Assessment of cardiopulmonary resuscitation practices in emergency departments for out-of-hospital cardiac arrest victims in Lebanon

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ABSTRACT

Background: The survival rate of out-of-hospital cardiac arrest (OHCA) victims in Lebanon is low. A national policy on resuscitation practice is lacking. This survey explored the practices of emergency physicians related to the resuscitation of OHCA victims in Lebanon. Methods: A sample of 705 physicians working in emergency departments (EDs) was recruited and surveyed using the LimeSurvey software (Carsten Schmitz, Germany). Seventy-five participants responded, yielding 10.64% response rate. Results: The most important factors in the participants’ decision to initiate or continue resuscitation were presence of pulse on arrival (93.2%), underlying cardiac rhythm (93.1%), the physician’s ethical duty to resuscitate (93.2%), transport time to the ED (89%), and down time (84.9%). The participants were optimistic regarding the survival of OHCA victims (58.1% reporting > 10% survival) and reported frequent resuscitation attempts in medically futile situations. The most frequently reported challenges during resuscitation decisions were related to pressure or presence of victim’s family (38.8%) and lack of policy (30%). Conclusion: In our setting, physicians often rely on well-established criteria for initiating/continuing resuscitation; however, their decisions are also influenced by cultural factors such as victim’s family wishes. The findings support the need for a national policy on resuscitation of OHCA victims.

Key Words: Emergency department, Lebanon, out-of-hospital cardiac arrest, practices, resuscitation

INTRODUCTION

Management of out-of-hospital cardiac arrests (OHCAs) remains a challenge in many countries, as many factors that relate to the victim, circumstances surrounding the arrest, the treating prehospital agency or emergency department (ED), and the overall system of care in the country influence the success of resuscitation of OHCA victims. Reported overall OHCA survival rates vary globally from 0% to 30.5%, including a 15% rate in the US for overall survival and with Utstein survival rates reaching as high as 50.7%. This variation in rates is due to the different definitions of OHCA (Utstein vs. other definitions), variation in emergency services, presenting rhythm, and presence of comorbidities (obstructive pulmonary disease, etc.). Early bystander cardiopulmonary resuscitation (CPR) and early defibrillation are also important factors in improving patient outcomes. The survival rate to hospital discharge was as high as 56% with rapid defibrillation by nonmedical personnel in a study examining OHCA in casinos. In Lebanon, a major tertiary referral center reported a survival rate to hospital discharge of...
4.5% for OHCA victims. Several challenges were reported to be contributing to this low-survival rate including lack of standardized training of prehospital providers, delay in emergency medical services (EMS) response, delay in defibrillation, absence of public access defibrillation, low bystander CPR rates, and delay in reaching hospital.

The American Heart Association (AHA) has guidelines for initiating and terminating adult basic life support (BLS) on OHCA victims. These guidelines are based on EMS and ethical principles that fit the Western context and may not apply to the health care system, legal, religious, and cultural contexts in Lebanon. Lebanon has a diverse population characterized by 17 religious sects that can be grouped under Muslim (59%) and Christian (39%) religions. Healthcare providers take into consideration the different cultural and religious beliefs of patients while providing care, especially in the end of life situations. Another vital factor is the involvement of the family members while communicating about end-of-life health care concerns. Moreover, interviews with key religious leaders in the country showed that in both Islam and Christianity death is determined by God. Although there have been some changes in the Lebanese law related to the health care system, such as the law established in 2004 related to patient’s rights and consent, there remains a need to develop health policies and increase public awareness regarding end-of-life issues. To date, there is no policy that governs resuscitation of OHCA victims in Lebanon. The first step in developing guidelines tailored to the Lebanese context is to understand current CPR practices.

