The Consequences of Hospital Crowding: Evidence from Texas

Laura Dague, Tiffany Radcliff, and Benjamin Ukert

Texas A&M University

March 2026

Extended Abstract

In the United States, where hospital care accounts for over $1.6 trillion in annual expenditures, approximately one-third of total healthcare spending, individual hospitals are responsible for determining how many of their licensed beds should be staffed and operational. Hospitals face a fundamental resource allocation dilemma when staffing hospital beds. Maintaining excess capacity drives up costs, while operating at high occupancy leaves little slack to absorb demand shocks. Crowding may impact facilities differently due to financial incentives and location constraints that can affect allocation decisions and flexibility to adjust capacity. For example, for-profit ownership may influence decisions about who to discharge, and constraints may be particularly binding for hospitals in locations that are limited in aggregate staffing capacity such as rural areas.

Emergency departments serve as the primary gateway for unscheduled admissions. When emergency demand spikes unexpectedly, hospitals operating near capacity must make real-time decisions about resource allocation that can affect patient outcomes, length of stay, and the quality of care delivered. Understanding how hospitals respond to these capacity constraints is essential for designing policies that balance operational efficiency with patient safety. When capacity is suddenly constrained, there are potential broader impacts and risks for hospitalized patients, including a potential for incomplete care that results in an earlier-than-expected discharge, transfer to other acute care facilities, an early hospital readmission, greater risk of death, and others. Despite the importance of understanding how capacity constraints affect care delivery, empirical evidence remains limited, especially in decentralized healthcare systems where hospital ownership and market incentives vary substantially.

In this paper, we examine how hospitals react to typical capacity constraints by evaluating changes in length of stay, discharge destination, readmission, and in-hospital mortality during unanticipated, plausibly exogenous patient surges. We use the universe of more than 8 million hospital discharges in Texas from January 2016 to February 2020 linked to the universe of emergency department (ED) admissions to measure surges in patient demand for care and to track the outcomes of those already in the hospital when those surges in demand occur (Table 1). Individual masked identifiers in these restricted access data allow us to follow people across their ED and hospitalization experiences and measure readmissions. We focus on non-federal general acute care hospitals, of which there are 341 in our data which vary by both for-profit status and rurality. We augment these discharge data with data on hospital characteristics from the

American Hospital Association's annual surveys. Our main measure of capacity is the daily level of emergency inpatient admissions relative to staffed hospital beds, although we examine robustness of our results to several alternate measures and extensively explore the robustness of the variation underlying this measure. We treat the capacity measure as an exogenous measure of hospital specific daily admission shocks and regress it on outcomes for patients already in the hospital on that day. Our identification relies on the assumption that day-to-day variation in emergency admissions is uncorrelated with the error term – that these shocks are unpredictable to hospitals. We include a wide battery of fixed effects (hospital-specific year, week-of-the-year, day-of-the-week, and holiday fixed effects) in addition to patient-specific demographic and diagnosis related group controls in order to make this assumption plausible.

We find that when hospitals face capacity constraints due to unexpected spikes in ED admissions, patient lengths of stay and intensity of treatment are lower, more patients have a same-day any-reason discharge – leaving the hospital immediately rather than being discharged in the next two days (Table 2). These different decisions about patient care had important consequences for patient health: we find a robust increase in within-hospital mortality when there was a surge in admissions. Patients are on average more likely to be transferred to another general acute care facility when discharged, although we did not find impacts overall on readmissions at one week or one month. Effects are particularly strong for patients admitted with a diagnosis that is considered non-deferrable (Table 3). Findings were generally similar for both non-profit and for-profit facilities, except that length of stay was not shorter during surges for non-profit facilities (Table 4). Effects for rural facilities, however, were generally more than twice as large as in urban facilities, including for in-hospital mortality, where the point estimate is three times larger (Table 4).

