

Nighttime Intensivist Staffing, Mortality, and Limits on Life Support

A Retrospective Cohort Study

Meeta Prasad Kerlin, MD, MSCE; Michael O. Harhay, MPH; Jeremy M. Kahn, MD; and Scott D. Halpern, MD, PhD

BACKGROUND: Evidence regarding nighttime physician staffing of ICUs is suboptimal. We aimed to determine how nighttime physician staffing models influence patient outcomes.

METHODS: We performed a multicenter retrospective cohort study in a multicenter registry of US ICUs. The exposure variable was the ICU's nighttime physician staffing model. The primary outcome was hospital mortality. Secondary outcomes included new limitations on life support, ICU length of stay, hospital length of stay, and duration of mechanical ventilation. Daytime physician staffing was studied as a potential effect modifier.

RESULTS: The study included 270,742 patients in 143 ICUs. Compared with nighttime staffing with an attending intensivist, nighttime staffing without an attending intensivist was not associated with hospital mortality (OR, 1.03; 95% CI, 0.92-1.15; $P = .65$). This relationship was not modified by daytime physician staffing (interaction $P = .19$). When nighttime staffing was subcategorized, neither attending nonintensivist nor physician trainee staffing was associated with hospital mortality compared with attending intensivist staffing. However, nighttime staffing without any physician was associated with reduced odds of hospital mortality (OR, 0.79; 95% CI, 0.68-0.91; $P = .002$) and new limitations on life support (OR, 0.83; 95% CI, 0.75-0.93; $P = .001$). Nighttime staffing was not associated with ICU or hospital length of stay. Nighttime staffing with an attending nonintensivist was associated with a slightly longer duration of mechanical ventilation (hazard ratio, 1.05; 95% CI, 1.02-1.09; $P < .001$).

CONCLUSIONS: We found little evidence that nighttime physician staffing models affect patient outcomes. ICUs without physicians at night may exhibit reduced hospital mortality that is possibly attributable to differences in end-of-life care practices. CHEST 2015; 147(4):951-958

Manuscript received February 28, 2014; revision accepted September 17, 2014; originally published Online First October 16, 2014.

ABBREVIATIONS: IMPACT = International Mission for Prognosis and Analysis of Clinical Trials in Traumatic Brain Injury; IQR = interquartile range; MPM₀-III = Mortality Prediction Model-III

AFFILIATIONS: From the Pulmonary, Allergy, and Critical Care Division, Department of Medicine (Drs Kerlin and Halpern), Center for Clinical Epidemiology and Biostatistics (Drs Kerlin and Halpern and Mr Harhay), and Department of Medical Ethics and Health Policy (Dr Halpern), Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA; Leonard Davis Institute of Health Economics (Drs Kerlin and Halpern and Mr Harhay), P30 Roybal Center on Behavioral Economics and Health (Dr Halpern), and Fostering Improvement in End-of-Life Decision Science (FIELDS) Program (Dr Halpern), University of Pennsylvania, Philadelphia, PA; and Clinical Research, Investigation, and Systems Modeling of Acute Illness (CRISMA) Center (Dr Kahn), Department of Critical Care, University of Pittsburgh School of Medicine, Pittsburgh, PA.

Part of this article has been presented in abstract form at the American Thoracic Society 2013 International Congress, May 17-22, 2013, Philadelphia, PA.

FUNDING/SUPPORT: This project was supported in part by a grant from the National Heart, Lung, and Blood Institute [K08HL116771 to Dr Kerlin] and a grant from the Agency for Healthcare Research and Quality [K08HS018406 to Dr Halpern].

CORRESPONDENCE TO: Meeta Prasad Kerlin, MD, MSCE, Pulmonary, Allergy, and Critical Care Division, Perelman School of Medicine, University of Pennsylvania, 3600 Spruce St, W Gates Bldg, Rm 05011, Philadelphia, PA 19104; e-mail: prasadm@uphs.upenn.edu

© 2015 AMERICAN COLLEGE OF CHEST PHYSICIANS. Reproduction of this article is prohibited without written permission from the American College of Chest Physicians. See online for more details.

DOI: 10.1378/chest.14-0501

Most available evidence suggests that intensivists improve outcomes of critically ill patients,¹⁻³ leading experts to speculate that more exposure to intensivists could be better still.⁴ However, previous studies of the effectiveness of nighttime intensivists have yielded mixed results.⁵⁻⁹ One retrospective cohort study found that among 22 US ICUs with low-intensity daytime physician staffing (ie, absence of routine care by intensivists during the day), ICUs that employed in-hospital intensivists at night had lower risk-adjusted mortality than those without nighttime intensivists. No such differences were seen in ICUs with high-intensity daytime staffing (ie, mandatory involvement of intensivists as primary physicians or consultants).⁹ The absence of benefit of nighttime intensivists in ICUs with high-intensity daytime staffing was subsequently confirmed in a randomized trial⁸ and meta-analysis of observational studies.¹⁰ However, we do not yet understand the effects of other specific forms of nighttime staffing (eg, staffing by nonintensivist attending physicians); the effects of these staffing models in a sample comprising primarily community-based ICUs; or the effects of these staffing models on important nonmortal outcomes, such as length of stay and duration of mechanical ventilation.