A number of investigations had addressed CPR practices by emergency physicians. Initiating and concluding resuscitation attempts were practiced according to ethical and cultural norms, as well as the victim's medical condition. Factors most commonly cited for withholding or withdrawing CPR were: prolonged asystole, time from collapse to BLS, underlying disease, ongoing treatment status or the medical condition that caused the arrest and presence of advance directives. Less commonly reported factors were the wishes of the family and the victim's age. Moreover, the performance of CPR despite judgment of medical futility was reported, with fear of litigation being cited as an important consideration in the US. In Europe, investigators reported victim's age, previous health status, and the context of the arrest, including on-site CPR and initial cardiac rhythm as influential in resuscitation decisions. In the Middle Eastern countries, ethicality of withholding and withdrawing life-sustaining treatment is different from Western countries. Yazigi et al. reported that Lebanese physicians were hesitant to withdraw life-supporting therapy such as intubation and mechanical ventilation, which was practiced in 7% of patients, whereas withholding therapy was reported in 38% of patients in a major tertiary care facility in Beirut. Thus, most investigators emphasized the importance of policy in guiding resuscitation practices. In the absence of a national policy or a national resuscitation council in Lebanon, this study examines the current practices of ED physicians when dealing with resuscitation of OHCA victims.

METHODS

Sample

The target population included physicians who work in EDs in Lebanon. There is no national categorization of hospitals by their emergency services; however, there are 174 hospitals that provide emergency care to OHCA victims. Volunteer EMS providers belonging to two main EMS agencies (Lebanese Red Cross and Civil Defense) provide prehospital care in Lebanon. National curriculum and standards for provider certification and training for EMS providers are lacking. Community or school programs for CPR and BLS are rare and rely on initiatives from the EMS agencies and few NGOs. In Lebanon, there are few physicians who are certified in emergency medicine. The Lebanese Society of Emergency Medicine, founded in 2004, has only 32 members, 16 of whom are board certified in emergency medicine, with only seven working full time in Lebanon. Each hospital therefore designates the physicians of various specialties to work in the ED. The Lebanese Society for Emergency Medicine has a mailing list of 705 healthcare providers, including physicians, emergency medical technicians, and nurses who work in EDs of hospitals all over Lebanon that is used to communicate issues related to emergency medicine. The sample for this survey included the 705 contacts that were recruited electronically. Considering the expected low-response rate with online surveys, we recruited all the members on the E-mail list. Since the list was anonymous as to the exact position of the members, we stated in the consent form that this survey addresses physicians who work in EDs. The Institutional Review Board (IRB) of the University deemed this survey exempt from review.

Instrument

The questionnaire was adapted from the literature with few questions added for their relevance to the context in Lebanon. The items addressed the presence of an institutional policy about CPR, the rates of OHCA victims’ survival, and declared dead on arrival. Factors that may influence the ED physician’s decision to attempt or continue CPR were asked next; these items are rated on a four-point scale (1 = not important to 4 = very important). Attempting resuscitation despite judging the case a medical futility, the criteria used for the termination of resuscitation and the difficulties encountered in making resuscitation decisions were also queried. Participants were also asked what elements a national policy about CPR must include and their recommendations to improve the outcomes of OHCA resuscitation. The last section included demographic questions about gender, age, place of practice, type of hospital, and the estimated total number of ED visits at the place of work. The questionnaire was translated into Arabic and back translated to English; both the original and back-translated English versions demonstrated semantic equivalence.
Procedure
The questionnaire was pilot tested with five physicians in resuscitation medicine for relevance, clarity of items, and ease of administration; no modifications were needed. After securing approval of the IRB and the owner of the electronic list, the survey was administered using the Limesurvey software, which is among the safest for ensuring anonymity of participants. The E-mails were sent with the consent form as the first page, explaining the purpose and procedure of the study, and providing assurance of confidentiality and anonymity. Reminder E-mails were sent at one and two weeks after the initial mailing. A total of 75 completed questionnaires were returned out of the 705, with a response rate of 10.64%.

Statistical analyses
Descriptive statistics (frequencies and percentages for categorical variables and means and standard deviations for continuous variables) were used to describe the sample and summarize the results. Bivariate analyses were used to examine practices by age, gender, years of experience in emergency medicine, and estimated patient volume, using ANOVA, Student’s t-test, and Fisher exact test.

RESULTS

Sample characteristics
The sample included 75 participants working in EDs across Lebanon. The demographic questions were put at the end of the survey and up to 16 participants did not answer them [Table 1]. The majority of the responders were male (79.66%) with a mean age of 46.95 (SD 10.37) years, range 32–75 years.

