Int. J Med. Pharm. Res. (P-ISSN: 2958-3675 | E-ISSN: 2958-3683)
Available on: https://ijmpr.in/

International Journal
of Medical and Pharmaceutical Research

ORGINAL ARTICLE **OPEN ACCESS**

A Database Based Prospective Analysis to Evaluate the Current State of Out of Hospital Cardiac Arrest in An Urban Tertiary Care Hospital

Pradesh Vampu[1]*, Suyash Saurabh[1], Swati Suman[1], Divya Nishi[1]

[1]Junior Resident, Department of Physiology, Rajendra Institute of Medical Sciences, Bariatu, Ranchi, Jharkhand, India 834009

OPEN ACCESS

***Corresponding Author**
Pradesh Vampu

Junior Resident, Department of Physiology, Rajendra Institute of Medical Sciences, Bariatu, Ranchi, Jharkhand, India 834009

Received: 05-12-2024
Accepted: 20-01-2025
Available online: 24-01-2025

A B S T R A C T

***Background and Objectives*:** Out-of-hospital cardiac arrest (OHCA) is a major global public health concern, especially in India, where the lack of an official registry makes it difficult to gauge the full extent of the problem. With a focus on young cardiac arrest patients, this study intends to shed light on OHCA at MMI Narayana Multi-speciality Hospital in Raipur by examining survival rates and important affecting factors. ***Materials and Techniques*:** Data from January through December 2023 were analyzed using the Utstein OHCA registry as part of a registry-based observational study that was carried out in the emergency department of the urban Indian tertiary care MMI Narayana Multi-speciality Hospital in Raipur. Non-traumatic OHCA patients of all ages who were admitted to the hospital met the inclusion criteria. ***Results*:** Of the 123 non-traumatic OHCA instances, 8.1% involved laypeople doing bystander cardiopulmonary resuscitation (CPR). Young adults (18–49 years old) had a 3.1% survival rate, whereas the overall survival rate was 0.8%. Notably, increased survival rates were linked to continued CPR. ***Conclusion*:** Immediate action is needed to address low survival rates, particularly among young people in India who are experiencing OHCA. Given that citizen education takes a lot of time, our main suggestion is to focus on quick and focused interventions to increase public awareness and training. Putting emergency physicians at the center of these initiatives enables them to handle complex obstacles, maximize short-term results, and support ongoing OHCA care development in India.

Keywords: Cardiopulmonary resuscitation, Emergency medical services, Extracorporeal membrane oxygenation, India, Observation, Out-of-hospital cardiac arrest, Registries, Survival rate.

INTRODUCTION

A serious worldwide public health concern that impacts people of all ages is out-of-hospital cardiac arrest (OHCA) [1]. Interestingly, OHCA patients in India show a clear trend: Compared to their counterparts in other Asian nations, they are younger and have significantly poorer survival rates [2]. Given the seriousness of this problem, we are steadfastly committed to enhancing the prognosis for OHCA patients, especially those who are young. We set up an OHCA register at our center in order to address this important issue in its entirety. From the beginning of cardiac arrest until transfer, treatment, and final prognosis, the registry painstakingly records all pertinent information. We hope to offer a perceptive picture of the present OHCA situation in one of the biggest cities in South India by using the abundance of data gathered through this register. The goal of our analysis is to determine existing.

Materials and Techniques

Using data from January to December, 2023 this registry-based observational study was conducted in the emergency department (ED) of a tertiary care hospital in a Indian city named Raipur. The hospital has a post-resuscitation intensive care facility, a 24-hour cardiac catheterization capabilities, and an emergency transport service. We created the Utstein OHCA registry to collect thorough and standardized data. We took ideas from well-known registries like the European register of Cardiac Arrest and the Cardiac Arrest Registry to Enhance Survival [4] in order to customize our register to our local setting [5]. A thorough post-hospital course will be described for patients who have been successfully resuscitated, and the Cerebral Performance Category (CPC) score will be used to track discharged

persons' results for up to a year. For comparison, data from patients who went into cardiac arrest after arriving at the emergency department has also been examined throughout that time.

Criteria for Inclusion: All ages of non-traumatic OHCA patients are brought to our facility.

Criteria for Exclusion

Patients pronounced dead outside of the hospital (due to rigormortis, for example, or for transportation to the mortuary). The Institutional Ethics Committee gave its approval to the study on December 12, 2024 (No: MMI/IN/112-2024). By using a unique identity and password-protected data entry that only authorized users could access, patient confidentiality was secured. Information was entered into Microsoft Excel. Whereas continuous data were displayed as median and interquartile range (IQR), categorical variables were summarized using frequencies and percentages. Using Fisher's exact test, we evaluated whether there were any significant differences between the two groups' risk ratios for survival to admission and survival to discharge. Statistical significance was defined as a p-value of less than 0.05. Our statistical computing environment was R Software Version 4.3.1, created by the R Core Team (2021). When necessary, the responsible physician reviewed the data. Missing data was labeled as "Unknown," and recalled data—additional information acquired later—was added to the dataset. To preserve the missing data, cases with partial data for particular variables were added to the registry.

