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Nationwide Use of Laparoscopic Hysterectomy Compared With Abdominal and Vaginal Approaches

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Abstract

Objective—To examine factors associated with undergoing laparoscopic hysterectomy compared with abdominal hysterectomy or vaginal hysterectomy

Methods—This is a cross-sectional analysis of the 2005 Nationwide Inpatient Sample. All women aged_18 years or older who underwent hysterectomy for a benign condition were included. Multivariable analyses were used to examine demographic, clinical, and health system factors associated with each hysterectomy route.

Results—Among 518,828 hysterectomies, 14% were laparoscopic, 64% abdominal, and 22% vaginal. Women above age 35 years had lower rates of laparoscopic than abdominal (odds ratio [OR] 0.85, 95% confidence interval [CI] 0.770.94 for age 45-49 years) or vaginal hysterectomy (OR 0.61, 95% CI 0.540.69 for age 45-49 years). The odds of laparoscopic compared with abdominal hysterectomy were higher in the West than in the Northeast (OR 1.77, 95% CI

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1.2-2.62). African-American, Latina, and Asian women had 40-50% lower odds of laparoscopic compared with abdominal hysterectomy (*P*<.001). Women with low income, Medicare, Medicaid, or no health insurance were less likely to undergo laparoscopic than either vaginal or abdominal hysterectomy (*P*<.001). Women with leiomyomas (*P*<.001) and pelvic infections (*P*<.001) were less likely to undergo laparoscopic than abdominal hysterectomy. Women with leiomyomas (*P*<.001), endometriosis (*P*<.001), or pelvic infection (*P*<.001) were more likely to have laparoscopic than vaginal hysterectomy. Laparoscopic hysterectomy had the highest mean hospital charges ($18,821; *P*<.001) and shortest length of stay (1.65 days; *P*<.001).

Conclusion—In addition to age and clinical diagnosis, nonclinical factors such as race/ethnicity, insurance status, income, and region appear to affect use of laparoscopic hysterectomy compared to abdominal hysterectomy and vaginal hysterectomy.

Introduction

The introduction of laparoscopy into benign gynecology has dramatically changed hysterectomy practice patterns. The proportion of hysterectomies performed laparoscopically has increased significantly over the last 20 years, from 0.3% in 1990 to 11.8% in 2003.[1, 2] This rise in laparoscopy has been coupled by a marked decrease in the rate of abdominal hysterectomies from 74% to 60%, and a slight decrease in the proportion of vaginal hysterectomies from 24% to 22%.[1, 2] Gynecologists may favor a laparoscopic approach compared to abdominal hysterectomy because of shorter hospital stays, faster recovery time, less blood loss and fewer infections. However, these benefits are weighed against the reported increase in urologic injury with laparoscopic hysterectomy.[3] In contrast, compared to vaginal hysterectomy, the laparoscopic route has not shown any significant advantages in randomized trials.[3]

Although rates of laparoscopic hysterectomy have increased overall, the rise in laparoscopy may not be uniformly distributed. Several factors have been associated with differential use of laparoscopic hysterectomy including geographic location, race/ethnicity, income, and health insurance status.[1, 4, 5] However, these studies have not examined the full range of factors that may influence the decision to perform laparoscopy, in particular the indication for hysterectomy. Our aim is to describe nationwide laparoscopy practice patterns and identify independent demographic, clinical, and health system factors associated with the use of laparoscopy in a diverse population of women undergoing benign hysterectomy.

Materials and Methods

This is a cross-sectional analysis of the 2005 Nationwide Inpatient Sample (NIS), a national database sponsored by the Agency for Healthcare Research and Quality. The NIS is a 20% stratified random sample of discharges from all community hospitals in the United States. Hospitals considered for sampling include nonfederal, general, and specialty short-term hospitals, including public and academic facilities. The sampling scheme of the NIS represents approximately 90% of all hospitals. It is the largest all-payer database of hospital discharges with 8 million hospital stays in the 2005 NIS from 37 states. The 2005 NIS was the most recent version of this database available at the time of our analysis. The study was

deemed exempt by the Institutional Review Board at the University of California, San Francisco.

