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Complications Following Surgical Intervention for Stress Urinary Incontinence: A National Perspective

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Aims: Stress urinary incontinence (SUI) impacts many women. Treatment is primarily surgical. Post-operative morbidity considerably affects individuals and the health care system. Our objective is to describe complications following surgery for SUI and how they affect resource utilization. **Methods:** Utilizing the Nationwide Inpatient Sample (a nationally representative dataset), 147,473 patients who underwent surgery for SUI from 1988 to 2000 were identified by ICD-9 codes. Comorbid conditions/complications were extracted using ICD-9 codes, including complication rates, length of stay (LOS), hospital charges, and discharge status. **Results:** Overall complication rate was 13.0% (not equal to sum of complication sub-types, as each woman may have had = 1 complication), with 2.8% bleeding, 1.4% surgical injury, 4.3% urinary/renal, 4.4% infectious, 0.1% wound, 1.1% pulmonary insufficiency, 0.5% myocardial infarction, 0.2% thromboembolic. The "gold standard" surgical technique for SUI, the pubovaginal sling, had the lowest morbidity at 12.5%. Mean LOS increased with morbidity: from 2.9 to 4.1 to 6.1 days for those with 0, 1, and =2 complications respectively ($P < 0.001$). Similarly, inflation-adjusted hospital charges increased with morbidity: from \$7,918 to \$9,828 to \$15,181 for those with 0, 1, and =2 complications respectively ($P < 0.001$). The percentage of patients requiring post-discharge subacute or home care increased with morbidity: from 4.4% to 8.4% to 14.3% for those with 0, 1, and =2 complications ($P < 0.001$). **Conclusions:** A substantial percentage of women experience complications following surgery for SUI. Post-operative morbidity leads to dramatically increased resource utilization. Prospective studies are needed to identify pre-operative risk factors and intraoperative process measures to optimize the quality of care. *Neurourol. Urodynam. 24:659–665, 2005.* © 2005 Wiley-Liss, Inc.

Key words: morbidity; outcomes; resource utilization; stress urinary incontinence

INTRODUCTION

Up to one-third of adult woman in the United States experience involuntary loss of urine at an estimated annual cost of over \$12.4 billion in 1995 [Hampel et al., 1997; Wilson et al., 2001]. Stress urinary incontinence (SUI) is the most common type of urinary incontinence in women under the age of 60, and it accounts for approximately half of incontinence in all women [Hannestad et al., 2000]. While pelvic floor therapy, behavior modification, biofeedback, and medical treatment can lead to moderate improvement in SUI symptomatology, a paucity of data exists with regard to long-term therapy and outcomes. Surgical intervention remains the mainstay of therapy for SUI, although the optimal procedure remains at the discretion of the surgeon.

In the United States, the current healthcare climate is typified by increasing public scrutiny of quality of care delivered by its providers [Chassin and Galvin, 1998; Institute of Medicine, 2001]. As a result, patients, payers, and policy makers are seeking to identify reliable indicators in order to assess quality of care. Within surgical disciplines, direct evaluation of outcomes has been fundamental in assessing quality of care; and, post-operative morbidity has been shown to vary significantly among hospitals across the nation [Khuri et al., 1998; Dimick et al., 2003]. Post-operative complications can have a devastating effect on the individual patient as well as lead to substantial additional costs to the health care system.

Most information about surgery for SUI is from large single institution series and focuses on post-operative urinary retention and incontinence. Little data exists regarding morbidity following surgical intervention for SUI [Glazener and Cooper, 2001, 2004]. Thus, the aim of this study is to describe the frequency and nature of complications following surgery for SUI and how they affect resource utilization using a nationally representative dataset.

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METHODS

Data Source

The Nationwide Inpatient Sample (NIS) dataset is a 20% stratified sample of all hospital discharges in the United States. It is maintained by the Agency for Health Care Research and Quality (AHRQ) as part of the Healthcare Cost and Utilization Project (HCUP) [Healthcare Cost and Utilization Project (HCUP-6), 1997]. Data for this study were derived from the NIS dataset for the years 1988 through 2000. The NIS is a 20% stratified, random sample of all hospital discharges in the United States. All patients who were discharged from NIS participating hospitals between 1988 and 2000 with a primary *International Classification of Disease, Ninth Revision, Clinical Modification* (ICD-9-CM) procedure code for a SUI surgery were included. In addition, an ICD-9-CM diagnostic code for SUI was necessary for inclusion. All numeric codes described herein refer to ICD-9-CM procedure and diagnostic codes. According to federal regulations, CFR Title 45 Section 46.101 subparagraph (b)(4) explicitly states that IRB approval is not needed for datasets that are publicly available or that keep patient information anonymous [Code of Federal Regulations, 2004]. Both requirements are met by the NIS dataset.

