Vol. 4 No. 2 (2025)

Pakistan Journal of Medical & Cardiological Review

https://pakjmcr.com/index.php/1/about

Online ISSN 3007-2387

Print ISSN 3007-2379

Role of Emergency Protocols in Reducing In-Hospital Mortality During Cardiac Arrests

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Keywords:

Received on 27 May 2025

Accepted on 01 July 2025

Published on 03 July 2025

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Abstract

Background:
Even with evolving resuscitation methods, in-hospital cardiac arrest (IHCA) is still a leading cause of death. The prompt implementation of systematic emergency frameworks is essential to enhance the chances of survival. The purpose of this investigation was to evaluate the impact of following protocols on reducing IHCA mortality at The Islamia University of Bahawalpur and Quaid e Azam Medical college Bahawalpur.
Methods:
A possible observation study was conducted in six months, including 120 adult patients who experienced IHCA and received cardiopulmonary revival (CPR). Patients were divided into two groups based on the compliance with the protocol Advanced Cardiovascular Life Support (ACLS). Data on demographics, arrest site, initial rhythm, intervention time, return of spontaneous circulation (ROSC) and survival results were collected and analyzed.
Results:
Protocol farming is significant improvement results. In a non-party group, ROSC was

achieved in 59.7% of patients in a protocol-sided group compared to 22.9%. Survival for discharge was 29.1% respectively compared to 10.4%. Neurological results were also better in the adherence group. CPR delays, defiber and correlated mortality in drug administration.
Conclusion:
The strict compliance with the emergency protocol during cardiac arrest significantly reduces mortality and increases neurological improvement. Regular exercise, skilled code blue system and timely intervention are needed to improve the IHCA results. Protocol -based revival can save institutional focus on life and improve the quality of care in hospital settings.

INTRODUCTION

Cardiac arrest is an important medical emergency characterized by a sudden ending of effective cardiac activity, causing a sudden damage to the blood flow to important organs, especially the brain. Without instant intervention, this condition dies within a few minutes [1]. Higher cardiac arrest (IHCA) varies to the world around the world, where the survival rate varies widely depending on institutional preparations, the timeliness of the response and the efficiency of the emergency protocol. It is important to implement emergency protocols during such incidents and reduce excess execution mortality and improve patient results [2].

Over the past few decades, significant advances have been made in Carmopul-lung rescue techniques (CPR), initial defibation and contemporary care. Despite this progress, the survival rate of patients who experience cardiac arrest in the hospital settings survives a lot to be desired [3]. Several studies have shown that fast and organized responses during cardiac arrest events are directly associated with high survival rates. This organized response is very well developed, well practiced and frequently depending on the presence of emergency protocols. The emergency protocol, often standardized during the American Heart Association (AHA) or the European Revolutionary Council (ERC), is a number of evidence -based procedures designed to provide timely and in time under heart conditions [3, 4]. These protocols include early recognition of cardiac arrest, activism of emergency systems, rapid initiation of high quality CPR, initial defibation, when indicated, advanced heartbeat (ACLs) and coordinated care after birth. Each component plays an important role in the existence series [5].

One of the decisive factors for reducing the IHCA mortality is the first recognition of the patient's fall. For this, the hospital staff must be well trained in identifying indications of early warning such as abnormal heartbeat, low oxygen saturation, altered mental state or sudden collapse. The presence of Rapid Response Teams (RRT) or Medical Emergency Teams (Mates) has become the cornerstone of the initial intervention strategies. These multi -wolf teams become active when the clinical condition of a patient begins to subside, often prevents progress in the arrest of full heart. Evidence indicates that working RRT hospitals are experiencing cardiac arrest and lower frequency of related mortality [6]. Another important aspect of the emergency protocol includes standardization and simulation -based training of health professionals. High-loyal simulation and regular spot code blue exercises have been shown to increase the skills and confidence in medical teams, reduce the response time and improve compliance with the guidelines under real emergencies. The effectiveness

of these exercises lies in their ability to repeat the landscapes in the real world, thus preparing employees to perform under pressure and communicate effectively in multidisciplinary teams [6].