Each record in the NIS contains a maximum of 15 procedure codes and 15 diagnostic codes classified using both the International Classification of Disease, 9th Revision, Clinical Modification (ICD-9-CM) and the Clinical Classification Software developed by the Agency for Healthcare Research and Quality. The Clinical Classification Software is a categorization scheme that collapses ICD-9 codes into clinically meaningful categories that are useful for descriptive analysis.

ICD-9-CM procedure codes were used to categorize all women age ≥18 years who underwent hysterectomy into one of three groups: 1) abdominal: 683.9 for subtotal abdominal hysterectomy, 684.9 for total abdominal hysterectomy; 2) vaginal: 685.9; 3)laparoscopic: 683.1 for subtotal laparoscopic hysterectomy, 685.1 for laparoscopic-assisted vaginal hysterectomy. In 2005, there was not an ICD-9-CM for total laparoscopic hysterectomy. Women were excluded with ICD-9-CM procedure codes for cesarean section with concomitant hysterectomy or with any ICD-9-CM code or Clinical Classification Software code for cancer of the gynecologic, gastrointestinal, or genitourinary tract, lymphoma, or malignant neoplasm without specification of site.

Predictor variables were classified as demographic (age, race/ethnicity, income, region of the country, rural/urban hospital setting), clinical (surgical diagnosis, concomitant adnexal surgery), or health system (primary payer, hospital bedsize, hospital teaching status). Data on age, race/ethnicity, income, region, and hospital setting were derived from predefined NIS categories. Primary expected payer, hospital size and teaching status were also extrapolated from available NIS categorical variables. The 7 categories for surgical diagnosis were constructed using the following codes: 1) fibroids: ICD-9-CM codes 218.0, 218.1, 218.2, or 218.9, 2) endometriosis: clinical classification software code 169, 3) pelvic infection: ICD-9-CM codes 614.0-614.9, 615.0, 615.1, 615.9, 616.10, 616.11, or 616.2-616.5, 4) prolapse: ICD-9-CM codes 618.0-618.05, 618.09, 618.1-618.4, 618.6-618.8, 618.81- 618.83, 618.89, or 618.95) abnormal bleeding: ICD-9-CM codes 626.0-626.6, 626.8-627.1, or 626.7, 6) pelvic pain: ICD-9-CM diagnosis codes 625.0, or 625.2-625.5. Each patient had a maximum of 15 diagnosis codes listed at the time of surgery, and these codes were not treated as mutually exclusive in our analysis because many patients have multiple indications for undergoing hysterectomy. Each indication was represented in the model by a separate indicator variable. The resulting odds ratio for each indication can be interpreted as the odds of undergoing laparoscopy for women with that diagnosis compared to women without that diagnosis, holding all other indications and other covariates constant.

Women who underwent concomitant adnexal surgery with hysterectomy were placed in the predictor group “USO or BSO”. This category included women who underwent either unilateral or bilateral oophorectomy or salpingo-oophorectomy which we identified using the following ICD-9-CM codes: 656.1, 656.3, 655.1, 655.3, 656.2, 656.4, 655.2, 655.4, 654.9, 654.1, 653.1, 653.9. Total charges are reported in the NIS based on the overall dollar amount charged for the entire hospital stay excluding professional fees and non-covered

charges. Length of stay is calculated in the NIS by subtracting the admission date from the discharge date with same-day stays coded as 0 days.

To account for the sampling design of the NIS, special survey procedures were used in SAS version 9.12 (SAS Inc, Cary NC). Thus all analyses use the inverse probability of selection weights provided in the dataset, and account for stratification of the sample by geographic region, type of control (public, not-for-profit, proprietary), location (urban or rural), teaching status, and bed size (small, medium, large). The analyses also account for clustering of patient outcomes within hospitals, the primary sampling units. The subgroup and overall totals we present reflect the inverse probability weights, and thus can be interpreted as estimates of totals in the target population.

Logistic regression was used to assess the independent associations of demographic, clinical, or health system factors associated with undergoing laparoscopic compared to abdominal hysterectomy and laparoscopic compared to vaginal hysterectomy. Predictors were selected *a priori* on substantive grounds. All were included in the multivariable models, to avoid inflation of the type I error rate potentially induced by model selection. The very large NIS sample accommodates this large number of predictors. Total charges and length of stay between hysterectomy approaches were assessed using t-tests.

