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Large study reports results comparing two CPR methods used by EMS providers following sudden cardiac arrest

In a study published online today in the *New England Journal of Medicine*, researchers found that cardiopulmonary resuscitation (CPR) administered by emergency medical services (EMS) providers following sudden cardiac arrest that combines chest compressions with interruptions for ventilation resulted in longer survival times and shorter hospital stays than CPR that uses continuous chest compressions. Although compressions with pauses for ventilation lead to more hospital-free days within 30 days of the cardiac arrest, both methods achieved similar overall survival to hospital discharge, the study noted.

The compressions with interruptions consisted of 30 compressions then pauses for two ventilations. The continuous chest compressions consisted of 100 compressions per minute with simultaneous ventilations at 10 per minute. In both groups, emergency medical services (EMS) providers gave ventilations using a bag and mask.

The study, funded in part by the National Heart, Lung, and Blood Institute (NHLBI), is the largest of its kind to date to evaluate CPR practices among firefighters and paramedics and suggests the importance of ventilation in CPR by EMS providers, the investigators say. The study was presented at the American Heart Association 2015 Scientific Sessions in Orlando.

“Current CPR guidelines permit use of either continuous chest compressions or interrupted chest compressions with ventilations by EMS providers. Our trial shows that both types of CPR achieve good outcomes, but that compressions with pauses for ventilations appears to be a bit better,” said principal author Graham Nichol, M.D., director of the University of Washington-Harborview Center for Prehospital Emergency Care in Seattle.

Sudden cardiac arrest, or loss of mechanical activity of the heart, can be caused by a heart attack. More than 300,000 individuals are treated for out-of-hospital cardiac arrest each year, with the vast majority occurring at home, according to the American Heart Association. Studies show that only about 10 percent of people who suffer cardiac arrest outside the hospital survive. But effective treatment by CPR can greatly increase a victim's chance of survival.

Standard CPR performed by EMS providers involves chest compressions with interruptions for ventilation using a bag and mask. However, recent studies in animal models suggest that continuous chest compressions (CCC) may be just as good as standard CPR. To date, firefighters and paramedics have not had clear evidence-based guidance on which treatment method is optimal. As a result, treatment often varies from one community to another

That variation in treatment could soon become a thing of the past, researchers suggest. An international multi-center research team compared survival rates among 23,709 adults with cardiac arrest who were treated by EMS crews at 114 agencies from June 2011 to May 2015. Approximately half had received continuous compressions with simultaneous ventilations, while the other half received standard CPR with pauses for ventilations. The study was conducted by the Resuscitation Outcomes Consortium (ROC), which includes clinical sites in the United States and Canada. For a list of ROC participating sites, visit the following website: <https://roc.uwctc.org/tiki/participating-sites>.

Overall, survival to discharge was not significantly different between the continuous chest compressions group and the standard CPR group. A total of 8.9 percent (about 1,126 patients) from the continuous compressions group survived to reach hospital discharge, while 9.7 percent (about 1,073 patients) of the standard CPR group reached hospital discharge. The proportion of patients able to carry out all usual activities or requiring some help but able to walk unassisted, was also similar between treatment groups.

However, the standard CPR group had significantly more days alive and out of hospital during the first 30 days following cardiac arrest.

The researchers believe that the benefits of compressions with pauses for ventilation are due to improved blood flow and oxygenation. They are continuing to analyze the data to gain additional insight into the study results.

"This is the first randomized trial to show a significant difference in outcomes after hospital admission among patients treated for out-of-hospital cardiac arrest," Dr. Nichol added. "We can

improve outcomes for this common health condition. We believe that this study is a significant step in that direction.”

Funding for this study was provided by the National Heart, Lung, and Blood Institute in partnership with the U.S. Army Medical Research & Material Command, the Canadian Institutes of Health Research, the Heart and Stroke Foundation of Canada, and the American Heart Association.

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