Over one-third of the sample have 16–20 years (35.19%) or 6–10 years (33.33%) of work experience, 18.81% worked 11–15 years, 7.41% over 20 years, and the rest <6 years in ED. Regarding medical specialty, 40% were specialized in Emergency medicine/Trauma, and the rest of the participants were from other specialties such as family medicine, critical care, and internal medicine.

Over half of the participants (54.35%) reported practicing in Beirut, 15.22% in Mount Lebanon, 13.04% in Bekaa, 10.87% in the South and Nabatieh, and 6.52% in the North. A total of 48.53% of participants reported practicing in teaching hospitals, 30.88% in private hospitals and 20.59% in public hospitals. Around 40% believed that they have more than 40,000 emergency visits per year at their workplace, 34.55% estimated to have 10,000–40,000 emergency visits per year, and the remaining 25.45% had an estimate of <40,000 emergency visits per year. Table 1 shows the sample characteristics.

Factors that influence the decision to start or continue cardiopulmonary resuscitation
As shown in Table 2, 14 of the 18 factors that could influence the decision to initiate or continue CPR were considered quite important and very important by at least 60% of the sample. These include the presence of a pulse on arrival to ED (93.2%), the ethical duty of physicians to resuscitate (93.2%), the initial cardiac rhythm in ED (93.1%), transport time to ED (89%), downtime from arrest till resuscitation (84.9%), the condition that caused the arrest (81.1%), resuscitation by bystander before arrival to ED (80.5%), resuscitation by prehospital provider (78.3%), patient’s right to be given the chance of survival (77.4%), delivery of shock before ED (73.2%), age of the victim (71.6%), personal experiences from previous cases (71.6%), presence of a witness (66.2%), and transport by ambulance (60.3%). Around 20% of the sample rated presence or wishes of family members, and the presence of advance directives not important.

In addition, the participants listed other factors they considered in making decisions about resuscitation, which they rated as quite important or very important, with each factor stated by only one participant: the availability of places in the ED, the climate, hypothermia, level of the person performing CPR, mental status of the patient, patient’s pupillary reaction, proper training of emergency medical technicians, presence or absence of trauma, the victim’s respiratory and airway status on transfer, intoxication, presence of sufficient staff in ED, and the medications taken before the arrest.

### Table 1: Study population characteristics (n=75)

| Variable | Frequency | Percentage* |
|----------|-----------|-------------|
| Gender (n=59) | | |
| Male | 47 | 79.7 |
| Female | 12 | 20.3 |
| Age (mean, SD) (n=58) | | |
| 11-15 | 46.95 | 10.4 |
| Years of practice in emergency department (n=54) (years) | | |
| <5 | 5 | 9.3 |
| 6-10 | 18 | 33.3 |
| 11-15 | 8 | 14.8 |
| 16-20 | 19 | 35.2 |
| >20 | 4 | 7.4 |
| Medical specialty (n=30) | | |
| Emergency medicine/trauma | 12 | 40.0 |
| Critical care | 3 | 10.0 |
| Internal medicine | 2 | 6.7 |
| Other (family medicine, general practitioner) | 13 | 43.3 |
| Muhafaza (n=46) | | |
| Beirut | 25 | 54.4 |
| Mount Lebanon | 6 | 13.0 |
| Bekaa | 4/5 | 8.7/2.2 |
| South Lebanon/Nabatieh | 3 | 6.5 |
| North Lebanon | 25 | 54.4 |
| Type of hospital of practice (n=68) | | |
| Teaching | 33 | 48.5 |
| Private | 21 | 30.9 |
| Public | 14 | 20.6 |
| Estimated emergency visits per year (n=55) (visits) | | |
| <10,000 | 14 | 25.5 |
| 10,000-40,000 | 29 | 54.6 |
| >40,000 | 22 | 40.0 |

