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Emergency general surgery outcomes at safety net hospitals

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ABSTRACT

Background: The United States hospital safety net is defined by the Agency for Healthcare Research and Quality as the top decile of hospitals, which see the greatest proportion of uninsured patients. These hospitals provide important access to health care for uninsured patients but are commonly believed to have worse outcomes. The aim of this study was to compare the outcomes of emergency general surgery procedures performed at safety net and nonsafety net hospitals.

Material and methods: The Healthcare Cost and Utilization Project Nationwide Inpatient Sample from 2008–2010 was used to create a cohort of inpatients who underwent emergency appendectomy, cholecystectomy, or herniorrhaphy. Outcomes measured included length of stay, charge, cost, death in hospital, complications, and failure to rescue (FTR). Univariate and logistic regression analysis was performed to associate variables with outcomes.

Results: A total of 187,913 emergency general surgery cases were identified, 11.5% of which were performed at safety net hospitals. The safety net cohort had increased length of stay but lower mean charge and cost. Age, comorbidity score, black race, male gender, and Medicaid and Medicare insurance were associated with mortality, complication, and FTR. Lower socioeconomic status was associated with mortality and complication. Safety net status was positively associated with complication but not mortality or FTR.

Conclusions: Safety net hospitals had higher complication rates but no difference in FTR or mortality. This may mean that the hospitals are able to effectively recognize and treat patient complications and do so without increased cost.

1. Introduction

In the United States, safety net hospitals provide essential access to care for the nation's uninsured. The Agency for Healthcare Research and Quality defines safety net hospitals as those in the top decile of hospitals, which provide the largest proportion of care to the uninsured [1]. At this time, hospitals that provide more than 8.7% of care to self-pay patients are considered safety net hospitals. Because of significant financial pressures, nonsafety net hospitals have reduced the amount of uninsured patient care provided, while many safety net hospitals have been forced to close [2–4]. As a

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result, this further reduces access to care for uninsured patients who often experience delays in care because of difficulty finding practitioners and hospitals willing to treat them.

Further complicating the future of care for the uninsured is the evolving funding mechanisms for safety net care implemented as part of the health care reform. Planned reductions in the Medicaid Disproportionate Share Hospital Program, as part of the Affordable Care Act, could result in further financial stress on the safety net [5]. Studies are beginning to show that such changes in reimbursement are associated with decreases in the quality of surgical care based on performance on global Centers for Medicare and Medicaid Services quality measures [5].

At present, few studies have examined surgical outcomes at safety net hospitals and those that have been published are limited to either a single institution or within one regional hospital system [6]. As surgical outcomes are increasingly tied to hospital quality evaluations and reimbursement, this is an important aspect of determining the future of the health care safety net. The purpose of our study was to determine whether safety net hospitals have poorer emergency general surgery outcomes than those of nonsafety net hospitals using a national administrative database over a 3-y period.

2. Materials and methods

The Healthcare Cost and Utilization Project Nationwide Inpatient Sample (NIS) from years 2008–2010 was used to construct a retrospective cohort. The NIS is designed to approximate a 20% stratified sample of Unites States hospitals, composed of data from 41 states [7]. Over 24 million inpatient encounters are included in the NIS data set from 2008–2010.

The study cohort was constructed using International Classification of Diseases Ninth Revision (ICD-9) procedure codes to identify patients who had one of the three emergency surgical procedures being studied. The procedures studied were appendectomy (47.0, 47.01, and 47.09), cholecystectomy (51.2, 51.22, 51.23, and 51.24), and herniorrhaphy (53.0, 53.2, and 53.5–53.6). These operations were selected based on the assumption that every hospital with basic general surgery capabilities should be able to perform them. The cohort was further narrowed to include only unplanned admissions. Patients aged <18 y were excluded.

The study data set included patient information on age, sex, race and/or ethnicity, and comorbidities. Comorbidity was quantified using the Elixhauser score, a validated modification of the Charlson comorbidity index designed for use with large administrative databases [8]. A score is assigned to each comorbidity based on its association with mortality. The sum of these points for each patient equals the Elixhauser score. Race and/or ethnicity data were reclassified from the standard database as white, black, Hispanic, or other.

A binary variable was added to the data set to identify each case as either insured or uninsured based on the coded insurance status. Those with commercial insurance, Medicare, or Medicaid were designated as insured. Patients were designated as uninsured if the insurance status was listed as self-pay or other. Every hospital in the database was assigned safety net status based on the proportion of uninsured patients treated at that specific hospital. The top decile of hospitals treating the highest proportion of uninsured patients each year were identified as safety net hospitals in keeping with the Agency for Healthcare Research and Quality definition [1]. Each patient encounter was subsequently assigned safety net status based on the hospital where they received treatment.

Where available, cost data were obtained by multiplying the total charges for each case by the supplemental cost-to-charge ratio for each hospital provided by the NIS. Socioeconomic status was based on the mean household income from the patient's zip code. These were classified as lowest ($1–38,999), low ($39,000–47,999), high ($48,000–62,999), and highest ($63,000+).

Outcomes measured included length of stay, cost, charge, death, failure to rescue (FTR), and complications. FTR is defined as the presence of a complication and subsequent hospital death. FTR has been shown to be less influenced by patient characteristics and is more sensitive to hospital quality of care characteristics compared with that of mortality alone [9]. Finally, complications were identified using ICD-9 codes. These included surgery specific complications and generalized complications. The complications observed are listed in Table 1.

Statistical analysis was performed using SPSS (version 19.0; IBM Inc, Armonk, NY) and SAS (version 9.3; SAS Institute Inc, Cary, NC). Continuous variables were expressed as means or percentages where appropriate. Interquartile ranges were calculated for length of stay, cost, and charge. Multivariable regression and hierarchical analysis were performed where appropriate to evaluate the relationship between all available patient and hospital variables and outcomes. These models were chosen in an effort to account and control for both patient- and hospital-level characteristics. Any result with $P < 0.05$ was considered statistically significant. This study was approved and deemed exempt by The University of Tennessee Health Science Center Institutional Review Board.

3. Results

The study included 187,913 emergency general surgery cases in the cohort. Approximately 11.5% of cases were treated at safety net hospitals. The study sample included cases from

Table 1 – Complications observed.

Complication	ICD-9 code
Postoperative shock	998.0
Hemorrhage/hematoma	998.1
Accidental puncture	998.2
Wound disruption	998.3
Retained foreign body	998.4
Postoperative infection	998.5
Nervous system	997.0
Cardiac	997.1
Respiratory	997.3
Gastrointestinal	997.4
Urinary	997.5