



**Evidence-Based Medicine Journal Club**

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Journal club critique

**Are specialized ICUs so special?**

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**Expanded Abstract**

**Citation**

Lott JP, Iwashyna TJ, Christie JD, Asch DA, Kramer AA, Kahn JM: Critical illness outcomes in specialty versus general intensive care units. *Am J Respir Crit Care Med* 2009, 179:676-683 [1].

**Background**

General intensive care units (ICUs) provide care across a wide range of diagnoses, whereas specialty ICUs provide diagnosis-specific care. Risk-adjusted outcome differences across such units are unknown.

**Methods**

**Objective:** To determine the association between specialty ICU care and the outcome of critical illness.

**Design:** Retrospective cohort study.

**Setting:** 124 ICUs participating in the Acute Physiology and Chronic Health Evaluation IV from January 2002 to December 2005.

**Subjects:** 84,182 patients admitted to specialty and general ICUs with an admitting diagnosis or procedure of acute coronary syndrome, ischemic stroke, intracranial hemorrhage, pneumonia, abdominal surgery, or coronary-artery bypass graft surgery. ICU type was determined by a local data coordinator at each site. Patients were classified by admission to a general ICU, a diagnosis-appropriate ("ideal") specialty ICU, or a diagnosis-inappropriate ("non-ideal") specialty ICU.

**Intervention:** None.

**Outcomes:** The primary outcomes were in-hospital mortality and ICU length of stay.

**Results**

After adjusting for important confounders, there were no significant differences in risk-adjusted mortality between general versus ideal specialty ICUs for all conditions other than pneumonia. Risk-adjusted mortality was significantly greater for patients admitted to non-ideal specialty ICUs. There was no consistent effect of specialization on length of stay for all patients or for ICU survivors.

**Conclusions**

Ideal specialty ICU care appears to offer no survival benefit over general ICU care for select common diagnoses. Non-ideal specialty ICU care (i.e., "boarding") is associated with increased risk-adjusted mortality.

**Commentary**

Specialty ICUs provide diagnosis-specific care for select patient populations as opposed to general ICUs, which provide care for a wide variety of patients and diagnoses. Among the nearly 6,000 American ICUs, two thirds are general (mixed medical-surgical) and one third is specialized, the latter of which are more likely to be in teaching hospitals or large institutions [2]. There are many purported benefits of ICU specialization, including physician convenience, reduction of diagnoses and treatment variability, increasing nurse expertise and education, and focused training for fellows. All of these are assumed to result in improved patient outcomes. Surprisingly, the influence of ICU specialization on patient outcomes has only been studied for a single diagnosis. Diringier and colleagues found that after intracranial hemorrhage patients are more likely to survive when cared in neurological ICUs rather than in general ICUs [3]. The benefit of ICU specialization for other diagnoses remains unexplored.

In the present study, the authors sought to determine whether adult ICU patients benefit from care in specialty versus general ICUs in terms of survival and ICU length of stay [1]. The study was a retrospective cohort analysis of the APACHE IV database and focused on patients admitted with six common diagnoses and procedures. Patients were classified into three groups according to admission to a general ICU, a diagnosis-appropriate ("ideal") specialty ICU, or a diagnosis-inappropriate ("non-ideal") specialty ICU. The final cohort was large (n=84,182 patients, n=124 ICUs), representative of American hospitals, and well-balanced for baseline patient characteristics, including severity of illness as measured by the APACHE III score. Interestingly, admission to an ideal specialized ICU was not associated with improved outcomes. In fact, having pneumonia and being admitted to a medical ICU was associated with harm. Admission to a non-ideal specialized ICU for four of the six conditions was associated with worse outcomes. There was no association between ICU specialization and length of stay. The results were robust to sensitivity analysis, in which the authors varied the definition of specialty ICU and excluded patients with characteristics that might have biased their results.

This is a well done study and very relevant for the future organization of critical care services. However, there are several limitations that deserve consideration. First, this study includes only six categories of conditions and five types of specialized ICUs and cannot be generalized to all critically ill patients. Second, the decision to admit to a non-ideal ICU may introduce bias if the decision reflects overwhelmed hospital occupancy, which is associated with worse outcomes [4]. Third, though the authors adjusted for severity of illness, it is possible that unmeasured patient characteristics not captured by APACHE III, such as complexity of the surgical procedure or prior functional status of the patient, differed between groups. Fourth, specialization did not appear to improve survival or length of stay, yet it may improve other patient centered outcomes such as quality of life, which was unavailable in this dataset.

Perhaps the most important limitation is in what constitutes a specialized ICU. This was self-designated by each ICU, though the authors did test this designation in sensitivity analysis. Even so, merely calling an ICU specialized or generalized gives no indication of the type of care that is actually provided in the ICU and in no way reflects level of staffing, use of best practices, or the experience of providers [5,6]. There are no regulatory requirements to obtain the title of "specialized" ICU, which may lead to the existence of specialized ICUs that fail to receive a minimal volume of specific patients or lack sufficient expertise to improve patient outcomes. Therefore, before conducting additional research in this area, future investigators should be aware that specialized ICUs have only their name in common.

It seems plausible that admission to a non-ideal specialized ICU would be associated with worse outcomes. Yet, if this is true and if admission to an ideal specialized ICU is not

beneficial, then the logical conclusion would be to make all ICUs generalized and avoid specialization altogether. As illogical as this might sound to some readers, given the significant monetary and personnel investments that high level specialization requires, it would be prudent to know whether the investment will lead to improved patient outcomes.

### Recommendation

Without knowing more about the care that was provided in each ICU, it is impossible to know from this study whether care in specialty ICUs benefits patient outcomes. Future studies in this area should focus on care provided rather than on ICU specialization labels.

### Competing interests

The authors declare no competing interests.

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