*Valid percent is used accounting for missing data
Table 2: Importance of factors that influence the emergency physician’s decision to start/continue resuscitation (n=75)

| Factor | Not important | Somewhat important | Quite important | Very important |
|--------|---------------|-------------------|----------------|---------------|
| Presence of pulse on arrival | 3 (4.1) | 2 (2.7) | 10 (13.5) | 59 (79.7) |
| ED first cardiac rhythms (ventricular fibrillation or tachycardia) | 2 (2.7) | 3 (4.1) | 19 (26.0) | 49 (67.0) |
| My ethical duty as a physician to resuscitate | 1 (1.4) | 4 (5.4) | 28 (37.8) | 42 (55.4) |
| Transport time to ED | 2 (2.7) | 6 (8.2) | 20 (27.4) | 45 (61.6) |
| Down time | 2 (2.7) | 9 (12.3) | 15 (20.5) | 47 (64.4) |
| The condition that caused the arrest | 7 (9.5) | 7 (9.5) | 21 (28.4) | 39 (52.7) |
| Resuscitation by bystander prior to arrival to ED | 4 (5.6) | 10 (13.9) | 24 (33.3) | 34 (47.2) |
| Resuscitation by prehospital providers | 6 (8.1) | 10 (13.9) | 30 (40.5) | 28 (37.8) |
| Patient’s right to be given the chance to survive | 7 (9.9) | 9 (12.3) | 27 (36.5) | 38 (51.8) |
| Delivery of shock before arrival to ED | 6 (8.5) | 13 (18.3) | 23 (32.4) | 29 (40.8) |
| The victim’s age | 12 (16.9) | 10 (13.3) | 20 (27.0) | 33 (44.6) |
| Experience from previous cases | 7 (9.5) | 14 (18.9) | 27 (36.5) | 26 (35.2) |
| Whether or not the arrest was witnessed | 9 (12.2) | 16 (22.6) | 26 (35.2) | 23 (31.2) |
| Whether or not victim was transported by ambulance | 9 (12.2) | 20 (27.4) | 21 (28.4) | 23 (31.2) |
| The need to practice CPR | 25 (33.8) | 9 (12.2) | 11 (14.9) | 29 (39.2) |
| Presence of advance directive | 16 (21.6) | 15 (20.3) | 16 (21.6) | 27 (36.5) |
| Wishes of the victim’s family | 14 (18.9) | 22 (30.7) | 20 (27.0) | 18 (24.3) |
| Presence of family members | 15 (20.3) | 29 (39.2) | 19 (25.7) | 11 (14.9) |

The numbers are count (percentage). ED: emergency department; CPR: cardiopulmonary resuscitation.

Resuscitation practices

Half of the sample (50.70%) reported having an institutional policy, but 21.30% were not sure about the presence of a policy. Many participants (41.90%) estimated survival rate of OHCA victims until hospital admission at up to 10%, 36.50% reported 11–30% survival rates, 13.50% estimated 31–50% survival rates, and the rest over 50%. Moreover, half the sample (55.4%) reported that victims with cardiac arrests arrive dead to the ED only rarely or sometimes, with fewer (44.6%) reporting that victims arrive dead often or very often.

Over two-thirds (62.9%) reported having attempted resuscitation in futile situations in the past 3 years up to ten times. The most common reasons (35.56%) of such attempts were patients/family-related reasons, followed by improving the patient’s chance of survival (22.22%) then fear of legal implications (17.78%). Other factors reported by 20% of the sample included the lack of policy on resuscitation, the duty of ED residents to resuscitate all victims, and the need for training interns. For terminating resuscitation, most (48.89%) of the participants believed that the opinion of the medical team is mostly valued, 15.56% considered the opinion of the patient’s family or the patient’s preferences, 13.33% followed the patient’s legal guardian, and 6.67% considered all of the above important while making such a decision.

The most frequent reported criterion for termination of resuscitation (40%) was having attempted CPR for long duration with no response, followed by signs of irreversible death (33.33%), then asystole or pulseless electric activity (20%), following the patients’ preferences when known (17.78%) and the rest considered all these factors. Finally, the difficulties in making decisions about resuscitation-related mostly to the lack of policy (30%), pressure from or presence of family members (25% and 13.79%, respectively), with 27.78% listing other factors such as lack of information about the cases and the Lebanese law about next of kin [Table 3].

