



Nighttime physician staffing improves patient outcomes: we are not sure

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The financial cost to implement dedicated nighttime senior physician staffing in intensive care units (ICUs) would not be inconsiderable to any healthcare system. Therefore, prior to embarking on such a financial outlay, there would need to be substantive evidence around two major areas: (1) evidence that there is a nighttime “problem” and (2) evidence that dedicated nighttime ICU senior physician staffing fixed/mitigated the nighttime “problem” and delivered benefits, including economic benefits, to offset the financial outlay.

With respect to (1), while there is evidence that discharging patients from ICU at night can be harmful in some healthcare settings (with night used as a proxy either for premature ICU discharge and/or a period when staffing on the ward/floor is lower) [1], evidence of “harms” to patients who are admitted at night is conflicting [2] and for those who remain in the ICU overnight appears limited. Though not within the scope of this debate on patient outcomes, with respect to “harms” to family members, the evidence seems non-existent and with respect to “harms” to staff, there is some evidence that ICU physicians, working within a daytime-only model, may suffer cognitive fatigue and sleep deprivation and that this may impair performance. With regard to (2), while there is evidence that exposure to ICU physician staffing per se may improve patient outcomes (e.g. those treated in ICU physician-led or “closed” units) [3], the evidence that dedicated nighttime ICU senior physician staffing affords additional benefits to patients appears conflicting and limited.

The pro debaters [4] consider the question of dedicated nighttime ICU senior physician staffing broadly—including not only the impact on patient outcomes (the scope of this debate) but also on daytime ICU physicians’ workload and the cumulative role of fatigue and sleep deprivation on performance and burnout. The pro debaters suggest that, from both personal experience and the existing literature, there is ample evidence that dedicated nighttime ICU senior physician staffing improves outcomes for patients and for staff and that the difficulty lies only in teasing out from the existing evidence when, where and how outcomes are improved—given the important role played by context.

The con debaters [5] suggest that while the premise of dedicated nighttime ICU senior physician staffing appears intuitively one that would seem to improve patient outcomes, the evidence does not support this. However, they accept a need to consider not only the patient outcomes studied to date (predominantly mortality and length of stay) but also other outcomes for patients (e.g. quality of care including end-of-life care, quality of life, etc.), for family members/caregivers (e.g. family satisfaction) and for payers (e.g. staff satisfaction, cost savings) and agree that this evidence is far from substantive. The con debaters conclude that, given the absence of direct evidence of benefit of dedicated nighttime ICU senior physician staffing on the patient outcomes that have been studied, the costs of implementing it cannot be justified.

While coming to different conclusions, both sides of the debate, pro and con, highlight the challenges posed by the methodological limitations and the issues of generalizability of the existing evidence base evaluating dedicated nighttime ICU senior physician staffing.

With regard to methodological limitations, much of the existing evidence on dedicated nighttime ICU senior physician staffing comes from observational studies—both

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Table 1 Examples of service delivery and organizational factors that might affect the potential impact of dedicated nighttime ICU senior physician staffing

1. Healthcare system
(a) Provision of ICU beds
(b) Organization of ICUs (e.g. regionalization)
(c) Closed versus open model for ICUs
2. Hospitals/hospital organization
(a) Number/expertise/rotation of physician staffing
(b) Senior physician with specific expertise in case of difficult procedures, e.g. tracheal intubation, such as, an anaesthetist available 24/7
(c) Possibility to accommodate the patient in another place during the night, e.g. ED, dedicated postoperative care unit
3. ICUs
(a) Size of ICU (number of beds allocated to ICU/HDU patients)
(b) Admission (triage) and discharge protocols
(c) End-of-life decision-making, practices and patterns
(d) Handover procedures between day and night shifts
(e) Percentage of off-hours admissions
(f) Staff
(i) Nurse to patient ratio
(ii) Specific background of nurses
(iii) The presence of a resident during the night, his background discipline (anaesthesiology, internal medicine, surgery) and year of training
(iv) Definition of a senior intensive care physician i.e. an ICU fellow is not considered as a senior intensive care physician in the USA while he is in France
(g) Whether the ICU physician at night belongs to the team or comes from other department. Senior ICU physician on call with possible help for young doctors on site?
(h) Technologies provided e.g. specific expertise such as ECMO and therapeutic plasma exchange

ECMO extracorporeal membrane oxygenation, ED emergency department, HDU high dependency unit, ICU intensive care unit

retrospective and prospective—with the inherent problems (including residual confounding, temporal bias and causation) such designs and their inference pose [6]. The only two experimental studies are both small (and show no difference) [7, 8]. There are also challenges as to the interpretation of the precise nature of the intervention in some studies and to how, and for how long, it was delivered and to the analytical approach used (for an intervention with a potentially time-varying, cumulative effect). Finally, though outside the remit of this debate, there has been less consideration of family- and staff-related outcomes in studies to date [9].

With regards to generalizability, it is clear that context is important and that healthcare systems and hospital and ICU services within them vary widely internationally. To interpret the existing evidence on dedicated nighttime ICU senior physician staffing, these contextual factors (Table 1) and their potential impact on outcomes have to be considered. For example, there is wide variation in the number of available hospital and ICU beds per 100,000 population by country [10]. Within hospitals, the number, expertise and rotation of existing daytime and nighttime physician staffing can vary. Further, the size of ICUs can vary (from four to more than 30 ICU beds) and admission patterns can vary widely across ICUs (e.g.

some surgical ICUs do not admit patients at night while other general/medical ICUs admit more than 40 % of patients during nighttime hours) [11]. Daytime organization of ICU care (protocols, handover procedures, multidisciplinary rounds, communication skills, patient care pathways, morbidity-mortality reviews, etc.) also varies and has the potential to impact. Finally, there is a large difference in existing dedicated nighttime senior ICU physician staffing across countries: in the USA, the proportion of ICUs with dedicated nighttime senior ICU physician staffing is lower at 10 % [12] than the 21 % in Brazil [13], the 40 % in the Netherlands and the nearly 100 % in France, Italy, Spain and Portugal [14].

So, where does this leave us—the consumers of the debate? We can potentially design more rigorous studies in this area, expand the outcomes measured and account for context better. However, to offset the considerable costs of implementation [15], a primary objective of dedicated nighttime ICU senior physician staffing must be to provide continuous 24-h ICU care. In addition to improved short- and longer-term survival for patients, continuous 24-h ICU care (including options for continuous 24-h admission and discharge) should and must deliver cost savings in terms of a reduction in ICU length of stay alongside other improved outcomes for patients,

for family members/caregivers and for staff. However, unless the hospital system of care also shifts to effective delivery of continuous 24-h hospital care, then effective and efficient delivery of continuous 24-h ICU care is likely impossible—given that transitions in and out of an ICU are major steps in the trajectory of critically ill patients, for whom accurate clinical assessments, selection of the appropriate therapeutic intensity level and maintenance of continuity of care are fundamental determinants of outcome. So, we are left with the following question: is dedicated nighttime ICU senior physician staffing a high enough priority either for further investment in research or for adoption into practice? We are not sure.

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