From Scene to Survival: Anesthetic and Critical Care Insights into Out-of-Hospital Cardiac Arrest Outcomes

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Abstract

Out-of-hospital cardiac arrest (OHCA) occurs when the heart pauses to function outside of a medical facility. The high mortality rate persists despite advancements in resuscitation research, rendering it a significant global public health issue. To substantially reduce mortality associated with OHCA, a comprehensive understanding of all management phases—pre-hospital, in-hospital, and post-discharge—is essential. Pre-hospital factors, such as community socioeconomic level, bystander cardiopulmonary resuscitation (CPR), and access to defibrillators, are essential for early survival. In-hospital variables, like the accessibility of round-the-clock cardiac interventional treatments and structured emergency reception systems, can affect outcomes. Post-discharge survival mostly depends on patient adherence to medical and lifestyle interventions, psychological support, and rehabilitation programs. This assessment consolidates information about the factors influencing the management of OHCA and identifies critical issues and opportunities within the Jordanian healthcare system.

Introduction

Sudden cardiac arrest (SCA) is a significant public health issue globally due to its high mortality rate and prevalence among individuals. This necessitates the implementation of rapid response systems and comprehensive CPR training programs [1,2]. Out-of-hospital cardiac arrest (OHCA), as delineated by the 1997 Utstein guidelines and reaffirmed by the 2013 AHA update, refers to cardiac arrest occurring in individuals outside of emergency departments or hospital settings, and constitutes the predominant cause of cardiac-related mortality in developed countries. Nearly 90% of out-of-hospital cardiac arrest cases are attributable to coronary artery disease and dilated cardiomyopathy. The global average incidence is 95.9 cases per 100,000 persons annually [3]. Despite ad-

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vancements in technology and improved resuscitation techniques in hospitals, the fatality rate for out-of-hospital cardiac arrest (OHCA) remains as high as 90%, rendering it one of the leading causes of death in affluent countries [2,4,5]. Outcomes of out-of-hospital cardiac arrest (OHCA) are influenced by several factors at multiple stages: pre-hospital, in-hospital, and post-discharge, determined by community preparedness, system effectiveness, and rehabilitation strategies. Significant regional disparities exist: research indicates that those living in cities have a much higher survival rate compared to their rural counterparts due to the greater prevalence of bystander CPR, availability to AEDs, and expedited emergency response times [6,7]. In Jordan, outcomes following out-of-hospital cardiac arrest (OHCA) remain suboptimal. Raffee et al. reported an overall survival percentage of 2.97%, which rose to 4.3% when cardiopulmonary resuscitation was initiated before hospital arrival [8]. These results underscore the critical need for immediate community intervention and structured post-arrest care. This study examines the determinants influencing outcomes of out-of-hospital cardiac arrest (OHCA) prior to, during, and subsequent to admission. It addresses the issues within the Jordanian healthcare system and provides evidence-based recommendations for improvement.

Methodology

This narrative review employed a systematic search strategy to identify relevant studies regarding outcomes of out-of-hospital cardiac arrest (OHCA) and their associated factors. We conducted a search in databases such as PubMed and Scopus for combinations of the following keywords: ”Out-of-hospital cardiac arrest,” ”pre-hospital care,” ”cardiac catheterization,” ”rehabilitation,” and ”Jordan.” We examined peer-reviewed articles, meta-analyses, and data from national registries published in English. The selection concentrated on studies that offered insights into pre-hospital, in-hospital, and post-hospital management, along with those of regional relevance. The synthesis aimed to qualitatively capture factors associated with survival instead than providing individual research data.

Pre-Hospital Considerations

Survival following out-of-hospital cardiac arrest is significantly influenced by events occurring before to hospital admission. Research indicates that immediate bystander CPR and rapid emergency assistance are the primary factors influencing favorable outcomes [9]. Delays in scene or transit time, together with advanced airway interventions, frequently have little connection with 30-day survival rates. Regional disparities exist: suburban areas had a higher frequency of arrests and AED utilization compared to rural regions [9]. Nonetheless, even in the presence of advanced critical care teams, adjusted studies indicate that there is no independent correlation after accounting for other variables [10]. Advanced age, prolonged ambulance response time, extended duration of CPR, and pre-existing cardiac conditions are all unfavorable indicators. Bystander CPR, the presence of an early shockable rhythm, and seeing a collapse are all positive indicators. In Jordan, challenges encompass inadequate interagency collaboration, cultural disparities, restricted access to AEDs, and insufficient community training, hindering the enhancement of survival rates prior to hospitalization. Proposed remedies include statewide CPR instruction, enhancement of the EMS infrastructure, placement of AEDs in public areas, and the adoption of technology-based reporting systems to augment bystander response.

