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Ambulatory surgery centers and outpatient urologic surgery among Medicare beneficiaries

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Abstract

Objectives—To determine the effect of an ambulatory surgery center (ASC) opening in a healthcare market on utilization and quality of outpatient urologic surgery.

Methods—Retrospective cohort study of Medicare beneficiaries undergoing outpatient urologic surgery from 2001 to 2010. Markets were classified into three groups based on ASC status (i.e., those with ASCs, those without ASCs, and those where ASCs were introduced). Multiple propensity score methods adjusted for differences between markets and general linear mixed models determined the effect of ASC opening on utilization and quality, defined by mortality and hospital admission within 30 days of the index procedure.

Results—During the study period, 195 ASCs opened in markets previously without one. Rates of hospital based urologic surgery in markets where ASCs were introduced declined from 221 to 214 procedures per 10,000 beneficiaries in the 4 years after baseline. In contrast, rates in the other two market types increased over the same period ($p < 0.001$). Rates of outpatient urologic surgery overall (i.e., in the hospital and ASC) demonstrated similar growth across market types during same period ($p = 0.56$). The introduction of an ASC into a market was not associated with increases in hospital admission or mortality (p's > 0.5).

Conclusions—The introduction of an ASC into a healthcare market lowered rates of outpatient urologic surgery performed in the more expensive hospital setting. This redistribution was not associated with declines in quality or with greater growth in overall outpatient surgery use.

Keywords

population; propensity score; administrative claims; healthcare market; hospital service area; mortality; hospital admission

Introduction

The volume of outpatient surgery has increased dramatically over the last three decades, largely due to advances in medical technology and payment incentives.[1] Paralleling this growth, freestanding ambulatory surgery centers (ASCs) have proliferated widely,[2] serving as an alternative to the traditional hospital outpatient department. Procedure rates at ASCs have risen by 300% and currently these facilities deliver half of all outpatient surgery.[1]

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Relative to the hospital setting, ASCs can provide the same care at a lower cost per episode,[2–4] in part because facility payments are made at only a fraction of those for the same procedure performed in the hospital. In this context, redistribution of procedures to ASCs has the potential to improve the efficiency of the delivery system.

However, some worry that the recent proliferation of ASCs may in fact spur utilization and result in greater overall spending. Almost all freestanding ASCs are owned, at least in part, by the surgeons who staff them.[5] Because owners share in the profits of the facility in addition to collecting the professional fee for service, the Medicare Payment Advisory Commission (MedPAC) and others[2,6–9] are concerned that perverse financial incentives might result in volume creep, whereby indications for outpatient surgery, almost all of which is discretionary, are lowered. Such incentives also have the potential to encourage the redistribution of more marginal patients, or those less suitable due to health status, leading to possible declines in quality.

For these reasons, we used national Medicare data to determine the impact of the dissemination of ASCs on the delivery of outpatient urologic surgery. In particular, we interested in the effect of ASC on opening on both urologic procedure use and quality, as defined by perioperative mortality and hospital admission. Findings from this study directly inform policies surrounding physician ownership, financial incentives and utilization.

Material and Methods

Study subjects

This study represents a retrospective cohort study of Medicare beneficiaries undergoing outpatient urologic procedures between 2001 and 2010. We used a 20% sample of national claims form the Physician Carrier, Outpatient, Medicare Provider Analysis and Review (MEDPAR) and Denominator files. Patients between 65 to 99 years of age undergoing a urologic procedure, defined by a Healthcare Common Procedure Coding System code ranging from 50000 to 59999, at either a hospital outpatient department or freestanding ASC were included. The surgical setting was determined using explicit codes in the Medicare files.

The Provider of Service Extract, reported annually by the Centers for Medicare and Medicaid Services, was used to categorize each market according to the presence or absence of a Medicare certified freestanding ASC during each year of the study. For the purposes of this study, we chose the Hospital Service Area (HSA), as defined by the Dartmouth Atlas,[10] to reflect distinct healthcare markets. Each HSA, of which there 3,436 in the US, represents a collection of ZIP codes wherein residing Medicare beneficiaries receive the majority of their healthcare. We chose HSAs, as opposed to Hospital Referral Regions, because outpatient surgery is elective, discretionary and low risk. Thus, patients are likely to undergo such procedures locally as opposed to traveling large distances.

