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Abstract

Background: Globally, do-not-resuscitate orders have been used for many years. Due to the lack of a do-not-resuscitate policy, full resuscitative measures including cardiopulmonary resuscitation (CPR) are applied for all patients admitted to our institution regardless of prognosis.

Aims: To observe the outcomes of very old patients who underwent CPR, including mortality rate and length of stay. This will allow discussion of the need to implement a do-not-resuscitate policy in Bahrain, and its associated challenges.

Methods: This was a retrospective observational study conducted in a 1200-bed tertiary hospital in Bahrain. We included patients aged ≥ 80 years admitted under general medicine who underwent CPR between January and July 2018. Medical records were reviewed for patients' characteristics and outcomes.

Results: Ninety patients were included in the study with an average age of 87.91 (6.27) years. The inhospital mortality rate was 96.67%, and 57.78% of patients died immediately after the first CPR attempt and 38.89% died during subsequent attempts. The survival rate at 1-year follow-up was only 1.11%.

Conclusion: Survival of very old patients after cardiopulmonary arrest is low, and survival at discharge is even lower. The increase in the very old population will lead to a higher demand for critical care resources given the absence of a do-not-resuscitate policy. Our results demonstrate that implementing such a policy at our institution is crucial to reduce the number of futile CPR attempts, minimizing patients' suffering, and optimizing resource allocation.

Keywords: cardiopulmonary resuscitation, critical care, do not resuscitate, geriatric medicine, inpatient mortality

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Introduction

The World's population is ageing; most notably due to longer life expectancy accompanied by decreased fertility rates (1). According to Bahrain's national census, people aged ≥ 60 years comprised 3.5% of the population in 2010, whereas it is predicted to increase to 24.9% in 2050 (2). This demographic change will have an impact on resource allocation in the health sector due to an eventual increase in demand on intensive healthcare services. Current estimations indicate that two thirds of all bed-days in intensive care units (ICUs) in the developed world have been allocated to patients aged ≥ 65 years (3). It has been widely accepted in many countries to withhold medical therapy at the end of life based on medical grounds (4–6). On the contrary, it is common practice in our institution to provide full investigative and therapeutic measures to all cases including those deemed futile. This includes cardiopulmonary resuscitation (CPR), intravenous antibiotics, and mechanical ventilation.

Due to the lack of a policy, do-not-resuscitate (DNR) orders are not currently implemented in our institution. Multiple factors oppose the application of such a policy, including local culture and religion. As a result, patients undergo the maximum therapy regardless of prognosis. Wedaei et al. surveyed local physicians about withdrawing mechanical ventilation in cases of brain death and all agreed that such decisions need to be collectively owned by healthcare professionals, patients, families, religious advisors, and society (7).

In this study, we investigated the outcomes of very old patients (≥ 80 years) who were admitted and underwent inhospital CPR at our institute. We also discuss the need to produce and apply a local DNR policy in Bahrain, alongside its framework and expected challenges.

Methods

Study design, population and sample

This retrospective study was carried out in a 1200-bed tertiary hospital in Bahrain. All patients admitted under general medicine at our institution between January and July 2018 were assessed for eligibility. We included patients aged ≥ 80 years who underwent inpatient CPR. Patients with incomplete electronic medical records were excluded. There was a total of 894 patients admitted in that period and 90 met our selection criteria.

Study outcomes and measures

The main outcome examined was inpatient mortality, which was then subdivided based on the number of CPR attempts into early and late mortality. Early mortality was defined as death during the initial CPR attempt and late mortality was defined as death after surviving the initial but not the subsequent CPR attempts. Additionally, 1-year mortality was examined for survivors. Baseline characteristics including age, gender, chronic illnesses, total number of medications, reason for admission, and cause of death were retrieved from the electronic health system. Charlson's Comorbidity Index (8) was calculated to obtain the estimated 10-year chance of survival. The Katz Index of Independence in Activities of Daily Living (9) was calculated to identify the level of function prior to admission. The Acute Physiology And Chronic Health Evaluation II (APACHE II) (10) scores were recorded to indicate the physiological condition of the patients before CPR.

Ethical considerations

The study was conducted after approval from the Secondary Health Care Research Committee at the Ministry of Health in Bahrain.

Statistical analysis

The baseline characteristics of the patients were described using frequencies with proportions for categorical variables and means with standard deviations for continuous variables. Descriptive comparisons were made using the $\chi 2$ or Fisher's exact test for categorical variables and t test or Mann–Whitney U test for continuous variables. P

Results

Baseline characteristics of patients

A total of 90 patients were included in this study. The mean age was 87.91 (6.27) years and 48 (53.33%) were male (Table 1). Hypertension (n = 55, 61.11%) and diabetes mellitus (n = 43, 47.78%) were the most prevalent comorbidities, while respiratory tract (n = 41, 45.56%) and urinary tract (n = 35, 38.89%) infections were the most common admission diagnoses. The mean APACHE II score was 28.53 (5.80) among all patients. Mean scores of Charlson's Comorbidity Index and Katz Index were 14.59 (18.29) and 2.89 (2.28), respectively.