Stress incontinence procedures in our analysis included plication of the urethrovesical junction (59.3), suprapubic sling (59.4), retropubic urethral suspensions (59.5), paraurethral needle suspensions (59.6), levator muscle urethrovesical suspension operations (59.71), other repair for SUI (59.7, 59.79, 58.49, 57.89), injection of implantable material into urethra and/or bladder neck (59.72), implantation of artificial urinary sphincter (58.93), cystourethroplasty and repair of bladder neck (57.85), and anterior repair or cystocele (70.5, 70.50, 70.51). Any cases that had a coincident procedure code for hysterectomy (68.3, 68.4, 68.5, 68.9) were excluded so as to not confound the complication rates for SUI procedures with those of a more invasive procedure. The following ICD-9 diagnostic codes were employed to confirm that the procedure was performed for an SUI diagnosis rather than for another indication (i.e., pelvic prolapse): SUI (625.6), intrinsic sphincter deficiency (599.82), unspecified incontinence (788.3, 788.30, 788.39), urethral hypermobility/instability (599.81, 599.83), and mixed urinary incontinence (788.33).

Independent Variables

Patient demographic information including age, race, gender, primary insurance type, and median income in patients' zip code, as well as type of admission and year of treatment were abstracted. Secondary ICD-9-CM diagnostic codes were abstracted to enumerate comorbid conditions according to the Romano modification of the Charlson comorbidity index [Charlson et al., 1987; Romano et al., 1993]. Hospital factors including geographic region, teaching status, bed size, and rural versus urban location were abstracted from the dataset.

Outcome Variables

The primary outcome variable was complication rate. Complications were abstracted from the dataset using ICD-9 diagnostic codes in similar fashion to the Complications Screening Program [Iezzoni et al., 1994]. Bleeding complications included post-procedure hemorrhage (998.1, 998.11, 998.12), acute blood loss anemia (285.1), and blood transfusion (V582 and procedure codes 99.0–99.07). Surgical injury complications included injury to pelvic organs (867.0–867.9), accidental puncture or laceration during surgery (998.2), and surgical repair of laceration to urinary tract (procedure codes 56.82, 57.81, 58.41). Urinary and renal complications were urinary obstruction (599.6), urinary retention (788.2–788.29), acute renal failure (584–585.9), and urinary complications not otherwise specified (997.5). Infectious complications included sepsis (038), urinary tract infection (595.9, 597.80–597.89, 599.0, 996.64), post-operative infection not otherwise specified (998.5, 998.59), genital cellulitis (616.1, 616.10), *Clostridium difficile* colitis (008.45), pyelonephritis (590.1, 590.10, 590.11, 590.2, 590.80, 590.9), and pneumonia (481–486, 507-507.8). Wound complications included seroma (998.13), dehiscence (998.3), post-operative wound infection (998.51). Pulmonary insufficiency complications included pulmonary edema (518.4), pulmonary insufficiency following surgery (581.5), acute respiratory failure (518.81, 518.82), and respiratory complications (997.3). Post-operative myocardial infarction included 410–410.91 and 997.1. Cerebrovascular complications included 997.01 and 997.02. Thromboembolic complications included thrombosis of deep lower extremity veins (451.1–451.2), venous system thrombosis and embolism (453.8, 453.9), thrombophlebitis (451, 451.8, 451.81, 451.9), and pulmonary embolism (415.1–415.19).

Other outcomes of interest were LOS, discharge status (need for subacute or home healthcare services), inflation-adjusted hospital charges, and in-hospital mortality as reported by the NIS dataset. Hospital charges were adjusted to year 2000 levels using the consumer price index as reported by the Bureau of Labor Statistics of the U.S. Department of Labor [United States Department of Labor, 2003].

Statistical Analyses

Descriptive statistics for characteristics of all patients undergoing surgical intervention for SUI was conducted. Bivariate comparisons were performed using chi-square and analysis of variance (ANOVA) where appropriate. Risk adjustment consisted of demographic characteristics (age, gender, and race), comorbidity score, hospital factors (teaching status, bedsize, and region), time period, and type of procedure. A multivariable regression model was developed in a backward fashion to determine the association of morbidity with

independent factors. All hypothesis testing was performed at a 5% significance level using statistical software (Statistical Package for Social Sciences Version 11.0; SPSS, Inc., Chicago, IL).

