Opening Ambulatory Surgery Centers and Stone Surgery Rates in Health Care Markets

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Purpose: Ambulatory surgery centers deliver surgical care more efficiently than hospitals but may increase overall procedure use and adversely affect competing hospitals. Motivated by these concerns we evaluated how opening of an ambulatory surgery center impacts stone surgery use in a health care market and assessed the effect of its opening on the patient mix at nearby hospitals.

Materials and Methods: In a 100% sample of outpatient surgery from Florida we measured annual stone surgery use between 1998 and 2006. We used multiple regression to determine if the rate of change in use differed between markets, defined by the hospital service area, without and with a recently opened ambulatory surgery center.

Results: Stone surgery use increased an average of 11 procedures per 100,000 individuals per year (95% CI 1–20, $p < 0.001$) after an ambulatory surgery center opened in a hospital service area. Four years after opening the relative increase in the stone surgery rate was approximately 64% higher (95% CI 27 to 102) in hospital service areas where a center opened vs hospital service areas without a center. These market level increases in surgery were not associated with decreased surgical volume at competing hospitals and the absolute change in patient disease severity treated at nearby hospitals was small.

Conclusions: While opening of an ambulatory surgery center did not appear to have an overly detrimental effect on competing hospitals, it led to a significant increase in the population based rate of stone surgery in the hospital service area. Possible explanations are the role of physician financial incentives and unmet surgical demand.

Key Words: urinary calculi, urologic surgical procedures, ambulatory surgical procedures, ambulatory care facilities, hospitals

Abbreviations and Acronyms

ASC = ambulatory surgery center

HSA = hospital service area

RVU = relative value unit

SASD = State Ambulatory Surgery Databases

SES = socioeconomic status

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As the hospitalization rate for urinary stone disease has decreased in the last 2 decades, the number of outpatient procedures for upper tract calculi has increased more than 4 fold.[1] Multiple factors underlie this trend. Improved instrumentation and optics have allowed stone burden resolution with minimally invasive techniques, making ambulatory stone surgery more palatable to patients.[2,3] Also, health care reimbursement reforms have been enacted that incentivize hospitals and providers to move care for patients with urolithiasis away from the costly inpatient setting.[4,5] A

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byproduct of this shift toward outpatient care is the proliferation of ASCs and lithotripsy centers, where many stone surgeries are performed today.[6]

ASCs have been lauded for the capacity to increase provider productivity and the potential to decrease surgical episode costs.[7–9] However, critics of the ASC movement have warned about urologists' increasing investment in them.[10] Insofar as financial pressure leads urologists to lower the treatment threshold,[11] ASC expansion may increase overall stone surgery use. ASCs often compete with full-service hospitals for healthy, well insured patients who require remunerative procedures such as stone surgery. To the extent that ASCs siphon away these profitable patients, the hospital ability to cross subsidize under compensated and uncompensated care may be threatened.[12]

To our knowledge empirical evidence to justify either concern is lacking. Thus, we performed a population based study using Florida data in which we quantified the rate of change in stone surgery use for a health care market after an ASC opened in it. We also measured the impact of the ASC opening on the annual stone surgery volume, and patient and payer mixes at competing full-service hospitals.

METHODS

Subjects and Database

We used Florida data from the Healthcare Cost and Utilization Project SASD, which capture 100% of outpatient discharges in a given year. SASD Florida files are uniquely suited to study ambulatory stone surgery since they include procedures done at hospitals, freestanding ASCs and lithotripsy centers.[13] Using CPT codes we abstracted all discharges for urinary stone disease between 1998 and 2006. The SASD facility identifier allowed us to identify all hospitals and ASCs where 1 or more stone surgeries were done during the study period.

Defining Health Care Markets

We used HSA boundaries to assign each hospital and ASC to 1 health care market where stone surgery was performed. An HSA represents a collection of ZIP codes where residents receive most of their care at hospitals within that area.[14] We identified 2 mutually exclusive HSA types, including those 1) initially without an ASC but where an ASC opened in 1999 or later and 2) those where an ASC never opened within the HSA boundaries.

Outcomes

Our primary outcome was the annual HSA level rate of stone surgery, directly standardized to the 2000 United States population by age and gender. The numerator for this rate calculation was the number of times that stone surgery was done in an HSA during a specific calendar year. We calculated the primary outcome for HSAs where an ASC opened and for those that were always without an ASC. The denominator was the number of individuals living in the HSA that year. Our secondary outcome was the RVU total for stone surgery at hospitals in HSAs that were initially without an ASC but where an ASC then opened.

Statistical Analysis

We compared patient demographic characteristics, including age, gender, race, primary payer, socioeconomic status measured at the patient ZIP code level using a composite measure of low, medium or high[15] and comorbidity status using an adaptation of the Charlson index,[16] between the 2 HSA types using the chi-square or t test as appropriate. We also plotted population based rates of stone surgery by calendar year for these 2 HSA types and visualized trends using fractional polynomial regression.[17]

We then quantified the rate of change in stone surgery use for an HSA after an ASC opened using a multiple time series research design.[18] This approach decreased bias from 2 potential sources. 1) A difference in surgery rates between HSA types with time could not be mistaken for an ASC opening effect since each HSA was compared with itself. 2) Changes with time that affected all HSAs similarly could not be mistaken for an effect of an ASC opening because a control group, ie HSAs that were always without an ASC, was used. Also, the longitudinal nature of this approach allowed us to infer directionality.

To estimate changes in annual surgery rates in the periods before vs after ASC opening and test for no change between the pre-ASC and post-ASC opening periods we used generalized estimating equation models with a first order autoregressive correlation structure.[19,20] In these models we included time in years since the first ASC entered an HSA. We also included calendar time to account for temporal trends and adjusted for the multiplicity of ASCs in an HSA using an indicator variable.

Finally, we evaluated changes in the payer mix and level of disease severity in patients who underwent stone treatment at hospitals in the year before and the year after a competing ASC opened in the same HSA. We also contrasted the total annual stone surgery RVU at these hospitals in the 2 periods. For all analyses we performed 2-sided significance testing with the type I error rate set at 0.05. In accordance with the Code of Federal Regulations institutional review board approval was waived for this study.

RESULTS

During the study period stone surgery was done in 101 HSAs, in which an ASC did and did not open in 21% and 47%, respectively. HSAs differed in significant ways (table 1). In HSAs with no ASC vs HSAs with an ASC opening mean ± SD patient age was 55.3 ± 16.4 vs 54.9 ± 16.3 years. Patients treated for stones in an HSA where an ASC opened were more likely to be Hispanic, come from a higher socioeconomic environment and have a lower level of comorbidity (each $p < 0.001$). At the start of the study period the stone surgery rate in these HSAs was also higher (162 procedures per 100,000 individuals per year, 95% CI 112–212 vs 97/100,000, 95% CI 62–131, $p = 0.033$).