Performance Goals for Dispatcher-Assisted Cardiopulmonary Resuscitation

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An estimated 600,000 Americans are victims of sudden, unexpected out-of-hospital cardiac arrests each year.¹ Emergency medical services (EMS) providers attempt resuscitation in 360,000 of these “EMS-treated” individuals. EMS crews declare another 240,000 victims dead on arrival because the cardiac arrest was unwitnessed and the victim’s body shows physical signs that death has not just occurred. Approximately 9.5% of EMS-treated cardiac arrest victims survive to hospital discharge. However, if one includes the 240,000 victims in whom EMS does not even attempt resuscitation, the likelihood of surviving an out-of-hospital cardiac arrest in the United States is only 5.7%. Stated differently, only 1 in every 18 out-of-hospital cardiac arrest victims in the United States will survive to hospital discharge.

Despite these grim statistics, there are things that can be done to better the odds of survival for at least some of the victims. The likelihood of a favorable outcome increases substantially if the event is witnessed, if it occurs in a public place, if bystanders call 9-1-1 and initiate chest compressions promptly, if the initial rhythm is ventricular fibrillation, if an automated external defibrillator is applied and used, and if there is a prompt EMS response. Most of these variables are not under any one individual’s direct control but are subject to chance. A notable exception is bystander chest compressions, which, on average, are being performed in only approximately one third of EMS-worked cardiac arrests, but their frequency can be increased 2-fold when 9-1-1 dispatchers issue instructions that are carried out promptly and effectively.²,⁴ Omission of instructions for mouth-to-mouth ventilation, which many laypersons are unwilling to perform on strangers, does not affect survival adversely because of the presence of agonal respirations and because the lung alveoli contain sufficient oxygen to maintain the arterial oxygen saturation >90% for at least 5 to 6 minutes with chest compressions alone.⁵-⁷ In short, early provision of effective chest compressions promptly, if the initial rhythm is ventricular fibrillation, if an automated external defibrillator is applied and used, and if there is a prompt EMS response. Most of these variables are not under any one individual’s direct control but are subject to chance. A notable exception is bystander chest compressions, which, on average, are being performed in only approximately one third of EMS-worked cardiac arrests, but their frequency can be increased 2-fold when 9-1-1 dispatchers issue instructions that are carried out promptly and effectively.²,⁴ Omission of instructions for mouth-to-mouth ventilation, which many laypersons are unwilling to perform on strangers, does not affect survival adversely because of the presence of agonal respirations and because the lung alveoli contain sufficient oxygen to maintain the arterial oxygen saturation >90% for at least 5 to 6 minutes with chest compressions alone.⁵-⁷ In short, early provision of effective chest compressions can continue to deliver lifesaving oxygen to vital organs such as the brain and can “buy time” for EMS crews to arrive on scene.

The 9-1-1 dispatchers can issue chest compression instructions only to a caller who is next to a victim if the dispatcher recognizes that a cardiac arrest has likely occurred. It is well recognized that emergency medical dispatchers can be misled by layperson callers thinking that an unconscious person has simply fainted because the caller misinterprets agonal respirations or a brief period of grand mal seizure activity that can occur after the onset of cardiac arrest as a result of cerebral anoxia.⁸-¹¹ Until now, little has been known about how frequently these and other factors affect cardiac arrest recognition or provision of dispatcher-assisted chest compression instructions by 9-1-1 dispatchers. Understanding more about these factors and how to mitigate them can help dispatchers develop better interrogation strategies that can improve recognition and shorten the time to initiation of life-preserving chest compressions.

In this issue of Circulation, Lewis and Eisenberg¹² report their analysis of dispatch recordings and EMS records from 476 out-of-hospital cardiac arrest cases in King County, Washington, during 2011. The authors sought to determine the type and frequency of factors that affected dispatcher recognition of cardiac arrest and provision of timely chest compression instructions. Not surprisingly, because this community and EMS system are world-renown for their excellence in emergency care, 9-1-1 dispatchers were able to recognize the presence of cardiac arrest in 80% of the cases in a median of 75 seconds from call receipt. Dispatchers were unable to assess whether the patient was conscious or breathing normally in 13% of cases because of such factors as the caller not being at the scene (ie, medical alarm company notification), loss of phone contact, and emotional state of the caller. Thus, when able to assess patient consciousness and breathing adequately, the dispatchers were able to identify >92% of the arrests.

As in previous studies,⁵,¹⁰ agonal respirations caused confusion, particularly when the arrest occurred and was witnessed in a public place, because gasping is most obvious in the first few minutes and declines rapidly thereafter. The authors identified 3 different types of factors that delayed dispatcher recognition of cardiac arrest: dispatcher-related (eg, asking unnecessary or inappropriate questions), caller-related (eg, emotional state, vague or misleading answers to questions), and call-related (eg, language barriers, time spent moving the patient) factors. For the 381 cases in which the dispatcher recognized that a cardiac arrest was present, the median time from 9-1-1 call receipt to start of chest compressions was almost 3 minutes. Delays defined as deviation from protocol causing a time lapse of ≥5 seconds related to dispatchers, callers, or circumstances accounted for a median increase in the time to start of chest compressions of 28, 26, and 38 seconds, respectively.