Early and late mortality outcomes

No significant differences in demographics and comorbidities were found between the early and late mortality groups (Table 2). Respiratory tract infections were significantly higher in the late mortality group (P = 0.020), while dehydration and infected pressure ulcers were significantly more common in the early mortality group. APACHE II score was significantly higher in the early mortality group (P

Admission and resuscitation characteristics

The average length of stay was 21.23 (23.62) days and the admission–CPR interval was 12.22 (16.80) days (Table 3). Most patients had nonshockable initial rhythms (n = 85, 94.44%), while only 5 (5.56%) had shockable rhythms. Out of the 90 patients, 87 (96.67%) died in hospital; 52 (57.78%) died immediately after the first CPR (early mortality), and 35 (38.89%) in subsequent CPR attempts (late mortality). Of note, the survival rate at discharge was 3.33% (n = 3), while the 1-year survival rate was only 1.11% (n = 1). Patients in the late mortality group survived for an average of 18.91 (23.53) days after the initial successful CPR attempt. No significant differences were found in admission–CPR interval, initial rhythm during CPR, and duration of CPR between the early and late mortality groups.

Discussion

Islamic doctrine influences laws and policies in Bahrain, including some elements of medical practice. Withholding treatment in terminal illness has always been a source of debate among Muslim scholars (11). Not all Islamic countries have approved the application of DNR orders. Poli-cy-makers in Bahrain are still undecided about the legality of such orders. Since there is no

end-of-life policy at our institution, patients are ventilated during or before CPR. This sometimes leads to prolonged mechanical ventilation dependency accompanied by poor outcomes. In our study, patients survived for 18.91 (23.53) days after the first successful CPR attempt (late mortality). It is common practice to intubate dying patients electively as a comfort measure while administering sedatives. A DNR order is documented by a physician so that CPR is not initiated if a patient goes into cardiopulmonary arrest. DNR orders became well established in the United States of America with the advent of CPR training and defibrillators in the 1970s (12). DNR orders are usually initiated when resuscitation would not alter the outcome of a disease, therefore preventing unnecessary suffering and avoiding futile care (12). In countries where DNR orders are practiced, the decision-making process is similar (13). For example, in Sweden, the patient's primary physician decides on the DNR order after consultation with other certified professionals and preferably with the patient (13). Typically, a DNR order forbids CPR and intubation while permitting treatment for infections and other treatable conditions.

The American Heart Association recommends the widespread use of advance directives for all patients admitted to hospital in addition to frank discussions about prognosis and survival rates after CPR (14). Post-CPR survival is associated with a high chance of neurological and functional impairment leading to poor quality of life (14). The poor outcomes for inhospital CPR are most likely because cardiopulmonary arrest is usually associated with advanced chronic illness rather than an easily reversible acute cardiopulmonary event such as isolated arrhythmia (14).

In a meta-analysis, Ebell et al. concluded that less than half the patients survived immediately post-CPR and only 13.4% were discharged (15). They noted that survival rates dropped with age (15). In a retrospective study, Murphy et al. concluded that only 6.5% of adults aged ≥ 70 years who underwent inhospital CPR survived to discharge (16). Our results demonstrated an even lower survival rate of 3.33%. This can be attributed to multiple factors. Firstly, with the absence of a DNR policy, there is no decision-making process for who would benefit from CPR. Although futile, CPR is still performed in unfavourable cases such as terminal illness. This was shown by the fact that most patients (57.78%) died after initial CPR. Many of our patients would not have been appropriate candidates for CPR in the first place if DNR orders were allowed. Had they been at a different institution, they would not have been offered CPR. As a result, these additional futile cases could be responsible for lowering our survival rate. Secondly, it could be that our patients were managed in a general ward; therefore, it would have been interesting to look at post-CPR survival in our ICU. Thirdly, our patients generally had multiple comorbidities and were in critical condition as shown by the high APACHE II scores. Fourthly, most of the initial rhythms may have been nonshockable, which carry a lower chance of survival, especially in the older age group (17). Lastly, this low survival rate could have been due to poor technique; therefore, it would have been interesting to compare outcomes with the quality of CPR performed.

