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Nighttime physician staffing improves patient outcomes: no

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There is tremendous conceptual validity and a preponderance of evidence to suggest that being cared for by a critical care specialist (intensivist) is “good” for ICU patients.[1] Similarly, there are strong reasons to suspect, and some data to support, that outcomes are worse for ICU patients admitted during “off” hours.[2] Thus, it is a reasonable extrapolation that having intensivists staff ICUs at night would improve patient outcomes. If some exposure to intensivists is good, it stands to reason that more exposure would be better. This essay argues that despite the sensibility of these premises, there is sufficient evidence to forcefully conclude that nighttime intensivist staffing does not promote improved patient survival, length-of-stay, or other standard clinical outcomes.

Early studies on the effects of nighttime intensivists had significant limitations. For example, the first and most commonly cited study in support of in-hospital nighttime intensivist staffing was actually a study of on-demand availability of intensivists remotely (M. Blunt, personal communication, April 12, 2016).[3] Subsequent studies of in-person nighttime intensivist staffing were designed to take advantage of changes within institutions or existing differences among institutions. For example, a study performed in a single academic ICU demonstrated no differences in mortality or patient and family satisfaction following implementation of nighttime intensivist staffing.[4] Another study comparing two academic ICUs found that the ICU using nighttime intensivist staffing had lower risk-adjusted mortality rates.[5] However, neither establishes the causal effect of nighttime intensivist

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staffing. The before-after design cannot control for other ICU changes over time, and the comparison across two hospitals ignores the many differences between these hospitals and their patients.

More recent studies have addressed some of these limitations by using larger samples and carefully designed analyses. In 2012, a multicenter observational study of 49 ICUs demonstrated that nighttime intensivist staffing was associated with improved in-hospital mortality among ICUs that lacked daytime intensivists, but not among ICUs in which intensivists were routinely involved in daytime management.[6] However, a subsequent analysis of the same cohort demonstrated no association of daytime physician staffing when taking organizational factors such as clinical protocols and multidisciplinary rounds into account.[7] This departure from previous literature leaves one wondering about the possibility of residual confounding in the analyses, leading to the wrong conclusion about the relationship between nighttime intensivists and patient outcomes.

Further doubt regarding the mortality benefits of nighttime intensivists stems from a more recent and even larger observational study including 143 ICUs. Using a similar design as the 2012 paper, this study found no benefits of nighttime intensivists regardless of the daytime staffing model.[8] Further, this study actually found that ICUs with no physicians in the ICU at night at all had the lowest risk-adjusted mortality rates, possibly because limitations on life support were less commonly enacted in these ICUs. Thus, this larger study not only suggested that nighttime intensivists provide no mortality benefit in any ICU regardless of daytime staffing model, but also highlighted the problems inherent in attributing outcome differences across ICUs to any singular organizational difference.

The only two studies with experimental designs have cast further doubt on the benefits of nighttime intensivist staffing. First, Garland and colleagues conducted a crossover trial in one academic and one community ICU comparing high-intensity daytime staffing with home call at night (control) versus high-intensity daytime staffing with other intensivists in-house at night (intervention). The authors found reduced symptoms of burnout among the daytime intensivists in the intervention group, but no differences in in-hospital mortality, ICU length of stay, or family satisfaction.[9] Further, the intervention caused greater perceptions of role conflict among nurses and reduced sense of autonomy among trainees.

Finally, the lone randomized trial of nighttime intensivist staffing, conducted by us in a single academic ICU, demonstrated no difference in in-hospital mortality, ICU length-of-stay, or hospital length-of-stay.[10] Furthermore, objective measures of daytime alertness and hours slept at night were not improved for daytime intensivists when nighttime intensivists were available.[11] Although crossover trials are subject to temporally related biases, and the single-center randomized trial may have limited generalizability, the breadth of null findings in these experimental studies provides high-quality evidence that nighttime intensivist staffing is not associated with patient outcomes.

Are these data sufficient for hospitals to reasonably decide not to implement nighttime intensivist staffing in ICUs or for those who have already adopted the intervention to abandon it? Answering this question requires consideration of many outcomes for many

stakeholders, and we acknowledge that the evidence in this regard is highly incomplete (Table 1). For example, although nighttime intensivist staffing may reduce trainees' autonomy, trainees also report greater supervision when an intensivist is present at night.[9, 10] Might this translate into subtle improvements in patients' outcomes? Might the increased supervision mitigate the effects of reduced autonomy and promote better future physicians, thereby improving future patients' outcomes? Academic institutions must consider such questions, but they have no compelling answers at present.[12]

Further considerations relate to physician burnout and staff satisfaction. These factors have not been fully studied to date, but may favor nighttime intensivist staffing models.[4, 9, 13] And patient and family satisfaction with care have received little attention, but could plausibly be increased by the sense situational control that senior intensivists may provide at night. In light of these questions, we cannot conclude that nighttime intensivist staffing does not improve any patient outcomes. However, recognizing the costs to healthcare systems to employ around-the-clock physicians, the costs to payers to reimburse for their services, and the added strain on an already limited intensivist workforce, we believe it is reasonable – even essential – to ask a different type of question. In the face of high-quality evidence that nighttime intensivist staffing does not reduce mortality or length of stay, how large would improvements on more subjective outcomes for patients, families, nurses, physicians, and others have to be to justify this enormously resource-intensive approach to critical care? We believe these subjective benefits would have to be quite large, and regardless, should not be used to justify nighttime intensivist staffing until they are proven to manifest at all.