RESULTS

Using the NIS, 150,115 patients were identified as having a primary surgical procedure for SUI from 1988 to 2000. This number decreased to 147,473 when excluding patients who had a concurrent hysterectomy. Patient demographic and hospital data as well as their association with morbidity are presented in Table I. Increasing age was associated with a significant, stepwise increase in morbidity. Complication rates were relatively steady among differing racial groups with the exception of Hispanics, who were noted to have a markedly lower rate of adverse events (11.5%). Patients with Medicare had significantly higher morbidity (16.2%) compared to patients with other payers (11.3–12.0%). Patients with increasing comorbidity also experienced a greater complication rate. However, the overall cohort was relatively healthy with over 87% of women having a Charlson co-morbidity score of 0. Morbidity varied by hospital region, with the lowest complication rate in the West (11.5%) and the highest in the South (14.1%). Table II classifies the complications by bleeding, infectious, urinary/renal, surgical injury, pulmonary insufficiency, myocardial infarction, thromboembolic, wound-related, and cerebrovascular.

The frequency of each type of surgical procedure for SUI and its associated complication rate is illustrated in Table III. Pubovaginal slings and other repairs for SUI were noted to have the lowest morbidity at 12.5 and 11.5% respectively. Patients undergoing artificial urinary sphincter placement and injection of implantable material had the highest morbidity at 30.9 and 20.0% respectively. Of the study sample, 7,031 patients (4.8%) underwent concomitant vaginal suspension/fixation and 1,448 of them (20.6%) experienced a complication. Similarly, 35,683 patients (24.2%) had a concurrent rectocele repair, and of those, 5,505 (15.4%) had a complication.

The in-hospital mortality rate for women undergoing incontinence surgery from 1988 to 2000 was 0.03%. For those who experienced one complication, the mortality rate rose to 0.1%. For those who experienced 2 or more complications, the mortality rate reached 0.8%. The association of morbidity with resource utilization is summarized in Table IV. The overall mean LOS was 3.1 days. LOS increased with increasing morbidity: from 2.9 days for those patients without complications to 4.1 days for those with one complication and 6.1 days for those with two or more ($P < 0.001$). Mean inflation-adjusted hospital charges was $8,247. Similarly, hospital charges increased with morbidity: from $7,918 for those without complications to $9,828 for those with one complication to $15,181 for those with two or more complications ($p < 0.001$). The overall rate for patients requiring post-discharge care (in

TABLE I. Patient and Hospital Characteristics as Well as Their Associated Morbidity for Surgical Procedures to Treat SUI in the United States From 1988 to 2000

	Number of patients	Frequency of complications (%)	*P*-value
Age			<0.001
<40 years	13,352	1,343 (10.1)	
40–49 years	30,830	3,321 (10.8)	
50–59 years	34,905	4,066 (11.6)	
60–69 years	36,037	4,992 (13.9)	
≥70 years	32,319	5,498 (17.0)	
Race			<0.001
White	87,983	12,094 (13.7)	
Black	3,033	422 (13.9)	
Hispanic	7,044	812 (11.5)	
Asian	774	104 (13.4)	
Other	1,354	181 (13.4)	
Missing	47,285	5,616 (11.9)	
Insurance Type			<0.001
Medicare	50,440	8,154 (16.2)	
Medicaid	8,239	956 (11.6)	
Private/HMO	81,316	9,220 (11.3)	
Other	7,478	899 (12.0)	
Median Income for patient's zip code			0.002
<$25,000	28,336	3,855 (14.4)	
$25,000–$34,999	50,169	6,443 (13.7)	
$35,000–$44,999	31,795	3,966 (13.5)	
≥$45,000	24,366	3,120 (14.1)	
Missing	12,807	1,845 (14.4)	
Charlson Index comorbidity score			<0.001
CI = 0	128,385	16,363 (12.7)	
CI = 1	16,599	2,437 (14.7)	
CI ≥ 2	2,489	429 (17.2)	
Hospital type			0.356
Rural	22,802	2,987 (13.1)	
Urban, non-teaching	79,996	10,336 (12.9)	
Urban, teaching	44,289	5,846 (13.2)	
Hospital bed size			0.636
Small	18,100	2,349 (13.0)	
Medium	47,876	6,297 (13.2)	
Large	81,111	10,523(13.0)	
Region			<0.001
Northeast	24,088	3,208 (13.3)	
Midwest	32,518	4,232 (13.0)	
South	51,595	7,265 (14.1)	
West	39,272	4,524 (11.5)	
Time period of procedure			<0.001
1988–1991	35,957	4,542 (12.6)	
1992–1994	32,962	4,943 (15.0)	
1995–1997	39,789	5,481 (13.8)	
1998–2000	38,765	4,263 (11.0)	

