Are Intensivists Safe?

Intensivists have an identity problem. We do not perform unique procedures, such as coronary angioplasty or endoscopy. We used to take pride in our skills placing and interpreting data from pulmonary artery catheters, but this art is dying rapidly as the evidence mounts against its utility (1). We do not have an organ focus, as do neurologists or nephrologists. Many of us are internists, but others are pediatricians, anesthesiologists, neurologists, and surgeons. Despite this identity crisis, critical care medicine has not faded into obscurity but rather is enjoying a period of focused attention and popularity. Among the reasons are recent epidemiologic studies that emphasize the burden of critical illness and prominent, if controversial, clinical trials that are finally creating an evidence base for our practice (2–5). Of note, we have attracted the attention of payers and quality assurance agencies, primarily because of studies showing that organized staffing by intensivists improves the outcome of critically ill patients (6–8).

In most of the world, critically ill patients are managed in closed intensive care units (ICUs). Therefore, research about different intensivist staffing models is only possible in and primarily of interest to clinicians in the United States (9). The terminology for models of intensive care physician staffing is not standardized and can be confusing (see Glossary). In the most cited systematic review (7), high-intensity staffing referred to ICUs with policies that require transfer of responsibility for care of every critically ill patient to a single intensivist team (closed ICUs) or that mandate consultation by an intensivist. The high-intensity models evaluated in these studies were based on unit-level policies that reflect an environment of care rather than the individual physician (intensivist or nonintensivist) assigned to the patient. We use the term *intensivist staffing* to specifically refer to high-intensity models of care and not to the specialty of the individual physician assigned to the patient.

Glossary

Term	Definition
Closed ICU	All patients are cared for by 1 team of intensivists in collaboration with a primary service. Only intensivists have admitting privileges to the ICU. Also called *mandatory transfer*.
Open ICU	Any physician can admit patients to the ICU.
Elective consultation	Intensivists are available for consultation at the discretion of the responsible physician.
Choice ICUs	An ICU in which an intensivist is the responsible physician for some patients but not others; presumably an open ICU with elective consultation.
No-choice ICU	An ICU in which there is no choice about intensivist care—either all patients or no patients have an intensivist as their responsible physician.
Intensivist	A physician with subspecialty training in critical care medicine
High-intensity staffing	Includes both closed and mandatory consult models
Low-intensity staffing	Any model other than closed or mandatory consult model

ICU = intensive care unit.

In this issue, Levy and colleagues (10) explore the effects of ICU physician staffing models on mortality in Project IMPACT, a consortium of ICUs that receive benchmarking data in an effort to improve their care. Their findings not only refute the claim that intensivist-staffed ICUs improve outcomes but raise the possibility that intensivists are actually harmful. It is a complex study made more so by combining 2 separate research questions: one on the effect of intensivist care in choice ICUs and the other on intensivist care in no-choice ICUs.

Most of the patients in this cohort received care in choice ICUs, where someone, presumably a physician, decided whether to involve an intensivist. The investigators found that elective management by an intensivist in choice ICUs was associated with increased mortality. Elective management by an intensivist in a choice ICU should not be confused with intensivist staffing. The choice ICUs would all be classified as low-intensity staffed ICUs because intensivist involvement with a patient's care was discretionary. The effect of intensivists in low-intensity–staffed ICUs has not been studied extensively, but Levy and colleagues are not the first to raise concerns about this model of care. Treggiari and colleagues (11) demonstrated that elective consultation by a pulmonologist in open ICUs was associated with no benefit in patients with acute lung injury. These authors attributed the lack of association to indication bias, arguing that physicians would be more likely to seek help in cases that they judged to have worse prognosis. Because physicians' predictions of outcome contribute to prognoses generated by mathematical models, indication bias is difficult to eliminate from observational studies with regression models (12). Estimates of prognosis probably affect the decision to involve an intensivist, making the analysis of the choice ICUs susceptible to the same bias. Despite these limitations, these 2 studies certainly raise concerns that elective intensivist consultation in open ICUs may not substitute for intensivist staffing of the entire unit.

