Depth and rate of chest compressions during CPR impact survival in cardiac arrest

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The depth of chest compressions and the rate at which they were applied make a significant impact on survival and recovery of patients, a review of research by UT Southwestern Medical Center Emergency Medicine physicians shows.

Contrary to popular belief, the reviews showed that cardiopulmonary resuscitation (CPR) compressions deeper than 5.5 centimeters - about two inches - resulted in decreased survival, possibly because of collateral damage to other internal organs.

Previously, investigations and guidelines indicated that deeper compressions were better. The American Heart Association's 2010 CPR guidelines recommend compressing the chest at least 5 centimeters without providing any upper limit.

"Most people do not recognize that it takes quite a bit of thrust to compress the chest 2 inches," said Dr. Ahamed Idris, Professor of Emergency Medicine and Internal Medicine at UT Southwestern, who works with the Resuscitation Outcomes Consortium. "About 60 lbs. of pressure are required to reach this depth. But in some cases a burly fireman or well-intended volunteer can go way past that amount, which can harm the patient."

Dr. Idris' group also found that the rate at which chest compression was applied was most important. Compression rates of 100 to 120 per minute were optimal for survival when other factors were considered.

"Survival depends on the quality of the CPR," said Dr. Idris, Director of the Dallas-Fort Worth Center for Resuscitation Research sponsored by the National Institutes of Health. "Both the depth of chest compressions and the rate at which they are applied can have important results for patients in the first moments of cardiac arrest."

The findings, from two independent studies, appeared in *Circulation* and *Critical Care Medicine*.

About half of responders are giving chest compressions too fast, with about a third above 120 compressions per minute, and 20 percent above 140 per minute, said Dr. Idris, Section Chief of Research in Emergency Medicine and a trainer of paramedics. Most emergency responders find the beat of the children's song "Row, Row, Row Your Boat" to be a good measure to reach 100 to 120 beats per minute, the "sweet spot" for resuscitation and survival.

American Heart Association guidelines call for a two-step procedure: Call 911, and start chest compressions immediately. "And don't stop until the paramedics arrive," Dr. Idris said.

UT Southwestern will continue to oversee innovative clinical trials to test the early delivery of interventions for serious trauma and cardiac arrest as part of a federally funded consortium aimed at advancing prehospital emergency care.

The Resuscitation Outcomes Consortium (ROC), supported by the National Institutes of Health and other federal and Canadian agencies, has enrolled tens of thousands of patients to test prehospital interventions to improve outcomes in severely ill or injured patients before they are transported to a hospital. Dr. Idris, a pioneer in resuscitation research and cardiopulmonary resuscitation, is the principal investigator for the Dallas-Fort Worth Center for Resuscitation Research. In the Dallas-Fort

Worth area, about 5,000 paramedics and firefighters from 23 cities and their respective EMS agencies, and 31 hospitals, participate in the ROC studies.

Provided by UT Southwestern Medical Center