TABLE II. Categorization of Complications Following Surgery for SUI in the United States From 1988 to 2000

Morbidity	Frequency	Percentage of all surgeries[a]
Bleeding complications	4,178	2.8
Infectious complications	6,481	4.4
Urinary/renal complications	6,292	4.3
Surgical injury	2,082	1.4
Pulmonary insufficiency	1,555	1.1
Myocardial infarction	749	0.5
Thromboembolic complications (DVT and PE)	236	0.2
Wound complications (including wound infection)	143	0.1
Cerebrovascular complications	46	0.03
All complications	19,229	13.0

[a]Not equal to sum of each complication, as each woman may have more than one complication.

the form of subacute facilities or home healthcare services) was 5.0%. The percentage of patients requiring post-discharge care increased with morbidity: from 4.4% to 8.4% to 14.3% for those with zero, one, and two complications respectively ($P < 0.001$). Table V describes the significant factors associated with morbidity following surgical procedures for SUI.

DISCUSSION

The evaluation and treatment of women with urinary incontinence is gaining widespread attention in clinical urologic and urogynecologic practice as well as in national and international research. Surgical interventions for SUI are commonly performed and there are a variety of procedures available. Information on outcomes following surgery for SUI in women is mainly based on large case series however there are currently a number of prospective, multi-institutional trials ongoing. Population-based estimates of the rates of surgical interventions for SUI in the United States have been reported. Some have also reported complication rates [Boyles et al., 2003; Waetjen et al., 2003], but limited data exists relating the nature of the complications to resource utilization. Our study provides population-based outcomes from a nationally representative sample of several hundred hospitals that perform surgery for women with SUI. By our review of the contemporary literature, the current study is the first to describe that increased morbidity following surgical intervention for SUI leads to increased resource utilization.

It seems intuitive that post-operative complications would lead to increased resource utilization; however, this has not been quantified for women undergoing surgery for SUI. The current study reports that complications do indeed have a measurable effect on healthcare consumption and can be quantified in terms of increased LOS, increased charges and post-discharge care. Mean LOS doubled and mean inflation-adjusted charges were almost twice that for women with more than two complications compared with women who experienced no post-operative complications. Utilization of post-discharge care (need for subacute or home healthcare services) almost tripled when comparing the two groups. Although most of the complications reported following SUI surgery could be considered non-life threatening, they do nevertheless lead to significantly increased utilization of healthcare resources. What remains undetermined is how these minor complications impact quality of life for patients during their convalescence. Further study in this arena is warranted.

Other studies have utilized administrative data to examine complication rates for SUI procedures. Using the National Hospital Discharge Survey (NHDS) from 1979 to 1997, Boyles et al. reported a 6.5% overall complication rate. Women who had more than one procedure performed (37%) were no more likely to have a complication than the women who underwent only one procedure. In contrast, the current study found that patients undergoing paraurethral suspension or pubovaginal sling procedures were more likely to experience complications when combined with another procedure versus alone. Akin to the current study, Boyles et al. [2003] reported that women with pre-operative comorbidities were more likely to have a complication (10.4%) compared to those without (5.8%). Using 1988 NHDS data, Waetjen et al. [2003] determined that 68% of surgeries for SUI were performed concomitantly with a gynecologic procedure and approximately half of those were

TABLE III. Type of Surgery for SUI and its Associated Morbidity Rate in the United States From 1988 to 2000

	Frequency of procedures (%)	Frequency of complications (%)
Pubovaginal sling	13,082 (8.9)	1,633 (12.5)
Retropubic suspension	42,643 (28.9)	6,350 (14.9)
Paraurethral (needle) suspension	6,300 (4.3)	919 (14.6)
Collagen injection	878 (0.6)	176 (20.0)
Artificial urinary sphincter placement	123 (0.1)	38 (30.9)
Bladder neck repair—cystourethroplasty	680 (0.5)	91 (13.4)
Anterior repair (including UVJ plication)	46,864 (31.8)	6,576 (14.0)
Other repair for urinary stress incontinence	63,674 (43.2)	7,491 (11.8)