We study a variety of mechanisms to understand what types of decisions might be driving these results. First, we consider whether the intensity of treatment changes for patients by examining the number of procedures, the likelihood of primary and secondary procedures, and list charges, finding that discharged patients were treated less intensely (Table 5). Second, we also examined whether crowding impacted the admission time of day. We find that the average admission hour remains the same but the average discharge hour is later in the day. Third, we also considered patient selection – who is discharged when hospitals are crowded. We find some evidence of discharges of low-risk patients, which is concentrated among patients who stay less than 24 hours in the inpatient setting. U.S. law requires hospitals to at least triage patients before discharge or transfer regardless of their ability to pay, but this does not mean that patients need to be treated equally. Results showed large differences by patient payer status, with the largest effects on discharges and mortality for charity patients but no effects on transfers, while for private patients, length of stay impacts were smaller, transfers effects were large, and mortality effects were not statistically different from zero (Table 4). Patients with public payers were in between these extremes.

The US hospital inpatient occupancy rate averaged 75.3% in 2023-2024 and is expected to hit 85% by 2032 (Leuchter et al. 2025). Compared to 2009-2019, when occupancy averaged 64%, we are experiencing an increase in occupancy rates driven by reductions in bed capacity. In addition, there were major strains on hospital capacity during the most intense periods of the COVID-19 pandemic. The demand pressures of an aging population are likely to compound these concerns. In contrast with past worries about the costs of maintaining excess capacity (Keeler and Ying 1996; Gaynor and Anderson 1995), we provide the first systematic evidence on the negative impacts of hospital capacity constraints in the United States. Hoe (2022) considers hospital crowding in the English National Health Service within trauma and orthopedic departments and finds that high patient volumes lead to faster discharges with increased likelihood of readmission. However, since hospital ownership and market structures are starkly different in the U.S. context, it is unclear whether these results would generalize to a large country where physician and hospital decision-making is complicated by sometimes significant potential travel distances for both patients and staff, a fragmented health care payer system, and the financial incentives faced by privately owned and operated facilities. We find that the overall impact – "quicker and sicker" discharges –extends to the fragmented U.S. hospital system, but with important institutional differences.

Our work also relates to the literature on certificate of need laws, which govern hospital ability to expand capacity (recently reviewed in Courtemanche and Garuccio 2025), although our analysis differs substantively by examining variation in demand conditional on licensed beds. It also relates to the broader topic of how supply-side capacity affects patients. In the U.S., longer emergency department wait times have been shown to affect timely access to care and increase mortality (Hoot and Aronsky 2008; Gruber et al. 2023). Hospital profit status has also shown to influence quality of care, with privatization a known driver of increased mortality (Duggan et al. 2023). Other work has shown that location and market competition can be important drivers of costs and patient well-being (Finkelstein, Gentzkow, and Willians 2016; Gaynor, Ho, and Town 2015; Kessler and McClellan 2000), but there is not evidence that consolidation reduces overall capacity (Garmon 2022).

Our findings have several important implications for health policy. First, the robust increase in in-hospital mortality during patient surges elevates crowding from an operational inefficiency to a patient safety issue, providing a potential rationale for policies that ensure adequate surge capacity. Second, the fact that we find no effect on 7- or 30-day readmissions coupled with a significant increase in transfers to other acute care facilities, suggests that hospitals may be exporting risk to other institutions. Consequently, policies like the Hospital Readmissions Reduction Program, which penalize facilities based on their individual readmission rates, may miss system-wide welfare losses and could even create perverse incentives to transfer unstable patients. Finally, the heterogeneity in responses highlights that effective policy must account for different institutional incentives and market structures, such as ownership status and urban or rural location.

Acknowledgements:

We are grateful for support for this project from the Texas A&M Presidents Excellence Fund and Health Science Center. This study was approved by the Texas A&M IRB and the Texas Department of State Health Services (DSHS) IRB and Executive Steering Committee. We are grateful for the use of DSHS data for this project; no interpretations drawn from these data are those of DSHS or HHSC.

References

Courtemanche, Charles J., and Joseph Garuccio. "How Do Certificate-of-Need Laws Affect Hospitals? A Review of the Evidence." (2025) No. w34026. National Bureau of Economic Research.

