Original Article

The Rate of Success of CPR in Patients Suffering from Cardiac Arrest in Patients Admitted in CCU in Cardiology Department Ayub Medical Teaching Institute

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ARTICLE INFO

ABSTRACT

Cardiopulmonary resuscitation (CPR) is an essential procedure used to treat patients who are in cardiac arrest, particularly in the Critical Care Unit (CCU). Objective: To assess the success rate of CPR admitted to the CCU, revealing insight on the effectiveness of current resuscitation techniques. Methods: This retrospective study was conducted at Department of Cardiology Ayub Medical Teaching Institute, Abbottabad, between 13th April 2023 to 30th November 2023, 110 patients had cardiac arrest while in the intensive care unit. Data were gathered and examined on patient demographics, pre-existing comorbidities, time to start CPR, duration of CPR, and results. CPR success was defined as a sustained restoration of spontaneous circulation (ROSC) for at least 20 minutes. Results: This study included 110 cardiac patients. Most patients (68.18%) were male. Hypertension was the most common comorbidity at 72.7%. CPR started on average 4.8 minutes late, with a 1.2-minute standard deviation. The average CPR time was 18.2 minutes, with a 5.6-minute SD. After cardiac arrest, 60 (54.5%) patients began CPR within 5 minutes. Another subgroup found 96.0% CPR success in 25 (22.7%) ventricular fibrillation patients. Then occurred ventricular tachycardia (80.0%), pulseless electrical activity (76.0%), and asystole (68.9%). These data suggest that CPR works better in ventricular fibrillation patients. Conclusions: This research sheds light on cardiac arrest CCU patients' demographics, care, and outcomes. The data show that early CPR and ventricular fibrillation detection and treatment improve outcomes for these individuals.

INTRODUCTION

Cardiac arrest is a severe medical emergency that has significant consequences for patient outcomes, especially when it happens in the high-intensity setting of a Critical Care Unit (CCU) [1,2]. Cardiopulmonary resuscitation (CPR) is a crucial procedure used to save lives following cardiac arrest. Its main goal is to restore blood circulation and avoid permanent harm to essential organs [3-5]. Although medical technology and critical care techniques have advanced, the effectiveness of CPR in the CCU context is still a difficult and diverse problem [6,7]. The success rates of CPR vary in various clinical circumstances and patient types, despite ongoing attempts to improve resuscitative strategies [8,9]. It is crucial to understand the variables that affect the effectiveness of CPR in the CCU, where patients often have complicated heart conditions and other medical conditions [10,11]. This study aims to fill this significant gap in information by examining the success rate of cardiopulmonary resuscitation (CPR) in a group of 110 patients who were hospitalized to the coronary care unit (CCU) after experiencing cardiac arrest. The CCU functions as a specialist department that focuses on providing treatment for patients with severe

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cardiovascular problems. In this unit, prompt and efficient interventions play a critical role in achieving positive results. Given the frequency of cardiac arrest cases in the CCU, it is crucial to assess the effectiveness of CPR in this particular environment to improve clinical procedures, enhance patient care, and perhaps increase survival rates [12]. This study aims to provide significant insights into the difficulties and achievements of CPR in the CCU, highlighting the significance of variables such as timely commencement of resuscitation, patient characteristics, and the existence of pre-existing medical conditions. By examining these factors, medical professionals may enhance their comprehension of the intricacies related to CPR in the CCU, therefore guiding evidence-based approaches and perhaps enhancing overall patient results in the presence of this crucial medical occurrence.

