Simplifying Bystander CPR for Out-of-Hospital Cardiac Arrest

Rea TD, Fahrenbruch C, Culley L, et al. CPR with chest compression alone or with rescue breathing. N Engl J Med 2010;363:423–33.

Study Overview

Objective. To determine whether chest compression alone would result in improved survival as compared with chest compression plus rescue breathing for bystander cardiopulmonary resuscitation (CPR).

Design. Multicenter, randomized prospective trial of dispatcher instructions to bystanders for performing CPR.

Setting and participants. Adult persons with out-of-hospital cardiac arrest in the EMS catchment areas of King and Thurston Counties (Washington State, US) and London Ambulance Service (England) were randomized to receive chest compressions alone or chest compression plus rescue breathing as part of the Dispatcher-Assisted Resuscitation Trial (DART). Subjects were enrolled via consecutive calls to the 911 system and deemed eligible if the dispatcher determined that they were unconscious and not breathing normally and that bystander CPR was not already underway. Patients were excluded if they were younger than 18 years, had do-not-resuscitate status, or if the arrest was secondary to trauma, drowning, or asphyxiation. Study periods ranged from 2004 to 2009. Subjects were randomly assigned to 1 of 2 CPR strategies, stratified by the dispatch center and blocked in sets of 10.

Intervention. The intervention consisted of instructions to the bystander to perform either 50 chest compressions alone (1 cycle) or 2 rescue breaths followed by 15 chest compressions (1 cycle). Chest compressions were counted out loud while the dispatcher remained on the telephone. After the first cycle, the dispatcher would inquire about signs of life, and if warranted, would have the bystander continue CPR along the assigned strategy.

Main outcome measures. The primary outcome was survival to hospital discharge. Secondary outcomes were a return of spontaneous circulation (ROSC) at the end of EMS care, favorable neurologic status at hospital discharge (Cerebral Performance Category [CPC] of 1 [good cerebral performance] or 2 [moderate cerebral disability]) [1]. Dispatch, EMS, and hospital information were reviewed using a uniform data abstraction form with blinding to subject randomization status. Provision of CPR instruction and bystander initiation of chest compressions were confirmed with review of dispatch audiotape. A priori specified subgroup analyses were stratified by (1) underlying cause of arrest (cardiac, respiratory, overdose, neurologic, other), (2) presenting arrest rhythm, (3) witness status, and (4) EMS response interval among witness arrest (≤ 6 or > 6 minutes).

Results. A total of 1941 subjects met inclusion criteria with 981 randomly assigned to chest compression alone and 960 to chest compression plus rescue breathing. There were no significant differences between the 2 groups in survival to hospital discharge (12.5% in chest compression alone, 11% in chest compression plus rescue breathing; $P = 0.31$). There was a trend for improved survival for the chest compression alone vs. chest compression plus breathing group with cardiac causes of arrest (15.5% vs. 12.4%; $P = 0.09$) and for those with shockable rhythms (31.9% vs. 25.7%; $P = 0.09$).

Conclusion. There are no significant differences in survival to hospital discharge for out-of-hospital cardiac arrest persons who initially received bystander chest compression alone versus chest compression plus rescue breathing.

Commentary

Current advanced cardiac life-saving (ACLS) protocol requires that CPR consist of 30 chest compressions followed by 2 rescue breaths (30:2). The delivery of rescue breathing by bystanders potentially complicates what would otherwise be a simple action—continuous chest compressions. There has been growing momentum to focus CPR solely on continuous chest compression and minimize or completely eliminate rescue breathing.

Animal models now provide evidence that uninterrupted chest compressions result in significantly improved 24-hour post-resuscitation neurologically normal survival than those following American Heart Association (AHA) guidelines recommending 30 compressions followed by 2 rescue breaths [2]. In fact, the AHA now advocates "hands-only" CPR for bystanders not trained or competent in CPR with rescue breathing [3]. This would allow for increased and uninterrupted

circulation, is simpler and easier to train, and may be more favorably viewed and willingly performed by laypersons not having to deliver mouth-to-mouth rescue breaths.

The study by Rea et al provides further support that individuals with out-of-hospital cardiac arrest have no significant differences in survival whether bystander CPR consisted of chest compression with rescue breathing or chest compression alone. Investigators hypothesized that chest compression alone would have more favorable survival outcomes because coronary circulation with chest compressions would no longer be interrupted by inadequately delivered mouth-to-mouth rescue breathing. While only trends toward improved survival outcomes were demonstrated in patients with cardiac causes of arrest, similar survival rates between those that received both compression and breathing challenges the benefit of any rescue breathing being incorporated into bystander CPR.

Limitations of this study include the use of bystander CPR with 15 compressions to 2 rescue breaths, which is not consistent with current AHA CPR guidelines of 30:2. Findings are limited to adult CPR and cannot be extended to the pediatric population, where most arrests are due to respiratory causes. Also, findings are based on dispatcher-instructed CPR delivered by bystanders, whereby many bystander participants may not have trained in CPR techniques of delivering adequate chest compression and rescue breaths. Clinicians, who are trained and proficient in CPR, should continue to follow current ACLS guidelines of 30:2 compressions:breaths.

Applications for Clinical Practice

Bystander CPR with out-of-hospital cardiac arrest may safely consist of chest compression alone and minimize or even eliminate the need for rescue breathing.

—Review by Ula Hwang, MD, MPH

References

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