In addition, the integration of the automatic exterior defibrilates (AED) in the hospital settings has given an important dimension to the emergency protocol. When ventricular flicker or vibrant ventricular tachycardia is identified as an underlying rhythm during cardiac arrest, immediate defibation becomes the most important intervention. A delay in a few minutes can reduce the chances of survival. Therefore, protocols that ensure the availability and proper use of the defibrilates along with the clear role task among the employees significantly affect the results of the patient[7]. Technology also plays an important role in the control of cardiac arrest. Real -time feedback devices used under CPR can help maintain proper compression depth and speed, increasing the quality of the revival effort. In addition, integrated electronic medical record systems with initial warning score -algorithm can consume employees to get worse, which allows time intervention [8].

Post -Resurial Care is another important component of emergency protocols that directly affect mortality. After returning the spontaneous circulation (ROSC), patients require careful monitoring of intensive care units, targeted temperature handling, neurological assessment and adaptation of hemodynamic parameters. Hospitals with structured post-segregation care route have shown better neurological results and reduced mortality, and postponed the importance of a spontaneous infection from revival from revival [9]. Despite the extensive availability of guidelines, one of the most important challenges in emergency wheel care is still in different hospitals, and even in the same institution within the same institution, there is variability in the following of protocols between departments. Factors such as inadequate training, poor communication, management and resource restrictions can compromise the efficiency of emergency response systems. Therefore, it is necessary to identify areas for continuous improvement of quality, regular revision of cardiac arrest cases and to improve debri -firing sessions and secure compliance with best practice [9, 10].

Cultural and institutional approaches to emergency room also affect the results. In some health care settings, hierarchical structures can prevent junior employees from implementing decisive measures or calling for immediate help. Encouraging the culture of safety, openness and teamwork is important for creating an environment where protocols are not only implemented, but also at all levels in the health care system. In addition, there is a role as public and patient training on the importance of cardiac arrest and the importance of initial intervention, especially in the context of family witness arrest in the hospital environment. When family members know about the need for immediate action and understand the original stages of revival, it can support the health teams in starting a quick response. [11].

Globally, there are differences in the results of cardiac arrest in hospitals. High -income countries often adhere to better resources, exercise facilities and protocols, while countries with low and medium income can struggle with low purposes of health systems, limited access to advanced life support technology and lack of trained personnel [12]. To bridge this difference requires international cooperation, development of reference -specific guidelines and health services infrastructure and investment in education. The role of an emergency protocol to reduce the mortality rate of the hospital during heart rate is versatile and deeply important. From early recognition to subsequent care, each stage of the reaction process to survival and neurological improvement contributes. The effectiveness of these protocols depends not only on their design, but also on the institution's commitment to training, simulation,

teamwork, management and continuous improvement. As the health care system develops, strategies should be made to handle life situations in life drawn as a cardiac arrest [13]. The purpose of this research is to find out the effectiveness of emergency protocols, challenges and future directions to reduce the mortality rate during the arrest of the heart in the hospital, finally to contribute to the broader goal of saving life and improving the quality of care in hospital settings.

Methodology

Study Design

This possible observational study was held at The Islamia University of Bahawalpur and Quaid e Azam Medical College Bahawalpur, Pakistan at a large tertiary care and teaching hospital. The study led to a six -month period from January 2024 to June 2024. The primary goal was to assess the effectiveness of emergency protocols in reduced mortality in patients with cardiac arrest (IHCA) in the hospital. The study was non-traditional and observation, which means that it did not disturb the ongoing clinical care, rather recorded and analyzed events when they were naturally under emergency management.

Study Population

A total of 120 adult patients and cardiopulmonary revival (CPR) were achieved in the hospital during the study period, they were included in the analysis. These patients were administered in various departments at The Islamia University of Bahawalpur and Quaid e Azam Medical College Bahawalpur, including emergency rooms, intensive care units (ICU), medical and surgical departments and cardiology units. Participants' age ranged from 18 to 85 years. Both men and female patients were included without discrimination, even though the men made a little widespread in the sample [14].

Inclusion Criteria

The study included patients who were 18 years of age or older and experienced cardiac arrest in the hospital's premises, including emergency rooms, ICU or hospital departments. Only for patients such as revival efforts were tried by the trained hospital code Blue team, nominated. A cardiac arrest was clinically defined as a sudden loss of accountability, absence of heart rate and apnea or gaspecor [15].