Hospital-related factors

The attributes of a hospital are crucial in determining the survival of an individual who

has experienced an out-of-hospital cardiac arrest post-resuscitation. Institutions providing round-the-clock cardiac catheterization services, prompt patient intake (notably from 08:00 to 17:00), and adhering to established post-arrest protocols have significantly higher survival rates [11,12,13,14,15]. Conversely, factors such as the quantity of hospital beds or the incidence of out-of-hospital cardiac arrests do not independently forecast survival rates. Beneficial in-hospital biochemical and physiological indicators—absence of seizures, normothermia (37.8°C), base excess ¿3.5 mmol/L, and serum glucose 10.6 mmol/L—are associated with improved prognosis [15]. While advanced cardiac life support (ACLS) pre-hospital interventions are important, their integration into basic life support does not improve discharge survival rates during in-hospital delays [16]. To improve in-hospital outcomes in Jordan, the government must increase funding, assign additional resources, establish regional cardiac centers, standardize post-resuscitation protocols, and boost communication and training for emergency personnel.

Actions To Take Post-Hospitalization

The long-term survival and quality of life after out-of-hospital cardiac arrest (OHCA) depend on factors that persist after hospital discharge. Medication adherence, participation in rehabilitation, and psychological well-being are essential elements affecting sustained recovery [17,18,19]. Barriers to adherence include complex drug schedules, psychological distress, forgetfulness, and socioeconomic constraints, whereas facilitators comprise patient education, simplified treatment protocols, social support, and efficient contact with providers [18,19]. Comprehensive cardiac rehabilitation and multidisciplinary follow-up clinics improve cardiovascular fitness, mental well-being, and medication compliance [20,21]. Telemedicine monitoring facilitates continuous treatment by enhancing access to specialists and enabling early issue detection [22,23,24,25,26]. Psychosocial interventions, including individual counseling, cognitive-behavioral therapy, and peer support, mitigate anxiety, depression, and PTSD in survivors [27,28,29]. Engaging family members in rehabilitation facilitates emotional healing and enhances the efficacy of caregivers in their roles. Altering your lifestyle, including cessation of smoking, consistent exercise, and consumption of heart-healthy foods, remains one of the most crucial methods to prevent recurrence of incidents [25,26]. Ultimately, a nurturing family environment fosters greater independence and facilitates recovery.

Summary factors

In the pre-hospital phase, several factors influence outcomes following cardiac arrest. Positive predictors include early bystander CPR, a witnessed arrest, an initial shockable rhythm, use of an AED, female sex, and occurrence in densely populated areas—all of which are associated with improved survival and neurologic outcomes. In contrast, older age, prolonged ambulance response or CPR duration, and a history of cardiac disease negatively affect the likelihood of survival. Some factors appear to have little to no impact on outcomes, including scene time, transport time, and the use of advanced airway interventions. During the in-hospital phase, certain characteristics of care are associated with better outcomes. The presence of a 24-hour catheterization lab, admission during daytime hours, maintenance of normothermia, maintenance of normoglycemia, and the absence of seizures all positively predict survival and neurologic recovery. A delayed arrival to the hospital, however, is linked to worse outcomes. Other factors, such as overall hospital bed count and the volume of out-of-hospital cardiac arrest cases treated, appear to have no clear effect on patient prognosis. In the post-hospital phase, long-term recovery is shaped by several sup-

portive factors. Medication adherence, participation in structured rehabilitation programs, psychosocial support, telemedicine follow-up, and strong family engagement all contribute to improved outcomes and sustained recovery. On the other hand, financial strain, medication side effects, depression, and anxiety can hinder recovery and negatively affect long-term prognosis. No neutral predictors have been identified at this stage.

Conclusion

Out-of-Hospital Cardiac Arrest (OHCA) is a complex emergency requiring extensive coordinated care before, during, and after hospitalization. For survival, the community must react promptly, hospitals must implement structured protocols, and long-term rehabilitation must be comprehensive. Despite improvements in Jordan, survival rates remain inadequate. This underscores the significance of educating individuals in CPR, providing further interventional treatments, and establishing rehabilitation programs post-hospital discharge. Survival rates for out-of-hospital cardiac arrest can be significantly enhanced by the integration of healthcare policy, education, and systemic investments. Below are the final recommendations from out paper: • Enhancements prior to hospital admission: Establish global CPR training, public AED networks, and standardized EMS protocols. • Enhancing hospital care: Augment 24-hour cardiac intervention services, establish specialized post-resuscitation units, and ensure adherence to guidelines. • Post-hospital rehabilitation: Establish comprehensive countrywide follow-up services encompassing cardiac rehabilitation, mental health support, and telemedicine monitoring. • Policy and infrastructure: Ensure that all tiers of emergency and cardiac care receive the necessary funding, data-informed planning, and training.

Conflict of Interest

The authors declare that they have no competing interests.

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