Our results showed no significant difference in Katz Index and Carlson's Comorbidity Index scores between the early and late mortality groups. The APACHE II scores were, however, significantly higher in the early mortality group. This supports the fact that high APACHE II scores indicate severe illness, leading to a high risk of inhospital mortality (10). Regarding discussing DNR with patients and their relatives, our results demonstrate that APACHE II score could be helpful in predicting the chances of achieving return of spontaneous circulation after the initial CPR attempt. Further studies at our institution are needed to identify those predictors that could prove useful when discussing DNR orders with patients and relatives. These studies could include patients admitted under other specialties, in addition to other predictors such as location of CPR and arrest to CPR time.

Some of our patients undergo CPR multiple times since a DNR order cannot be written. These are time consuming and costly, and cause trauma, pain and suffering to patients and relatives. Menon et al. described the chances of survival after multiple CPRs in > 400 000 elderly patients (18). Survival rates at discharge for patients who underwent CPR once and more than once were 17.7% and 8.8%, respectively. The median survival durations after discharge for patients who underwent CPR once and more than once were 20.6 and 10.5 months, respectively (18). This information is helpful when discussing end of life care with patients and relatives who achieve return of spontaneous circulation but remain at risk of further arrest.

In Sharia law, a person is considered dead if the following criteria are met: (1) their heart and breathing have stopped completely and physicians have determined that both cannot be resumed; and (2) all brain function has ceased and expert physicians have determined that this cessation is irreversible (19). While the definition of death is clearly understood, the decision to withdraw or decide not to initiate certain treatments such as CPR has been debated by scholars (20). The consensus on applying DNR orders is still evolving, with Islamic verdicts or fatwas, in some countries, indicating the decision of medical futility is to be decided by competent physicians on the case (21). Therefore, the issue of DNR orders is not fully resolved and is influenced by physicians' choices and preferences (21). In our opinion, when there is strong clinical evidence supporting the absence of a net permanent benefit from the resuscitation attempt, the evidence must be interpreted in the context of previous institutional experience and data, similar to ours, from the literature supporting this. When discussing DNR orders from an Islamic perspective, there are 2 major principles that are emphasized in the Qur'an: preservation of life (22) and preservation of resources (23). A decision for DNR is against the principle of preservation of life; however, it it agrees with preservation of resources. Normally, preservation of life takes precedence over preservation of resources, but when the certainty of life is absent, consideration for preserving resources takes precedence.

Deciding on DNR, particularly early in the hospital stay, can significantly reduce use of resources (24). Early identification of such patients and careful evaluation based on objective

and validated criteria could reduce unnecessary patient suffering and medical care costs by limiting the therapeutic options. The same is the case for the criteria of admission to ICU. According to the American Thoracic Society, ICU admission should only be offered to patients who will likely benefit from it (25). Our hospital has a 22-bed ICU. Given the absence of a DNR policy, accommodating all patients in the ICU can prove challenging and impossible at times. As a result of the high demand for ICU beds, critically ill patients are treated in general wards. In principle, instigating a DNR policy would reduce the number of critically ill and ventilated patients and lower the demand on ICU. This conforms with the principle of preservation of natural resources.

Saudi Arabia is a neighbouring Islamic country with close cultural, religious, economic and political ties to Bahrain. In Saudi Arabia, DNR orders are widely used after being clarified by the Presidency of the Administration of Islamic Research and Ifta in their Fatwa number 12086 issued on 30/06/1409(Hijra) [1988 (AD)]. In summary, this highlights 6 situations where a DNR order is granted: (1) the patient is dead on arrival at a hospital; (2) the condition has been determined by a panel of physicians as untreatable and death is imminent; (3) there are repeated cardiac arrests or the patient suffers from advanced cardiopulmonary disease; (4) the patient is unfit for resuscitation because of their condition; (5) the patient is in a vegetative state; and (6) resuscitation is considered futile (26). Based on this fatwa, many hospitals in Saudi Arabia have implemented a No Code policy (same as a DNR order). The policy states that No Code status is applied after the agreement of 3 physicians; 2 of whom are consultants (4). The family members are informed about the decision but play no role in the decision-making. This policy has led to a dramatic reduction in futile CPR cases in Saudi Arabia (4).

Implementing a DNR policy in Bahrain may prove difficult due to religious and cultural views. To address this matter, healthcare workers and the general public should be educated about the limitations of aggressive life support in specific scenarios. It is important for physicians to acknowledge that withholding treatment is the same as providing treatment in some circumstances. Performing CPR and intubation, and ICU admission should all be considered treatments; and just like any other therapeutic options, proper consideration of the outcome should be taken, including balancing risks and benefits. In other words, as failing to provide treatment is considered negligence, overtreatment leads to poor utilization of important resources that could be allocated where they are more needed. Additionally, overtreatment can prolong suffering without achieving a desirable outcome. Given the absence of a DNR policy in our institution, it is never discussed with patients and their relatives. Frank et al. reported that most older inpatients prefer to be involved in shared discussions about CPR preference with their family (27). Murphy et al. concluded that most older patients understand the prognostic factors associated with CPR and most of them opted out of CPR once they were informed of the outcomes (28). Similar local studies are needed to identify the views and wishes of patients, which could support the implementation of a DNR policy.