We then sorted each HSA into three mutually exclusive groups based on their ASC status: (1) those with an ASC present throughout the study period, (2) those without an ASC throughout the study period, and (3) those where at least one ASC opened for the first time after 2001. A small number of HSAs (n=287, or 8.4%) that had an ASC open and close during the study period were excluded from the analysis.

Outcomes and study variables

The objective of the study was to assess the effects of an ASC opening in a healthcare market on utilization and quality. Our utilization outcomes were population-based rates of outpatient urologic surgery, both in the hospital and overall. In order to calculate the first, the numerator consisted of annual counts of hospital-based outpatient procedures in a HSA, and the denominator was comprised of eligible Medicare beneficiaries with Part B coverage residing in that HSA. The second utilization outcome differed only in that the numerator consisted of annual counts of outpatient urologic surgery (i.e., those in either the hospital or an ASC) in each HSA.

We operationalized quality for outpatient urologic surgery using mortality and hospital admission occurring within 30 days of the index procedure. The numerator for this measure consisted of counts of admission (or mortality). In contrast to our utilization outcomes, the denominator was the amount of time "at risk", expressed in person years, among eligible beneficiaries undergoing urologic outpatient surgery annually.

Demographic information on age, race, and gender of patients was obtained from the Denominator file. Comorbidity was assessed using *International Classification of Diseases, Ninth Revision, Clinical Modification* diagnosis codes submitted in the year preceding the index outpatient procedure and categorized into groups using the Charlson method.[11] To minimize confounding among healthcare markets, additional information pertaining to the local characteristics of the individual markets was abstracted from several data sources including the Area Resource File[12] and the American Health Planning Association's National Directory.[13]

Statistical analysis

The three categories of HSAs were contrasted according to beneficiary and contextual characteristics using nonparametric statistics. In order to address significant differences across healthcare markets, we used multiple propensity score-adjusted methods.[14] For this purpose, we fit a multinomial logistic regression model where the dependent variable was the HSA group and the independent variables were the clinical and contextual features previously described. The Hausman test was used to verify that the multinomial model met the Irrelevant Alternatives Assumption and overlapping of the distributions was visually performed. For this model, the Wald chi square was 492.4 with 24 degrees of freedom ($p < 0.0001$) and the pseudo R^2 was 0.3025. This approach enabled us to effectively calculate the predicted probability of each HSA to be assigned to one of the three market categories. These probabilities were then included as adjustment variables in subsequent models assessing relationships between HSA type and the outcomes.

We next assessed temporal relationships between HSA type and the utilization outcomes. In both cases, the HSA was the unit of analysis. Because ASCs open for the first time in HSAs in different years, it was necessary to use a multiple time series approach. For HSAs where

ASCs opened for the first time, “baseline” was defined as the year prior to the first facility opening within its boundaries. For the other two categories of HSAs, there are no changes during the study period, so there is not a natural “baseline”. However, to allow for comparisons to be made with the ASC opened category, a “baseline” year was randomly assigned for these other two HSA categories. Since the baseline year is not distributed uniformly across the study period in the ASC opened category, to prevent a time bias that may occur using the standard technique where “baseline” years would be randomly chosen and evenly distributed (e.g., resulting in more “baseline” years in the earlier part of the study period for the ASC always present group as compared to the ASC opened group), the random “baseline” selections were proportionally matched to the “opened for the first time” category so that the distribution of baseline years in the always and never present categories matched the distribution of baseline years in the “opened for the first time” category. Generalized linear mixed models were fitted to assess for differences in utilization across HSA types. Models were adjusted for differences in population and healthcare markets, the multiple propensity score and calendar year by incorporating these variables as fixed effects. The HSA was included in the model as a random effect to account for repeated measures of utilization within each HSA. Similar methods were used to calculate adjusted rates of mortality and hospital admissions. However, for these outcomes, the unit of analysis was the patient.

All analyses were performed using SAS v9.2 (Cary, NC). The probability of a type I error was set at 0.05 and all testing was two-sided. The institutional review board at the University of Michigan approved this study. The requirement for informed consent was waived.

Results

Aggregate beneficiary and regional characteristics according to market type are shown in Table 1. While significant differences were evident for many factors, most of these were small and likely of limited clinical significance, with one exception. Markets without ASCs were considerably more likely to be located in more rural areas. After adjusting for multiple propensity scores, all significant differences across markets disappeared.

