Outcome of Cardiopulmonary Resuscitation In Frail Patients

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Abstract

The concept of frailty is one which is gaining increasing attention due to its multifactorial constituents, and its impact on geriatric patient care. This retrospective analysis of cardiopulmonary resuscitation (CPR) in Maltese Hospitals aims to determine the significance of frailty in relation to CPR outcome in one calendar year. In this study, we analysed the outcome of cardiopulmonary resuscitation (CPR) in Maltese Hospitals for the year 2019 in relation to frailty status using the Charlson Comorbidity Index (CCI). 185 eligible patients were obtained from the CPR register after excluding patients <18 years of age, peri-arrest cases, a test case, double-recorded CPR documents and patients with insufficient data recorded. From these 185 patients, the statistics were of 123 males and 62 females, with an age range of 26 years to 99 years. The median age was 78 years whilst mean age was 76.2 years. The majority of patients fell within CCI of 4-8 (143 patients), with the largest cohort obtaining a score of 6 (39 patients). The results highlight a low rate of ROSC (4.32%) irrespective of CCI score. However, when ROSC was achieved, survival to discharge was noted to be greater with lower CCI scores. Only 5 patients survived one year post discharge. This data is in keeping with other studies regarding CPR in frail patients, despite the use of other scores such as the Clinical Frailty Score. Smith et al's study in Australian tertiary centres between 2008 and 2017 used the CCI, and points out a lower rate of discharge home in frail patients who survive an in-hospital cardiac arrest [1]. Limitations of our study include the small population, although exhaustive of the CPRs performed on the Maltese Islands in 2019.

Introduction:

Frailty was defined by Campbell and Buchner in 1997 as '*a condition or syndrome which results from a multi-system reduction in reserve capacity to the extent that a number of physiological systems are close to, or past, the threshold of symptomatic clinical failure. As a consequence the frail person is at increased risk of disability and death from minor external stresses*' [1]. There has been increasing interest in the concept of frailty in view of its implications in patient management, and several measures have been developed over the last few years in an attempt to quantify it.

Aim:

This retrospective analysis of cardiopulmonary resuscitation (CPR) in Maltese Hospitals aims to determine the significance of frailty in relation to CPR outcome in one calendar year.

Methodology:

Analysis of CPRs performed within one calendar year (2019) took place following clearance from Data Protection Office. Each patient was assigned a unique code to preserve anonymity. Data gathered consisted of: sex, age at time of CPR, comorbidities, date of CPR, cardiac rhythm and CPR outcome.

Results:

Results were tabulated as follows from the data extracted: patient code, age, sex, date of arrest, outcome, Charlson score.

The data sheet provided enlisted 223 CPR events. Of these, one was a test CPR, six were peri-arrest situations and two were double recorded CPR events. One case was a paediatric CPR which was also excluded. The remainder amounted to a total of 213 eligible CPR events. One patient sustained 3 CPR events during the same admission whilst another patient sustained 2 CPR events during the same admission.

Therefore 210 in-patients underwent CPR between 1st January 2019 till 31st December 2019. 185 patients out of these 210 had sufficient data to calculate the Charlson Comorbidity Index as seen in figure 1.

Of these 185 patients, 123 are males, and 62 are females.

The age range is 26years to 99 years.

The median age is 78 years. The mean age was 76.2 years.

154 patients did not make it to ROSC and so CPR was terminated as deemed medically futile. On the other hand, return of spontaneous circulation (ROSC) was obtained in 31 patients, out of which only 8 were discharged, whilst the remaining 23 died within the same hospital admission.

Therefore, 8 out of 185 patients made it to discharge, which amounts to 4.32%, irrespective of Charlson Comorbidity Index as seen in figure 2.

With regards to Charlson Comorbidity Index, the majority of patients fell within scores of 4-8 (143 patients), with the largest cohort obtaining a score of 6 (39 patients). None of the patients with scores of 0, 1, 2, 11, 12, 13 obtained ROSC, whilst patients within the other scores had >80% mortality rate. When ROSC was achieved, survival to discharge was noted to be greater with lower Charlson Comorbidity Index score.