RESULTS

With the exception of eight severe OHCA instances, 123 of the 131 OHCA patients who were admitted to our hospital between January 1, 2023, and December 31, 2023, were included in the analysis. Table 1 provides information about these 123 non-traumatic OHCA patients. Twelve patients survived to be admitted to the hospital, and one patient lived to be discharged (Fig 1). Only three cases (2.4%) out of the 123 patients had shockable beginning rhythms; the majority had non-shockable rhythms. Details of the 13 cases (10.6%) in which bystander cardiopulmonary resuscitation (CPR) was carried out are displayed in Table 2. This comprises bystander CPR carried out by healthcare professionals (HCPs) and emergency medical technicians (EMTs); aside from these, 10 instances (8.1%) had laypeople performing bystander CPR.

Notably, coworkers started CPR right away in four out of seven office instances and two out of two at sports facilities, but bystanders started CPR in five out of 95 cases that happened at home. Emergency medical services (EMS) provided continuous cardiopulmonary resuscitation (CPR) for all office and sports ground cases as they were transferred to the hospital. The automated external defibrillator (AED) was only used in the office twice during the study period; one of those instances resulted in defibrillation, while the other did not. Only 11 (21%) of the 52 cases who were transported by EMS had CPR administered by EMTs. Only three cases—all of which had asystole—were found to have the original rhythm in the ambulance. The first rhythm was established when the patients arrived at the hospital in the remaining cases. Non-emergency transportation was heavily relied upon, accounting for 57.7% of all forms of transit.

A median of 41.5 minutes (IQR 30–60) was recorded for the time between cardiac arrest and hospital arrival in 86 instances. Five (55.6%) and one (11.1%) of the nine patients who received continuous CPR—that is, CPR that was given continuously and without interruption from the scene of the arrest until they arrived at the hospital—lived to be admitted. However, only seven (6.14%) of the 114 patients who did not get continuous CPR because bystander CPR was absent or interrupted made it to admission, and none made it to release. When continuous CPR was used instead of not, the risk ratio (RR) for survival to hospital admission was 9.05 (95% CI: 3.59–22.8, $p < 0.001$). (Table 3). The aetiology included 81 patients (66%) with unidentified reasons and 20 instances (16%) with a cardiogenic cause, including suspected cardiac aetiology.

Table 1: Characteristics of non-traumatic OHCA patients

Characteristics	*No.*	*%*
Total Non-traumatic OHCA	123	
Age (y), median (IQR)		
68 (47.5–76)		
Age, groups		
0–17	2	1.6%
18–49	32	26%
50–79	74	60.2%
80–99	15	12.2%
Gender		
Male	88	71.5%
Female	35	28.5%
Event location		
Home	95	77.2%
Office	7	5.7%
In transit	6	4.9%
In Ambulance	5	4.1%
Healthcare facility	4	3.3%
Unknown	3	2.4%
Sports ground	2	1.6%
Outside	1	0.8%
Witness		
Seen or heard	91	74%
Unwitnessed	20	16.3%
Unknown	12	9.8%
Bystander CPR		
Yes	13	10.6%
No	110	89.4%
Transportation		
Private vehicle	61	49.6%
Ambulance	52	42.3%
Auto rickshaw	9	7.3%
Carried manually	1	0.8%
Continuous CPR to hospital	9	7.3%
Initial rhythm		
Asystole	116	94.3%
PEA	3	2.4%
pVT	1	0.8%
VF	1	0.8%
AED shockable	1	0.8%
AED non-shockable	1	0.8%
Admission		
Yes	12	9.8%
No	111	90.2%
Survival to discharge		
Yes	1	0.8%
No	122	99.2%
Aetiology		
Unknown	81	65.9%
Cardiac	20	16.3%
Hanging	4	3.3%
Suffocation	3	2.4%
Septic shock	3	2.4%
CVA	2	1.6%
Respiratory	2	1.6%
Poisoning	1	0.8%
Other	7	5.7%

AED, automated external defibrillator; CPR, cardiopulmonary resuscitation; CVA, cerebrovascular accident; IQR, interquartile range; OHCA, out-of-hospital cardiac arrest; PEA, pulseless electrical activity; pVT, pulseless ventricular tachycardia.

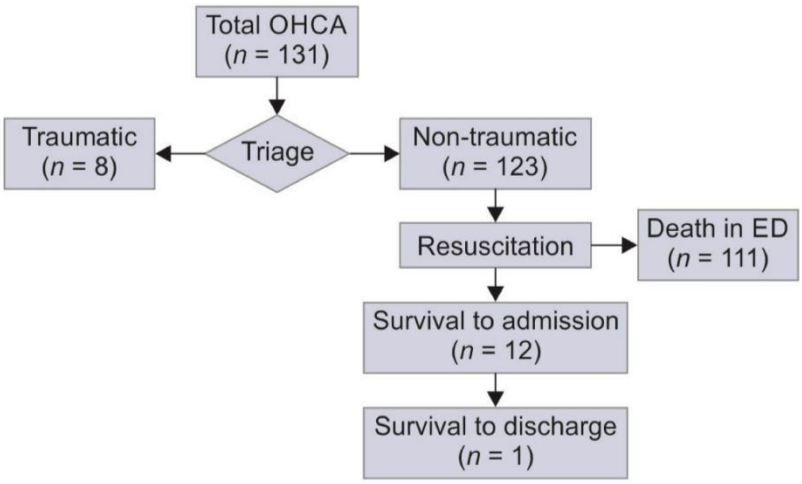

Fig 1: Flowchart of OHCA patient progression ED, emergency department; OHCA, out-of-hospital cardiac arrest