To account for the influence of the large number of observations with missing data for race/ethnicity (28% in the laparoscopy versus abdominal hysterectomy analysis and 27% in the laparoscopy versus vaginal hysterectomy analysis), all analyses are presented with the missing values for race/ethnicity treated as a separate category (as indicated in table footnotes). In this approach, all women with missing data for race/ethnicity are included in the analyses.

Results

In the 2005 Nationwide Inpatient Sample, there were 518,828 women who underwent hysterectomy for a benign gynecologic condition that were included in our analysis; 14% of hysterectomies were laparoscopic, 64% abdominal and 22% vaginal. Table 1 demonstrates the general characteristics of the hysterectomy population by surgical route. The majority of women were white and had private insurance, irrespective of hysterectomy approach. The most common surgical diagnosis for vaginal hysterectomy was prolapse (62%), whereas fibroids (62%) was the most common diagnosis for abdominal hysterectomy and abnormal bleeding (53%) the most common diagnosis for laparoscopic hysterectomy. The majority of women who underwent either laparoscopic (60%) or abdominal hysterectomy (68%) had concomitant unilateral or bilateral salpingo-oophorectomy compared to only 26% of women who had a vaginal hysterectomy. Approximately 40% of all hysterectomies, irrespective of route, occurred in the South.

There were several independent predictors of undergoing laparoscopic hysterectomy compared to abdominal hysterectomy in the multivariable model (Table 2). Women age 35-49 years ($p<.001$) and those ≥55 years ($p<.02$) were less likely to undergo a laparoscopic hysterectomy compared with women 18-34 years. Race/ethnicity was a significant predictor;

African-American, Latina, and Asian women had 40-50% lower odds of laparoscopic hysterectomy (p<.001). Women with household incomes in all three categories <$61,000 were less likely to undergo laparoscopy (OR 0.75, 95%CI 0.61-0.91 for the lowest income level, <$37,000). Compared to the Northeast, the West had a significantly higher laparoscopy rate (OR 1.77, 95%CI 1.20-2.62). A diagnosis of fibroids or pelvic infection was associated with approximately 30% lower odds of laparoscopy (p<.001) and the odds of laparoscopy were 29% lower in women who underwent concomitant unilateral or bilateral salpingooophorectomy (p<.001). Women with Medicare, Medicaid, or no health insurance (self-pay or no charge/charity) were 29-59% less likely to undergo laparoscopic hysterectomy, irrespective of race/ethnicity. Hospital setting (rural versus urban), teaching status, or bedsize were not associated with surgical route.

In comparison to vaginal hysterectomy, several factors were found to be associated with the odds of undergoing a laparoscopic hysterectomy (Table 3). Older age was associated with a decreased odds of laparoscopy, particularly for women age ≥55 years who were 62% less likely to undergo laparoscopy (p<.001), even accounting for prolapse as the surgical diagnosis. Low household income was also associated with lower rates of laparoscopy; women in all three income categories <$61,000 were less likely to have a laparoscopic hysterectomy (OR 0.76, 95%CI 0.61-0.95 for <$37,000). Race/ethnicity and region of the country were not statistically significant predictors of laparoscopy. Women with fibroids (p<.001), endometriosis (p<.001), pelvic infection (p<.001), or pelvic pain (p=.003) were more likely to undergo laparoscopy but women with uterine prolapse had a 80% lower odds of laparoscopy (p<.001). Women who had concomitant unilateral or bilateral salpingooophorectomy were nearly six times as likely to undergoing laparoscopic hysterectomy (p<.001). Women with Medicare, Medicaid, or no health insurance (self-pay or no charge/charity) were 27-71% less likely to undergo laparoscopy. Hospital setting and teaching status were not associated with laparoscopy rates but patients in medium and large bedsize hospitals were about 30% less likely to have a laparoscopic hysterectomy.