The majority of the delay was due to caller and circumstance factors that were not modifiable, which begs the question of

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1. Emergency medical services (EMS) providers attempt resuscitation in 360,000 of these “EMS-treated” individuals.
2. Omission of instructions for mouth-to-mouth ventilation, which many laypersons are unwilling to perform on strangers, does not affect survival adversely.
3. Early provision of effective chest compressions can continue to deliver lifesaving oxygen to vital organs such as the brain.
4. The 9-1-1 dispatchers can issue chest compression instructions only to a caller who is next to a victim.
5. Understanding more about these factors and how to mitigate them can help dispatchers develop better interrogation strategies.
6. The authors identified 3 different types of factors that delayed dispatcher recognition of cardiac arrest: dispatcher-related, caller-related, and call-related factors.
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what might be done differently by dispatchers to further decrease “modifiable” delay. On the basis of the data presented, a common reason for such a delay was that the dispatcher asked unnecessary or inappropriate questions. This is intriguing in light of the long-standing debate in the emergency medical dispatch community as to the relative merits of 2 differing approaches to caller interrogation: protocol guided (criteria based) versus protocol scripted (ie, the Medical Priority Dispatch System [MPDS]). In the former, which King County uses, dispatchers receive didactic and practical experience on interrogation following a protocol but are allowed to tailor their questioning to some degree on the basis of their judgment and the call circumstances. In the latter, dispatchers receive similar training and practical experience using a scripted interrogation approach. Minimal deviation from the script is tolerated, and as in criteria-based dispatch systems, intense quality improvement call review is provided at certified dispatch centers to ensure that there is little opportunity for the dispatcher to ask unnecessary or inappropriate questions.

From this, one would surmise that the scripted approach should result in fewer dispatch delays, leading to a shorter time from 9-1-1 call pickup to start of chest compressions and a higher likelihood that bystanders will perform chest compressions. As noted by the authors, the only published study from an accredited MPDS system (Wake County, North Carolina) in which ventilation instructions were not given (similar to the King County protocol) reported a 4-minute time interval from 9-1-1 call pickup to first chest compressions, roughly 1 minute longer than in the present study.13 The Wake County study was conducted when its dispatch center was using MPDS protocol versions 11.2, 11.3, and 12.0. The latest version (12.2) allows dispatchers to jump directly to prearrival chest compression instructions earlier in the call for a suspected cardiac arrest, and when there are multiple rescuers, some of the instructions are delayed until after compressions begin.

At the MPDS-accredited Richmond Ambulance Authority dispatch center in Richmond, VA, the time from 9-1-1 center call pickup to the start of dispatcher-assisted chest compressions was reduced by 50 seconds after implementation of version 12.2, documenting the near-equivalence of the 2 approaches in the hands of highly trained, professional medical dispatchers (D. Garrison, Richmond Ambulance Authority Dispatch Center director, 2013). Hardeland et al14 compared both types of dispatch systems with respect to cardiac arrest calls and found that, although each offered dispatch-assisted CPR instructions to 86% of callers and the time from call pickup to start of chest compressions was similar, fewer bystanders actually began delivering chest compressions in the MPDS compared with the criteria-based system (32% versus 70%). This occurred because, in this particular comparison, the dispatch center using the MPDS system was much more efficient at dispatching paramedics, who arrived on scene 3 minutes sooner than providers in the criteria-based system—in many cases, before bystanders could even begin chest compressions.

The important point is that either approach in the hands of highly trained, skilled dispatchers can achieve comparable results, but as Lewis and Eisenberg12 point out, any further improvement is limited by primarily nonmodifiable variables. Nonetheless, this study now provides a potential benchmark target recommendation for EMS systems to use in evaluating their own performance. Because the number of lives at stake from out-of-hospital cardiac arrests is so large, any “tweaks” in dispatch center prearrival instruction performance that can lead to a higher number of bystanders starting chest compressions earlier will be meaningful from a public health standpoint.

Disclosures

Dr Ornato is the operational medical director of the Richmond Ambulance Authority and cardiac co-chairman of the National Institutes of Health-sponsored Resuscitation Outcomes Consortium.

References


Key Words: Editorials  ■ cardiopulmonary resuscitation  ■ emergency medical services
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Circulation. 2013;128:1490-1491; originally published online August 27, 2013;
doi: 10.1161/CIRCULATIONAHA.113.005496
Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2013 American Heart Association, Inc. All rights reserved.
Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the
World Wide Web at:
http://circ.ahajournals.org/content/128/14/1490

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