Table 2: Details of patients who received any bystander CPR

Age/ Gender	*Location*	*Bystander CPR by*	*Bystander CPR Duration (min)*	*Transported by*	*Continuous CPR to hospital*	*Duration from arrest to hospital arrival (min)*	*Survival to admission*	*Survival to discharge*
66/F	Home	EMT	33	Ambulance	Yes	33	No	No
52/M	Home	Bystander	<1	Private vehicle	No	20	No	No
99/F	Home	Bystander	<1	Ambulance	No	30	No	No
71/M	Home	Bystander	3	Private vehicle	No	23	No	No
89/M	Home	Bystander	Unknown	Private vehicle	No	30	No	No
28/M	Office	Bystander	14	Ambulance	Yes	14	No	No
43/M	Office	Bystander	22	Ambulance	Yes	22	Yes	No
46/M	Office	Bystander	24	Ambulance	Yes	20	Yes	Yes (CPC1)
37/M	Office	Bystander	Unknown	Ambulance	Yes	20	Yes	No
44/M	Sports ground	Bystander	5	Ambulance	Yes	15	Yes	No
37/M	Sports ground	Bystander	20	Ambulance	Yes	20	No	No
23/M	In Ambulance	HCP	20	Ambulance	Yes	20	Yes	No
69/F	In Ambulance	EMT	Unknown	Ambulance	Yes	Unknown	No	No

CPC, cerebral performance category; CPR, cardiopulmonary resuscitation; EMT, emergency medical technician; HCP, healthcare provider

Table 3: Comparison of survival outcomes in non-traumatic OHCA cases

	No. (%)		*Risk ratio (95% CI)*	*p-value*
	Continuous CPR (*n* = 9)	No continuous CPR (*n* = 114)		
Survival to admission	5 (55.6%)	7 (6.14%)	9.05 (3.59–22.8)	<0.001
Survival to discharge	1 (11.1%)	0 (0%)	N/A	N/A
	OHCA (*n* = 123)	CPA in ED (*n* = 18)		
Survival to admission	12 (9.76%)	9 (50%)	0.20 (0.10–0.40)	<0.001
Survival to discharge	1 (0.81%)	3 (16.7%)	0.05 (0.005–0.44)	0.007
	Continuous CPR (*n* = 9)	CPA in ED (*n* = 18)		
Survival to admission	5 (55.6%)	9 (50%)	1.11 (0.53–2.34)	0.55
Survival to discharge	1 (11.1%)	3 (16.7%)	0.67 (0.08–5.54)	0.59

CI, confidence interval; CPA, cardiopulmonary arrest; CPR, cardiopulmonary resuscitation; ED, emergency department; OHCA, out-of-hospital cardiac arrest

With the exception of situations where ST-segment elevation on the ECG occurred following the return of spontaneous circulation (ROSC) or when cardiogenicity was highly suspected, as in the case of typical chest pain, the etiology was classified as unknown. Twelve patients (9.8%) were admitted following the achievement of ROSC, while 18 instances (14.6%) achieved any ROSC lasting 30 seconds or more. With a CPC score of one upon release, one patient (0.8%) made it out of the hospital alive, and this status was maintained six months later. These 12 individuals had a median hospital stay of 2.5 days (IQR 1.75–7.0). Nineteen patients in all arrived after visiting another medical center. Six of these were taken from the referral unit by ambulance. Only four of those were taken by ambulance while receiving

constant cardiopulmonary resuscitation. Up to 68% of patients who came from the former facility to our hospital did so via non-emergency transportation. Based only on visual inspection, four facilities identified a potential cardiac arrest and sent the patient to our center. These patients were driven in both public and private automobiles without a medical attendant.

Table 4: Details of non-traumatic cardiac arrests in the emergency department.

Age	*Gender*	*Initial rhythm*	*Low-flow time*	*Admission*	*Survival to discharge*	*LOS*	*Aetiology*
Subset of patients in whom ROSC was not achieved							
27	M	PEA	N/A	No	No	N/A	Cardiogenic
71	M	PEA	N/A	No	No	N/A	Cardiogenic
73	M	Asystole	N/A	No	No	N/A	Cardiogenic
48	M	PEA	N/A	No	No	N/A	Septic shock
73	M	PEA	N/A	No	No	N/A	Septic shock
70	F	Asystole	N/A	No	No	N/A	Malignancy
78	M	Asystole	N/A	No	No	N/A	Malignancy
86	M	PEA	N/A	No	No	N/A	Unknown
77	M	Asystole	N/A	No	No	N/A	Unknown
Subset of patients who survived to admission							
73	F	PEA	25	Yes	No	3	Cardiogenic
69	F	Asystole	6	Yes	No	9	Cardiogenic
40	M	Asystole	Unknown	Yes	No	5	Cardiogenic
65	M	PEA	3	Yes	No	2	Septic shock
71	M	PEA	8	Yes	No	8	CVA
65	M	Asystole	26	Yes	No	5	Unknown
Subset of patients who survived to discharge							
27	M	VF	10	Yes	Yes (CPC 1)	5	Cardiogenic
63	M	PEA	3	Yes	Yes (CPC 1)	4	Cardiogenic
58	M	Asystole	10	Yes	Yes (CPC 1)	13	Cardiogenic

