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Original Article

Trends in inpatient female urinary incontinence surgery and costs in Taiwan, 1997–2011

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ABSTRACT

Objective: To explore the factors influencing the trends in incidence and cost for female inpatient urinary incontinence (UI) surgery from 1997 to 2011.
Materials and methods: A dataset of one million individuals was randomly drawn from the nationwide National Health Insurance claim database covering Taiwan's population from 1997 to 2011. The participants consisted of women aged ≥20 years who underwent UI surgery. We evaluated the trends of inpatient UI incidence, the medical cost of UI surgery, and the number of UI surgeries performed from 1997 to 2011.
Results: A total of 1517 women underwent inpatient UI surgery from 1997 to 2011. Among these patients, the age-standardized incidence of UI surgery gradually trended upward from 1997 to 2010 but decreased in 2011. The trends were similar for medical costs, including annual inpatient cost, total medical service cost, and surgery fees. The annual inpatient cost had doubled in 2011 compared with that in 1997. However, physician visit fees, ward fees, and anesthesia fees started decreasing from 2005. The length of hospital stay and medication fees decreased during the 15-year study period. Surgeries by doctor specialty, hospital accreditation level, and patient age were stable for the study period.
Conclusion: The trends of age-standardized incidence of UI surgery, annual inpatient cost, total inpatient cost, and surgery fees increased significantly from 1997 to 2009, and abruptly decreased from 2010 to 2011. Long-term observation evaluating the impact of Diagnosis-Related Group payment system in Taiwan is warranted to verify in the future.

Introduction

Female urinary incontinence (UI) is a common, costly, and burdensome condition for women [1]. In Taiwan, 18.7% of women aged 20–59 years and 29.8% of women aged ≥60 years reported of having UI [2,3]. The prevalence of stress urinary incontinence (SUI) is 18.0% based on patient perceptions in Taiwan [4].

In the US, $16 billion is spent annually for UI treatment, and approximately $13.2 billion is attributable to SUI [5]. The costs continue to grow [6]. SUI is treated by strengthening the pelvic muscles, implanting support devices, or surgery. When methods that are more conservative fail, women often choose surgical treatment for UI [1,7].

The costs of the UI management have increased continuously due to increasing numbers of surgeries, increasing prevalence of SUI, and the willingness of patients to improve their quality of life by undergoing surgery [6,8,9]. Anger et al [6] reported that the total medical cost of UI Medicare claims in the US almost doubled from 1992 to 1998. Furthermore, the incidence of inpatient surgery for UI also increased from 1979 to 2007 [1,10]. Few, if any, studies have reported incidence and cost trends of UI surgery in Taiwan. Thus, we determined female inpatient UI surgery and medical cost trends in a cohort of one million individuals randomly selected from a nationwide National Health Insurance claim database of 23 million beneficiaries from 1997 to 2011.

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Materials and methods

The National Health Research Institute (NHRI) of Taiwan manages the medical benefits claims of the 23 million residents of Taiwan, covering more than 99% of the population. All inpatient and outpatient claims records paid by the National Health Insurance are registered in the National Health Insurance Research Database (NHIRD).

This retrospective, population-based cohort study used a subset of the NHIRD known as the Longitudinal Health Insurance Database (LHID) (current version, 2005), which is a sample of one million insured individuals and is randomly sampled from the NHRI registry in 2005 and contains the complete original medical claims from 1997 to 2011.

The study dataset includes no patient identification information, thereby making it unnecessary to obtain the approval of an institutional review board.

The study focused on the incidence of UI in women aged ≥20 years who underwent inpatient UI surgery from 1997 to 2011. Table 1 lists the International Classification of Disease, 9th Revision, Clinical Modification codes used to identify adult female UI patients. Women who underwent UI surgery were defined as those who had claims for UI-related surgical procedures (Table 1).

We analyzed demographic variables including the year the surgery was performed, patient age (stratified into three groups: 20–39 years, 40–59 years, ≥ 60 years), hospital accreditation level (medical center, ≥ 500 general beds, regional hospital, 250–499 beds, and district hospital, < 250 beds), specialties of the doctors who performed the surgery (gynecologist, urologist), and length of hospital stay. The medical cost variables included annual inpatient cost, total inpatient cost, surgery fee, anesthesia fee, medication fee, physician consultation fee, and ward fee. The total inpatient cost included 13 fees covering the surgery, anesthesia, physician visit, ward, examination, radiological procedure, therapeutic management, blood plasma, special material, medication, pharmacy service, injection, and rehabilitation fees.

Table 1
ICD-9-CM codes identifying urinary incontinence and related procedure codes based on National Health Insurance claims in Taiwan.