TABLE IV. Association of Morbidity and Resource Utilization as Defined by Length of Stay (LOS), Inflation-Adjusted Hospital Charges, and Requirement for Post-Discharge Care Following Surgery for SUI

	Mean LOS (95% CI)	Mean inflation-adjusted hospital charges (95% CI)	Percent requiring post-discharge care (95% CI)[a]
0 Complications	2.9 (2.9–3.0)	$7,918 ($7,879–7,957)	4.4% (4.3–4.5%)
1 Complication	4.1 (4.0–4.1)	$9,828 ($9,730–$9,925)	8.4% (8.0–8.8%)
≥2 Complications	6.1 (5.9–6.4)	$15,181 ($14,184–$16,178)	14.3% (12.9–15.8%)

[a]Any patient discharged to a subacute facility or with home healthcare services.

hysterectomies. In their study, 18.3% of women had one or more complications—more specifically, 17.1% when SUI surgery was performed alone and 18.9% when in combination with another procedure. In order to gain a clearer assessment of the complications associated with surgical intervention for SUI, the current study excluded women with concomitant hysterectomy because its more invasive nature might confound the results. When all women who underwent SUI surgery are analyzed (including those who had a hysterectomy), the overall complication rate was 16.0%. Pelvic organ prolapse

TABLE V. Multivariable Analysis of Morbidity: Significant Predictors of Complications Following Surgery for SUI

Independent variable	Reference group	Odds ratio (95% confidence interval)
Age		
40–49 years		1.07 (1.00–1.15)
50–59 years		1.16 (1.08–1.23)
60–69 years	Age < 40 years	1.27 (1.19–1.36)
≥70 years		1.53 (1.41–1.65)
Insurance type		
Medicaid Insurance		0.91 (0.84–0.99)
Private/HMO Insurance	Medicare	0.83 (0.79–0.87)
Other		0.83 (0.77–0.90)
Median income for zip code		
25,000–34,999		1.00 (0.96–1.05)
35,000–44,999	<$25,000	1.05 (0.99–1.10)
≥$45,000		1.15 (1.09–1.21)
Comorbidity score		
Charlson index = 1	Charlson Index = 0	1.12 (1.07–1.17)
Charlson index ≥ 2		1.30 (1.17–1.45)
Hospital region		
Northeast		1.03 (0.97–1.08)
South	Midwest	1.09 (1.04–1.13)
West		0.85 (0.81–0.89)
Time period		
1992–1994		1.20 (1.15–1.26)
1995–1997	1988–1991	1.04 (0.99–1.08)
1998–2000		0.74 (0.70–0.77)
Procedure		
Artificial sphincter		3.53 (2.40–5.20)
Collagen		1.74 (1.47–2.06)
Retropubic suspension		1.42 (1.36–1.48)
Retropubic suspension + another procedure		1.42 (1.34–1.50)
Pubovaginal sling		1.07 (1.00–1.15)
Pubovaginal sling + another procedure		1.22 (1.12–1.32)
Paraurethral suspension		0.99 (0.91–1.08)
Paraurethral suspension + another procedure		1.33 (1.22–1.45)
Rectocele		1.28 (1.23–1.33)
Vaginal suspension/fixation		1.56 (1.46–1.66)

surgery performed as secondary procedures were included in the current study; and, patients undergoing prolapse surgery experienced significantly higher morbidity. Further assessment of the morbidity and mortality of SUI procedures performed alone and in conjunction with other surgical procedures deserves further investigation.

Kinchen et al. [2004] described issues related to health care utilization in 3,735 women who underwent surgery for SUI during 1995–2000, based on data reported by Medstat's MarketScan Commercial Claims and Encounters (CC&E) and the Medicare Supplemental and Coordination of Benefits (COB) databases. These contain inpatient, outpatient, and outpatient drug claim data. A small number of cases were complicated by: infection (1.4%), bleeding (0.3%), and injury to the ureters or bladder (0.05%). Overall, 8.5% of women experienced urinary retention following surgery, with the greatest number of patients (12.8%) having undergone sling surgery. Conversely, we found that pubovaginal sling surgeries had low morbidity (12.5%), whereas artificial urinary sphincter (AUS) surgery and collagen injection carried the highest morbidity (30.9 and 20.0%, respectively). The high morbidity associated with AUS is not unexpected, given that AUS is typically indicated only for women with refractory or extremely complex SUI. The high morbidity associated with collagen injection may be related to the time period of data gathering by the NIS. Collagen injection was approved by the Food and Drug Administration in 1996, and the morbidity at this early stage of clinical experience was likely greater than that experienced in current practice. The high complication rate seen following collagen injection may reflect that only the most ill patients are admitted to the hospital post-operatively.