CVA, cerebrovascular accident; CPC, cerebral performance category; LOS, length of stay; ROSC, return of spontaneous circulation, PEA, pulseless electrical activity; VF, ventricular fibrillation

Thirteen of the 32 cases (26%) of OHCA in young adults aged 18 to 49 were ascribed to cardiogenic reasons, while the remaining thirteen were categorized as having an uncertain aetiology. Furthermore, in addition to one each of Dengue Shock Syndrome, cerebrovascular accident, and poisoning, there were three hanging incidents. Ventricular fibrillation and pulseless ventricular tachycardia were the initial rhythms in one and one of these 13 cases with suspected cardiogenic causes, respectively. When an AED was used, it delivered shock in one case and did not recommend shock in another; the other nine cases were all asystole. Non-shockable starting rhythms were present in all 13 cases where the reason for the arrest was unclear. Only one instance of pulseless electrical activity was observed. The younger age group had a survival rate of 1 in 32 (3.1%), with seven of them surviving to admission and only one surviving to discharge.

Non-traumatic patients who had cardiac arrest in the emergency department following hospital admission at the same time period had noticeably greater survival rates than those who suffered OHCA. Nine (50%) and three (16.7%) of the 18 ED cardiac arrest patients made it to hospital admission and discharge, respectively (Table 4). By contrast, only 0.81% of OHCA patients made it to discharge, and only 9.76% made it to hospital admission. In comparison to ED cardiac arrests, the RR for surviving to hospital admission for OHCA was 0.20 (95% CI: 0.10–0.40, $p < 0.001$), while the RR for survival 0.05 (95% CI: 0.005–0.44, $p = 0.007$) was the time to discharge. Interestingly, at discharge, every survivor in the ED cardiac arrest group had a CPC score of 1. Furthermore, even after three months, we were able to confirm a CPC score of one for two of these patients, while one survivor was lost to follow-up.

The amount of time between starting chest compressions and reaching ROSC is known as the low-flow period. For the five OHCA patients who were given on-scene CPR until help arrived. 45 minutes (IQR 38–56 minutes) was the median low-flow duration at the hospital. Conversely, the median low-flow duration for patients who went into cardiac arrest in the emergency department was 8 minutes (IQR 3–25 minutes). However, survival to hospital admission or release did not differ statistically significantly between the two groups. In particular, when OHCA patients receiving continuous CPR were compared to those experiencing cardiac arrest in the emergency department, the risk ratio for survival to hospital admission was 1.11 (95% CI: 0.53–2.34, $p = 0.55$). For survival to discharge, the risk ratio was 0.67 (95% CI: 0.08–5.54, $p = 0.59$).

DISCUSSION

Although India does not have an official OHCA registration, earlier reports have highlighted the difficult circumstances.6–9. Beyond providing with only 0.8% of all cardiac arrests and 3.1% of young adults surviving to

discharge, this paper highlights the harsh reality of survival statistics and offers fresh insights into the limited non-traumatic OHCA environment. This result is significantly less than other studies that have been published [1, 10, 11]. Like previous registries, the bulk of OHCAs occurred in home settings and were typically observed by a lay bystander, usually a family member. This research discovered before arriving at the hospital, only 10.6% of OHCA patients received bystander CPR. This is far lower than the 40.2% recorded in the US and is consistent with findings from earlier research conducted in Raipur India [9, 10]. Family members' bystander CPR was stopped too soon, either for private car transport or because the person was too tired or didn't respond. We noticed that CPR was not continued until the patient arrived at the hospital in every OHCA instance that came from home. In each of these instances, the first rhythm seen upon arrival was asystole. The Indian account, which states that no patient found at home was released alive, is consistent with this observation [13]. On the other hand, we discovered that the vast majority of people in workplace and athletic environments received bystander CPR right away. The patients and onlookers in each of these instances were in their forties or younger. It implies that very few people, especially those in younger age groups, understand the significance of continuous cardiopulmonary resuscitation. Additionally, it's feasible that the office staff members were given the chance to learn bystander CPR and were able to respond to a cardiac arrest situation with the help of their coworkers.

It should be mentioned that although 42.3% of the OHCAs arrived by ambulance, only 21% received CPR, and 5.8% had an initial rhythm evaluation while in route. An initially startling instances that were initially sensitive to defibrillation may have disappeared as the rhythm gradually changed into one that is not shockable [14]. Since ambulances are largely used as transport vehicles and frequently cannot offer critical emergency care, as well as because there is significant variance in ambulance models and uneven technical qualifications for EMTs, it has been noted that the Indian EMS is fragmented and has limited accessibility [9, 15, 16], Additionally, about 60% of all forms of transportation were non-ambulance, such as private automobiles or auto-rickshaws. In other words, a sizable portion of people either never call EMS or, when they do, receive noticeably subpar EMS. Compared to patients whose CPR was interrupted, those who got continuous bystander CPR and made it to the hospital had noticeably higher survival rates to hospital admission. During this study period, the sole survivor was given continuous cardiopulmonary resuscitation (CPR) by his workplace colleagues during the pre-hospital phase. Patients who were arrested in the ED had noticeably better outcomes than those of all OHCAs when comparing their outcomes.