Exclusion Criteria

Patients who had an already existing "orders" not the Razkiset "(DNR) were excluded from the study. Similar people who had experienced arresting at the hospital and were brought into an emergency room without documents without a revival effort in the hospital. The patients under the agePatients who had an already existing "orders" not the Razkiset "(DNR) were excluded from the study. Similar people who had experienced arresting at the hospital and were brought into an emergency room without documents without a revival effort in the hospital. The patients under the age [16].

Emergency Protocol Followed

All revival efforts during the study period were followed by the guidelines in 2020 Advanced Cardiovascular Life Support (ACLS) established by the American Heart Association (AHA). These protocols were strictly implemented at The Islamia University of Bahawalpur and Quaid e Azam Medical College Bahawalpur through the Code Blue Activation System. Identification of cardiac arrest, a trained multidisciplinary team immediately responded to starting life -saving intervention. The reluctance sequence included instant -quality chest compression with minimal delays, usually started within 30 seconds after cardiac arrest. In patients with shockable rhythm such as ventricular fibrillation (VF) or heart rate ventricular tachycardia (VT), defibulation was administered within two minutes of recognition. Medical support, including the administration of intravenous epinephrine, was standardized at an interval

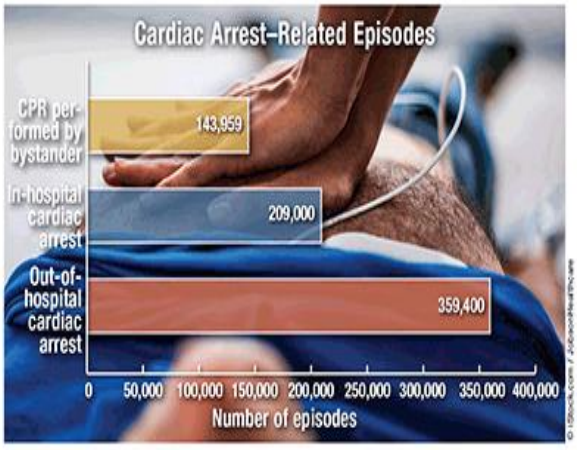
of 3 to 5 minutes. The Airways control included oxygen supplementation, bag mask ventilation and endotric intubation when needed. Capnography was used when available to monitor the quality of breast contraction and determine the return of the spontaneous circulation (ROSC). After successful revival, patients were transferred to ICU for reproductive care, including hemodynamic stabilization, temperature control and neurological monitoring [17].

Aspect	Details	Aspect	Details
Study Design	Observational Prospective Study	Study Duration	Jan 2024 – Jun 2024 (6 months)
Location	The Islamia University of Bahawalpur and Quaid e Azam Medical College Bahawalpur	Sample Size	120 IHCA Patients
Inclusion Criteria	Adults ≥18 years, in-hospital CPR	Exclusion Criteria	DNR, Out-of-hospital arrest, Incomplete records
Protocol Used	ACLS 2020 (AHA Guidelines)	Group Division	Group A (72), Group B (48)
Primary Outcome	In-hospital Mortality	Data Analysis Tool	SPSS version 26

Table: Summary of the methodology

Data Collection Tool

A structured data collection form was used to gather information on each cardiac arrest. Data was deducted from patients' medical records, code blue response sheets, nursing notes and ICU input logs. The form captured demographic data such as age and gender, the location of arrest in the hospital and the time of the incident, in the morning, evening and night changes. It also recorded the current heart rhythm, which was classified as Assistol, is pulse Electrical Activity (PEA), ventricular fibration (VF) or heart rate ventricular tachycardia (VT) [18]. Time intervals such as time for CPR initiation, the first battle in rhythm in shock, and the total period of CPR was mentioned. The details of medication used during the revival, including epinephrine, amoderon and sodium bicarbonate, were also documented. The form included results such as ROSC status,



24-hour existence, until discharge and neurological status at the time of discharge on Cerebral Display (CPC) scale and neurological status (Table 1).