Almost all physicians in a neighbouring Bahraini hospital agreed that a hospital must have a DNR policy, while more than half believed that the family should participate in the DNR decision (29). In our opinion, family members usually lack knowledge or training to make such decisions. Additionally, the emotional connection with their loved ones might impair their decision-making process. Collectively, we agree that physicians should make the decision as a team, and keep the family fully informed at all times.

Once a DNR policy is instituted, education and training of healthcare workers in all aspects related to the policy are crucial. A study in Saudi Arabia demonstrated that physicians were not familiar with DNR policies and the fatwa, and had lacked understanding about treating DNR-labelled patients (30). Another concern about initiating a DNR order is the decrease in level of care provided. Al Farhan et al. concluded that placement of DNR orders significantly reduced vital sign measurements, investigations, documentation, and visits by physicians (31). Additionally, some Saudi hospitals lack regulations to guide the use of DNR orders and their effect on quality of care (32). The sensitivity of this matter means that implementing such a policy will not succeed if proper education is not prioritized in addition to support and reinforcement by administrators and policy-makers.

Our study had several limitations. First, this was a retrospective study and erroneous record-keeping could have affected the results. Second, data were not available on CPR performance or quality of CPR performed, including adherence to guidelines and the level of experience of the CPR team members. Third, the patients were selected from those admitted solely under general medicine, which may not represent all other specialty admissions. Therefore, it may not be suitable to generalize our results to other specialties, hospitals or countries. Finally, our sample size was small; however, our study is the first of its kind in Bahrain to focus on the outcomes of critically unwell patients aged ≥ 80 years undergoing CPR.

Conclusion

Inpatient cardiopulmonary arrests usually lead to unfavourable outcomes in very old patients. For instance, our study showed low survival rates post-CPR during admission and follow-up at 1 year. There is currently no attempt to discuss conservative management options with patients due to the absence of a DNR policy. When considering outcomes, patient’s wishes, and wise allocation of resources, the development of a DNR policy in Bahrain is of utmost importance. Additionally, regarding treatment of very old patients, especially with multiple comorbidities, it is important to ensure that our priority is not to do harm by futile CPR attempts.

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Competing interests: None declared.

Est-il temps d'adopter une politique de non-réanimation ? Issu de la réanimation cardiopulmonaire en milieu hospitalier chez des patients très âgés à Bahreïn

Résumé

Contexte : Dans le monde entier, les ordres de ne pas réanimer sont utilisés depuis de nombreuses années. En raison de l'absence de politique concernant la non-réanimation, des mesures de réanimation complète, y compris la réanimation cardiopulmonaire, sont appliquées à tous les patients admis dans notre établissement, indifféremment du pronostic.

Objectifs : Observer l'issu pour les patients très âgés qui ont subi une réanimation cardiopulmonaire, y compris le taux de mortalité et la durée du séjour. Cela permettra d'examiner la nécessité de mettre en œuvre une politique de non-réanimation à Bahreïn et de passer en revue les défis qui y sont associés.

Méthodes : Il s'agissait d'une étude observationnelle rétrospective menée dans un hôpital tertiaire de 1200 lits à Bahreïn. Nous avons inclus des patients âgés de 80 ans et plus admis en service de médecine générale et ayant subi une réanimation cardiopulmonaire entre janvier et juillet 2018. Les dossiers médicaux ont été examinés afin de déterminer les caractéristiques des patients et l'issu de la procédure.

Résultats : Quatre-vingt-dix patients ont été inclus dans l'étude avec une moyenne d'âge de 87,91 ans (ET 6,27). Le taux de mortalité en milieu hospitalier était de 96,67 ; 57,78 % des patients sont décédés immédiatement après la première tentative de réanimation cardiopulmonaire et 38,89 % sont décédés au cours des tentatives ultérieures. Le taux de survie à un an n'était que de 1,11 %.

Conclusion : La survie des patients très âgés suite à un arrêt cardiopulmonaire est faible, et la survie à la sortie de l'hôpital est encore plus faible. Compte tenu de l'absence de politique de non-réanimation, l'augmentation de la population très âgée entraînera une demande accrue de ressources en soins intensifs. Nos résultats montrent que la mise en œuvre d'une telle politique au sein de notre institution est cruciale pour réduire le nombre de tentatives de réanimation

cardiopulmonaire inutiles, minimiser la souffrance des patients et optimiser l'allocation des ressources.

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