Length of hospital stay and total charges for the surgery and hospital admission were significantly different between surgical routes. The laparoscopic approach had the shortest average length of stay at 1.65 days compared to 1.86 for vaginal hysterectomy and 3.07 for abdominal hysterectomy (p<.001 for pair-wise comparisons, laparoscopy as reference group). However, laparoscopic hysterectomy had the highest total charges at $18,821 compared to $17,839 for abdominal hysterectomy and $14,121 for vaginal (p<.001 for pair-wise comparisons, laparoscopy as reference group).

Discussion

In this large nationwide sample of over 500,000 women who underwent hysterectomy for a benign condition, we identified several independent factors that are associated with undergoing a laparoscopic procedure compared to a vaginal or abdominal hysterectomy. As expected, clinical factors such as surgical diagnosis and concomitant adnexal surgery were independently associated with the use of laparoscopy. For instance, women with possible extrauterine disease (endometriosis or pelvic infection) were more likely to undergo laparoscopic compared to vaginal hysterectomy. However, race/ethnicity, income, and

insurance were also highly associated with the use of laparoscopy. These findings indicate that nonclinical patient characteristics influence the use of laparoscopy, and that medically underserved women may be excluded from the widespread use of this technology.

Women without private health insurance, including those with Medicaid, Medicare, self-pay, or no charge/charity were less likely to undergo a laparoscopic approach to hysterectomy compared to both the abdominal and vaginal route. Overall hysterectomy reimbursement from Medicaid and Medicare is significantly lower than that of most private insurers and these programs reimburse $100-$200 less for a laparoscopic approach compared to abdominal or vaginal. Therefore, physicians have a financial disincentive to perform laparoscopy in women enrolled in these insurance programs. Similarly, when the hospital absorbs the cost of care for uninsured women ("no charge/charity") or patients pay out-of-pocket (self-pay), the desire to contain costs may drive the decision to avoid laparoscopy.

Race/ethnicity was a predictor of surgical route with African-American, Latina, and Asian women less likely to undergo laparoscopic hysterectomy compared to abdominal hysterectomy, even accounting for confounding by surgical diagnosis and all other factors in our multivariable model. Two previous studies have also found lower rates of laparoscopy among nonwhite women undergoing hysterectomy, although these analyses did not account for the effect of diagnosis on the choice of surgical route.[1, 4] We controlled for surgical diagnosis, including the presence of uterine fibroids, and still found racial/ethnic differences in the use of laparoscopy compared to abdominal hysterectomy. Differences in surgical approach by race/ethnicity is not unique to hysterectomy. African-American and Latina adults who undergo appendectomy are also less likely to receive laparoscopic surgery[6], and African-American patients have lower rates of laparoscopy compared to open cholecystectomy[7], suggesting a larger trend in laparoscopy practice. We were unable to determine whether patient preference, provider bias, or some other unmeasured factor was responsible for the racial/ethnic differences we observed in hysterectomy route. Further investigation is warranted to better understand these differences in practice and why they did not persist for the comparison of laparoscopy to vaginal hysterectomy.

Irrespective of race or ethnicity, lower income was associated with a lower odds of undergoing laparoscopy in our analysis. This is consistent with studies of breast cancer and lung cancer patients that have found differences in surgical treatment based on socioeconomic status.[8, 9] There are likely several factors that contribute to lower laparoscopy rates among low income hysterectomy patients. First, low income women may have lower health literacy and therefore inquire less frequently about newer technologies for hysterectomy. Low health literacy has been shown to affect surgical decision making and decrease postoperative satisfaction.[10] In addition, low income women may not have access to gynecologists who have the training and skill to perform laparoscopic procedures or hospitals that have the required laparoscopic equipment.