Fig 1: Cardiac Arrest and CPR

Fig 2: Emergency Resuscitation

Study Groups

For comparative analysis, patients were classified into two groups based on compliance with the emergency protocol. Group A included 72 patients, who strictly followed all components of the standard emergency protocol. These included timely activation of code blue team, fast initiation of CPR, appropriate rhythm recognition, timely defibation and administration of guidelines-oriented pharmacoterapy. Group B consisted of 48 patients where one or more elements of the protocol were remembered, delayed or distracted due to different logistics, personnel or status obstacles.

Outcome Measures

The primary result of interest was the mortality rate in the hospital, which was defined as dead before discharge after a cardiac arrest. Secondary results included the return of spontaneous circulation within 20 minutes of arrest, survival after 24 hours and neurological status at discharge, which was evaluated by using the extent of the cerebral performance category. CPC scores of 1 and 2 were considered favorable neurological results, while score 3 to 5 was classified as poor results.

Ethical Considerations

Prior to the start of the study, morally withdrawal was obtained from the Institutional Review Board (IRB) from The Islamia University of Bahawalpur and Quaid e Azam Medical College Bahawalpur. Since it was a non-conventional study using hospital-based items for research purposes, individually informed consent of patients was not considered necessary and waived by IRB. The confidentiality of the patient's information was strictly maintained and all the data was made unknown before analysis. The study followed the moral principles mentioned in the announcement of Helsinki.

Statistical Analysis

The data collected was collected and analyzed using IBM SPSS Statistical version 26. Descriptive numbers were used to summarize the demographic and clinical properties of the patient population. The instrument and standard deviations were calculated during a period of continuous variables such as age and CPR, while gender, initial rhythm and performance conditions that classified variables were presented as frequencies and percent. The curvature test was used to compare categories between protocol spending and non-party groups, while independent sample-T prisoners were used to compare constant variables between the two groups. P-mind of less than 0.05 was considered statistically important for all analyzes
[19].

Results

Total Patient Enrollment and Demographics

During the study period from January 2024 to June 2024, a total of 120 adult patients, who experienced cardiac arrest (IHCA) in the hospital and included cardiopulmonary revival (CPR). The average age for patients was 59,4,8 12.8 years, with a limit of 18 to 85 years. Of the total, 67 patients (55.8%) were male and 53 (44.2%) women.

Location and Timing of Cardiac Arrest Events

The hospital departments where cardiac arrest was distributed thus distributed: 38 cases (31.7%) in the intensive care unit (ICU), 33 cases (27.5%) in emergency rooms, 26 cases in medical departments (21.6%) and 23 cases in surgical departments (19.2%).

When analysis is done after the day, they are most arrested during the night round (41.6%), followed by evening shift (34.1%) and morning shift (24.3%).

Initial Cardiac Rhythms

The most common was rhythm assistant, which was seen in 49 patients (40.8%), followed by pulse's electrical activity (PEA) in 38 patients (31.7%). Ventricular fibrillation (VF) was present in 18 cases (15%), and 15 cases (12.5%) Pulse ventricular tachycardia (VT). Shockable rhythm (VF/VT) is responsible for 27 patients (22.5%) at the same time.

Time to CPR and Defibrillation

The average time for CPR initiation in the Protocol Partner Group (Group A) was 38.6 seconds, while the non-partisan group (group B) was significantly delayed, the average in 96.4 seconds ($p < 0.01$). For patients with shockable rhythms, the average time for the first defibrillation was 1.8 ± 0.6 minutes in group A, which has an important role as initial defibation, compared to 4.2 in 1.3 minutes in group B ($p = 0.001$).

Medication Administration and CPR Duration

According to ACLS guidelines, timely administration group A patients were achieved compared to only 60.4% of group B patients in 93.1% of patients with patients. The average duration of CPR was 16.3 minutes in group A and 22.7 minutes in group B, indicating a longer and less effective revival in a non-partition group.

Return of Spontaneous Circulation (ROSC)

Overall, ROSC was achieved in 54 patients (45%). Of these, 43 patients (59.7%) were group AK, while only 11 patients (22.9%) were from group B. The difference in ROSC rates was statistically important ($p < 0.01$), suggesting a strong correlation between protocol follow -up and successful revival.