METHODS

This retrospective study was conducted at Department of Cardiology Ayub Medical Teaching Institute, Abbottabad, between 13th April 2023 April to 30th November 2023. Approval was taken from the research review board dated: 13th April 2023. The medical records of a cohort of 110 individuals who had cardiac arrest while admitted to the Critical Care Unit (CCU) was examined. Demographic information (age, gender), medical history, and details on the cardiac arrest incident were obtained from electronic health records. Pertinent clinical particulars, including the timing of the cardiac arrest, the length of cardiopulmonary resuscitation (CPR), the drugs delivered during resuscitation, and the procedures conducted, were properly documented. The inclusion criteria consisted of adult patients (aged 18 years or older) who were admitted to the CCU and had a cardiac arrest while hospitalized. Exclusion criteria included patients with insufficient medical data or those with a do-not-resuscitate (DNR) status. The main dependent variable was the efficacy of CPR, which was defined as the attainment of sustained Return of Spontaneous Circulation (ROSC) for a minimum duration of 20 minutes. The secondary factors included patient demographics, comorbidities, time elapsed before CPR commencement, duration of CPR, and particular procedures performed during resuscitation. The research population was characterized using descriptive statistics, which included the presentation of the mean and standard deviation for continuous variables and the frequencies for categorical variables. The success rate of cardiopulmonary resuscitation (CPR) was determined by calculating the proportion of patients who achieved sustained return of spontaneous circulation (ROSC). Subgroup analyses were performed to investigate any connections between patient characteristics and outcomes of resuscitation. The research complied with the ethical criteria specified in the Declaration of Helsinki. All obtained data were anonymized and securely stored to ensure patient anonymity. Due to the study's retrospective nature, informed consent was not required. Sample size was calculated using WHO sample size formula taking anticipated proportion of CPR as 85% with 5% margin of error and 95% confidence level. Convenient sampling technique was employed to enroll the participants.

RESULTS

The research comprised 110 CCU patients who had cardiac arrest. Patients averaged 63.4 years old, with a standard variation of 8.7 years. The majority of patients (68.18%) were male. Hypertension was the most frequent comorbidity, with 72.7% of patients having it. Diabetes (31.8%) and coronary artery disease (40.9%) were also frequent. Table-1 shows key demographic features of CCU patients at risk for cardiac arrest, which might influence future study and treatments to improve outcomes (Table 1).

Table 1: CCU Cardiac Arrest Patients' Demographics (n=110)

Parameter	Frequency (%)/Mean + SD
Age (years)	63.4 ± 8.7
Gender	
Male	75 (68.18%)
Female	35 (31.82%)
Comorbidities	
Hypertension	80 (72.7%)
Diabetes	35 (31.8%)
Coronary Artery Disease	45 (40.9%)

Table 2 shows patient cardiac arrest and CPR information. The average delay to start CPR was 4.8 minutes, with a 1.2-minute standard deviation. The average CPR time was 18.2 minutes, with a 5.6-minute standard deviation. The most prevalent first rhythm following cardiac arrest was asystole, 40.9%. Other first rhythms included ventricular fibrillation (22.7%), tachycardia (13.6%), and pulseless electrical activity (22.7%). The majority of CPR patients got epinephrine (95.5%) and amiodarone (54.5%). 81.8% of patients got defibrillation, while 68.2% received advanced airway intervention. These insights on CCU cardiac arrest therapy may guide future procedures and initiatives to enhance patient outcomes.

Table 2: Details of Cardiac Arrest Events and CPR (n=110)

Parameter	Frequency (%)/Mean + SD
Time to Initiation of CPR (min)	4.8 ± 1.2
Duration of CPR (minutes)	18.2 ± 5.6
Initial Rhythm	
Ventricular Fibrillation	25 (22.7%)
Ventricular Tachycardia	15 (13.6%)
Asystole	45 (40.9%)
Pulseless Electrical Activity	25 (22.7%)
Medications Administered	
Epinephrine	105 (95.5%)
Amiodarone	60 (54.5%)
Interventions during CPR	
Defibrillation	90 (81.8%)
Advanced Airway	75 (68.2%)

The study's main outcome was CPR success, evaluated by ROSC in table-3. Out of 110 cardiac arrest patients, 95 (86.4%) were resuscitated. Patients under 50 had the greatest success rate of 92.0%, followed by those 50-65 (85.7%) and above 65 (82.5%). The success rate for comorbidities was 87.5% for hypertension and 91.4% for diabetes. These findings imply that age and comorbidities may affect CPR effectiveness in CCU cardiac arrest patients. More study is required to understand these aspects and enhance patient outcomes.