Adjusted rates for hospital based outpatient urologic surgery are shown in Figure 1 according to HSA group. Rates of urologic surgery performed in markets where ASCs were added for the first time declined 3.2% from 220.9 per 10,000 Medicare beneficiaries at baseline to 213.8 per 10,000 Medicare beneficiaries 4 years after baseline. There were no differences in the rate of change in use between market groups prior to baseline ($p=0.77$). However, the rate of change of hospital based urologic procedures did vary significantly across HSA grouping after baseline ($p<0.001$ for test between 3 slopes). This difference was attributable to the decline in utilization in markets where ASCs were added for the first time. In contrast, rates of hospital based outpatient surgery continued to increase in markets where ASCs were always or never present.

Adjusted rates of urologic procedures performed in both hospital based outpatient departments and in ASCs are shown in Figure 2 according to market type. Adjusted rates of urologic procedures performed in markets where at least 1 ASC was introduced during the study period increased by 15.8%, or from 268.8 per 10,000 Medicare beneficiaries at baseline to 311.3 per 10,000 Medicare beneficiaries 4 years after baseline. However, this overall rate of increase did not significantly differ from the rates of increase of outpatient urologic procedures performed in the other 2 market types, indicated by similar slopes for rates of change over time (p=0.56).

Adjusted rates of perioperative mortality and hospital admissions are shown in Figure 3A and B, respectively. Rates of mortality within 30 days of a urologic procedure remained flat in markets where ASCs were introduced for the first time, ranging from 0.65 deaths per 1,000 person-years for the 2-year period prior baseline to 0.66 deaths per 1,000 person years for the 4-year period after baseline. There were no differences in the rate of change of mortality across HSA grouping after ASC introduction (p=0.99 for test between 3 slopes). Similarly, rates of hospital admission remained stable, ranging from 9.8 admissions per 1,000 person-years for the 2-year period prior baseline to 10.6 admissions per 1,000 person years for the 4-year period after baseline. The introduction of an ASC into a healthcare market had no effect on hospital admission within 30 days of the index procedure (p=.50 for test between 3 slopes).

Comment

The introduction of an ASC into a healthcare market resulted in declines in hospital-based surgery. Further, the opening of an ASC performing urologic surgery did not lead to growth in overall rates of outpatient surgery. This redistribution from the hospital setting occurred without any negative implications for quality, as measured by perioperative mortality and hospital admission. Collectively, our data suggest that these facilities are achieving their desired effect for the delivery system, at least as they are measurable in claims data pertaining to urologic surgery.

Over the last several decades, there has been a shift from inpatient to outpatient surgery. Concurrent with this trend, there has been a sea change in the setting for these procedures with movement out of the hospital and into the ASC, such that approximately half of all outpatient surgery is performed in these facilities.[1] Compared to hospitals, ASCs have several advantages, most of which are derived from their efficiency. For payers, ASCs provide similar care at a lower cost per episode.[2,3] For patients, ASCs afford a patient-centered experience in a comfortable, and often plush, environment with lower co-payments.[15] Finally, physicians enjoy greater administrative control and higher productivity.[5,16]

Despite these advantages, however, many worry inherent conflicts of interest associated with ASCs may spur overall utilization and drive healthcare spending.[2] Freestanding ASCs, by and large, are owned by the surgeons who staff them.[5] In this arrangement, surgeons share in the facility profits, which can significantly eclipse revenue generated by the professional fee for service. For this reason, some believe that financial incentives may lead to lower thresholds for intervention, resulting in induced demand. Our findings allay these concerns as they pertain to urologic outpatient surgery.

This study should be interpreted with two limitations in mind. First, these analyses were performed using Medicare claims and directly pertain to Medicare certified ASCs. Other insurers and non-Medicare certified ASCs may behave differently; however, it is common practice that Medicare policy mandates generally precede and guide those of third parties. Second, our measurement of surgical quality, as defined by perioperative mortality and hospital admission, are broad measures of quality. Understanding the impact of ASCs on other relevant measures, including patient reported quality-of-life and satisfaction, would help to better clarify their value to the delivery system.

Conclusions

The introduction of an ASC into a healthcare market served to effectively offload outpatient urology surgery from the hospital without spurring its overall utilization. This redistribution of urologic surgery occurred without negatively impacting quality, as measured by perioperative mortality and hospital admissions. In terms of outpatient urologic surgery, ASCs have the potential to improve the efficiency of the delivery system among Medicare beneficiaries undergoing these procedures.