24-Hour Survival

Of the 120 patients, 38 (31.6%) survived at least 24 hours arrest. It consisted of 30 patients with group A and 8 patients from Group B. The 24-hour survival rate in group A was 41.6%, while in Group B it was 16.6%, a statistically significant difference ($p = 0.005$).

Survival to Hospital Discharge

A total of 26 patients (21.6%) were achieved total for discharge. Of these, 21 were patients (29.1%) from the protocol-sided group and only 5 patients (10.4%) from the non-Partisan group reflect a significant difference ($p = 0.007$).

Neurological Outcomes

The neurological status of discharge was evaluated using Cerebral Display Category (CPC) scale. A favorable result (CPC 1 or 2) was observed in 17 patients (14.1%), where only 3 from group A and only 3 from group B and poor neurological results (CPC 3 to 5) were more common in non-unique groups, which emphasized the role of timely and complete protocol performance in the brain function.The neurological status of discharge was evaluated using Cerebral Display Category (CPC) scale. A favorable

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Outcome	Protocol-Adherent Group (n=72)	Non-Adherent Group (n=48)	p-Value
ROSC Achieved	43 (59.7%)	11 (22.9%)	< 0.01 (Significant)
Survived for 24 Hours	30 (41.6%)	8 (16.6%)	0.005 (Significant)
Survived to Hospital Discharge	21 (29.1%)	5 (10.4%)	0.007 (Significant)
Favorable Neurological Outcome	14 (19.4%)	3 (6.2%)	0.02 (Significant)
Mean Time to CPR Initiation	38.6 seconds	96.4 seconds	< 0.01
Mean Time to First Defibrillation	1.8 ± 0.6 minutes	4.2 ± 1.3 minutes	0.001
Timely Epinephrine Administration	93.1%	60.4%	< 0.01
Average Duration of CPR	16.3 minutes	22.7 minutes	0.04
In-Hospital Mortality	70.8%	89.6%	0.008

Table 2: Clinical Outcomes in Protocol-Adherent vs. Non-Adherent Groups
Rhythm-Specific Survival

Among 27 patients with shockable rhythm (VF/VT), bought 18 ROSC (66.6%), and survived for 14 emissions (51.8%), which was much higher than people with Estistol or peas. This indicates that the first defibation, especially in ICU and emergency rooms, helped significantly to survive in patients with shockable rhythms (Table 2).