Recommendations for policy and practice

Finally, the following recommendations were made by the participants when planning a national policy for resuscitation as listed in Table 4. Around 30.2% stated the need to have specific criteria for withholding CPR, 28.3% reported the importance of adding criteria for terminating CPR, 15.1% required to have clear guidelines for liability, 15.1% addressed the duty of lay people in resuscitation, and the remaining 11.3% specified other aspects. Moreover, suggestions were made regarding improving current resuscitation practices for OHCA victims. Approximately 26.6% recommended having automated external devices (AEDs) in public places, 25.3% stated providing community training programs in CPR, 21.5% stressed on improving prehospital emergency care management, 20.3% added organizing awareness campaigns for recognition, and management of cardiac arrest. The remaining 6.3% proposed improving the transport time of victims to the ED, clear communication between the EMS agencies and the ED physicians during transfer, promotion of research, and obligatory BLS training sessions to get a driving license.

Bivariate analyses

There were no gender differences in the responses to any of the survey questions. Older participants accorded more importance to the ethical duty of physicians to do resuscitation ($r = 0.27$, $P = 0.038$) than younger ones. The years of experience were significantly associated with the importance of resuscitation by prehospital providers ($F = 3.36$, $P = 0.011$), presence of advance directives ($F = 3.72$, $P = 0.006$), and the physician’s ethical duty to resuscitate ($F = 3.82$, $P = 0.005$). Those with less experience considered prehospital CPR more important but
advance directives less important than those with more years of experience.

Physicians who saw more patient volumes (estimated more ED visits in their work setting) accorded more importance to the victim’s age ($F = 7.03$, $P = 0.002$) and underlying disease that caused the arrest ($F = 6.78$, $P = 0.002$) in making decisions about starting or continuing resuscitation, but less importance to the need to practice CPR ($F = 6.78$, $P = 0.002$) compared to those who saw fewer patients in their EDs.

### DISCUSSION

Our study is the first to assess resuscitation practices among practicing ED physicians in Lebanon for victims of OHCA. Important factors affecting the decision to initiate or stop resuscitation in the ED were elicited. In a setting where prehospital emergency services transport all the cardiac arrests to the ED, physicians often have to decide on the management approach when receiving such patients.

The main factors considered important for initiation or continuation of resuscitation in the ED in descending frequencies included presence of pulse on arrival (or prehospital return of spontaneous circulation), presence of shockable rhythm on arrival to ED, and downtime (collapse to ED arrival). Witnessed arrest was less important as a factor in our study. A recent study by Goto et al.[20] developed a rule for termination of resuscitation in the ED for patients with OHCA using three elements: no prehospital return of spontaneous circulation, unshockable initial rhythm, and unwitnessed by bystanders. The rule predicted well the 1-month death in a validated group with a specificity of 0.903 (95% confidence interval [CI], 0.894–0.911), a positive predictive value of 0.993 (95% CI, 0.992–0.993), and area under the ROC of 0.874 (95% CI, 0.872–0.876).[20] Similarly, in countries with more developed EMS systems, cardiac arrests are often worked on the scene, and only survivors are transported. Validated rules such as the one proposed by Morrison et al.[20] lists the following criteria for prehospital termination of resuscitation: “no return of spontaneous circulation (ROSC) before transport, no shock delivered, no bystander CPR and the arrest was not witnessed by bystanders or EMS.”[20] The fact that delivery of shock before ED arrival and bystander CPR were considered less important in this study reflects the lack of community training in CPR, the rare prehospital AED usage, and the limited EMS resources in Lebanon. It was interesting to note that wishes of the family/patient were rated least important in deciding to start or continue CPR; this may be explained by the ethical duty expressed by the respondent that compel them to resuscitate no matter what, in addition, to the fact that advance directives in Lebanon are not a common practice. This is also reflected in the low priority accorded to the opinion of the family when deciding to terminate resuscitation in futile situations.

