergency physicians and one advanced trauma certified nurse instructor for validity. A number of items of the questionnaire were used in a previous study of emergency physicians in Lebanon.^[5] The questionnaire was developed in English then translated to Arabic by the primary investigator. The Arabic version was back translated to English by a nurse who is not familiar with the study; both the original and back translated versions were equivalent. The questionnaire was administered in English to two centers and in Arabic to eight centers.

Sample characteristics and questionnaire items were described using frequencies and percent. Chi-squared test was used to compare gender, participants from urban and rural areas, and participant groups based on years of experience on their attitudes and practices related to CPR. For the bivariate analyses, the number of years of experience variable was dichotomized in 2 categories (up to 5 years of experience and >5 years).

RESULTS

A total of 300 questionnaires were distributed, and 258 were returned completed (86% response rate). Most participants (62.4%) were between the ages of 18 and 25, 63.9% were men and 73.8% had up to 5 years of experience. The majority of participants (70.2%) were from urban areas, and 94.1% were field volunteers [Table 1]. It is worth mentioning that the participants were from an organization that provides standardized training to its volunteers that follows that of the International Red cross and get certified accordingly.

Regarding resuscitation experiences [Table 2], 38.3% reported witnessing >10 OHCA's per year, 27.7% witnessed 6–10 per year and 34% witnessed 5 or less per year. When asked about the proportion of ROSC among the witnessed arrests, most (72.5%) reported witnessing ROSC in <6% of arrests. Over half of participants (52.9%) stated that they believed in attempting resuscitation in futile situations (defined as situations where resuscitation will not affect

Table 1: Sample characteristics (n=258)

Variables	Count (%)
Age (years)	
18-25	161 (62.4)
26-30	63 (24.4)
31-40	29 (11.2)
>40	5 (1.9)
Gender	
Male	161 (63.9)
Years of experience	
<1	38 (14.8)
1-2	67 (26.2)
3-5	84 (32.8)
>5	67 (26.2)
Area of service	
Urban	179 (70.2)
Rural	76 (29.8)
Kind of service	
Administrative	13 (5.9)
Field	206 (94.1)

Table 2: Resuscitation experiences and perceptions (n=258)

Variables	Count (%)
Number of cardiac arrests encountered per year (arrests)	
0-5	87 (34.0)
6-10	71 (27.7)
>10	98 (38.3)
Percent of ROSC in cardiac arrest victims that are witnessed (%)	
0-5	187 (72.5)
6-10	57 (22.1)
>10	14 (5.4)
I think that resuscitation should be initiated in futile situations	136 (52.9)
I am faced with cases where I believe that the patient should not be resuscitated	235 (91.1)
Situations where futile resuscitation was practiced*	
Decapitation	192 (74.4)
Rigor mortis	186 (72.1)
Obvious death (cold cyanotic body)	161 (62.4)
Unsurvivable injuries	88 (34.1)
Other	36 (14.0)

*The percentages add up to >100% since participants were instructed to choose all what applies. ROSC: Return of spontaneous circulation

survival). However, the majority (91.1%) reported that they had resuscitated patients whom they believed should not have been resuscitated. The participants' perception of what counts as futile cases for resuscitation were most frequently decapitation (74.4%), rigor mortis (72.1%), obvious death (cold cyanotic body) in 62%, and unsurvivable injuries (34.1%).

Table 3 shows the results of the attitudes and beliefs regarding resuscitation. When asked about when they think resuscitation should be stopped, 143 (55.4%) chose prolonged

resuscitation (>30 min), 88 (34.1%) when the patient's preferences are known ahead of time, 71 (27.5%) chose advanced terminal illness, and 23 (8.9%) chose old age.

Reported challenges facing prehospital providers in field resuscitation were most frequently the witnesses' reactions (70.1%), followed by lack of national policy (11.6%), availability of defibrillators (8.9%), and training (8.1%). As for the problems that influence resuscitation success, participants cited delays of bystanders and family members in contacting EMS (84.4%), traffic delays (72.1%), delays in initiating resuscitation (30%), and lack of defibrillators in ambulances (20%). Eight participants chose other problems that were not specified [Table 3].