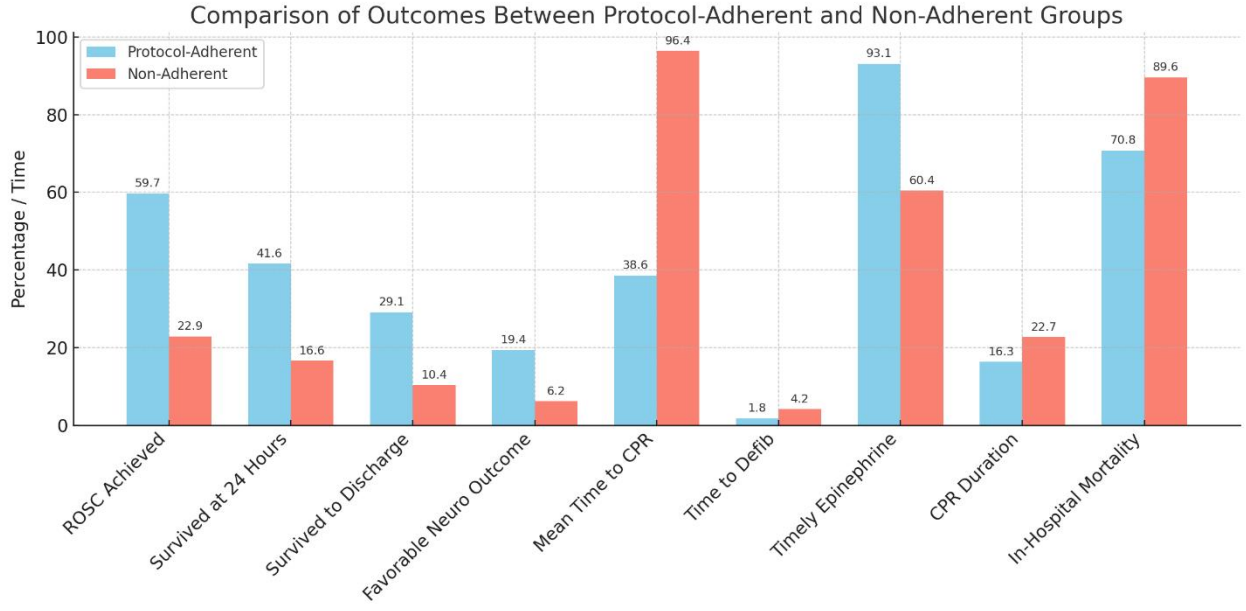


Figure 4: Summary of the results

Mortality Rates

The total mortality rate in hospitals was 78.3% (94 out of 120 patients). In Group A, mortality was 70.8%, while in Group B it was clearly more than 89.6%, highlighting the harmful effects of delayed or incomplete emergency reactions (Fig. 4).

Departmental and Shift-Based Outcomes

The ICU had the highest frequencies of ROSC and had survival for discharge, followed by the emergency room. Patients in the departments, especially those arrested during the night shift, had poor results due to slow recognition of cardiac arrest, delay in activating code blue system and low frequent access to trained ACLS teams. The average code blue response time was 1.5 minutes in ICU and emergency, but 3.8 minutes in departments, reflecting a possible area for institutional improvement.

Discussion

Cardiac arrest is one of the most important contingency conditions facing hospital settings, where existence depends on a great extent rapid recognition, timely initiation of life -saving interventions and strict adherence to standardized protocols. The current study was held for more than six months at The Islamia University of Bahawalpur and Quaid e Azam Medical College Bahawalpur, with the aim of evaluating the role of emergency protocol in reducing mortality in hospitals during cardiac arrest events. The conclusions of this study strongly support the hypothesis that protocol -cut care improves the patient's results to a large extent in terms of survival and neurological function.

The data shows that at times and structured revival directed by internationally acclaimed protocols, such as the American Heart Association (AHA) ACLS guidelines, are associated with better withdrawal of the intuitive circulation (ROSC), increase in the existence of 24-hour, better survival for discharge. Patients who were careed in full breeding of emergency protocols (group A) had better results than those where the protocol was not followed strictly (group B) [20]. The existence of emissions in the Protocol-Pasi Group was 29.1%, which was about three times higher than the non-Partisan group (10.4%). This in line with previous studies, which has emphasized the importance of guidelines-based exercises to improve the speeds of cardiac arrests [21].

One of the most important determinants for survival during cardiac arrest is the time of initiation of CPR. In our study, CPR was introduced within 38.6 seconds in a protocol partner group, compared to 96.4 seconds in a non-partisan group. These findings are in line with international literature that states that the chances of survival in CPR are reduced by 7-10%. Early initiation of breast contraction is important for maintaining spraying vital organs and preserving neurological functions. The findings from the study confirm that reducing the time of intervention is directly associated with better existence, especially when combined with timely defense in patients with shocking rhythms [22].

Shock rhythms, such as ventricular fibrillation (VF) and pulse, diagnose a better disease when the ventricular tachycardia (VT), immediately managed. In our study, 66.6% of VF/VT patients received ROSC, and 51.8% survived the discharge of the hospital. The average time for the first shock in the protocol side group was less than 2 minutes in a non-party group than 4 minutes. This delay greatly affected the results, which emphasizes the important character of early defusion. These findings are in line with studies from developed health care where rapid defibation is credited with more than 50% survival in shockable cardiac arrest [23].

An equally important observation was the role of drug farming, especially the time of epinephrine. When it was managed properly every 3-5 minutes under CPR, epinephrine coronary and cerebral spray pressure increase, which improves the possibility of ROSC. In the current study, 93.1% of patients in the Protocol-sided group received only 60.4% against time in the non-side work group. This difference may explain the lower ROSC and high mortality rate in group B. It also highlights a general challenge in hospital systems - lack of employees due to lack of training or inadequate monitoring of drug protocols [24].

The difference in neurological results was also remarkable. Fourteen patients with group A had a favorable neurological recovery (CPC 1-2), compared to only three from group B, neurological results are often reduced in cardiac arrest research, but they are an important way to succeed. A patient who survives with severe neurological injury can represent poor quality of survival. The study confirms that rapid intervention not only improves existence, but also increases the possibility of meaningful, functional recovery [24].