Initiating resuscitation on even medically futile cases was reported with substantial frequency. A variety of reasons were elicited. Family presence was the most cited reason for performing CPR on a futile case while this was not as important when considering initiation or stopping resuscitation in general. The reasons behind the lack of transparency about the patient prognosis during

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**Table 3: Resuscitation practices (n=75)**

| Variable | Frequency | Percentage* |
|----------|-----------|-------------|
| Is there an institutional policy about resuscitation? (n=75) | | |
| Yes | 38 | 50.7 |
| No | 21 | 28.0 |
| Not sure | 16 | 21.3 |
| Estimated survival rate of out-of-hospital cardiac arrest victims till hospital admission (n=74) (%) | | |
| Up to 10 | 31 | 41.9 |
| 11-30 | 27 | 36.5 |
| >30 | 16 | 21.6 |
| Frequency of cardiac arrest victims who are dead on arrival to the emergency department (n=74) | | |
| Rarely | 12 | 16.2 |
| Sometimes | 29 | 39.2 |
| Often | 26 | 35.1 |
| Very often | 7 | 9.5 |
| Frequency of attempting resuscitation in situations of perceived futility in the past 3 years (n=62) (times) | | |
| 1-5 | 23 | 37.1 |
| 6-10 | 16 | 25.8 |
| >10 | 17 | 27.4 |
| Never | 6 | 9.9 |
| Reason for attempting futile resuscitation (n=45) | | |
| Patient/family related reasons | 16 | 35.6 |
| To improve patient’s chance of survival | 10 | 22.2 |
| Fear of legal implications | 8 | 17.8 |
| Fear of being criticized | 2 | 4.4 |
| Other (ED resident must resuscitate all victims; no policy; interns who need training; to have a clear conscience) | 9 | 20.0 |
| Person whose opinion to terminate resuscitation in futile situations is mostly honored (n=45) | | |
| Medical team | 22 | 48.9 |
| Patient’s family | 7 | 15.6 |
| Patient’s preference if known | 7 | 15.6 |
| Patient’s legal guardian (advance directives) | 6 | 13.3 |
| Other (all of the above) | 3 | 6.7 |
| Criteria used to terminate resuscitation (n=54) | | |
| Long resuscitation with no response | 18 | 40.0 |
| Signs of irreversible death | 15 | 33.3 |
| Patient preferences if known | 8 | 17.8 |
| Asystole | 6 | 13.3 |
| Pulseless electric activity | 3 | 6.7 |
| Other (all of the above, preexisting condition, reversible vs. nonreversible causes) | 4 | 8.9 |
| Difficulties faced in making resuscitation decisions (n=36) | | |
| Lack of standard policies about resuscitation | 12 | 30.0 |
| Pressure from family members | 9 | 25.0 |
| Presence of family members | 5 | 13.8 |
| Other (all of the above; lack of information about the case; Lebanese law on next of kin) | 10 | 27.8 |

*Valid percent used accounting for missing data. ED: Emergency department.
physicians in our setting were familiar with important factors affecting OHCA survival and value a comprehensive approach to addressing this problem in a setting where important predictors of good outcomes in OHCA victims are missing. A previous study described system related limitations affecting survival in OHCA victims in Lebanon: these included low bystander CPR rates, delays in EMS response, in prehospital CPR, and in defibrillation, in addition to other EMS-related factors such as difficult access to EMS and absence of prearrival phone instructions to initiate CPR.

**Limitations**
The study is limited by the small sample size and low-response rate, thus limiting the representativeness of the sample. With the E-mail list anonymous, we could not ascertain that all respondents were physicians; however, the consent form specified that only physicians were targeted, and only physicians should respond. The survey questions were not mandatory, and some participants elected not to answer demographic questions. Self-selection bias is another limitation that is common to online survey type studies since some individuals are more likely to respond than others to this type of survey.

**CONCLUSION**
The findings of the study reflect the lack of policy even at the level of health care institutions to guide resuscitation of out of hospital arrest victims. Resuscitation decisions are mostly made by physicians and based on recognized established criteria, but dealing with the family’s wishes in initiating or terminating resuscitation efforts remains a challenge. Research is needed on the public’s attitudes related to resuscitation to inform the development of a national policy.

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**Conflicts of interest**
There are no conflicts of interest.

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