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## Postoperative acute care use after freestanding ambulatory surgery



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### ABSTRACT

**Background:** Surgical procedures in the United States are increasingly performed in the ambulatory setting, including freestanding ambulatory surgery centers (ASCs). However, there is a lack of research and tracking of surgical outcomes in this setting.

**Materials and methods:** We analyzed data from a state all-payer claims database to produce a retrospective cohort study on the rate of acute care use (emergency department [ED] visits and inpatient admissions) within 7 d after operations performed in freestanding ASCs in South Carolina. Two-level reliability-adjusted generalized linear mixed models accounting for random facility-level effects were used to adjust for patient-level and facility-level characteristics.

**Results:** A total of 1,328,708 procedures were performed in 86 freestanding ASCs in South Carolina from 2006-2013. The overall rate of postoperative acute care per 1000 procedures within 7 d was 17.3 (95% confidence interval [CI], 15.3-19.5). Patient characteristics associated with the highest postoperative acute care use within 7 d included Medicaid insurance (adjusted odds ratio [aOR], 1.79; 95% CI, 1.70-1.90), lowest median household income (aOR, 1.36; 95% CI, 1.30-1.43), and preoperative Charlson Comorbidity Index (CCI) score 3+ (aOR, 4.14; 95% CI, 3.95-4.34). Total charges for postoperative ED visits ( $n = 14,682$ ) and inpatient admissions ( $n = 8945$ ) within 7 d were approximately \$51.4 and \$361.1 million, respectively from 2006-2013.

**Conclusions:** Acute care use within 7 d was commonly  $\geq 10$  per 1000 procedures performed in freestanding ASCs in South Carolina. These measures may be targets for quality and cost improvement and innovation. Patients at risk for acute care utilization may benefit from improvements in postoperative follow-up after procedures in ASCs.

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## Introduction

Over the last 30 y, many surgical procedures have moved from inpatient to outpatient settings.<sup>1</sup> More recently, surgical procedures performed in ambulatory surgery centers (ASCs) have been found to take less operating room time and subsequently are associated with reported cost savings ranging from \$363 to \$1000 per procedure—barring complications.<sup>2</sup> Furthermore, between 1996 and 2006, the rate of visits to freestanding ASCs not affiliated with acute care hospitals increased by 300%, whereas there was no change in the rate of visits to hospital-based ASCs during the same time period.<sup>3</sup> Despite estimates that 22.6 million ambulatory procedures were performed out of 14.6 million visits to freestanding ASCs in 2006,<sup>3</sup> there is no routine tracking of surgical outcomes in this setting.

It might be assumed that quality concerns in the freestanding ASC environment are negligible given that surgeons likely elect to operate on patients in this setting who are at low risk and unlikely need hospital-based care. Although the incidence of major postoperative morbidity or mortality is relatively rare,<sup>4–8</sup> there are other indicators of patient harm, poor outcome, and increased cost such as increased utilization of acute care, including emergency department (ED) visits, inpatient hospital admissions, and/or returning to the ASC where the procedure was performed. Previous studies have reported rates of postoperative acute care use ranging from 0.7% to 5% after ambulatory operations, although many of these studies did not distinguish between ambulatory procedures performed at hospital-based ASCs and those at freestanding ASCs.<sup>5,6,9–12</sup> There are also no data on whether these rates of postoperative acute care are low, expected, or high. Additionally, there are no national clinical or administrative databases that capture a representative sample of surgical procedures performed in freestanding ASCs in the United States.

The growing volume of surgical care performed in freestanding ASCs necessitates epidemiologic evaluation of meaningful metrics that could be amenable to quality improvement initiatives. Therefore, the purpose of this study was to evaluate the utilization of acute care, including ED visit and inpatient admission within 7 d, after surgical procedures performed in freestanding ASCs in South Carolina. We hypothesized that rates of acute care within 7 d after surgical procedures performed in freestanding ASCs differed across patient characteristics. Additionally, we hypothesized that there is substantial variability in rates of acute care use across procedures performed in freestanding ASCs. Secondly, we evaluated the reported charges associated with acute care use.

## Materials and methods

### Data source

Three all-payer claims data sets from South Carolina that included outpatient surgery, ED visits, and inpatient admissions, respectively, from 2006–2013 were used. These data sets were obtained from the Revenue and Fiscal Affairs Office of South Carolina. The outpatient surgery data set captured all

operations performed in the outpatient environment, including hospital-based ASCs and freestanding ASCs. The inpatient admission data set included all hospital admissions, whereas the ED data set captured all ED visits in South Carolina irrespective of whether the patient was subsequently admitted to the hospital.

Patients were assigned a unique, encrypted identifier that linked across these three data sets and allowed identification of all health care encounters including outpatient surgical procedures, inpatient admissions, or ED visits. Using these unique patient identifiers, the three data sets were merged at the patient level, to allow identification of subsequent care use after ambulatory procedures. Each data set included information on patient demographics, primary diagnosis (*International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) diagnostic codes), primary procedure (ICD-9-CM procedure codes), primary payer at discharge, and other important patient-specific information.

### Inclusion criteria

Freestanding ASCs in South Carolina were included if they performed 250 or more surgical procedures per year. This translated to approximately five surgical procedures per week during 50 weeks a year. All patients who were  $\geq 18$  y and who had an operation performed in one of these facilities between January 1, 2006 and November 30, 2013 and who did not have any missing data for age, gender, race, or primary procedure were included. If a patient had more than one surgical procedure performed, each procedure was included if it was performed  $>90$  d after the previous procedure. Then, to focus the analysis on commonly performed procedures, patients who underwent procedures that were performed in a freestanding ASC  $<50$  times a year, throughout the state, were excluded. Last, because there were multiple procedures that fell into similar categories, we categorized all procedures into groups using the Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications Software (CCS) for single-level procedures.<sup>13</sup> All patients who had an AHRQ CCS procedure group that included a primary procedure that did not reflect procedures performed in an operating room were excluded (see [Appendix](#) for excluded procedures).

### Outcomes of interest

The main outcome of interest was the rate of postoperative acute care use, which was defined to include ED visits and inpatient admissions per 1000 procedures that occurred within the first 7-d period after the index surgical procedure date. When reporting the cumulative rate of acute care, visiting the ED and subsequently being admitted to the inpatient setting was counted as one event. Secondly, the rates of all ED visits and all inpatient admissions within the first 7-d period were evaluated separately. Patients who died without ever using acute care were identified using a state-wide death registry and were subsequently excluded from these analyses. The AHRQ CCS for single-level diagnoses<sup>13</sup> was used to categorize all ED visit and inpatient primary diagnoses into similar groups of diagnoses. Another secondary outcome of interest

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