When asked for suggestions to improve the outcomes of OHCA resuscitation, 204 (79.1%) recommended training lay persons in CPR, 176 (68.2%) training prehospital providers in advanced airway management, 155 (60.1%) in intravenous (IV) insertion skills training, 154 (59.7%) making prehospital medications available in ambulances, 134 (52%) adjusting traffic laws, and 68 (26.3%) equipping ambulances with defibrillators. Finally, the participants suggested that a national policy on resuscitation should address the duty of lay persons in CPR (73.2%), legal aspects of CPR (41.5%), criteria for withholding (40.3%), and for withdrawing CPR (39.5%). Participants also suggested items related to increasing scope of practice such as performing endotracheal intubation, inserting IVs and administering emergency drugs.

Comparison by gender, years of experience and area of service

Table 4 shows the significant differences by gender in experiences and attitudes related to resuscitation. Prehospital male providers reported witnessing significantly more cardiac arrests than female providers (44.7% vs. 27.5% witnessed >10 OHCA's per year) and more frequent ROSC (7.5% vs. 1.1% witnessed ROSC in >10% of OHCA's). Male providers were also significantly more likely to report believing that resuscitation ought to be terminated in case of advanced directives than female providers (42.8% vs. 25.3%).

Table 5 shows the significant associations between years of experience and the variables under study. Participants with >5 years of experience reported witnessing >10 arrests per year significantly more frequently than those with 5 years or less; they were also less likely to report lack of defibrillators as a challenge in practice than their less experienced colleagues.

Table 6 shows the significant differences in attitudes and reported problems by area of service. Participants in urban areas were significantly more likely to report delays due to traffic (78.1% vs. 59.2%) and delays in defibrillation (23.6% vs. 11.8%) as problems in their daily practice compared to those in rural areas. On the other hand, those in rural areas were significantly more likely to report believing in withdrawing resuscitation in old age (17.6% vs. 6.1%)

Table 3: Attitudes and beliefs regarding resuscitation (n=258)

Variables	Count (%)*
Situations in which I think resuscitation must be stopped	
Prolonged resuscitation (>30 min)	143 (55.4)
Advanced directives (patient's wish known ahead of time)	88 (34.1)
Advanced terminal illness (e.g., cancer with <6 months expected survival)	71 (27.5)
Old age	23 (8.9)
Challenges faced in resuscitation practice	
Reactions of witnesses of arrest	181 (70.1)
Lack of national resuscitation policy	30 (11.6)
Availability of defibrillators	23 (8.9)
Resources or equipment (e.g., oxygen)	21 (8.1)
Training	20 (7.7)
Problems that influence resuscitation success	
People delaying calling an ambulance	218 (84.4)
Traffic related delays in reaching the victim	186 (72.1)
Delay in initiating resuscitation	77 (30.0)
Delay in providing defibrillation	51 (20.0)
Other	8 (3.1)
Suggestions to improve prehospital care for OHCA victims	
Training citizens in resuscitation	204 (79.1)
Training emergency technicians in advanced airway management	176 (68.2)
Training emergency medical technicians with IV skills	155 (60.1)
Making prehospital medications available	154 (59.7)
Adjusting traffic laws	134 (52.0)
Providing ambulances with defibrillators	68 (26.3)
Other	4 (1.5)
Aspects that a national policy on resuscitation of OHCA victims must address	
Duty of lay persons in resuscitation	189 (73.2)
Liability/legal aspects	107 (41.5)
Criteria for withholding CPR in the field	104 (40.3)
Criteria for withdrawing CPR in the field	102 (39.5)
Other	6 (2.3)

*Some percentages add to >100 because many participants chose more than one option. OHCA: Out-of-hospital cardiac arrest, CPR: Cardiopulmonary resuscitation, IV: Intravenous

and in cases of terminal illness with short life expectancy (51.4% vs. 31.5%) compared to those working in urban areas.

DISCUSSION

To the best of our knowledge, this is the first study that explores the attitudes and practices related to the resuscitation of OHCA victims among prehospital providers in Lebanon, a country that lacks an organized national emergency care system. The sample was relatively young, with most participants reporting <5 years of experience, but participants were mostly involved in fieldwork (94.1%), which might offer reasonable insight to the actual practice in the field. The low ROSC rate reported in this study is in line with the low survival rate of OHCA victims reported in Lebanon.^[1]

Although 91.1% of participants identified criteria for situations in which they performed resuscitation that they believed to be futile, still 52.9% stated that they would initiate resuscitation on patients in futile situations. This finding may be explained by policies and procedures of EMS agencies in Lebanon where volunteers are instructed to initiate resuscitation and to continue during transport regardless of the etiology of the arrest with decapitation being the only exception for not initiating resuscitation. Another interpretation could be the participants' lack of confidence in their ability to ascertain the futility of resuscitation, as this is beyond their scope of practice.^[8] It is worth noting that EMS volunteers in Lebanon get their training regardless of how far they reached in school and are not required to have any background in health education. The EMS agency that participated in this survey has its own internal protocols with practice at the emergency medical technician-basic level and that are strictly followed. Participants' responses regarding futile cases (decapitation, rigor mortis and obvious signs of death) might reflect common knowledge rather than protocol definitions.

