# Compression Quality Affects Heart Attack Survival

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SAN FRANCISCO — The timing of chest compressions in CPR can mean life or death to some patients in cardiac arrest, Lance B. Becker, M.D., said at the annual meeting of the American College of Emergency Physicians.

An observational study of approximately 100 patients being resuscitated in a hospital counted the number and measured the rate of chest compressions through a personal digital assistant operated by a nurse at the rescue scene.

Even in this small group of patients, those who received the 80-100 chest compressions per minute during CPR recommended by the American Heart Association were significantly more likely to survive, compared with those who received lower compression rates, said Dr. Becker, director of the emergency resuscitation center and professor of emergency medicine at the University of Chicago.

The study will be published in the Feb. 1, 2005, issue of the journal Circulation, he said.

The results especially are cause for concern when combined with new concepts about three phases of cardiac resuscitation, Dr. Becker added. He and others have proposed that the first, "electrical" phase of ventricular fibrillation is well treated by defibrillation, but patients in a second, "circulatory" phase may be better treated by first receiving compression, then defibrillation. In a third, "metabolic" phase, newer therapies are needed in addition to compression and defibrillation to save more lives, he said. At present, all patients in ventricular fibrillation undergo defibrillation.

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"In that second phase, compression is important, but it has to be good compression," Dr. Becker explained. "I'm worried about this. I think there are really good data that [show] we're not doing a great job on cardiac compression."

A randomized, controlled trial in 2003 compared standard defibrillation with CPR first, then defibrillation in approximately 200 patients being resuscitated after cardiac arrest outside of hospitals. In a subgroup of patients reached by rescuers more than 5 minutes after cardiac arrest (who could be considered to be in that second phase of ventricular fibrillation), 20% who underwent compression plus defibrillation remained alive 1 year later, compared with 4% in the defibrillation-only group (JAMA 2003:289;1389-95).

Animal studies back this concept, Dr. Becker said.

Physicians can begin today to save more lives by insisting that CPR be done appropriately, he suggested.

Dr. Becker and his associates are studying a new device to give resuscitators instant feedback on how well they're doing CPR. An accelerometer and a pressure gauge embedded into a sternal pad placed on the patient's chest are wired to a defibrillator and attached to a minicomputer.

The device accurately measures the timing of compressions down to the millisecond and gives a good measurement of the depth of each compression, among other data.

In some patients, the readings show faster ventilation than compression. Hyperventilation in someone who has almost no cardiac output can increase venous return and cause what others have termed "death by ventilation," Dr. Becker noted.

The investigational device can talk to rescuers with messages such as, "Slow down your ventilation," or "Speed up your compression."

It is being studied in U.S. hospitals and on patients arresting outside of hospitals in Europe to see if it improves CPR and, thus, survival.

Early results seem "very promising," Dr. Becker said.

He has financial relationships with a series of companies involved in developing the device and is a paid consultant to two of them. ■