

## JOURNAL CLUB CRITIQUE

# Intensivists: don't quit your day job...yet!

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### Expanded Abstract

#### Citation

Levy MM, Rapoport J, Lemeshow S, Chalfin DB, Phillips G, and Danis M: Association between Critical Care Physician Management and Patient Mortality in the Intensive Care Unit. *Ann Intern Med* 2008 Jun 3, 148(11): 801-9 [1].

#### Background

Critically ill patients admitted to intensive care units (ICUs) are thought to gain an added survival benefit from management by critical care physicians, but evidence of this benefit is scant.

#### Methods

**Objective:** To examine the association between hospital mortality in critically ill patients and management by critical care physicians.

**Design:** Retrospective analysis of a large, prospectively collected database of critically ill patients.

**Setting:** 123 ICUs in 100 U.S. hospitals.

**Subjects:** 101,832 critically ill adults.

**Intervention:** None.

**Outcomes:** Through use of a random-effects logistic regression, investigators compared hospital mortality between patients cared for entirely by critical care physicians and patients cared for entirely by non-critical care physicians. An expanded Simplified Acute Physiology Score was used to adjust for severity of illness, and a propensity score was used to adjust for differences in the probability of selective referral of patients to critical care physicians.

#### Results

Patients who received critical care management (CCM) were generally sicker, received more procedures, and had higher hospital mortality rates than those who did not receive CCM. After adjustment for severity of illness and propensity score, hospital mortality rates were higher for patients who received CCM than for those who did not. The difference in adjusted hospital mortality rates was less for patients who were sicker and who were predicted by propensity score to receive CCM. Residual confounders for illness severity and selection biases for CCM might exist that were inadequately assessed or recognized.

#### Conclusion

In a large sample of ICU patients in the United States, the odds of hospital mortality were higher for patients managed by critical care physicians than those who were not. Additional studies are needed to further evaluate these results and clarify the mechanisms by which they might occur.

### Commentary

Management of critically ill patients by physicians with advanced training in critical care medicine has been associated with improved outcomes in a variety of disease states, such as acute lung injury [2] and intracranial

hemorrhage [3], as well as following traumatic injury [4] and aortic [5] or esophageal [6] surgery. Additionally, a systematic review revealed that outcomes were better in a cohort of critically-ill patients managed by intensivists in high-intensity ICUs (defined as closed ICUs or ICUs with mandated intensivist consultation) as compared to low-intensity ICUs, with an overall reduction in the relative risk (RR) of both hospital and ICU mortality [7]. Furthermore, experts predict that there will be a shortage of critical care physicians in the very near future that is projected to increase dramatically as the population ages

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[8]. Based on these data, many have called for an increase in the number of trained intensivists. However, these studies have been criticized on the basis of methodological flaws and limited generalizability.

In the current study, Levy and colleagues [1] further explore these issues by examining the association between critical care physician management and patient mortality in the Project IMPACT database, a consortium of ICUs that receive benchmarking data in an effort to improve their care. Over 101,000 patients were analyzed from 123 ICUs in 100 U.S. hospitals. Three different ICU staffing models were evident: ICUs in which all patients received critical care management (CCM), ICUs in which no patients received CCM, and ICUs in which patients may or may not have received CCM. Random-effects logistic regression was used to compare hospital mortality rates between patients who were cared for *entirely* by critical care physicians to those who were cared for by non-critical care physicians (after adjusting for severity of illness and probability of referral to critical care physicians). To the authors' surprise, they found that the odds of hospital mortality were 40% higher for patients managed by critical care physicians compared to those who were not, even after adjusting for severity of illness and probability of referral to critical care physicians.

The strength of this study lies in its large sample size and heterogeneous patient population, making generalizability less of an issue than with prior studies. Furthermore, the authors conducted a very robust statistical analysis in an effort to control for potential confounders. The strength of association is impressive and the risk estimates are very precise with a high degree of statistical significance (OR 1.4 [1.32-1.49],  $p < 0.001$ ), but are the conclusions accurate? First, the Project IMPACT database was not designed to address this question and, as such, one must carefully consider the possibility that additional, unmeasured confounders exist. For example, it is known that critical care physicians are more likely to institute "comfort measures" than are non-intensivists [9]. Could this have accounted for the mortality difference? Second, as the authors point out, the influence of where/how long and the type of treatment the patient received prior to ICU admission was not accounted for. Third, the authors defined a critical care physician as someone who is a) fellowship-trained, b) board-certified/eligible, or c) *recognized by the institution*. Exactly what constitutes *institutional recognition* and how many of the physicians in this database are classified as such is unclear, but perhaps differences in training or experience contributed to the findings. Finally, this study runs counter to the existing body of literature and does not make "biological sense." If it were true, greater exposure to critical care physicians should cause more harm, but in fact the opposite appears to be true [10,11].

Despite these limitations, we must consider the possibility that the authors' conclusions are accurate and ask *why*? As pointed out by others, this must be clarified before the results of this study are embraced, particularly in this era of "pay-for-performance" [12]. Perhaps patients cared for by critical care physicians were transferred out of the ICU to physicians less familiar with their hospital course, implicating the "hand-off" process as an area for improvement. Or perhaps "inappropriate" involvement of critical care physicians in the care of less severely-ill patients was partially to blame, suggesting that the selection process for ICU admission should be more stringent. Whatever the reasons, this study raises more questions than answers and should be viewed as a stimulus for further research on how the delivery of critical care can be improved.

### Recommendation

As critical care physicians, we should not quit our day jobs. Rather, we should continue to deliver the highest quality care to the critically-ill and strive to find ways to further improve patient outcomes. Standardization of care with a focus on evidenced-based management may be the most efficacious and practical way to achieve this goal.

### Competing interests

The authors declare no competing interests.

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