

## High ICU occupancy influences patient disposition from the ED



Patients with sepsis not requiring life support therapies have a reduced likelihood of being admitted from the emergency department (ED) to the intensive care unit (ICU) when the ICU is crowded, according to new research led by the University of Pennsylvania Perelman School of Medicine. The study is in press in the journal *Annals of the American Thoracic Society*.

"Furthermore, such sepsis patients who are admitted from the ED to the ward during times of ICU crowding have higher hospital mortality," the study says. "This finding merits further investigation to determine whether it suggests the superiority of ICUs in caring for such patients or is instead due to residual confounding by severity of illness such that sepsis outcomes on the ward rival those in the ICU."

ICU capacity strain refers to the potential limits — due to occupancy, turnover, acuity and other factors — placed on an ICU's ability to provide high-quality care for all patients who may need it at a given time. Few studies have investigated how fluctuations in ICU capacity strain might influence care outside of the ICU.

This retrospective study involved a cohort of patients with sepsis admitted from the ED to a medical ward or ICU at three hospitals within the University of Pennsylvania Health System from 2012 to 2015. Patients were excluded if they required life support therapies, defined as invasive or non-invasive ventilatory support or vasopressors, at the time of admission. Researchers sought to determine whether ICU capacity strain is associated with ICU versus ward admission decisions, which capacity strain metrics account for such associations, and whether the severity of capacity strain is associated with patient outcomes.

Among 77,142 hospital admissions from the ED, 3,067 patients met the study's eligibility criteria. The ICU capacity strain metrics varied among and within study hospitals over time. In unadjusted analyses, ICU occupancy, ICU turnover, ICU census acuity, and ward occupancy were all negatively associated with ICU admission. In the fully adjusted model including patient-level covariates, only ICU occupancy remained associated with ICU admission (OR = 0.87 95% CI, 0.79-0.96,  $p = 0.005$ ), such that a 10% increase in ICU occupancy (e.g., 1 additional patient in a 10-bed ICU) was associated with a 13% decrease in the odds of ICU admission.

Notably, among the subset of patients admitted initially from the ED to a medical ward, ICU occupancy at the time of admission was associated with increased odds of hospital mortality (OR = 1.61, 95% CI 1.21-2.14,  $p = 0.001$ ).

This study "illustrates that many ICU admissions may be highly discretionary, independent of clinical characteristics of the patient being triaged. It is well established that access to and utilisation of ICU resources for patients with similar severities of illness vary dramatically among hospitals for many diseases," the authors write.

"This study," the authors continue, "shows that the probability that patients with sepsis will be admitted to an ICU also varies dramatically within hospitals according to ICU bed availability, controlling for patient-level clinical characteristics."

The study has some important limitations, including that the data were derived from three hospitals in a single health system. Future studies would benefit from the addition of more hospitals from more geographically and organisationally diverse health systems and better take into account organisational differences between facilities, the authors explain.

Source: [Annals of the American Thoracic Society](#)

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