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References

1. Cullen KA, Hall MJ, Golosinskiy A. Ambulatory surgery in the United States, 2006. National health statistics reports. Jan 28.2009 (11):1–25. [PubMed: 19294964]
2. Medicare Payment Advisory Comission (MEDPAC). Report to the Congress: Medicare Payment Policy. 2012. http://www.medpac.gov/documents/Mar12_EntireReport.pdf
3. Hollingsworth JM, Saigal CS, Lai JC, Dunn RL, Strope SA, Hollenbeck BK. Surgical quality among Medicare beneficiaries undergoing outpatient urological surgery. The Journal of urology. Oct; 2012 188(4):1274–1278. [PubMed: 22902012]
4. Centers for Medicaire and Medicaid Services. 2F: Assessing payment adequacy and updating payments for ambulatory surgical center services. Report to Congress: Medicare Payment Policy. 2003. http://webcache.googleusercontent.com/search?q=cache:http://www.medpac.gov/publications/congressional_reports/Mar03_Ch2F.pdf
5. Ambulatory Surgery Center Association. Ambulatory surgery centers: A positive trend in health care. http://ascassociation.org/advocacy/AmbulatorySurgeryCentersPositiveTrendHealthCare.pdf
6. Iglehart JK. The emergence of physician-owned specialty hospitals. The New England journal of medicine. Jan 6; 2005 352(1):78–84. [PubMed: 15635118]
7. Hollingsworth JM, Ye Z, Strope SA, Krein SL, Hollenbeck AT, Hollenbeck BK. Physician-ownership of ambulatory surgery centers linked to higher volume of surgeries. Health Aff (Millwood). Apr; 2010 29(4):683–689. [PubMed: 20368599]
8. Hollingsworth JM, Krein SL, Ye Z, Kim HM, Hollenbeck BK. Opening of ambulatory surgery centers and procedure use in elderly patients: data from Florida. Arch Surg. Feb; 2011 146(2):187–193. [PubMed: 21339431]
9. Shactman D. Specialty hospitals, ambulatory surgery centers, and general hospitals: charting a wise public policy course. Health Aff (Millwood). May-Jun;2005 24(3):868–873. [PubMed: 15886184]

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10. Wennberg, JE. The Dartmouth Atlas of Health Care in the United States. Chicago, IL: AHA Press; 1999.
11. Klabunde CN, Potosky AL, Legler JM, Warren JL. Development of a comorbidity index using physician claims data. Journal of clinical epidemiology. Dec; 2000 53(12):1258–1267. [PubMed: 11146273]
12. U.S. Department of Health and Human Services F. Area Resource File (ARF). [Accessed January 4, 2012.] National county-level Health Resource Information Database. 2012. http://arf.hrsa.gov/
13. American Health Planning Association. [Accessed September 15, 2013.] National Directory. 2012. http://www.ahpanet.org/national_directory.html
14. Spreeuwenberg MD, Bartak A, Croon MA, et al. The multiple propensity score as control for bias in the comparison of more than two treatment arms: an introduction from a case study in mental health. Medical care. Feb; 2010 48(2):166–174. [PubMed: 20068488]
15. American Health Association. [Accessed August 27, 2013.] Trendwatch: The migration of care to non-hospital settings: Have regulatory structures kept pace with changes in care delivery?. 2006. http://www.aha.org/research/reports/tw/twjuly2006migration.pdf
16. Merrill DG, Laur JJ. Management by outcomes: efficiency and operational success in the ambulatory surgery center. Anesthesiol Clin. Jun; 2010 28(2):329–351. [PubMed: 20488398]

