

Financial Stability of Level I Trauma Centers Within Safety-Net Hospitals

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- BACKGROUND:** Level I trauma centers often exist within safety-net hospitals (SNHs), facilities servicing high proportions of low-income and uninsured patients. Given the current health care funding environment, trauma centers within SNHs may be at particular risk. Using California as a model, we hypothesized that SNHs with trauma centers vary in terms of financial stability.
- STUDY DESIGN:** We performed a retrospective cohort study using data from publicly available financial disclosure reports from California's Office of Statewide Health Planning and Development. Safety-net hospitals were identified from the California Association of Public Hospitals and Health Systems. The primary outcomes metric for financial performance was operating margin.
- RESULTS:** California hospitals with Level I trauma centers were analyzed (11 SNH sites, 2 non SNH). The SNHs did not behave uniformly, and were clustered into county-owned SNHs (36%, n = 4) and nonprofit-owned SNHs (64%, n = 7). Mean operating margins for county SNHs, nonprofit SNHs, and non SNHs were -16.5%, 8.4%, and 9.5%, respectively (p < 0.001). From 2010 to 2015, operating margins improved for all hospitals, partly due to increases in the percent of insured patients and changes in payer mix. Nonprofit SNHs had a payer mix similar to that of non SNHs; county SNHs had the highest proportions of MediCal (California Medicaid) (45% vs 36% vs 12%, respectively, p < 0.001) and uninsured patients (17% vs 5% vs 0%, respectively, p < 0.001) compared with nonprofit SNHs and non SNHs, respectively.
- CONCLUSIONS:** The majority (85%) of Level I trauma centers are within SNHs, whose financial stability is highly variable. A group of SNHs rely on infusions of government funds and are therefore susceptible to changes in policy. These findings suggest deliberate funding efforts are critical to protect the health of the US academic trauma system. (J Am Coll Surg 2018;■:1–9. © 2018 by the American College of Surgeons. Published by Elsevier Inc. All rights reserved.)

Level I trauma centers play a special role within trauma systems. In addition to providing the highest level of trauma care, they are responsible for training the next generation of trauma surgeons and for advancing the academic mission.^{1,2} Level I trauma centers share another

characteristic in that they are often situated within safety-net hospitals (SNHs). Safety-net hospitals are defined by the Institute of Medicine (IOM) as hospitals that “organize and deliver a significant level of health care to the uninsured, Medicaid, and other vulnerable populations, or who by mission, offer access to care regardless of a patient’s ability to pay.”³ To support this mission, these centers have historically relied on disproportionate share hospital (DSH) funds and other forms of external subsidies. The dependency on external subsidies places SNHs at unique financial risk with regard to government funding and policy. For example, implementation of the Affordable Care Act (ACA) in 2010, which simultaneously expanded insurance coverage through Medicaid programs, also, in some cases, reduced DSH payments to SNHs.^{4,5} Despite these concerns, an understanding of the financial stability of SNH, and the trauma centers located within them, is still lacking.⁶

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Abbreviations and Acronyms

ACA	= Affordable Care Act
CMI	= case mix index
DSH	= disproportionate share hospital
HHI	= Herfindahl-Hirschman Index
LOS	= length of stay
OSHPD	= Office of Statewide Health Planning and Development
SNH	= safety-net hospital

We sought to assess the financial vulnerability of Level I trauma centers in the era of changes in health care reimbursement. Specifically, our objective was to characterize the financial performance of SNHs that house Level I trauma centers compared with non SNHs with Level I trauma centers in order to better understand the financial risk to this critical type of trauma center. Currently, approximately 37% of trauma centers in the United States exist within public or county SNHs.⁷ However, on further analysis, there are additional hospitals that qualify as SNHs. They fall under nonprofit ownership, and are affiliated with University of California teaching hospitals, or have a church-based ownership.⁵ We included both types of SNH in our analysis to obtain a full-spectrum view of the financial status of Level I trauma center hospitals. Using the State of California as a model, we hypothesized that SNHs with Level I trauma centers are heterogeneous in their financial performance, and that county-owned SNHs with trauma centers are at the greatest risk, as defined by a negative operating margin. We further explored whether implementation of the ACA affected payer mix and hospital financial indicators over time.

METHODS

Financial information for hospitals was obtained using publicly available financial disclosure reports from California's Office of Statewide Health Planning and Development (OSHPD). The State of California mandates annual submission of these reports, which provide summary data reporting a wide range of information including hospital ownership, volumes and use, payer mix, and select financial indicators. Audited reports from fiscal years 2010 to 2015 represented the 6 most recent years available for analysis, and were included in the study. We also used OSHPD case mix index (CMI) files that were available from 2010 to 2013 in order to assign a CMI to each hospital studied. The hospital CMI reflects "the diversity, clinical complexity and resources in the population of all patients in the hospital."⁸ Finally, we incorporated the Healthcare Cost and

Utilization Project, Agency for Healthcare Research's Market Structure Files in order to obtain the Herfindahl-Hirschman Index (HHI) for each hospital. The HHI is calculated based on geopolitical boundaries of a given health service area (HSA) and used as an indicator of the hospital's market competition, ranging from 0 to 1.0, where increases in the index represent a decrease in competition and an increase in market power. These data are not available every year, and the most recently available data were from 2009.

We identified all Level I adult trauma hospitals up until 2015 within the State of California by referencing the state-based Local Emergency Medical Services Agency (LEMSA) designation of trauma centers.⁹ All but 1 of the sites were also verified as Level I by the American College of Surgeons Committee on Trauma.² In this case, the level designated by the state was used as the trauma center status. We excluded hospitals that were designated as pediatric Level I trauma centers only, as pediatric hospitals often differ in their payer mix and the sources of external funding (eg donations) that they receive.

Safety-net hospital designation for each Level I trauma center was determined according to the definition applied by the California Association of Public Hospitals (CAPH) and their 501(c)3 nonprofit affiliate, the Safety Net Institute (SNI).¹⁰ The CAPH confers safety net status onto public county hospitals as well as those affiliated with the University of California and under other nonprofit or church ownership. We distinguished between these 2 types of SNHs' safety net status by dividing trauma SNHs into county and nonprofit cohorts, where nonprofit SNHs had university, or church-based affiliation, rather than being under county governance. Safety net status was also indicated by the receipt of disproportionate share hospital (DSH) funds on financial reports.

The primary outcome was hospital operating margin, defined as the net operating income (ie the total revenue minus total expenses or costs) divided by the total operating revenue of a hospital, expressed as a percentage.¹¹ This metric is a key measure of a hospital's ability to control expenses relative to revenue and is commonly used for benchmarking in both public and private hospitals.¹²⁻¹⁴ Secondary outcomes were DSH funds received by the hospital and net inpatient revenue. Net inpatient revenue per day was defined as the revenue of inpatient services per adjusted inpatient day.¹¹ We first sought to compare the hospital cohorts to each other. We next determined whether there were changes to the outcomes after vs before implementation of the ACA.

Univariate analysis was performed using 1-way ANOVA statistics to evaluate differences between public

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