The participants listed several reasons for considering stopping resuscitation such as when it is not likely to be useful to the patient's outcome, prolonged duration of resuscitation when the patient or the legal guardians' preference is against it and in case of advanced terminal illness. Other investigators^[6,7] have highlighted advanced directives as a key factor in resuscitation decisions. In Lebanon, advanced directives are not commonly practiced, partly because they may be at odds with religious beliefs, and partly since the Lebanese society is collectivist, with major life and death decisions made by the family rather than the individual. Anecdotal evidence in critical care settings in Lebanon provides many examples where a patient's preferences regarding resuscitation get overridden by his/her family members once he/she is unconscious.

Old age was reported as a situation where resuscitation must be stopped by only 8.9% of participants, whereas it was a significant predictor of termination of resuscitation in other studies.^[9] Old age does not seem to be a significant factor in deciding on termination of resuscitation in our setting. This is different from other studies which identified age as an important predictor of cessation of resuscitation of OHCA victims.^[9] In addition, since only the physician has the authority to declare death in Lebanon and compliance with the agency-specified scope of practice and their training, prehospital providers would continue resuscitation until they reach the ED. In Lebanon, in the absence of prehospital standards, communication between EMS agencies and hospitals is limited to informing EDs of arriving units in very few cases such as cardiac arrests. Similarly, the concept of online medical direction regarding physician advising providers about continuing resuscitation as recommended by some investigators^[8] is not routine practice for EMS agencies.

The most frequently cited challenges in prehospital practice were the presence and reaction of witnesses and lack of

Table 4: Experiences and attitudes related to resuscitation among men and women

Variable	Men (n=161), n (%)	Women (n=97), n (%)	χ^2	P
Witnessed OHCA's per year				
Up to 5	45 (28.3)	42 (46.2)	9.76	0.008
6-10	43 (27.0)	24 (26.4)		
>10	71 (44.7)	25 (27.5)		
Percent prehospital ROSC in OHCA's (%)				
0-5	108 (67.1)	75 (82.4)	8.55	0.012
6-10	41 (25.5)	15 (16.5)		
>10	12 (7.5)	1 (1.1)		
Believed that CPR must be terminated in case of advanced directives	65 (42.8)	21 (25.3)	7.06	0.008

Values are *n* and (%). OHCA's: Out-of-hospital cardiac arrests, ROSC: Return of spontaneous circulation, CPR: Cardiopulmonary resuscitation

Table 5: Significant experiences and perceptions by years of experience

Variable	Up to 5 years of experience (n=189), n (%)	>5 years of experience (n=67), n (%)	χ^2	P
Witnessed OHCA's per year				
Up to 5	73 (39.0)	14 (20.9)	8.52	0.014
6-10	51 (27.3)	19 (28.4)		
>10	63 (33.7)	34 (50.7)		
Lack of defibrillator is a challenge in practice	21 (11.9)	2 (3.2)	4.05	0.044

Values are *n* and (%). OHCA's: Out-of-hospital cardiac arrests

Table 6: Significant experiences and challenges by area of practice

Variable	Urban (n=179), n (%)	Rural (n=76), n (%)	χ^2	P
Traffic is a problem	139 (78.1)	45 (59.2)	9.51	0.002
Delay in defibrillation is a problem	42 (23.6)	9 (11.8)	4.59	0.032
CPR must be withdrawn/stopped in old age	10 (6.1)	13 (17.6)	7.78	0.005
CPR must be withdrawn/stopped in case of terminal illness	52 (31.5)	38 (51.4)	8.56	0.003

Values are *n* and (%). CPR: Cardiopulmonary resuscitation

national policy, similar to the findings of the survey of Lebanese emergency physicians.^[5] One challenge that was possibly under-reported (8.1%) was the lack of availability of defibrillators; this could be attributed to the recent introduction of defibrillators in ambulances, especially in urban areas where the majority of the sample came from. For participants from rural areas, the absence of defibrillators was not reported as a problem, probably due to their lack of awareness about the importance of early defibrillation in resuscitation in the absence of national training guidelines or prehospital curriculum. This requires further study since in 2015 all ambulances owned by the surveyed agency were equipped with automated external defibrillators. The problems that participants reported to influence resuscitation success included delays in contacting EMS and subsequent initiation of CPR, in addition to traffic-related delays, mainly due to the absence of traffic laws assigning priority lanes for ambulances. This is in line with studies of cardiac patients in Lebanon that found that people often prefer driving to the hospital rather than waiting for an ambulance to come.^[12,13]