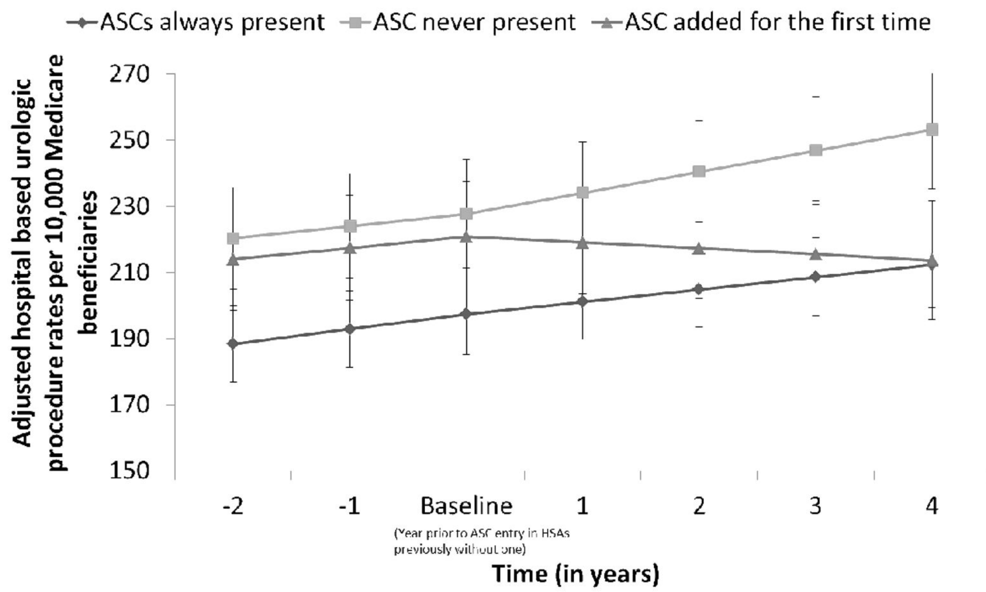

Figure 1.

Adjusted rates for hospital based outpatient urologic surgery based on type of healthcare market.

P=0.77 for all 3 healthcare markets from years −2 to 0

*P<0.001 for all 3 healthcare markets from years 0 to 4

P=0.081 for markets where ASCs were always present compared to markets where ASCs were never present from years 0 to 4

*P<0.001 for markets where ASCs were added compared to markets where ASCs were never present from years 0 to 4

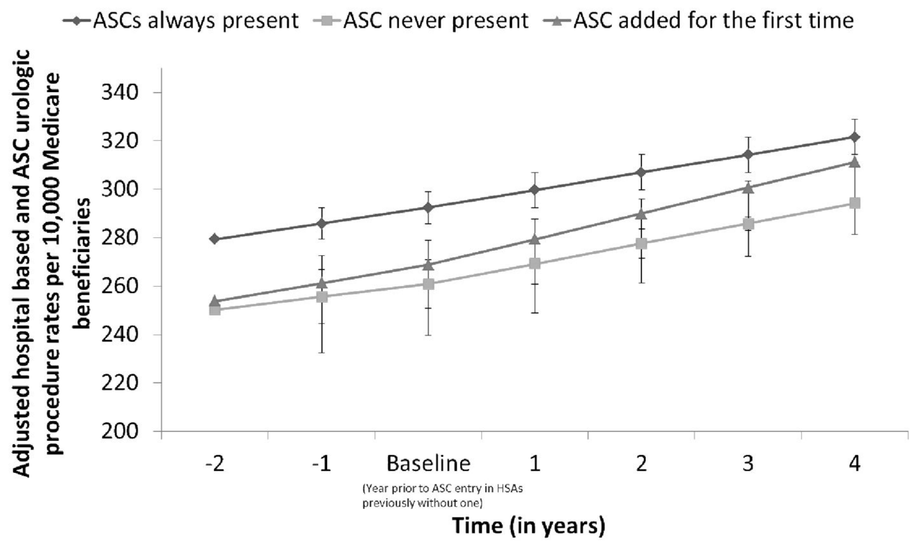

Figure 2.

Adjusted rates of outpatient urologic surgery performed in hospital based outpatient departments and ASCs based on type of healthcare market.