Despite the difference in median low-flow times (45 minutes for OHCA patients vs. 9 minutes for ED patients), there was no statistically significant difference in survival rates for OHCA patients who received continuous CPR from the scene until arrival at the hospital. Despite the small sample size, these findings highlight the important role that continuous CPR plays in improving survival rates. Of the patients referred from other facilities, only 20% received continuous CPR prior to arriving at our hospital; some facilities chose non-ambulance transport instead of admission, a phenomenon that suggests skill deficiencies and facility limitations, including a strong patient transport network. To better understand general practitioners' CPR awareness, proficiency, and improvement readiness, more study is possible. The study found that young individuals with OHCA who were between the ages of 18 and 49 had a 3.1% survival rate. 40.6% of the young adults in our sample had a cardiogenic cause that was proven, while another 40.6% had a "unknown cause." Given the high death rate and early onset of cardiovascular illness in India, it is likely that a significant percentage of these "unknown causes" individuals also had underlying cardiovascular disorders. According to a publication, 21% of sudden cardiac death cases in people under 50 were caused by unevaluated ischemic heart disease,20 which is in good agreement with the results of our investigation. Additionally, we noticed that a cardiogenic aetiology was probably responsible for 21.1% of the non-traumatic cardiac arrests that we received. The first stage in the chain of survival is recognizing a cardiac arrest. This is followed by prompt hospital transfer, early defibrillation, high-quality bystander CPR, and excellent post-resuscitation care. We must acknowledge the fact that the chain of survival is broken across the country before we can improve any results. More information is required for greater acceptance.

First, OHCA registries are being promoted worldwide [12, 21] to act as a readily available database for determining issues in the chain of survival, evaluating the efficacy of education, and implementing actions and ongoing quality enhancement, which eventually help to raise survival rates. We observe that while registers have been set up in a number of Indian regions [22, 23] they must be unified, which will take a substantial amount of administrative capacity. Every facility should be ready to gather and then combine data until an official registry is set up. Since OHCA cases usually go through the emergency department at practically every facility, emergency departments should be in charge of keeping the registry up to date. This study highlights the unquestionable importance of bystander CPR training in enhancing OHCA outcomes in India. Sweden [11] has recently reported a threefold increase in over the last 30 years in 30-day survival rates among young adults with favorable cerebral function. Improvements in dispatcher-assisted CPR (DACPR), extensive CPR training, the widespread availability of public AEDs, and bystander CPR rates above 60% are all responsible for this. As evidenced by earlier observations, our analysis shows low rates of bystander CPR, AED use, and EMS use [6]. In line with the findings of our investigation, a 2018 survey conducted in Bengaluru, India [24], revealed that 92% of people were not familiar with CPR, 6% were aware of AEDs, and only 3% had received training.

According to numerous studies, other crucial elements include supportive healthcare policy, high-quality emergency care, and ambulance accessibility [7-9, 13, 22]. But there's a pressing necessity can raise survival chances, particularly for patients who are younger. In order to do this, we thus suggest many crucial areas in which emergency physicians ought to be heavily involved. It was discovered that EMS providers adhere to standard procedures, which call for patients to be transported to the closest hospital in cases such as cardiac arrest. Even though this is accurate and speaks to common sense, as long as the closest facility has the necessary equipment to treat cardiac arrest. We discovered that the patient's case was transferred to a higher center right away from the initial facility they visited, often even in the same car they were brought in. This was frequently the patient's initial diagnosis of cardiac arrest. This is a weak link in the chain that could be fixed, as we have determined. The facility should identify itself as CAC upon designation, and EMS agencies should be notified that patients who are not responding or who are about to experience respiratory failure should be taken to the closest CAC instead of the closest medical establishment that is unable to do complete resuscitation. For continuous CPR, the CACs need have their own EMS system with transport capabilities. A minimum of two qualified paramedics are essential for transporting patients while sustaining continuous advanced cardiovascular life support in India, while ambulances normally only have one EMT. Furthermore, DACPR integration into CAC protocols is essential for raising the standard of bystander CPR [11]. Additionally, as previously mentioned, it is advised that all CACs create and keep an OHCA register in the Utstein format.

Although extracorporeal cardiopulmonary resuscitation (ECPR) has been used or is being used in a number of centers, it is not yet generally accessible in India. The European Resuscitation Council guidelines [21] and the American Heart Association [27] may not have strong recommendations for ECPR, but a systematic review that included data from three recent randomized controlled trials points to the intervention's possible advantages [28-31]. However, establishing patient selection criteria for ECPR is still crucial because of the procedure's resource-intensive and expensive nature [31]. Although the Extracorporeal Life Support Organization [32] (ELSO) guidelines provide insightful information, its applicability could not fully match India's particular situation. Living a healthy life, our analysis focused on young persons under 50 years old, for whom the implementation of ECPR might be rationally evaluated given an expectancy at birth of 60.3 years [33]. Additionally, as long as continuous pre-hospital CPR has been performed, the initial shockable rhythm [34] should serve as the basis for the decision to start ECPR. But in the case of India.