ICD-9-CM code	
596.51	Hypertonicity of bladder
596.52	Low bladder compliance
596.59	Other functional disorder of bladder
599.8	Other specified disorders of urethra and urinary tract
599.81	Urethral hypermobility
599.82	Intrinsic (urethral) sphincter deficiency
599.83	Urethral instability
599.84	Other specified disorders of urethra
625.6	Stress incontinence, female
788.3	Urinary incontinence
788.30	Urinary incontinence unspecified
788.31	Urge incontinence
788.33	Mixed incontinence, male, female
788.34	Incontinence without sensory awareness
788.37	Continuous leakage
Urinary incontinence procedure	
77029B	Abdominal perineal urethral suspension
78028B	Transabdominal urinary incontinence surgery
78029B	Transvaginal urinary incontinence surgery (Kelly plication included)
78030B	Burch colposuspension
78037B	KELLY operation
78047B	(Retroperitoneoscopy) Laparoscopy, Bladder neck suspension
80007B	Colporrhaphy, anterior
80023B	Vesicovaginal fistula repair

ICD-9-CM = International Classification of Diseases, 9th Revision, Clinical Modification.

Gynecologists and urologists performed most of the UI surgeries. Nonetheless, we found three surgeries performed by doctors of other specialties (general surgeon and cardiovascular surgeon). Therefore, we classified the specialties into the two groups of gynecologists and urologists.

The continuous data were expressed as means and standard deviations (SDs), whereas the categorical data were expressed as numbers and percentages. A joinpoint regression analysis of trends was used to assess the trends in surgery incidence and medical costs from 1997 to 2011. All analyses were performed using the SAS software version 9.4 (SAS Institute, Cary, NC, USA).

Results

We identified 1517 UI inpatient surgeries in the LHID 2005 database during the 15-year study period. The trend analyses showed that the incidence of UI surgery increased significantly during the 15-year study period. The age-standardized incidence of UI surgeries based on the World Health Organization standardized population in 2000 increased significantly from 1997 to 2011 ($p < 0.001$). It increased from 13.82 per 100,000 women in 1997 to 23.68 per 100,000 women in 2010, and finally 20.48 per 100,000 women in 2011. From 1997 to 2009, the inpatient surgery rate increased significantly in the women ≥60 years age group ($p = 0.004$). Moreover, the number of cases was more than doubled from 32.65 per 100,000 in 1997 to 68.35 per 100,000 in 2009. Since 2000, the inpatient surgery rate in the women ≥60 years age group surpassed that in the women of 40–59 years age group (Figure 1). The trends for the numbers of UI cases in the women of 20–39 years ($p = 0.272$) and 40–59 years ($p = 0.084$) age groups remained stable during the study period (see Table 2 & Figure 2).

Table 2 compares the patient demographics and hospital characteristics for inpatient UI surgeries for 1997, 2005, 2010, and 2011 and shows the trends for medical fees from 1997 to 2011. The annual number of procedures increased from 60 in 1997 to 124 in 2011 in Taiwan. The overall average age at which UI surgery was performed was 54.39 years, and 946/1517 (62.36%) patients belonged to the 40–59 years age group. We found that the annual inpatient cost, total inpatient cost, and surgery fee increased from 1997 to 2010 but decreased in 2011 (see Table 2 & Figure 2), similar to the age-standardized incidence and the numbers of surgeries. Remarkably, since 1997, the annual inpatient cost increased by more than three times in 2010 and by over two times in 2011 ($p = 0.026$).

In addition, the other medical fees, such as the ward fee ($p = 0.012$), physician visit fee ($p = 0.012$), and anesthesia fee ($p < 0.001$), were stable before 2005 and subsequently decreased through 2011. The data showed a considerable decrease in the length of hospital stay with an average stay of 7.45 days in 1997, decreasing to only 3.47 days in 2011. We found a similar trend for medication fees.

By specialty, gynecologists performed 80.6% (1223/1517) of the UI surgeries i.e., four times higher than those performed by urologists (19.35%, 294/1517) in 2011. These percentages remained stable from 1997 to 2011 ($p = 0.157$). Slightly more than half (58.4%, 886/1517) of the inpatient UI surgeries were performed at medical centers from 1997 to 2011, and this trend was stable among the types of hospitals (p values for medical center = 0.685, regional hospital = 0.703, and district hospital = 0.351) (Table 2).

Discussion

The age-standardized incidence of inpatient UI surgery sustainably increased from 13.82 per 100,000 women in 1997 to 20.48 per 100,000 women in 2011. Additionally, the incidence of UI surgery in the women ≥60 years age group doubled during the 15-year