P=0.43 for all 3 healthcare markets from years −2 to 0

P=0.56 for all 3 healthcare markets from years 0 to 4

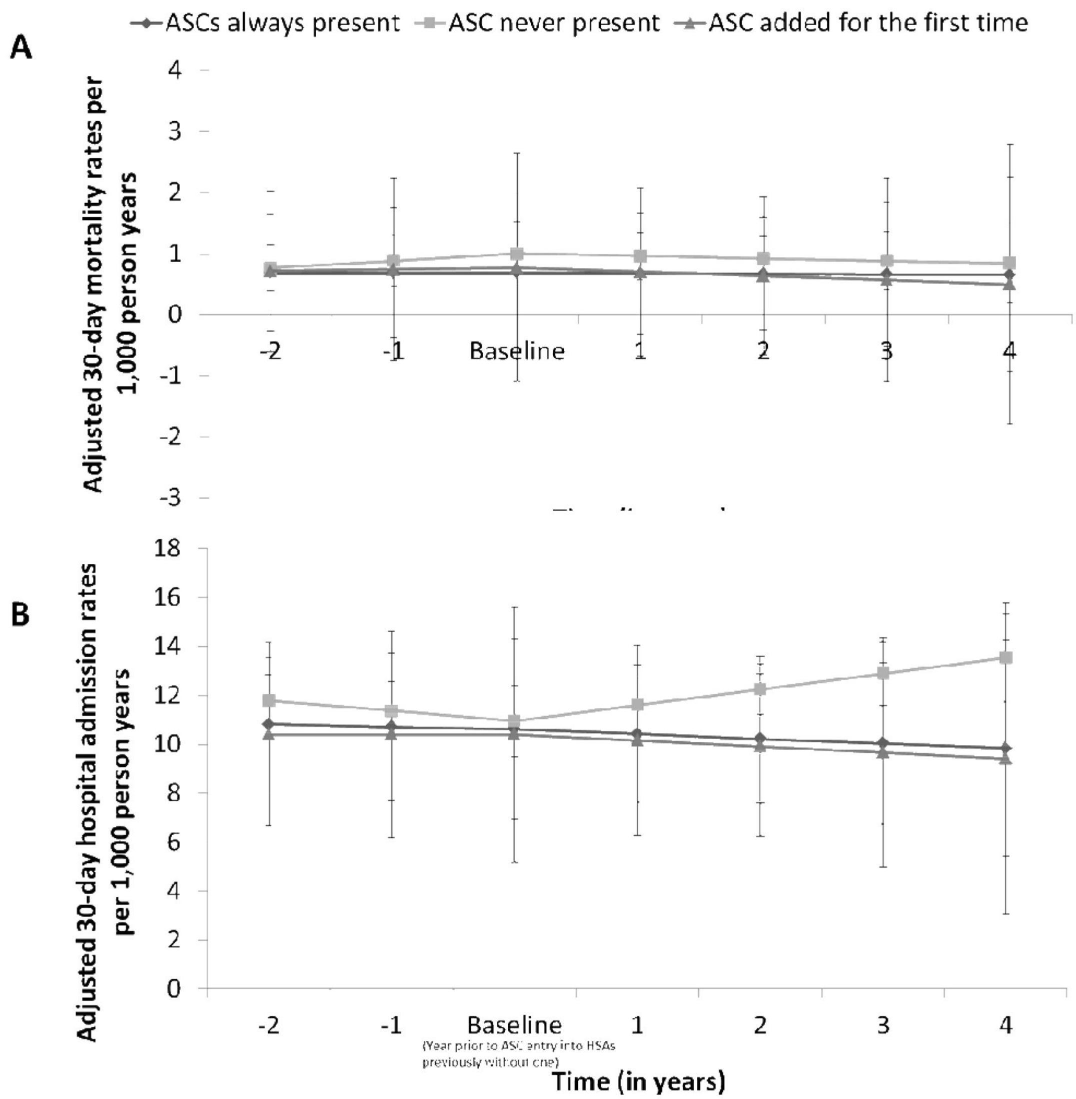

Figure 3.

Adjusted rates for (A) 30-day mortality and (B) 30-day hospital admission per 1,000 person years of follow-up based on hospital market.

[(A): P =0.85 for all 3 healthcare markets from years −2 to 0, P=0.99 for all 3 healthcare markets from years 0 to 4; (B) P=0.81 for all 3 healthcare markets from years −2 to 0, P=0.50 for all 3 healthcare markets from years 0 to 4]

Table 1

Characteristics of the population undergoing outpatient urologic surgery and the associated healthcare markets

	Hospital Service Area type			p-value	
	ASC always present	**ASC never present**	**ASC added**	**Before multiple PS correction**	**After multiple PS correction**
No. HSAs	414	2540	195	--	--
No. patients in 2010	11,499,643	9,951,517	2,522,493	--	--
Age, mean	70.7	70.5	70.5	0.093	0.82
Gender, % female	55.1	54.0	54.9	<0.001	0.90
Race, % non-white	15.4	10.6	12.5	<0.001	0.75
Charlson score 2+, %	26.0	23.5	25.6	<0.001	0.74
Living below poverty, %	13.7	15.7	13.8	<0.001	0.77
College education or more among those 25 years and older, %	24.8	17.1	22.8	<0.001	0.79
Log of hospital discharges per 10,000	8.7	8.4	8.8	0.0023	0.91
Log of urologists per 10,000	2.0	1.1	2.0	<0.001	0.31
Certificate of need, %	65.0	67.1	64.2	0.54	0.97
Urban, %	85.8	33.3	72.9	<0.001	0.44