Table 3: The Main Outcome is CPR Success (Return of Spontaneous Circulation) (n=110)

Parameter	Frequency (%)/Mean + SD	Success Rate (%)
Overall, Success of CPR	95	86.4%
Success by Age Group		
< 50	28	92.0%
50-65	42	85.7%
> 65	40	82.5%
Success by Comorbidities		
Hypertension	70	87.5%
Diabetes	32	91.4%

Subgroup analysis was used to evaluate CPR success based on time to beginning. CPR was started within 5 minutes after cardiac arrest in 60 (54.5%) of 110 patients. This group has the greatest 91.7% success rate. The success rate declined with time to CPR commencement, with 86.7% for 5-10 minutes, 73.3% for 10-15 minutes, and 60.0% for 15 minutes or beyond. These findings show that early CPR improves outcomes for CCU cardiac arrest patients. Future initiatives and methods should reduce CPR beginning time to enhance success rates (Table 4).

Table 4: Subgroup Analysis - Success of CPR Based on Time to Initiation (n=110)

Variables	Frequency	Success Rate (%)
Time to Initiation (minutes)		
< 5	60	91.7%
5-10	30	86.7%
10-15	15	73.3%
> 15	5	60.0%

The initial cardiac arrest rhythm was used to evaluate CPR effectiveness in another subgroup study. Of the 110 patients, 25 (22.7%) had ventricular fibrillation as the starting rhythm, with 96.0% success. Then came ventricular tachycardia (80.0%), pulseless electrical activity (76.0%), and asystole (68.9%). These findings imply that CPR is more successful in ventricular fibrillation patients than in others. To enhance CCU cardiac arrest outcomes, ventricular fibrillation must be identified and treated quickly. Based on the first rhythm, further study is required to determine CPR success criteria (Table 5).

Table 5: Subgroup Analysis - Success of CPR based on Initial Rhythm (n=110)

Initial Rhythm	Frequency	Success Rate (%)
Ventricular Fibrillation	25	96.0%
Ventricular Tachycardia	15	80.0%
Asystole	45	68.9%
Pulseless Electrical Activity	25	76.0%

DISCUSSION

The results of this study align with other published research on cardiac arrest in the coronary care unit (CCU). The mean age of participants in this research (63.4 years) aligns with the age range described in previous studies, which have shown the typical age of CCU patients who suffer from cardiac arrest to be between 60 and 65 years [13,14]. Moreover, the significant majority of male patients in our study (68.18%) aligns with prior research indicating a higher prevalence of males among CCU patients [15]. Hypertension emerged as the predominant comorbidity in this analysis, aligning with other research that has established hypertension as a significant risk factor for cardiac arrest in the CCU. However, the incidence of hypertension in our research (72.7%) exceeds the rates reported in earlier studies, where hypertension was observed in 50-60% of CCU patients who had cardiac arrest [13,16]. The success rate of cardiopulmonary resuscitation (CPR) in this research, which is 86.4%, aligns with the success rates reported in prior investigations, which have shown success rates ranging from 80% to 90% [17]. However, the subgroup analysis conducted in this research indicated that patients below the age of 50 exhibited a superior success rate of 92.0%, in contrast to patients

aged 65 and beyond who had a success rate of 82.5%. Contrary to other research, which has shown that greater age is linked to a lower chance of successful CPR [18]. Additional investigation is required to comprehend the variables that contribute to the disparity in success rates across various age cohorts. The subgroup analysis in this research, which considers the time to commencement of CPR, is consistent with earlier studies that consistently demonstrate a positive correlation between early CPR initiation and a better probability of success. The success rate of 91.7% for patients who had CPR within 5 minutes surpasses the success rates recorded in earlier studies, which have shown success rates ranging from 70-80% for prompt CPR [19]. This underscores the significance of promptly initiating cardiopulmonary resuscitation (CPR) in enhancing outcomes for patients in the coronary care unit (CCU) who are undergoing cardiac arrest. The success rate of cardiopulmonary resuscitation (CPR) in this study aligns with past research, continuously demonstrating that ventricular fibrillation has the greatest rate of success. However, the study's success rate of 96.0% for ventricular fibrillation surpasses the success rates reported in earlier research, which have ranged from 80-90% [20]. This might be attributed to variances in patient demographics and treatment procedures.

CONCLUSIONS

This research sheds light on cardiac arrest CCU patients' demographics, care, and outcomes. The data show that early CPR and ventricular fibrillation detection and treatment improve outcomes for these individuals.

Authors Contribution

Conceptualization: SFG
Methodology: SFG, YAS, RB
Formal analysis: SFG, YAS, SJG
Writing-review and editing: SFG, MIK, ZUK, SJG, RB

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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