Reported suggestions for improving resuscitation practices included training laypersons in CPR, training prehospital

providers in advanced airway management and IV therapy, and provision of medications in ambulances. These findings may be unique to Lebanon where regulations do not allow prehospital providers to practice these skills (limited and undefined scope of practice). This in addition to traffic-related delays can have very negative consequences for the patients' outcomes. In fact, 26.3% of participants suggested adjusting traffic laws to facilitate the timely arrival of the ambulance to the destination. Community involvement regarding training the public was the most frequent suggestion and is essential to improve patients' outcomes. Training lay persons in resuscitation can result in increased bystander CPR rates and can affect the overall survival rate by decreasing the time to initial resuscitation. This recommendation echoes the one made by Lebanese emergency physicians,^[5] as do the recommendations on what a national resuscitation policy ought to include.

Male providers reported more experience with cardiac arrests than female providers and more frequent ROSC in the cases they saw. Anecdotal evidence suggests that when the dispatcher is called at the headquarters, he/she is more likely to send out a male volunteer when the case is an arrest, whereas female providers may be sent to less severe cases. If this is true, then

it may put female prehospital providers at a disadvantage regarding acquiring experience in OHCA. Studying this observation and better understanding it and its impact on outcomes may be warranted. The less experienced participants were more likely to report lack of defibrillator as a challenge than the more experienced ones, probably due to the recent increased awareness of the importance of defibrillators in the health media in Lebanon.

Participants from urban areas were more likely to report delays in traffic as expected, considering the traffic jams in cities. They also reported more delays in defibrillation than those from rural areas, which may reflect higher expectations regarding care provided and of availability of defibrillators in urban ambulances. On the other hand, rural participants were more likely to report thinking that resuscitation ought to be stopped in cases of old or terminally ill arrest victims, which may reflect a more fatalistic view of the inhabitants of the Lebanese villages. However, there is no evidence to show that Lebanese individuals residing in urban areas have a different view about the end of life care compared to rural. Socioeconomic status or level of education might have also contributed to differences in responses between rural and urban providers.

This study has some limitations. The sample included prehospital providers of only one agency in Lebanon, and thus may not be representative of all prehospital providers in Lebanon. The surveyed agency is, however, the main agency in Lebanon and is unique in providing its providers with structured training and internal credentialing that follows the International Red Cross standards. Its providers compared to other volunteers might be better equipped to voice their opinion of resuscitation practices since other agencies provide minimal prehospital care in the field.^[13] Moreover, urban responders were overrepresented, which may have affected the results. Another limitation has to do with the use of self-report and its attendant bias of social desirability. For instance, although only 8.9% reported the availability of defibrillators as a challenge, 26.3% recommended that this equipment must be provided in all ambulances. This discrepancy may be explained by the different mindset when answering the first question that addresses the participant's personal experience with resuscitation, and the second one that asks for a general recommendation. Given the low OHCA survival rate in Lebanon, the recommendations offered by the participants seem to be valid; even if only as few ambulances are not provided with defibrillators the issue needs to be attended to by policy makers and the Ministry of Public Health in order to improve the quality of prehospital emergency care and OHCA survival rates.

This study, however, explores the perspective of prehospital providers on resuscitation practices in a setting with underdeveloped EMS system that lacks national standards for prehospital care. The findings of this study should be explored in other similar developing settings and can help guide system and policy development to improve resuscitation practices.

CONCLUSION

Prehospital providers in Lebanon face several challenges in their resuscitation practices. Developing training programs and advancing the scope of practice of prehospital providers, as well as training lay-persons are needed to help improve the outcomes of OHCA victims in Lebanon. Creating a well-designed national EMS curriculum that covers resuscitation training and establishing guidelines for withholding resuscitation are important. Environment restructuring regarding traffic regulations are also needed. Finally, a policy that clearly defines and enhances accountability of all individuals and organizations involved in resuscitation (municipalities, prehospital providers, training organizations, and possibly, most importantly the layperson) is urgently needed.

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Conflicts of interest

There are no conflicts of interest.

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