Due to factors like low bystander CPR rates and bystander failure to recognize cardiac arrest, witnessed cardiac arrest may not be a good candidate for ECPR. Furthermore, our research showed that the typical journey time in crowded Indian cities was 40 minutes, highlighting the significance of starting ECPR as soon as the patient arrives at the hospital. This emphasizes the necessity of creating mechanisms that enable the implementation of pre-hospital ECPR, which could eventually lead to better prognoses [35]. Only three patients in our dataset met the requirements and were considered possible ECPR candidates. They were all taken into custody for cardiogenic reasons. Only one made it to discharge alive with a positive neurological outcome; nevertheless, more research could be done to determine the possible advantages of ECPR. ECPR is mostly used for in-hospital cardiac arrest cases in India [36, 37]. Expanding its use to include OHCA scenarios is essential, though.

Limitations

Our results might not accurately reflect the whole situation in India because they are based on a single facility register. Limitations of registry research include lacking details and possible memory bias in areas that were verified with attending doctors. Additionally, one case was not followed up on after being discharged.

CONCLUSION

In India, where the high death rate from OHCA has become apparent, this study adds a new report to the scant data currently available. The study emphasizes how crucial it is to perform AED use and bystander CPR. Our main suggestion is that the first Education should be the first step in altering the situation. Even though citizen education is essential, it could take a long time for its effects to become apparent. Thus, we point out areas that need development in the interim, such as creating an OHCA registry in the Utstein manner, designating CACs with emergency systems, DACPR, mechanical CPR equipment, and the potential introduction of ECPR. Since they are the first responders in OHCA, emergency physicians can be crucial in tackling these concerns.

Clinical Significance

Critical shortcomings in Raipur India's OHCA management are revealed by our study, highlighting the urgent need for focused solutions. The extremely low survival rates highlight how urgent of calculated actions. The formation of specialized cardiac arrest centers, extensive public education on bystander cardiopulmonary resuscitation, the integration of extracorporeal cardiopulmonary resuscitation, and the establishment of an OHCA registry for thorough data collecting are among the recommendations. These programs, which highlight the critical role emergency physicians play, have a great deal of potential to improve survival rates and raise the standard of OHCA care in the area.

Source of support: Nil

Conflict of interest: None

REFERENCES

1. Yan, S., Gan, Y., Jiang, N., Wang, R., Chen, Y., Luo, Z., ... &Lv, C. (2020). The global survival rate among adult out-of-hospital cardiac arrest patients who received cardiopulmonary resuscitation: a systematic review and meta-analysis. *Critical care*, *24*(1), 1-13. DOI: 10.1186/s13054-020-2773-2.
2. Ong, M. E. H., Do Shin, S., Ko, P. C. I., Lin, X., Ma, M. H. M., Ryoo, H. W., ... & Tanaka, H. (2022). International multi-center real world implementation trial to increase out-of-hospital cardiac arrest survival with a dispatcher-assisted cardio-pulmonary resuscitation package (Pan-Asian resuscitation outcomes study phase 2). *Resuscitation*, *171*, 80-89. DOI: 10.1016/j.resuscitation.2021.12.032.
3. Perkins, G. D., Jacobs, I. G., Nadkarni, V. M., Berg, R. A., Bhanji, F., Biarent, D., ... &Zideman, D. A. (2015). Utstein Collaborators. Cardiac Arrest and Cardiopulmonary Resuscitation Outcome Reports: Update of the Utstein Resuscitation Registry Templates for Out-ofHospital Cardiac Arrest: A Statement for Healthcare Professionals From a Task Force of the International Liaison Committee on Resuscitation (American Heart Association, European Resuscitation Council, Australian and New Zealand Council on Resuscitation, Heart and Stroke Foundation of Canada, InterAmerican Heart Foundation, Resuscitation Council of Southern Africa, Resuscitation Council of Asia); and the American Heart Association Emergency Cardiovascular Care Committee and the Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation. *Resuscitation*, 96, 328–340. DOI: 10.1016/j.resuscitation.2014.11.002.