Older age was associated with lower rates of laparoscopy in our analyses. In young women <35 years, providers and patients may be highly focused on cosmetic outcomes and opt for smaller incisions with laparoscopy compared to laparotomy. Age differences in surgical

route were most pronounced comparing laparoscopy to vaginal hysterectomy, irrespective of uterine prolapse as the surgical diagnosis. There was a steady decline in the likelihood of laparoscopy for each increasing age category above 34 years with the oldest group of women ≥55 years 62% less likely to undergo laparoscopy. Increasing parity and/or pelvic relaxation with increasing age may explain these lower rates of laparoscopy compared to vaginal hysterectomy. Unfortunately, we were unable to assess these variables in the NIS database. In addition, younger patients might seek out younger gynecologists with less training and comfort in performing vaginal hysterectomy compared to a laparoscopic approach.[11]

There are several limitations to our analysis. The Nationwide Inpatient Sample is a large database that receives input from 32 state databases. Therefore, errors in coding and classification of all predictor variables are possible. In addition, the dataset does not provide information on outpatient hysterectomies or physician characteristics such as specialty training, gender, surgical volume, or practice setting that may effect surgical route.[12-14] Finally, there was a large amount of missing data (approximately 30%) for the race/ethnicity predictor. However, all of our models included women with missing data for this predictor in the complete case analysis and we do not believe that missing data for race/ethnicity would be systematically associated with the outcome of interest, hysterectomy surgical route. In addition, models that excluded women with missing data for race/ethnicity were not significantly different from the complete case analyses and the magnitude of associations we found for race/ethnicity are unlikely to be effected by possible residual confounding due to missing data.

The ideal surgical approach to hysterectomy should be guided by the patient's clinical presentation, experience and skill of the provider, evidence-based practice, and patient preferences. While we believe that many hysterectomy decisions incorporate this complex set of factors, our analyses indicate that there may be a nationwide bias towards decreased use of laparoscopy among hysterectomy patients who are low income, do not have private health insurance, or are part of a racial or ethnic minority group. Although the benefit of laparoscopy for performing hysterectomy is debatable, particularly compared to vaginal hysterectomy, the option of this surgical approach should be readily available for appropriately selected patients. Further research is needed to better understand the etiology of these significant variations in nationwide laparoscopy practice.

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Table 1
Characteristics of Hysterectomy Population by Surgical Route

	Vaginal Hysterectomy N=112,282 (22%)	Abdominal Hysterectomy N=333,764 (64%)	Laparoscopic Hysterectomy N=72,782 (14%)
AGE			
Mean (SE)	49.32 (0.09)	45.16 (0.04)	44.22 (0.08)
RACE/ETHNICITY			
White	63,795 (79)	159,731 (67)	43,939 (80)
African-American	4,993 (6)	40,051 (17)	4,151 (8)
Latina	8,582 (11)	24,462 (10)	4,120 (8)
Asian/Pacific Islander	1,011 (1)	5,777 (2)	813 (1)
Native American	171 (0)	655 (0)	171 (0)
Other	2,206 (3)	7,707 (3)	1,637 (3)
SURGICAL DIAGNOSIS			
Fibroids	38,666 (34)	207,531 (62)	36,094 (50)
Endometriosis	22,226 (20)	111,107 (33)	27,276 (37)
Pelvic infection	16,538 (15)	109,402 (33)	17,912 (25)
Prolapse	69,816 (62)	20,841 (6)	14,902 (20)
Abnormal bleeding	45,116 (40)	157,597 (47)	38,244 (53)
Pelvic pain	17,837 (16)	53,612 (16)	17,841 (25)
ADNEXAL SURGERY			
USO or BSO	29,267 (26)	225,581 (68)	43,937 (60)
INCOME			
<$37,000	26,173 (24)	82,184 (25)	15,328 (21)
$37,000-45,999	28,867 (26)	84,949 (26)	16,506 (23)
$46,000-60,999	30,050 (27)	84,715 (26)	19,192 (27)
≥$61,000	24,890 (23)	75,149 (23)	20,287 (28)
INSURANCE			
Medicare	19,254 (17)	24,466 (7)	4,171 (6)
Medicaid	9,668 (9)	35,078 (11)	5,552 (8)
Private insurance	76,703 (68)	249,369 (75)	59,477 (82)
Self-pay	2,589 (2)	11,788 (4)	1,304 (2)
No charge (charity)	449 (0)	1,933 (1)	133 (0)
Other	3,494 (3)	10,851 (3)	2,093 (3)
REGION			
Northeast	16,651 (15)	55,391 (17)	9,650 (13)
Midwest	28,484 (25)	82,936 (25)	15,517 (21)
South	43,433 (39)	134,094 (40)	29,122 (40)
West	23,714 (21)	61,343 (18)	18,493 (25)

