

## The Association Between Physician Turnover (the “July Effect”) and Survival after In-Hospital Cardiac Arrest

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**Importance:** The July Effect refers to adverse outcomes that occur as a result of turnover of the physician workforce in teaching hospitals during the month of June.

**Objective:** As a surrogate for physician turnover, we used a multivariable difference-in-difference approach to determine if there was a difference in outcomes between May and July in teaching versus non-teaching hospitals.

**Design:** We used prospectively collected observational data from United States hospitals participating in the Get With The Guidelines®-Resuscitation registry. Participants were adults with index in-hospital cardiac arrest between 2005-2014. They were *a priori* divided by location of arrest (general medical/surgical ward, intensive care unit, emergency department). The primary outcome was survival to hospital discharge. Secondary outcomes included neurological outcome at discharge, return of spontaneous circulation, and several process measures.

**Results:** We analyzed 16,328 patients in intensive care units, 11,275 in general medical/surgical wards and 3,790 in emergency departments. Patient characteristics were similar between May and July in both teaching and non-teaching hospitals. The models for intensive care unit patients indicated the presence of a July Effect with the difference-in-difference ranging between 1.9-3.1%, which reached statistical significance ( $p < 0.05$ ) in all but one model ( $p = 0.07$ ). Visual inspection of monthly survival curves did not show a discernible trend, and no July Effect was observed for return of spontaneous circulation, neurological outcome or process measures except for airway confirmation in the intensive care unit. We found no July Effect for survival in emergency departments or general medical/surgical wards ( $p > 0.20$  for all models).

**Conclusions:** There may be a July Effect in the intensive care unit but the results were mixed. Most survival models showed a statistically significant difference but this was not supported by the secondary analyses of return of spontaneous circulation and neurological outcome. We found no July Effect in the emergency department or the medical/surgical ward for patients with in-hospital cardiac arrest.