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References

1. Wilcox ME, Chong CA, Niven DJ, Rubenfeld GD, Rowan KM, Wunsch H, Fan E. Do intensivist staffing patterns influence hospital mortality following ICU admission? A systematic review and meta-analyses. Crit Care Med. 2013; 41(10):2253–2274. [PubMed: 23921275]
2. Laupland KB, Shahpori R, Kirkpatrick AW, Stelfox HT. Hospital mortality among adults admitted to and discharged from intensive care on weekends and evenings. J Crit Care. 2008; 23(3):317–324. [PubMed: 18725035]
3. Blunt MC, Burchett KR. Out-of-hours consultant cover and case-mix-adjusted mortality in intensive care. Lancet. 2000; 356(9231):735–736. [PubMed: 11085695]
4. Gajic O, Afessa B, Hanson AC, Krpata T, Yilmaz M, Mohamed SF, Rabatin JT, Evenson LK, Aksamit TR, Peters SG, Hubmayr RD, Wylam ME. Effect of 24-hour mandatory versus on-demand critical care specialist presence on quality of care and family and provider satisfaction in the intensive care unit of a teaching hospital. Crit Care Med. 2008; 36(1):36–44. [PubMed: 18007270]
5. Baharoon S, Alyafi W, Tamim H, Al-Jahdali H, Alsafi E, Al-Sayyari A, Ahmed Q. Continuous Mandatory Onsite Consultant Intensivists in the ICU: Impacts on Patient Outcomes. J Patient Safety. 2014
6. Wallace DJ, Angus DC, Barnato AE, Kramer AA, Kahn JM. Nighttime intensivist staffing and mortality among critically ill patients. New Engl J Med. 2012; 366(22):2093–2101. [PubMed: 22612639]

7. Costa DK, Wallace DJ, Kahn JM. The Association Between Daytime Intensivist Physician Staffing and Mortality in the Context of Other ICU Organizational Practices: A Multicenter Cohort Study. Crit Care Med. 2015; 43(11):2275–2282. [PubMed: 26308426]

8. Kerlin MP, Harhay MO, Kahn JM, Halpern SD. Nighttime Intensivist Staffing, Mortality, and Limits on Life Support: A Retrospective Cohort Study. Chest. 2015; 147:951–958. [PubMed: 25321489]

9. Garland A, Roberts D, Graff L. Twenty-four-hour intensivist presence: a pilot study of effects on intensive care unit patients, families, doctors, and nurses. Am J Resp Crit Care Med. 2012; 185(7): 738–743. [PubMed: 22246176]

10. Kerlin MP, Small DS, Cooney E, Fuchs BD, Bellini LM, Mikkelsen ME, Schweickert WD, Bakhru RN, Gabler NB, Harhay MO, Hansen-Flaschen J, Halpern SD. A randomized trial of nighttime physician staffing in an intensive care unit. New Engl J Med. 2013; 368(23):2201–2209. [PubMed: 23688301]

11. Bakhru RN, Basner M, Ecker A, Kerlin MP, Halpern SD, Rosen IM, Hansen-Flaschen JH, Dinges DF, Schweickert WD. The Effects Of Nocturnal In-Hospital Intensivist Coverage On Sleep, Work And Behavioral Alertness In Faculty And Fellows. D22 ADVANCING CRITICAL CARE THROUGH NEW APPROACHES AND PARADIGMS. 2013:A5291–A5291.

12. Kerlin MP, Halpern SD. Twenty-four-hour intensivist staffing in teaching hospitals: tensions between safety today and safety tomorrow. Chest. 2012; 141(5):1315–1320. [PubMed: 22553264]

13. Stanton E, Hilbert C, Maillie S, Dine J, Cooney E, Halpern SD, Kerlin MP. Nursing Perceptions Of In-Hospital Vs. Telephone Availability Of An Intensivist. C106. INTERPROFESSIONAL TOPICS IN THE PROVISION OF CRITICAL CARE. 2014:A5252–A5252.

Table 1

Potential endpoints and stakeholders in studies of nighttime intensivist staffing or other ICU organizational characteristics

Stakeholder group	Outcomes and considerations
Patients and family members or caregivers	Survival Survivorship outcomes (physical, emotional, cognitive, overall quality of life) ICU complications Quality of end-of-life care Caregiver bereavement outcomes Satisfaction with ICU care
ICU nurses and other staff	Job satisfaction Symptoms or reports of burnout Quality of interdisciplinary communication Quality of communication with patients and families
ICU residents and other trainees	Autonomy Adequacy of supervision / avoidance of feeling incompetent Perceived educational value
Health system leaders and payers	Resource utilization Impact on physician workforce Costs and reimbursements