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News Release: Research

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Study Findings Help EMS Respond to Cardiac Arrest Emergencies More Safely and Efficiently

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When cardiac arrest patients cannot successfully be resuscitated by emergency medical services in the field, lifesaving attempts to race them to a nearby hospital via ambulance often prove to be futile. In addition, the effort potentially increases danger to other drivers, pedestrians and the EMS professionals themselves, according to findings reported in the Sept. 24, 2008 issue of the Journal of the American Medical Association.

The project and findings, involving researchers from Emory University, the University of Michigan Health System and the Henry Ford Health System in Michigan, were based on the Emory-initiated CARES (Cardiac Arrest Registry to Enhance Survival) Program. The program is a Center for Disease Control and Prevention (CDC) funded surveillance registry, which was designed to help local officials determine how well their community performs in each link of the American Heart Association "Chain of Survival" -- basic steps necessary to properly resuscitate a cardiac arrest patient quickly and safely.



"The study, which involved 19 EMS agencies and 111 hospitals in eight cities, helped us to identify those patients who have had an out-of-hospital cardiac arrest, and then determine which patients had the best chance of survival and which patients had little chance, thus negating any effective results gained by transporting them to a nearby hospital," says co-lead investigator Bryan McNally, MD, MPH, assistant professor of emergency medicine, Emory School of Medicine. "It is our goal that these findings will help change the process of transporting patients to a hospital, which can be incredibly risky to the EMS crew, other drivers on the road and pedestrians when racing to a hospital - when resuscitation efforts may have ended in the field."

According to McNally, researchers involved with CARES have been collecting data since 2005, and as part of this study were able to go back and look at data for multiple hospitals and EMS agencies in eight cities, including Anchorage, Atlanta, Austin, Boston, Cincinnati, Columbus, Ohio, Houston and Raleigh, N.C.

In every way of thinking, a patient suffering from cardiac arrest has died, says co-author Arthur Kellermann, MD, MPH, associate dean for health policy and professor of emergency medicine, Emory School of Medicine, Emory University.

"Except, the heart can be restarted if action is taken," says Kellermann. "Many victims can be resuscitated, the heart restarted, and they go back to live a long and healthy life."

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For that to happen, however, a series of critical actions must be taken quickly and properly. These include a bystander recognizing the seriousness of the emergency and calling 9-1-1. Secondly, CPR should be promptly started at earliest possible moment -- ideally by a bystander or family member who knows how to give CPR even before an ambulance arrives. The third critical action is defibrillation -- a counter shock that can help the heart stop the quivering action. And the fourth and final key to survival is prompt transportation to a nearby emergency department.

"While the science of medicine and technology has advanced to the point where we know what it takes to get that heart started, the fact remains that by the time EMS arrives, it may already be too late," says Kellermann. "At that point, the critical decision has to be made as to whether we stop and recognize the sad fact that the individual will not survive."

If all the right things are done in the field, and a patient's heart cannot be restarted, the study calls into question whether it is fair to ask the paramedics, ambulance crew, family members who might be riding in the ambulance and the public to put their lives at risk, and whether more lives can be saved that way.

The bottom line for this study was a resounding no, says McNally. In identifying and weighing the risk to benefit of rapid transport, researchers who analyzed the records of more than 5,500 patients instituted two separate rules called the Basic Life Support (BLS) Rule and the Advanced Life Support (ALS) Rule. These rules were used to help determine which patients would have been transported, or survived, if EMS crews had applied the three-part BLS Rule or five-part ALS rule - both of which were developed by a Canadian team as part of the Ontario Pre-hospital Advanced Life Support study.

Under the three part BLS rule, EMS teams would end their resuscitation efforts if: 1) Cardiac arrest occurred before EMS arrived. 2) No defibrillator was used and 3) The EMS team could not get the patient's blood to begin circulating again.

All three must apply for resuscitation efforts to be stopped and, according to the study, if ambulance and fire crews had applied the three-part rule, nearly 50 percent of all cardiac arrest patients in the study would not have met the criteria to be transported by ambulance to the hospital, and 2,592 patients would have been pronounced dead at the scene -- potentially saving 1,645 trips to the hospital.

Under the ALS Rule, the three criteria from BLS are used, as well as two others: 4) Cardiac arrest had no witnesses at all and 5) No bystander attempted to perform CPR.

If the more conservative ALS rule had been applied to the 5,505 cardiac arrest victims in the overall study, nearly 1,200 patients would have been declared dead at the scene -- saving approximately 245 trips to the hospital.

Researchers then went beyond that data to investigate the outcomes of patients who were actually transported to the hospital and cross-referenced those findings when applying either the BLS or ALS models.

Under the BLS rule, only 70 patients who would have otherwise been declared dead at the scene survived the ER treatment and were admitted to the hospital. However, of those 70 patients, only five were discharged from the hospital alive - and four of them were able to live a relatively normal life afterward.

Of the 245 patients who would have been declared dead under the more conservative ALS rule but were able to be resuscitated in the ER, none of them survived long enough to be sent home from the hospital.

In addition to McNally and Kellermann, other study authors included Comilla Sasson, MD, MSA, University of Michigan Medical School; A.J. Hegg, MD, Henry Ford Hospital in Detroit; Michelle Macy, MD, University of Michigan Department of Emergency Medicine; and Allison Park, MPH, of the CARES project. Study reference: JAMA, Sept. 24, 2008, Vol. 300, No. 12.