4. McNally, B., Stokes, A., & Crouch, A. (2009). CARES Surveillance Group. CARES: Cardiac Arrest Registry to Enhance Survival. *Ann Emerg Med, 54*(5), 674–683.e2. doi: 10.1016/j.annemergmed.2009.03.018.
5. Wnent, J., Masterson, S., Gräsner, J. T., Böttiger, B. W., Herlitz, J., Koster, R. W., ... & Bossaert, L. (2015). EuReCa ONE–27 Nations, ONE Europe, ONE Registry: a prospective observational analysis over one month in 27 resuscitation registries in Europe–the EuReCa ONE study protocol. *Scandinavian journal of trauma, resuscitation and emergency medicine*, *23*, 1-6. Doi: 10.1186/s13049-015-0093-3.
6. Patel, H., Mahtani, A. U., Mehta, L. S., Kalra, A., Prabhakaran, D., Yadav, R., ... &Tamirisa, K. P. (2023). Outcomes of out of hospital sudden cardiac arrest in India: A review and proposed reforms. *Indian Heart Journal*, *75*(5), 321–326. Doi: 10.1016/j.ihj.2023.08.005.
7. Pandian, G. R., Thampi, S. M., Chakraborty, N., Kattula, D., &Kundavaram, P. P. A. (2016). Profile and outcome of sudden cardiac arrests in the emergency department of a tertiary care hospital in South India. *Journal of Emergencies, Trauma, and Shock*, *9*(4), 139-145. DOI: 10.4103/0974-2700.193348.
8. Krishna, C. K., Showkat, H. I., Taktani, M., & Khatri, V. (2017). Out of hospital cardiac arrest resuscitation outcome in North India—CARO study. *World Journal of Emergency Medicine*, *8*(3), 200-205. DOI: 10.5847/wjem.j.1920-8642.2017.03.007.
9. Bhat, R., Ravindra, P., Sahu, A. K., Mathew, R., & Wilson, W. (2021). Study of pre-hospital care of out of hospital cardiac arrest victims and their outcome in a tertiary care hospital in India. *Indian Heart Journal*, *73*(4), 446-450. DOI: 10.1016/j. ihj.2021.02.004.
10. Tsao, C. W., Aday, A. W., Almarzooq, Z. I., Anderson, C. A., Arora, P., Avery, C. L., ... & American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee. (2023). Heart disease and stroke statistics—2023 update: a report from the American Heart Association. *Circulation*, *147*(8), e93-e621. DOI: 10.1161/CIR.0000000000001123.
11. Gustafsson, L., Rawshani, A., Råmunddal, T., Redfors, B., Petursson, P., Angerås, O., ... &Myredal, A. (2023). Characteristics, survival and neurological outcome in out-of-hospital cardiac arrest in young adults in Sweden: A nationwide study. *Resuscitation Plus*, *16*, 100503. DOI: 10.1016/j.resplu.2023.100503.
12. Kiguchi, T., Okubo, M., Nishiyama, C., Maconochie, I., Ong, M. E. H., Kern, K. B., ... & Iwami, T. (2020). Out-of-hospital cardiac arrest across the World: First report from the International Liaison Committee on Resuscitation (ILCOR). *Resuscitation*, *152*, 39-49. DOI: 10.1016/j.resuscitation.2020.02.044.
13. Grewal, C. S., Singh, B., Bansal, R., Sidhu, U. S., Gupta, D., Tandon, R., ... & Mohan, B. (2018). Outcome in survivors of out-of-hospital cardiac arrest in a tertiary care center of North India: A prospective observational study. *Journal of the Practice of Cardiovascular Sciences*, *4*(3), 193-197. DOI: 10.4103/jpcs.jpcs_53_18.
14. Kurkciyan, I., Meron, G., Behringer, W., Sterz, F., Berzlanovich, A., Domanovits, H., ... &Laggner, A. N. (1998). Accuracy and impact of presumed cause in patients with cardiac arrest. *Circulation*, *98*(8), 766-771. DOI: 10.1161/01.cir.98.8.766.
15. Sharma, M., & Brandler, E. S. (2014). Emergency medical services in India: the present and future. *Prehospital and disaster medicine*, *29*(3), 307-310. DOI: 10.1017/S1049023X14000296.
16. Plummer, V., & Boyle, M. (2017). EMS systems in lower-middle income countries: a literature review. *Prehospital and disaster medicine*, *32*(1), 64-70. DOI: 10.1017/S1049023X1600114X.

