

**FAST FACTS AND CONCEPTS #179
CPR SURVIVAL IN THE HOSPITAL SETTING
David H Ramenofsky and David E Weissman MD**

Background Survival to discharge following cardiac arrest occurring in the hospital is infrequent. This *Fast Fact* will review data on CPR outcomes in hospitalized patients.

I. A 2003 report of in-hospital CPR outcomes from the National Registry of Cardiopulmonary Resuscitation, reported data from 14,720 resuscitation attempts (2000-2002) in adults from 207 U.S. hospitals (1). The uniform case inclusion definition included cardiac and respiratory arrests requiring an emergency response from hospital personnel.

- Survival 20 minutes after CPR was 44%, but only 17% of all CPR patients survived to discharge. The survival to discharge for ventricular fibrillation and pulseless ventricular tachycardia was 34% and 35%, respectively, but only 10% for asystole and pulseless electrical activity.
- Pre-CPR, 84% of patients came from home. Among survivors, 51% returned home, the remainder being discharged to another hospital, a rehabilitation facility, or a nursing home. Two percent were discharged to hospice care.
- Neurological function of survivors was assessed using a five point scale (1 = good performance to 5 = brain death). Pre-CPR, 68% were in category 1, falling to 59% at discharge. In other words, 86% of category 1 patients remained at this level if they survived CPR, whereas 14% had neurological decline.
- Overall functional performance was assessed using a similar five point scale (1 = good to 5 = brain death). Overall performance declined: 49% of survivors were category 1 pre-CPR compared to only 37% after CPR, a 25% decline in overall function.

II. A meta-analysis of CPR outcomes was reported in 1998; it included data from 49 research publications after 1980, totaling 9,838 patients (2).

- Depending on the rigor of CPR event definition, immediate survival was 41-44% and survival to discharge was 13-15%.
- Of the five studies reporting discharge information, 78% of 93 survivors returned to their home.
- Factors associated with survival to discharge were: myocardial infarction, coronary heart disease, and hypertension.
- Factors predicting a failure to survive to discharge:
 - Sepsis the day prior to the CPR event
 - Serum creatinine >1.5 mg/dl
 - Metastatic cancer
 - Dementia or dependent status

III. In 2013, the American Heart Association (AHA) published a consensus statement reviewing in-hospital cardiac arrest results in the US. Major take-home points were:

- There is a lack of consistency with how investigators report survival after inpatient CPR. Some studies exclude patients made DNR after the CPR attempt from data analysis, others do not.
- Regardless, survival to hospital discharge has remained essentially unchanged for decades.
- Despite the rising prevalence of “rapid response teams”, there is no convincing evidence these teams have improved survival rates. Rather, these teams likely spare the need for non-ICU CPR attempts via earlier identification of critically ill patients and more efficient ICU transfer.

IV. Historically, the CPR success rate in cancer patients has been thought to be less than 2%. A meta-analysis of 42 studies from 1966-2005 suggests that 6.7% of cancer patients (localized: 9.1%; metastatic: 5.6%) survived CPR to discharge (4). Survival to discharge for ward patients was better than ICU patients: 10.1% vs.2.2%. Data on neurological outcome were not included.

V. Renal dialysis patients: 3 studies have looked at CPR outcomes in a total of 137 dialysis patients. Survival to discharge was seen in 14% of patients. One study examined long-term survival: of 74 patients undergoing CPR, only 2 (3%) survived six months (vs. 9% of non-dialysis controls) (5).

Summary CPR for hospitalized patients is associated with poor outcomes, as the cause of arrest is usually associated with advanced chronic illness rather than an easily reversible acute cardio-pulmonary event (e.g. isolated arrhythmia). The AHA recommends the widespread use of advance directive for all patients admitted to the hospital as well as “frank” discussions about prognosis and survival rates from CPR. When talking with patients about CPR, physicians can say roughly 15%, or 1 in 6 patients, who undergo CPR in the hospital may survive to discharge. However, specific co-morbidities will reduce the chance of survival, and surviving patients are at risk for a range of CPR-related complications including permanent neurological and functional impairment.

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