Discussion:

The above results indicate a very low rate of successful CPRs, regardless of Charlson Comorbidity Index. One must note, however, that with an increasing Charlson comorbidity index, the chance of survival until discharge after ROSC decreases.

These results are in-keeping with international studies conducted at various hospitals. Fernando et al noted a high mortality rate following in-hospital cardiac arrest from the Ottawa Hospital Network, which was higher for frail patients (95.2% compared to 68.6% non-frail patients). The frail patients who survived

to hospital discharge amounted to 6 individuals, making up 5% of the frail population, of whom only 1 patient was discharged to a home setting. [2]

A similar study conducted in a UK district hospital echoed these results, as frailty was noted to play an important role in return of spontaneous circulation, as well as survival to hospital discharge for those who achieved ROSC. The study did point out, however, that there was a longer time period in between hospital admission and in-hospital cardiac arrest for patients with higher frailty scores, when compared to less frail patients. [3]

An Australian study which took place in a tertiary centre between 2008 and 2017, points out a lower rate of discharge home in frail patients who survive an in-hospital cardiac arrest. However, frailty was not associated with death in hospital after correcting for other factors. One must mention that in the latter study, the Hospital Frailty Risk Score (HFRS) and Charlson index of comorbidity were used to calculate frailty, unlike in the previous two studies whereby Clinical Frailty Scale (CFS) was retrospectively assigned. [4]

The most recent single-centre study concerning the link between in-hospital cardiac arrest and frailty, by Ibitoye et al, brings to light more concerning results. All patients studied were above 60 years of age, and those with a clinical frailty score of above 4 died in hospital, that is, none survived to hospital discharge. [5]

Advanced age is frequently mentioned as a negative predictor for outcome after CPR [6]. Mowbray et al's systematic review regarding the prognostic Utility of Frailty for Postarrest Outcomes hypothesises that frailty may be a more accurate prognostic factor for post cardiopulmonary resuscitation outcome, rather than age alone. This hypothesis is difficult to confirm in view of the various different screening tools utilised for frailty. [7]

Limitations of this study include the small population, although exhaustive of the CPRs performed on the Maltese Islands in 2019, which was further hindered by incomplete data in the 25 patients mentioned above and lack of accessibility to deceased patient's information. The latter meant that the Clinical Frailty Score could not be calculated, as this score would require knowledge regarding patient's independence, besides comorbidities.

In conclusion, we note that CPR itself has a low success rate, irrespective of patient age, comorbidities and frailty. However, frail patients are less likely to survive to hospital discharge. Based on this knowledge, CPR status should be recorded upon admission to hospital following a thorough and honest discussion with the patient and, if necessary, the relatives.

Declarations:

Acknowledgments

We would like to thank all the workers in Mater Dei Hospital which provided us with all the necessary databases required for this study.

We confirm that all methods were carried out in accordance with relevant guidelines and regulations.

We confirm that no experiments were performed.

Permission to access and use the data in this manuscript file was granted after data protection approval was obtained from Mater Dei Hospital including Data Protection Officer and the hospital's CEO Ms. Cecilia Falzon.

All data was anonymised and temporarily recorded and stored in an anonymous way until data collection and analysis was complete. No medical images or parts were obtained since no patient consent was obtained as patients we dealt with were deceased and all data was anonymous. Once all data was analysed all data was destroyed. Data was kept only internally on an H or P Drive folder and made accessible only by the researchers i.e Dr. Elaine Camilleri, Dr. Juliet Camilleri, Dr. Luke Sultana and Dr. Nicole Sciberras.

Competing interests

All authors have no conflicts of interests

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Figures

Figure 1

Patients excluded from the study

Figure 2

Figure 3

A graph of patients who did not survive vs those who achieved ROSC in relation to Charlson Comorbidity Index (CCI)

Supplementary Files

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