In a separate analysis, Levy and colleagues showed that no-choice ICUs, in which at least 95% of patients were cared for during their entire stay by an intensivist, had higher mortality rates than ICUs in which 5% or fewer of the patients received care by an intensivist (10). Presumably, the former would qualify as intensivist-staffed units, and the latter are not only open units but open units with no access to intensivists. This analysis should be comparable to previous studies of intensivist staffing. Moreover, indication bias is unlikely, because no one had a choice about whether to involve an intensivist. Although the over-

all cohort was subject to multiple sensitivity analyses to account for assumptions about patient mix and statistical models, the analysis of the no-choice ICUs was not. Because the findings of the primary analyses were robust across a wide range of assumptions, a cautious reader must ask, is it possible that intensivist-staffed ICUs are dangerous?

In trying to answer this question, readers should consider the strength of the evidence supporting the alternate hypothesis (that intensivist-staffed ICUs reduce mortality) and the evidence supporting possible causal mechanisms for harms or benefits. The evidence that mortality is lower in intensivist-staffed ICUs is extensive and consistent across various study designs and patient populations (8, 9). In addition to studies involving general ICU patients, studies show that patients with acute lung injury, trauma, abdominal aortic surgery, and esophageal resection have better outcomes in intensivist-staffed ICUs (11, 13, 15). Curiously, an analysis of an earlier version of the same Project IMPACT data set that Levy and colleagues used to show that intensivists were harmful was used to demonstrate that intensivists with dedicated neuro-ICUs improved outcomes in patients with intracerebral hemorrhage (16).

Are these associations between intensivist care and better outcomes examples of cause and effect? One way to answer this key question is to look for dose effects. If intensivists are dangerous, greater exposure to them should cause even greater harm. In fact, a higher "dose" of intensivists, even in intensivist-staffed ICUs, appears to confer additional benefit (17, 18). In assessing whether an association is causal, readers should also look for evidence for a causal mechanism. Intensivist-staffed ICUs are more likely to use evidence-based treatments and to initiate earlier end-of-life discussions, which may explain their effect on outcomes (11, 19, 20). Although Levy and colleagues speculate about mechanisms by which intensivists might increase mortality, they do not provide evidence to support a proposed mechanism. Patients cared for by intensivists were sicker and more likely to be mechanically ventilated and, not surprisingly, more likely to receive "ICU procedures" than patients in the care of nonintensivists. This more aggressive approach, which might be accompanied by nosocomial complications, is a plausible culprit. But patients who did not receive ICU procedures also had worse outcomes when they received care by an intensivist, making the procedures an unlikely explanation. Therefore, until someone replicates Levy and colleagues' results in another cohort and provides evidence for a mechanism by which intensivist-staffed ICUs increase mortality, their study will remain one observation against many.

Another explanation for these data could present a unique opportunity to learn how to improve critical care. Although the intensivist-staffed no-choice units appear to be harmful, it is possible that they only appear harmful because they were being compared with 21 high performing units that achieved superior outcomes without intensivists. Zimmerman and colleagues (21) found that a similar group of high-performing ICUs did not have a single approach to intensivist staffing but did consistently use treatment protocols, participated in benchmarking studies like Project IMPACT, used specific criteria for selecting patients for ICU admission, and had extensive staff training. Although multiple lines of compelling evidence indicate that mortality and length of stay are better in intensivist-staffed ICUs, none of it precludes the possibility that some ICUs can, in the absence of an organized intensive care service, evolve alternative strategies to deliver high-quality care (22). With a looming shortfall in intensivists and many other barriers to creating intensivist-staffed ICUs in the United States, studies that explicitly identify these techniques are urgently needed (23). Although intensivist staffing is an evidence-based recommendation, it is probably only a first step toward, and hardly a guarantee of, the care that critically ill patients and their families deserve.

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