Given the resource intensiveness of staffing ICUs with attending physicians, particularly intensivists, at night,

it is essential to clarify how the full range of possible nighttime ICU staffing models influences patient-centered outcomes. Furthermore, because intensivists may play

FOR EDITORIAL COMMENT SEE PAGE 867

an important role in decisions to limit life support, which in turn could affect both mortality and length of stay, it is critical to assess whether the relationships between nighttime staffing models and clinical outcomes are mediated by differences in end-of-life decision-making.

we conducted a retrospective cohort study of nighttime physician staffing models in the largest sample, to our knowledge, of US ICUs to date, using the Project IMPACT (International Mission for Prognosis and Analysis of Clinical Trials in Traumatic Brain Injury) database, a voluntary clinical registry of primarily US ICUs. We had three specific aims: (1) to determine whether previously detected mortality reductions with nighttime intensivists in low-intensity ICUs are reproducible; (2) to determine whether rates of limitations on life support differ among nighttime staffing models; and (3) to study the effects of nighttime staffing on other clinical outcomes, such as length of stay and duration of mechanical ventilation.

Materials and Methods

We conducted a retrospective cohort study using the Project IMPACT database (Cerner Corporation). IMPACT is a multicenter, voluntary (therefore nonrandom) ICU clinical registry used for benchmarking purposes and frequently used in critical care outcomes research.¹¹⁻¹⁴ Each ICU uses a trained data collector and standardized electronic form to gather data on ICU and hospital organization, structure, and processes of care and on clinical characteristics of admitted patients. Data collectors specifically report the in-hospital physician and nonphysician staffing of ICUs, including whether the daytime and nighttime physicians, if any, are critical care attending physicians (attending intensivists), noncritical care attending physicians, or trainees. The characteristics of IMPACT ICUs reflect those of US ICUs as a whole,¹¹ and prior work has demonstrated the validity of key data fields.¹⁵ The present study was deemed exempt from review by the Institutional Review Board of the University of Pennsylvania because it was a secondary analysis of an existing database with no patient identifiers.

Patients

We initially included all patients admitted to US ICUs enrolled in IMPACT for whom complete data were collected between 2001 and 2008 (Fig 1) and excluded ICUs with < 20 admissions per quarter, that were enrolled in the registry for < 1 year, and with no data for daytime or nighttime staffing. We also excluded one ICU covered by advanced practitioners (nurse practitioners or physician assistants) overnight because effects attributable to that staffing model could not be differentiated from other characteristics of that ICU. Patients who were ineligible for risk adjustment using the Mortality Prediction Model-III (MPM₀-III) score were excluded (ie, those for whom the MPM₀-III is not validated, including patients aged < 18 years, burn patients, coronary care

patients, and cardiothoracic surgery patients).¹⁶ For patients with multiple admissions to a study ICU (during the same hospitalization or in a subsequent hospitalization), we excluded readmissions to maintain the independence of observations.

Study Variables

The primary exposure was the in-hospital physician staffing model during nighttime hours, which we defined in two ways. First, we created

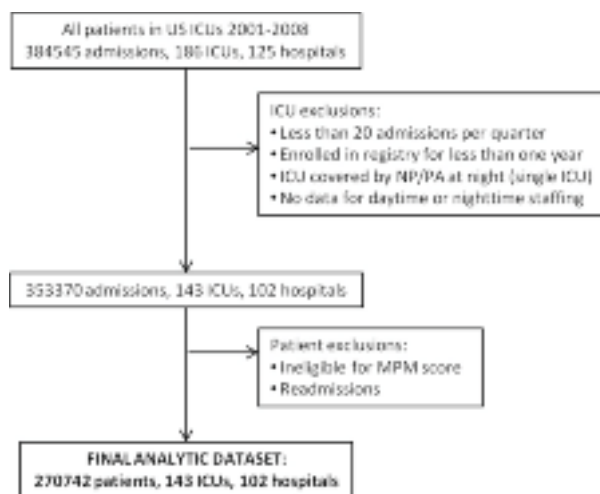


Figure 1 – ICU and patient exclusions. MPM = Mortality Prediction Model; NP = nurse practitioner; PA = physician assistant.

Download English Version:

<https://daneshyari.com/en/article/2900127>

Download Persian Version:

<https://daneshyari.com/article/2900127>

[Daneshyari.com](https://daneshyari.com)