Duggan, Mark, Atul Gupta, Emilie Jackson, and Zachary S. Templeton. *The impact of privatization: Evidence from the hospital sector*. No. w30824. National Bureau of Economic Research, 2023.

Finkelstein, Amy, Matthew Gentzkow, and Heidi Williams. "Sources of geographic variation in health care: Evidence from patient migration." *The quarterly journal of economics* 131, no. 4 (2016): 1681-1726.

Garmon, Christopher. "Hospital concentration and bed capacity." *Applied Economics Letters* 29, no. 6 (2022): 551-554.

Gaynor, Martin, and Gerard F. Anderson. "Uncertain demand, the structure of hospital costs, and the cost of empty hospital beds." *Journal of health economics* 14, no. 3 (1995): 291-317.

Gaynor, Martin, Kate Ho and Robert J. Town. 2015. "The Industrial Organization of Health-Care Markets." *Journal of Economic Literature*, 53 (2): 235–84.

Gruber, Jonathan, Thomas P. Hoe, and George Stoye. 2023. "Saving lives by tying hands: the unexpected effects of constraining health care providers." *Review of Economics and Statistics* 105, no. 1: 1-19.

Hoe, Thomas P. "Does hospital crowding matter? Evidence from trauma and orthopedics in England." *American Economic Journal: Economic Policy* 14, no. 2 (2022): 231-262.

Hoot, Nathan R., and Dominik Aronsky. "Systematic review of emergency department crowding: causes, effects, and solutions." *Annals of emergency medicine* 52, no. 2 (2008): 126-136.

Keeler, Theodore E., and John S. Ying. "Hospital costs and excess bed capacity: A statistical analysis." *The Review of Economics and Statistics* (1996): 470-481.

Kessler, Daniel P., and Mark B. McClellan. "Is hospital competition socially wasteful?." *The Quarterly Journal of Economics* 115, no. 2 (2000): 577-615.

Leuchter, Richard K., Benjo A. Delarmente, Sitaram Vangala, Yusuke Tsugawa, and Catherine A. Sarkisian. "Health care staffing shortages and potential national hospital bed shortage." *JAMA Network Open* 8, no. 2 (2025): e2460645.

Texas Hospital Inpatient Discharge Data Research File, [2016-2020]. Austin, Texas: Department of State Health Services, Austin, Texas.

Texas Outpatient Data Research File, [2016-2020]. Austin, Texas: Department of State Health Services, Austin, Texas.

Tables

Table 1 -Hospital and Patient Level Summary Statistics

	All	For-Profit	Non-Profit
Panel A. Independent variable (Hospital-day-level)			
Daily Admissions	16.0	20.1	14.2
Daily emergency admissions	10.2	12.9	9.1
Daily Admissions relative to staffed beds	15%	20%	13%
Daily Emergency Admissions relative to staffed beds	9%	12%	8%
Panel B. Inpatient Characteristics			
Age	54.6	54	54.8
Male	41%	40%	41%
White	70%	70%	69%
Black	14%	11%	16%
Asian	2%	2%	2%
Masked	14%	17%	12%
Hispanic Origin	28%	35%	24%
Insurance Coverage	89%	90%	88%
ER Admission	64%	64%	64%
Panel C. Outcomes			
Length of Stay	4.7	4.5	4.7
Same day Discharge	2%	2%	2%
One Day Discharge	14%	15%	13%
Two Days Discharge	24%	24%	23%
Transfer to GAC	1%	1%	2%
Readmission within 7days	12%	12%	13%
Readmission within 30days	23%	22%	24%
In hospital mortality	2%	2%	2%
Observations	8,268,969	3,064,355	5,204,613