Departmental differences also affected the survival rate. The intensive care unit and emergency room, where trained employees and equipment were easily accessible, had significantly higher ROSC and survival rate. On the other hand, the delay of patients in medical and surgical wards - especially those arrested during the night shift - delay in recognition, code blue activation and arrival of the revival team. This inequality suggests the need to improve training, staffing and infrastructure in general departments. Hospital administration should consider regular practice to bridge these intervals, the correct allocation of emergency resources and probability monitoring system [25].

The group that is not partition shows the results of a delay or incorrect response in high mortality (89.6%). Some of these deaths probably followed the protocol. Factors that contribute may include a lack of ACLS-certified employees during night shifts, limited access to cardiac arrests in some departments and poor communication between team members. These operational problems should be addressed through institutional political changes, capacity building and strict enforcement of clinical standards [26].

Our findings also resonate a global anxiety for deviations in revival practices. While ACLS guidelines are widely circulated, the implementation of hospitals and departments varies. Simulation -based training has proven effective in reducing this difference. Inclusion of regular, multidisciplinary simulation in the hospital can improve the reaction time, teamwork and compliance with protocols, all directly related to the patient's survival. Another important point raised by this study requires continuous revision and feedback system. After reconstruction can provide valuable insight into being right or wrong during each event. This feedback loop encourages responsibility and continuous improvement. Hospitals with installed range of cardiac arrest have reported better survival rate due to emphasis on learning and protocol passage.

However, this study is not without boundaries. As a single center study conducted in six months, the findings may not be normal for all hospitals, especially with different resources and staffing levels. In addition, while each attempt was made to record accurate data, the observation of the study may have affected data integrity in nature and documentation. Despite these limitations, the strength of this study lies in its real - time data collection, structured function and clear storage of protocol farming. Finally, this research confirms the life -saving role of the emergency protocol during cardiac arrest in hospitals. The compliance with the standardized revival guidelines significantly reduces mortality and improves neurological results. The importance of preliminary CPR, timely defibation, correct drug administration and coordinated

teamwork cannot be exaggerated. Hospitals should prefer training, resource allocation and enforcement of protocol to ensure that each patient has the best opportunity to survive. Future multi -central studies with long follow -up periods are encouraged to validate these conclusions and lead the national revival policy reforms.

Conclusion

This study highlights the important role that plays the standardized emergency protocol to reduce the mortality rate of the hospital during cardiac arrest. Patients receiving timely, protocol-based care such as immediate CPR, initial defibation and appropriate drug administration-KO-operative circulation, 24-hour existence, discharge survival and withdrawal of favorable neurological results were significantly higher. In contrast, delayed or incomplete revival was related to poor prognosis and high mortality. Conclusions outline the importance of rapid recognition, well -coordinated team reactions and regular training in advanced cardiovascular life support (ACLS) protocols, especially in resource -limited and highly informed hospitals such as The Islamia University of Bahawalpur and Quaid e Azam Medical College Bahawalpur. Improvement in code blue system, operation of regular simulation exercises and ensure adequate staffing during all rounds can further increase survival results. These results are advocating institutional commitment to improve emergency preparation and continuous quality to strengthen the series of survival for admitted patients experiencing cardiac arrest.

Acknowledgment:

We highly acknowledge the The Islamia University of Bahawalpur and Quaid e Azam Medical College Bahawalpur, which provided us with the platform, labs, and internet source to search for the article.

Author contribution:

The authors confirm their contribution to the paper as follows: study conception, design, **Hafiz Abdul Sattar Hashmi,** Data Collection, **Faizan Mohi ud din Rawa**, Analysis, and interpretation of results, **Dr. Tabish Sohail**. Draft and manuscript preparation, **Dr. Ali Raza Saleem, Muhammad Naveed Uz Zafar**. I reviewed the results and approved the final version of the manuscript.

Data Availability:

All the work is performed in the labs of The Islamia University of Bahawalpur and Quaid e Azam Medical College Bahawalpur, and supporting data is collected from different authentic research papers.

Funding:

No funding was granted from any source.

Conflicts of interest:

The authors declare no conflict of interest.

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