17. Prabhakaran, D., Jeemon, P., & Roy, A. (2016). Cardiovascular diseases in India: current epidemiology and future directions. *Circulation*, *133*(16), 1605-1620. DOI: 10.1161/CIRCULATIONAHA.114.008729.
18. Kumar, A. S., & Sinha, N. (2020). Cardiovascular disease in India: A 360 degree overview. *Medical Journal Armed Forces India*, *76*(1), 1-3. DOI: 10.1016/j.mjafi.2019.12.005.
19. Kalra, A., Jose, A. P., Prabhakaran, P., Kumar, A., Agrawal, A., Roy, A., ... & Prabhakaran, D. (2023). The burgeoning cardiovascular disease epidemic in Indians–perspectives on contextual factors and potential solutions. *The Lancet Regional Health-Southeast Asia*, *12*, 100156. DOI: 10.1016/j.lansea.2023.100156.
20. Rao, B. H. (2014). Global burden of sudden cardiac death and insights from India. *indian heart journal*, *66*, S18-S23. DOI: 10.1016/j. ihj.2013.11.009.
21. Perkins, G. D., Gräsner, J. T., Semeraro, F., Olasveengen, T., Soar, J., Lott, C., ... &Zideman, D. A. (2021). European resuscitation council guidelines 2021: executive summary. *Resuscitation*, *161*, 1-60. DOI: 10.1016/j.resuscitation.2021.02.003.
22. Ramaka, S., Nazir, N. T., Murthy, V. S., Hoek, T. V., Prabhakar, B. S., Chodavarapu, R., ... & Weine, S. M. (2020). Epidemiology of out-of-Hospital Cardiac Arrests, knowledge of cardiovascular disease and risk factors in a regional setting in India: The Warangal Area out-of-hospital Cardiac Arrest Registry (WACAR). *Indian Heart Journal*, *72*(6), 517-523. DOI: 10.1016/j.ihj.2020.10.002.
23. Clerk, A. M., Patel, K., Shah, B. A., Prajapati, D., Shah, R. J., Rachhadia, J., ... & Vyas, B. (2023). Arrest Outcome Consortium Registry Analysis [AOCRA 2022]: Outcome Statistics of Cardiac Arrest in Tertiary Care Hospitals in India, Analysis of Five Year Data of Indian Online Cardiac Arrest Registry, www. aocregistry. com. *Indian Journal of Critical Care Medicine: Peer-reviewed, Official Publication of Indian Society of Critical Care Medicine*, *27*(5), 322-329. DOI: 10.5005/jp-journals-10071- 24457.
24. Duber, H. C., McNellan, C. R., Wollum, A., Phillips, B., Allen, K., Brown, J. C., ... & Ng, M. (2018). Public knowledge of cardiovascular disease and response to acute cardiac events in three cities in China and India. *Heart*, *104*(1), 67-72. DOI: 10.1136/ heartjnl-2017-311388.
25. Yeung, J., Matsuyama, T., Bray, J., Reynolds, J., &Skrifvars, M. B. (2019). Does care at a cardiac arrest centre improve outcome after out-of-hospital cardiac arrest?—A systematic review. *Resuscitation*, *137*, 102-115. DOI: 10.1016/j.resuscitation.2019.02.006.
26. Yeo, J. W., Ng, Z. H. C., Goh, A. X. C., Gao, J. F., Liu, N., Lam, S. W. S., ... & Ho, A. F. W. (2022). Impact of cardiac arrest centers on the survival of patients with nontraumatic out-of-hospital cardiac arrest: a systematic review and meta-analysis. *Journal of the American Heart Association*, *11*(1), e023806. DOI: 10.1161/JAHA.121.023806.
27. Perman, S. M., Elmer, J., Maciel, C. B., Uzendu, A., May, T., Mumma, B. E., ... & American Heart Association. (2024). 2023 American Heart Association Focused Update on Adult Advanced Cardiovascular Life Support: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*, *149*(5), e254-e273. DOI: 10.1161/CIR.0000000000001194.
28. Yannopoulos, D., Bartos, J., Raveendran, G., Walser, E., Connett, J., Murray, T. A., ... & Aufderheide, T. P. (2020). Advanced reperfusion strategies for patients with out-of-hospital cardiac arrest and refractory ventricular fibrillation (ARREST): a phase 2, single centre, open-label, randomised controlled trial. *The lancet*, *396*(10265), 1807-1816. DOI: 10.1016/S0140-6736(20)32338-2.
29. Belohlavek, J., Smalcova, J., Rob, D., Franek, O., Smid, O., Pokorna, M., ... & Prague OHCA Study Group. (2022). Effect of intra-arrest transport, extracorporeal cardiopulmonary resuscitation, and immediate invasive assessment and treatment on functional neurologic outcome in refractory out-of-hospital cardiac arrest: a randomized clinical trial. *Jama*, *327*(8), 737-747. DOI: 10.1001/jama.2022.1025.
30. Suverein, M. M., Delnoij, T. S., Lorusso, R., Brandon Bravo Bruinsma, G. J., Otterspoor, L., Elzo Kraemer, C. V., ... & Van De Poll, M. C. (2023). Early extracorporeal CPR for refractory out-of-hospital cardiac arrest. *New England Journal of Medicine*, *388*(4), 299-309. DOI: 10.1056/NEJMoa2204511.
31. Holmberg, M. J., Granfeldt, A., Guerguerian, A. M., Sandroni, C., Hsu, C. H., Gardner, R. M., ... & Andersen, L. W. (2023). Extracorporeal cardiopulmonary resuscitation for cardiac arrest: An updated systematic review. *Resuscitation*, *182*, 109665. DOI: 10.1016/j. resuscitation.2022.12.003.
32. Richardson, A. S. C., Tonna, J. E., Nanjayya, V., Nixon, P., Abrams, D. C., Raman, L., ... & Pellegrino, V. (2021). Extracorporeal cardiopulmonary resuscitation in adults. Interim guideline consensus statement from the extracorporeal life support organization. *Asaio Journal*, *67*(3), 221-228. DOI: 10.1097/MAT.0000000000001344.
33. World Health Organization. Life expectancy Data. Available from: https://data.who.int/countries/356.
34. Havranek, S., Fingrova, Z., Rob, D., Smalcova, J., Kavalkova, P., Franek, O., ... & Belohlavek, J. (2022). Initial rhythm and survival in refractory out-of-hospital cardiac arrest. Post-hoc analysis of the Prague OHCA randomized trial. *Resuscitation*, *181*, 289-296. DOI: 10.1016/j.resuscitation.2022.10.006.
35. Lamhaut, L., Hutin, A., Puymirat, E., Jouan, J., Raphalen, J. H., Jouffroy, R., ... & Carli, P. (2017). A pre-hospital extracorporeal cardio pulmonary resuscitation (ECPR) strategy for treatment of refractory out hospital cardiac arrest: an observational study and propensity analysis. *Resuscitation*, *117*, 109-117. DOI: 10.1016/j.resuscitation.2017.04.014.

36. Gulla, K. M., Sahoo, T., Pooboni, S. K., & Oza, P. (2021). Extracorporeal Cardiopulmonary Resuscitation in Indian Scenario: A Web-based Survey. *Indian Journal of Critical Care Medicine: Peer-reviewed, Official Publication of Indian Society of Critical Care Medicine*, *25*(6), 675-679. DOI: 10.5005/jp-journals-10071- 23850.
37. Kumar, K. M. (2021). ECPR-extracorporeal cardiopulmonary resuscitation. *Indian J Thorac Cardiovasc Surg*, *37*(Suppl 2), 294–302. DOI: 10.1007/s12055-020-01072-2.