Table 2

Factors Associated with Undergoing Laparoscopic Compared With Abdominal Hysterectomy

			Multivariable*	
	Total	**Laparoscopic Hysterectomy N (row%)**	**OR(95% CI)**	**P Value**
Demographic Factors				
AGE in years				
18-34	46,079	10,093 (22)	Reference	
35-39	60,494	11,751 (19)	0.90 (0.84-0.98)	.010
40-44	102,018	17,690 (17)	0.86 (0.79-0.93)	<.001
45-49	102,666	16,620 (16)	0.85 (0.77-0.94)	.001
50-54	47,684	8,391 (18)	0.92 (0.83-1.03)	.15
≥55	47,604	8,238 (17)	0.86 (0.75-0.98)	.02
RACE/ETHNICITY				
White	203,670	43,939 (22)	Reference	
African-American	44,203	4,151 (9)	0.50 (0.42-0.59)	<.001
Latina	28,582	4,120 (14)	0.60 (0.48-0.75)	<.001
Asian/Pacific Islander	6,590	813 (12)	0.49 (0.37-0.65)	<.001
Native American	826	171 (21)	1.22 (0.78-1.89)	.38
Other	9,343	1,637 (18)	0.78 (0.48-1.27)	.32
INCOME				
≥$61,000	95,437	20,287 (21)	Reference	
$46,000-60,999	103,907	19,192 (18)	0.84 (0.73-0.97)	.02
$37,000-45,999	101,455	16,506 (16)	0.72 (0.60-0.86)	<.001
<$37,000	97,512	15,328 (16)	0.75 (0.61-0.91)	.004
REGION				
Northeast	65,041	9,650 (15)	Reference	
Midwest	98,453	15,517 (16)	1.06 (0.71-1.58)	.78
South	163,216	29,122 (18)	1.29 (0.89-1.87)	.17
West	79,836	18,493 (23)	1.77 (1.20-2.62)	.004
HOSPITAL SETTING				
Urban	349,068	61,863 (18)	Reference	
Rural	57,478	10,919 (19)	1.20 (0.92-1.55)	.18
Clinical Factors				
SURGICAL DIAGNOSIS				
Fibroids	243,624	36,094 (15)	0.71 (0.67-0.76)	<.001
Endometriosis	138,383	27,276 (20)	1.24 (1.16-1.34)	<.001
Pelvic infection	127,314	17,912 (14)	0.70 (0.64-0.76)	<.001
Prolapse	35,743	14,902 (42)	3.91 (3.40-4.48)	<.001

			Multivariable*	
	Total	**Laparoscopic Hysterectomy N (row%)**	**OR(95% CI)**	**P Value**
Abnormal bleeding	195,842	38,244 (20)	1.29 (1.20-1.40)	<.001
Pelvic pain	71,453	17,841 (25)	1.45 (1.33-1.58)	<.001
ADNEXAL SURGERY				
NO USO/BSO	137,028	28,845 (21)	Reference	
USO or BSO	269,518	43,937 (16)	0.71 (0.65-0.78)	<.001
Health System Factors				
INSURANCE				
Private insurance	308,846	59,477 (19)	Reference	
Medicare	28,637	4,171 (15)	0.69 (0.62-0.78)	<.001
Medicaid	40,629	5,552 (14)	0.70 (0.62-0.79)	<.001
Self-pay	13,092	1,304 (10)	0.59 (0.46-0.75)	<.001
No charge (charity)	2,066	133 (6)	0.41 (0.21-0.79)	.008
Other	12,944	2,093 (16)	0.83 (0.67-1.02)	.08
HOSPTIAL TEACHING STATUS				
Nonteaching	254,561	47,458 (19)	Reference	
Teaching	151,985	25,324 (17)	1.10 (0.87-1.40)	.42
HOSPITAL BEDSIZE				
Small	54,561	11,695 (21)	Reference	
Medium	98,741	18,424 (19)	0.82 (0.58-1.16)	.26
Large	253,244	42,663 (17)	0.76 (0.56-1.03)	.07

*Adjusted for all predictors listed in table and includes complete case analysis for women with missing data for race/ethnicity.

