Cardiac Arrest Resuscitation

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KEYWORDS

• Cardiac arrest • Defibrillation • Chest compressions • Airway • Medications

KEY POINTS

- Pit crew–style cardiopulmonary resuscitation improves efficiency, communication, and is associated with improved outcomes.
- Large, randomized controlled trials are underway to address the optimal strategy for ALS resuscitation.
- No resuscitative medication has ever been shown to improve long-term survival or neurologic outcomes.
- The duration of the peri-shock pause is inversely associated with survival and neurologic outcomes.
- High-quality observational evidence suggests that routine prehospital advanced airway management is associated with worse outcomes; a well-conducted randomized trial is needed to address this question.
- Extracorporeal life support is an exciting new therapy that is gaining traction in the United States.

INTRODUCTION

Out-of-hospital cardiac arrest (OHCA) is a profound clinical and public health challenge, both in the United States and across the globe. The incidence of OHCA globally is highest in Australia (113 per year per 100,000 population), followed by North America (94 per year per 100,000 population), Europe (86 per year per 100,000 population), and Asia (55 per year per 100,000 population).[1] Cardiovascular disease is the most common cause of OHCA, and death caused by cardiovascular disease accounts

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for one-third of annual deaths in the United States.[2] The incidence of OHCA from a presumed cardiac cause is highest in North America (55 per year per 100,000 population), followed by Australia (44 per year per 100,000 population), Europe (35 per year per 100,000 population), and Asia (32 per year per 100,000 population).[1] OHCA is more likely to be from a cardiac cause in patients older than 35 years and more likely to be from a noncardiac cause in patients younger than 35 years.[3] In fact, 83% of cardiac arrests occurring in patients younger than 19 years are noncardiac in origin.[4] Health care providers are notoriously inaccurate in predicting the cause of OHCA, often underestimating noncardiac causes.[5,6]

There is marked regional variation in outcomes from OHCA, as documented by a 10-site North American resuscitation research consortium with a total catchment population of 21.4 million.[7] The median survival to hospital discharge of emergency medical services (EMS)–treated patients with cardiac arrest was 8.4% (interquartile range: 5.4%–10.4%), with survival rates ranging from 3.0% to 16.3% across North America. Survival was markedly higher in patients with ventricular fibrillation (VF) as the initial rhythm. The median survival to hospital discharge in this subpopulation was 22.0% (interquartile range: 15.0%–24.4%), with survival rates ranging from 7.7% to 39.9% across the same geographic locales.

Resuscitation science has evolved greatly since the inception of cardiopulmonary resuscitation (CPR).[8] An internal body of experts, the International Liaison Committee on Resuscitation (ILCOR), updates the guidelines and recommendations for resuscitation by health care professionals every 5 years. ILCOR conducts hundreds of systematic reviews every 5 years to delineate the latest consensus on resuscitation science and provide treatment recommendations based on available evidence and expert opinion. ILCOR recommendations are then funneled through national or regional associations (eg, American Heart Association) and packaged as educational curricula (eg, Basic Life Support or Advanced Cardiac Life Support). The emergency provider must be aware of the source material for these curricula and understand the accumulated evidence behind the latest recommendations. In this section, the authors highlight the latest evidence and controversies surrounding key facets of cardiac arrest resuscitation.

GENERAL MANAGEMENT CONSIDERATIONS

Cardiac arrest is a dynamic disease. Few other clinical presentations strain the multitasking and leadership abilities of the emergency physician to the same degree. However, the astute clinician must realize that he or she is orchestrating only one portion of a larger series of events, each of which directly affects patient outcomes. Prehospital and/or emergency department resuscitation to achieve return of spontaneous circulation (ROSC) is only one small piece of the puzzle. Layperson recognition of cardiac arrest, activation of the EMS system, and provision of bystander CPR are equally important tasks. Likewise, the critical care, inpatient, and rehabilitation phases play crucial roles in attaining neurologically favorable survival. This larger view of cardiac arrest care is embodied in the success of bundled postresuscitation care packages that boost rates of neurologically favorable survival among patients attaining ROSC.[9]

Pit Crew Cardiopulmonary Resuscitation

Prompt and effective cardiac arrest management is often difficult in the hectic and potentially austere environments surrounding cardiac arrest. To orchestrate efficient and effective resuscitation, regimented training and good working relationships between providers are vitally important. One proposed way of managing the chaos