

## CPR Was a Success, But the Patient Died: Performance Debriefing of Cardiac Arrest Processes and Postevent Outcomes

Edelson DP, Litzinger B, Arora V, et al. Improving in-hospital cardiac arrest process and outcomes with performance debriefing. *Arch Intern Med* 2008;168:1063–9.

### Study Overview

**Objective.** To determine whether weekly postevent performance debriefing sessions improve in-hospital cardiopulmonary resuscitation (CPR) outcomes.

**Design.** Unblinded, pre-/postintervention comparison.

**Setting and participants.** Weekly postevent performance debriefing sessions (45 min) with internal medicine residents were conducted between March 2006 and February 2007 at a single academic hospital using CPR performance transcripts generated by CPR-sensing and feedback-enabled defibrillators. Processes and outcomes of CPR during the intervention period were compared with those of a previous control period (data collected December 2004–December 2005), which used a similar defibrillator without the debriefing sessions.

**Main outcome measures.** Return of spontaneous circulation, defined as the onset of an organized rhythm with a palpable pulse and measurable blood pressure for  $\geq 20$  minutes, and survival to hospital discharge. CPR process measures included ventilation rate, chest compression rate and depth, and no-flow fraction (ie, the fraction of time that a pulseless patient went without chest compressions), reported as aggregate mean values over the first 5 minutes of resuscitation. CPR process was within the target range if the compression rate was 90 to 120/min, compression depth was  $\geq 38$  mm, and the ventilation rate was  $\leq 15$ /min.

**Main results.** 123 patients during the intervention period and 101 patients during the control period experienced cardiac arrest and underwent CPR. Patient gender, age, initial cardiac rhythm, location (intensive care unit or ward), and time of event (day or night) were similar between groups; however, a higher percentage of events occurred in the first academic quarter during the intervention. The rate of return of spontaneous circulation increased from 44.6% in the control period to 59.4% in the intervention period ( $P = 0.03$ ). There was no significant change in survival to hospital discharge between the control and intervention periods (8.9% vs. 7.4%;  $P = 0.69$ ). Several CPR processes improved between the control and intervention groups, including ventilation rate (18/min vs. 13/min;  $P < 0.001$ ), chest compression depth (44 mm vs. 50 mm;  $P = 0.001$ ), chest compression rate (100/min vs. 105/min;  $P = 0.003$ ), and no-flow fraction (20% vs. 13%;  $P < 0.001$ ).

**Conclusion.** Despite improvements in several CPR processes and in return of spontaneous circulation, weekly debriefing sessions using CPR transcripts did not increase the likelihood of patients' survival to discharge following an in-hospital cardiac arrest. Hospitals investing in defibrillators with feedback and recording capabilities may not experience improvements in patient survival, with or without the addition of debriefing sessions.

### Commentary

Recent studies have documented deficiencies in the performance of in-hospital CPR on patients with cardiac arrest

#### Outcomes Research in Review SECTION EDITORS

Ashish K. Jha, MD, MPH  
Brigham and Women's Hospital  
Boston, MA

Ula Hwang, MD, MPH  
Mount Sinai School of Medicine  
New York, NY

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Mount Sinai School of Medicine  
New York, NY

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Boston, MA

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New York University School of Medicine  
New York, NY

Jason P. Block, MD, MPH  
Brigham and Women's Hospital  
Boston, MA

Asaf Bitton, MD  
Brigham and Women's Hospital  
Boston, MA

[1,2]. Although there is evidence that improved CPR process performance can increase the probability of initial survival [3,4], few studies have documented an association between CPR process improvement and short-term patient outcomes in the in-hospital setting. Recently, new CPR devices that provide real-time feedback have been investigated as ways to improve CPR quality, but these trials have shown little patient benefit [5,6]. Postevent debriefing, which has been used in other industries to improve the outcomes of stressful and infrequent events, has not previously been investigated as a means of improving CPR processes and outcomes.

The current investigation by Edelson and colleagues is the first trial to investigate whether postevent debriefing sessions—based on CPR device recordings—affect CPR outcomes. Using a pre-/postintervention design, outcomes and several CPR processes were compared between an earlier control period with real-time device-based feedback and a later intervention period with real-time device-based feedback plus debriefing sessions. Although the rate of return of spontaneous circulation improved significantly with the addition of debriefing sessions, the rate of survival to hospital discharge did not improve. This failure to improve a more meaningful outcome may not be solely due to inadequate study power. In fact, there was a nonsignificant trend towards a lower rate of survival to hospital discharge for the intervention group.

While this study has important implications for the use of new CPR devices and management strategies for improving CPR, some important limitations should be noted. First, national guidelines for CPR were revised substantially between the time data were collected in the control and intervention periods, and these changes confound the comparison between study groups [7]. Any improvements in CPR outcomes observed in this study could have been due to guideline improvements rather than the study intervention. Second, the distribution of when cardiac arrests took place based on academic quarters differed significantly between study groups, with more cardiac arrest occurring near the start of the academic year in the intervention period. If new trainees tend to conduct lower-quality CPR, this asymmetry could bias study

findings towards the null. Finally, the study was conducted in a single academic institution, raising concerns about the replicability of the intervention and its effects in other settings, particularly hospitals without medical trainees.

### Applications for Clinical Practice

Event debriefing sessions assisted by new CPR recording devices may not improve patient survival to hospital discharge following cardiac arrest. If CPR devices with recording capabilities are substantially more costly than the more basic, commonly used devices, payers and hospital administrators should take this finding into account when deciding whether to make large-scale investments in new CPR technologies.

—Review by Mark W. Friedberg, MD, MPP

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