Table 2 – Main Regression Results of Hospital Crowding on Patient Outcomes

	Length of Stay	Same day Discharge	Transfer to GAC
Operational Outcomes			
Daily Emergency Admissions relative to staffed beds	-0.147**	0.0891***	0.00544***
	(0.0725)	(0.00534)	(0.00170)
Implied Effect at 10% increase in relative admission ra	-0.31%	42.43%	3.89%
Quality Outcomes	Readmission within 7days	Readmission within 30days	In hospital mortality
Daily Emergency Admissions relative to staffed beds	0.0134	0.0119	0.00559***
	(0.0109)	(0.00966)	(0.00120)
Implied Effect at 10% increase in relative admission ra	1.12%	0.52%	2.66%

Table 3 – Subsample for Non-deferrable Diagnosis Admissions

	Length of Stay	Same day Discharge	Transfer to GAC	Readmission within 7days	Readmission within 30days	In hospital mortality
All Hospitals (n=1,006,197)						
Daily Emergency Admissions relative to staffed beds	-0.167	0.103***	0.00908*	0.0180	0.0145	0.0125***
	(0.137)	(0.00655)	(0.00472)	(0.0145)	(0.0129)	(0.00418)
For-Profit (n=364,072)						
Daily Emergency Admissions relative to staffed beds	-0.324**	0.101***	0.00903	0.0153	-0.00715	0.0170**
	(0.151)	(0.00863)	(0.00641)	(0.0132)	(0.0156)	(0.00727)
Non-Profit (n=642,073)						
Daily Emergency Admissions relative to staffed beds	-0.0490	0.104***	0.00943	0.0212	0.0305	0.00908*
	(0.205)	(0.00934)	(0.00668)	(0.0227)	(0.0188)	(0.00477)

Table 4 – Subsample by Hospital Profit Status, Location, and Payor

	Length of Stay	Same day Discharge	Transfer to GAC	Readmission within 7days	Readmission within 30days	In hospital mortality
For-Profit (n=3,064,355)						
Daily Emergency Admissions relative to staffed beds	-0.254***	0.0912***	0.00519**	0.00677	0.0108	0.00513***
	(0.0821)	(0.00781)	(0.00206)	(0.00702)	(0.00706)	(0.00173)
Non-Profit (n=5,204,613)						
Daily Emergency Admissions relative to staffed beds	-0.0645	0.0876***	0.00563**	0.0185	0.0127	0.00603***
	(0.110)	(0.00720)	(0.00255)	(0.0182)	(0.0159)	(0.00165)
Rural (n=526,020)						
Daily Emergency Admissions relative to staffed beds	-0.293	0.158***	0.0326***	0.00371	0.00397	0.0153***
	(0.216)	(0.0152)	(0.00691)	(0.00887)	(0.0136)	(0.00383)
Urban (n=7,742,938)						
Daily Emergency Admissions relative to staffed beds	-0.134*	0.0821***	0.00232	0.0144	0.0128	0.00459***
	(0.0768)	(0.00524)	(0.00168)	(0.0119)	(0.0105)	(0.00125)
Private (n=2,524,056)						
Daily Emergency Admissions relative to staffed beds	-0.161	0.0750***	0.00637***	0.0145	0.00866	0.00178
	(0.115)	(0.00653)	(0.00215)	(0.0129)	(0.0114)	(0.00172)
Public (n=4,725,078)						
Daily Emergency Admissions relative to staffed beds	-0.0723	0.0807***	0.00489**	0.0177*	0.0158	0.00689***
	(0.0875)	(0.00417)	(0.00218)	(0.0103)	(0.00963)	(0.00179)
Charity (n=901,754)						
Daily Emergency Admissions relative to staffed beds	-0.351**	0.168***	0.00301	-0.0190	-0.0105	0.00920***
	(0.168)	(0.0125)	(0.00364)	(0.0156)	(0.0169)	(0.00270)

Table 5 – Intensity of Care

	Total number of Procedures	Primary Surgery	Secondary Surgery	Total number of Revenue Codes	Total Charges
Daily Emergency Admissions relative to staffed beds	-0.596	-0.0110***	-0.00802**	-0.919	-225,245**
	(0.933)	(0.00385)	(0.00357)	(0.757)	(111,489)
Implied Effect	-3.06%	-0.18%	-0.20%	-0.51%	-0.36%