Table 3
Factors Associated with Laparoscopic Compared With Vaginal Hysterectomy

			Multivariable*	
	Total	**Laparoscopic Hysterectomy N(row%)**	**OR(95% CI)**	**P Value**
Demographic Factors				
AGE in years				
18-34	22,504	10,093 (45)	Reference	
35-39	25,887	11,751 (45)	0.93 (0.84-1.02)	.14
40-44	38,803	17,690 (46)	0.81 (0.73-0.89)	<.001
45-49	36,621	16,620 (45)	0.61 (0.54-0.69)	<.001
50-54	19,569	8,391 (43)	0.55 (0.48-0.63)	<.001
≥55	41,680	8,238 (20)	0.38 (0.33-0.45)	<.001
RACE/ETHNICITY				
White	107,734	43,939 (41)	Reference	
African-American	9,145	4,151 (45)	0.95 (0.77-1.19)	.68
Latina	12,702	4,120 (32)	0.85 (0.68-1.07)	.18
Asian/Pacific Islander	1,823	813 (45)	1.07 (0.77-1.47)	.70
Native American	342	171 (50)	1.63 (0.96-2.77)	.07
Other	3,843	1,637 (43)	1.13 (0.72-1.77)	.61
INCOME				
≥$61,000	45,178	20,287 (45)	Reference	
$46,000-60,999	49,241	19,192 (39)	0.79 (0.67-0.93)	.003
$37,000-45,999	45,373	16,506 (36)	0.74 (0.60-0.90)	.003
<$37,000	41,501	15,328 (37)	0.76 (0.61-0.95)	.01
REGION				
Northeast	26,300	9,650 (37)	Reference	
Midwest	44,001	15,517 (35)	0.73 (0.50-1.08)	.12
South	72,555	29,122 (40)	0.84 (0.59-1.21)	.35
West	42,207	18,493 (44)	0.98 (0.66-1.44)	.91
HOSPITAL SETTING				
Urban	154,555	61,863 (40)	Reference	
Rural	30,508	10,919 (36)	0.95 (0.67-1.34)	.78
Clinical Factors				
SURGICAL DIAGNOSIS				
Fibroids	74,760	36,094 (48)	1.39 (1.28-1.50)	<.001
Endometriosis	49,502	27,276 (55)	1.55 (1.41-1.71)	<.001
Pelvic infection	34,450	17,912 (52)	1.40 (1.23-1.60)	<.001
Prolapse	84,718	14,902 (18)	0.20 (0.18-0.23)	<.001
Abnormal bleeding	83,361	38,244 (46)	0.86 (0.79-0.94)	<.001

			Multivariable*	
	Total	**Laparoscopic Hysterectomy N(row%)**	**OR(95% CI)**	**P Value**
Pelvic pain	35,678	17,841 (50)	1.17 (1.05-1.30)	.003
ADNEXAL SURGERY				
NO USO/BSO	111,860	28,845 (26)	Reference	
USO or BSO	73,204	43,937 (60)	5.69 (5.04-6.42)	<.001
Health System Factors				
INSURANCE				
Private insurance	136,180	59,477 (44)	Reference	
Medicare	23,424	4,171 (18)	0.73 (0.65-0.83)	<.001
Medicaid	15,220	5,552 (36)	0.69 (0.59-0.80)	<.001
Self-pay	3,893	1,304 (33)	0.64 (0.46-0.90)	.01
No charge (charity)	582	133 (23)	0.29 (0.11-0.74)	.010
Other	5,586	2,093 (37)	0.78 (0.60-1.00)	.05
HOSPITAL TEACHING STATUS				
Nonteaching	121,025	47,458 (39)	Reference	
Teaching	64,038	25,324 (40)	1.05 (0.82-1.36)	.68
HOSPITAL BEDSIZE				
Small	25,076	11,695 (47)	Reference	
Medium	48,149	18,424 (38)	0.69 (0.48-0.99)	.04
Large	111,839	42,663 (38)	0.70 (0.50-0.99)	.04

*Adjusted for all predictors listed in table and includes complete case analysis for women wit missing data for race/ethnicity