ATS Highlights 2025:
Critical Care Assembly Early Career Professionals

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Tell us about yourself.
I am from Nepal and learned about mountain medicine during medical school and established an internationally accredited program in Mountain Medicine in the Nepalese Himalayas which is now running over a decade. Later, I studied the respiratory health effects of indoor air pollution in rural Nepal and came to the US for Pulmonary Critical Care Fellowship.

Tell us about your research.
I am interested in health services researches and leverage large databases to understand hospital overcrowding and its effects on patient outcomes with goal to improve critical care delivery during routine times and crisis situations.

Where do you see yourself in 5 years?
I hope to return to academic medicine after fulfilling my five years of clinical service requirements in medically underserved area.

How has the Critical Care Assembly contributed to your career?
It has helped me connect, network, and build collaborations.

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Did hospital type, classified by capabilities and resources, influence COVID-19 volume–outcome relationships during Delta wave surges?

620 US hospitals July–November 2021
223 380 adult inpatients with COVID-19

Validated surge index to rank hospitals

Marginal probabilities of in-hospital death or discharge to hospice by hospital type, 620 US hospitals

Cohort		Marginal Probability (95%)
Primary cohort	All hospitals	0.055 (0.045 to 0.065)
n = 223 380	ECMO-capable hospital	0.050 (0.038 to 0.062)
Interaction P value = 0.32	Multi-ICU hospitals	0.061 (0.046 to 0.075)
	≥200 beds, single-ICU hospitals	0.048 (0.019 to 0.076)
	<200 beds, single-ICU hospitals	0.066 (0.046 to 0.086)

Marginal probability (95% CI) for Mortality Risk Associated With Log Surge Index

Survival decreased as patient volumes surged regardless of hospital capability.

Neupane M, Warner S, Mancera A, et al. Association between hospital type and resilience during caseload stress: a natural quality-of-care experiment from the COVID-19 pandemic. Ann Intern Med. 10 September 2024. [Epub ahead of print]. doi:10.7326/M24-0869
http://acpjournals.org/doi/10.7326/M24-0869
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Annals of Internal Medicine®

Association Between Hospital Type and Resilience During COVID-19 Caseload Stress: A Retrospective Cohort Study

Background: Understanding which hospital types were more resilient to pandemic overcrowding-related excess deaths may prioritize patient safety during future crises.

Objective: To determine whether hospital type classified by capabilities and resources (ECMO capability, multiplicity of ICU types, and large or small hospital) influenced COVID-19 volume–outcome relationships during Delta wave surges in the US.

Participants: Adult COVID-19 inpatients admitted July to November 2021 in 620 US hospitals in PINC-AI Database.

Measurements: Hospital-months were ranked by previously validated surge index (severity-weighted COVID-19 inpatient caseload relative to hospital bed capacity) percentiles. Hierarchical models were used to evaluate the effect of log-transformed surge index on the marginally adjusted probability of in-hospital mortality or discharge to hospice. Effect modification was assessed for 4 mutually exclusive hospital types.

Results: Among 620 hospitals recording 223 380 inpatients with COVID-19 during the Delta wave, there were 208 ECMO-capable, 216 multi-ICU, 36 large (≥200 beds) single-ICU, and 160 small (<200 beds) single-ICU hospitals. Overall, 50 752 (23%) patients required admission to the ICU, and 34 274 (15.3%) died. The marginally adjusted probability for mortality was 5.51% (95% CI, 4.53% to 6.50%) per unit increase in the log surge index (strain attributable mortality = 7375 [CI, 5936 to 8813] or 1 in 5 COVID-19 deaths). The test for interaction showed no difference (P = 0.32) in log surge index–mortality relationship across 4 hospital types. Results were consistent after excluding transferred patients, restricting to patients with acute respiratory failure and mechanical ventilation, and using alternative strain metrics.

Conclusion: Comparably detrimental relationships between COVID-19 caseload and survival were seen across all hospital types, including highly advanced centers, and well beyond the pandemic's learning curve. These lessons from the pandemic heighten the need to minimize caseload surges and their effects across all hospital types during public health and staffing crises.
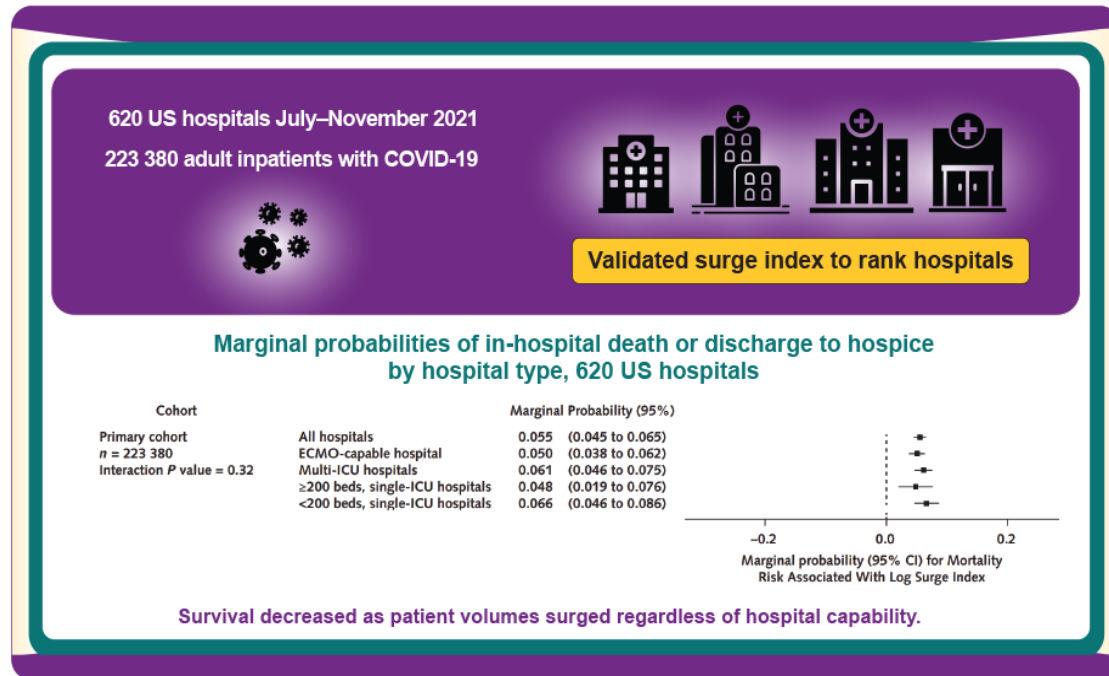
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