Another interesting finding from the current study is the increased complication rate in patients with greater comorbid disease as measured by the Charlson Index: from 12.7% to 14.7% to 17.2% for those patients with a Charlson score of 0, 1, and =2 respectively ($P < 0.001$). The complications most associated with increased comorbidity were infectious conditions, pulmonary insufficiency, thromboembolic events, and myocardial infarction. In contrast, procedure-specific complications such as bleeding, surgical injury, wound troubles, urinary obstruction or retention did not vary with comorbidity.

Several limitations exist in the current study. The NIS is an administrative database composed of 20% of United States' hospital discharges. Analysis of NIS data is limited by that which was collected. The NIS dataset does not include past obstetrical or surgical history; functional status; American Society of Anesthesiologists score; or other clinical or physiologic patient data. Disease-specific information is lacking, such as urodynamic testing, extent of pelvic organ prolapse, history of conservative treatment or prior pelvic surgery. Because the NIS is limited to only inpatient data, the 13% of women found to have complications following SUI surgery likely underestimates the true morbidity. The increased availability and use of minimally invasive techniques has generated a movement toward ambulatory surgery for SUI. A recent report from Boyles et al. [2004] describing data in the National Survey of Ambulatory Surgery found that outpatient procedures for urinary incontinence are performed at one fifth the frequency of inpatient procedures [Boyles et al., 2004]. Ambulatory surgery for incontinence continues to become increasingly common and will need to be studied in more detail in terms of healthcare utilization and quality of care. The widespread availability and utilization of the many recently approved minimally invasive surgical procedures for SUI in women since the late 1990s is not reflected in our report. Although there are specific codes for the numerous and varied surgical procedures available for the treatment of women with SUI, we recognize that there is variation in how the procedures are performed, where they are performed, and how they are coded. Differences in frequency and rate of complications may reflect physician practice, choice of surgical intervention, patient characteristics, and incontinence severity. This dataset also does not record any patient reported outcomes relating to morbidity. In describing the nature of complications following incontinence surgery in particular, patient related outcomes are recognized as very important in terms of not only efficacy but also morbidity.

Surgical interventions for SUI are relatively safe procedures with low morbidity and mortality for most women. However, when complications do occur, they lead to increased utilization of healthcare resources, whether in terms of increased hospital charges, prolonged LOS, need for home healthcare services, prescription medication, additional office visits, or further surgical procedures. The continued introduction and refinement of minimally invasive therapies for SUI will ideally lead to less morbidity and mortality with time. However, the effect of these techniques on healthcare utilization has yet to be fully determined. Potentially, the rapid adoption of recently introduced surgical therapies for SUI may lead to decreased success rates and the need for more revision procedures with time, negating the up-front benefit from a utilization standpoint of some newer procedures that may or may not lack long-term durability and treatment efficacy.

As the population ages, the absolute number of surgical procedures performed for SUI is likely to increase, as is the rate of surgical procedures. They will likely be increasingly performed in the ambulatory setting and on women of older age. By our review, a considerable percentage of women experience post-operative complications following SUI surgery. It will be important to identify those women with comorbid risk factors that can be addressed pre-operatively, thereby minimizing avoidable over-utilization of healthcare resources and maximizing quality of care. Furthermore, ongoing research to define causative and relational factors to the development and progression of SUI in women will be directly beneficial to reducing the incidence of SUI. This will make an even greater impact on healthcare utilization with regard to the care of women with SUI in the United States.

CONCLUSION

A substantial percentage of women experience complications following surgical intervention for SUI. This postoperative morbidity leads to dramatically increased resource utilization as measured by hospital LOS, inflation-adjusted hospital charges, and use of post-discharge care. Prospective study is needed to identify clinical risk factors and intraoperative process measures that may be used to optimize the quality of care. The identification of potentially modifiable factors associated with greater morbidity and therefore greater resource utilization may provide opportunities for improvement in the quality of care.

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