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Media Advisory: To contact Shinji Nakahara, M.D., Ph.D., email [snakahara-tky@umin.net](mailto:snakahara-tky@umin.net). To contact Carolina Malta Hansen, M.D., call Samiha Khanna at 919-419-5069 or email [samiha.khanna@duke.edu](mailto:samiha.khanna@duke.edu). To contact editorial co-author Graham Nichol, M.D., M.P.H., F.R.C.P., call Susan Gregg at 206-616-6730 or email [sghanson@uw.edu](mailto:sghanson@uw.edu).

**Studies Find Increase in Use of Bystander Interventions for Out-of-Hospital Cardiac Arrest; Associated With Improved Outcomes**

Two studies in the July 21 issue of *JAMA* find that use of interventions such as cardiopulmonary resuscitation and automated external defibrillators by bystanders and first responders have increased and were associated with improved survival and neurological outcomes for persons who experienced an out-of-hospital cardiac arrest.

Out-of-hospital cardiac arrest (OHCA) is an increasing health concern worldwide, with poor prognoses. Shinji Nakahara, M.D., Ph.D., of the Kanagawa University of Human Services, Yokosuka, Japan, and colleagues examined the associations between bystander interventions and changes in neurologically intact survival among patients with OHCA in Japan. The researchers used data from Japan's nationwide OHCA registry, which started in January 2005. The registry includes all patients with OHCA transported to the hospital by emergency medical services (EMS) and recorded patients' characteristics, prehospital interventions (including defibrillation using public-access automated external defibrillators [AEDs] and chest compression) and outcomes.

The study included 167,912 patients with bystander-witnessed OHCA between January 2005 and December 2012. The researchers found that during this time period, the number of these events increased and the rate of use of chest compressions (39 percent to 51 percent) and defibrillation (0.1 percent to 2.3 percent) also increased. In addition, likelihood of neurologically intact survival improved (age-adjusted proportion, 3.3 percent to 8.2 percent), but remained quite low. The increase in neurologically intact survival was associated with bystander defibrillation and chest compressions.

The authors write that further increases in use of chest compression by bystanders should be promoted. “In Japan it is used in just 50 percent of patients and is increasing slowly. Simplifying the basic life support procedure by omitting mouth-to-mouth breathing may have reduced hesitancy and increased its use. Facilitating chest compression has an economic advantage over deployment of expensive public-access AEDs. Fire departments provide training to more than 1,400,000 citizens every year to increase the prevalence of skills in basic resuscitation procedures, including chest compression and AED use. This effort should be further strengthened.”

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Carolina Malta Hansen, M.D., of the Duke Clinical Research Institute, Durham, N.C., and colleagues examined the outcomes and changes in bystander and first-responder resuscitation efforts for cardiac arrest patients before arrival of the EMS following statewide initiatives to improve these efforts in North Carolina.

Out-of-hospital cardiac arrest is a major public health issue, associated with low survival and accounting for approximately 200,000 deaths per year in the United States. Early cardiopulmonary resuscitation (CPR) and defibrillation can improve outcomes if more widely adopted, according to background information in the article.

This study included 4,961 patients with out-of-hospital cardiac arrest for whom resuscitation was attempted and who were identified through the Cardiac Arrest Registry to Enhance Survival (2010-2013). First responders included police officers, firefighters, rescue squad, or life-saving crew trained to perform basic life support until arrival of the EMS. Statewide initiatives to improve bystander and first-responder interventions included training members of the general population in CPR and in use of AEDs, training first responders in team-based CPR including AED use and high-performance CPR, and training dispatch centers in recognition of cardiac arrest.

The combination of bystander CPR and first-responder defibrillation increased from 14 percent (51 of 362) in 2010 to 23 percent (104 of 451) in 2013. Survival with favorable neurological outcome increased from 7 percent in 2010 to 10 percent in 2013 and was associated with bystander-initiated CPR. Bystander and first-responder interventions were associated with higher survival to hospital discharge. Survival following EMS-initiated CPR and defibrillation was 15 percent compared with 34 percent following bystander-initiated CPR and defibrillation; 24 percent following bystander CPR and first-responder defibrillation; and 25 percent following first-responder CPR and defibrillation

“Our study presents novel findings indicating that improvements in bystander and first-responder CPR and defibrillation are both associated with increased survival,” the authors write. “Our findings suggest the possibility of improving outcomes by strengthening first-responder programs, in addition to increasing the number of bystanders who could then provide CPR, including those assisted by emergency dispatchers, and by improving EMS systems. This is particularly important for cardiac arrests that occur in residential areas and in areas with a long EMS response time, where public access defibrillation programs are unlikely to be implemented.”

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**Editorial: Bystander Interventions Can Improve Outcomes From Out-of-Hospital Cardiac Arrest**

“Despite increased knowledge and use of bystander CPR as well as improved survival over time, ongoing efforts are needed to improve outcomes after OHCA,” write Graham Nichol, M.D., M.P.H., F.R.C.P., and Francis Kim, M.D., of the University of Washington, Seattle, in an accompanying editorial.

“Mortality after resuscitation from cardiac arrest continues to be high in many communities. Further improvements in outcomes will require additional coordinated efforts to improve resuscitation care. The Institute of Medicine has released a report that describes multiple steps to improve outcomes after cardiac arrest. Key recommendations of this report include simple, sustainable high-quality efforts to measure and improve the process and outcome of care, as well as increased training of EMS personnel and leadership and funding for resuscitation research. The current studies by Malta Hansen et al and by Nakahara et al demonstrate the potential benefit these changes can have on resuscitation outcomes. Lay persons can improve outcomes after cardiac arrest in their community by participating in their system of care as well as supporting increased measurement and resuscitation research.”

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