

Short Communication

# Do lower urinary tract symptoms (LUTS) predispose the individuals to more admissions in Taiwanese women? – A preliminary report

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## Abstract

**Objective:** Lower urinary tract symptoms (LUTS) are highly prevalent, and increase significantly as age advances. However, whether LUTS predispose women to more admissions and/or operations has not been well reported. We studied the risks of admissions among women with or without LUTS.

**Materials and Methods:** Based on a nationwide population-based database, the risks of admissions among women of National Health Insurance enrollees with at least one outpatient service claim, with the coding of LUTS during 2001–2004, were compared with those without LUTS for the following 2 years.

**Results:** Total admission rates (per 1000 person-years) were significantly higher in women with LUTS, as compared with the controls; 309.7 versus 173.6, respectively. The adjusted incidence rate ratio (IRR) = 1.79 and 95% confidence interval (CI) = 1.63–1.95. The adjusted IRRs = 1.78 (95% CI = 1.56–2.03), 2.02 (95% CI = 1.75–2.33), 1.53 (95% CI = 1.29–1.81), 2.09 (95% CI = 1.13–3.86), 1.40 (95% CI = 1.21–1.63), and 4.48 (95% CI = 3.37–5.96) in the departments of internal medicine, gynecology, surgery, psychiatry, orthopedics and urology, respectively; all *p* values < 0.05. Meanwhile, the operation rates were also higher in women with LUTS, as compared with controls, in total and in the departments of gynecology, orthopedics, and surgery; all *p* values < 0.05.

**Conclusions:** The preliminary data showed a higher risk of admissions and operations among women with LUTS. The possible explanations included: more co-morbidities, a poorer quality of life, a lower threshold of admission, or potential early symptoms of either medical or surgical conditions. This highlights a broad understanding of multiple and overlapping systems in LUTS.

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**Keywords:** epidemiology; lower urinary tract symptoms (LUTS); National Health Insurance Research Database; risks for admission

## Introduction

Lower urinary tract symptoms (LUTS) have gained global attention, because of a high prevalence [1]. According to the EPIC epidemiology study in five countries in Europe, using the 2002 International Continence Society (ICS) definitions,

the prevalence of LUTS (at least one symptom) was as high as 64.3% among a total of 19,165 individuals [1]. Nocturia was the most prevalent LUTS (men = 48.6%; women = 54.5%). The prevalence for storage, voiding and post micturition symptoms was 51.3%, 25.7%, and 16.9%, respectively, in men, and 59.2%, 19.5%, and 14.2%, respectively, in women [1]. The pathogenesis of LUTS is not completely understood, but it is considered to be a multi-factorial process, e.g., neurologic, vascular, connective tissue, etc. [2]. LUTS are known to have a negative impact on the health-related quality of life (HRQL) [3, 4]. They may also cause work productivity

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loss/activity impairment, and work absenteeism [4]. However, whether LUTS predispose women to more admissions, has not been well reported. Based on a nationwide population-based database, we studied the risks of admissions and operations among women with or without LUTS among National Health Insurance enrollees in Taiwan.

## Materials and methods

The data of this study were obtained from the random population sample of about one million individuals as a representative cohort dated from the National Health Insurance Research Database (NHIRD), Taiwan. NHIRD was established by the National Health Research Institute, with the aim of promoting research into current and emerging medical issues in Taiwan. During the recruitment periods 2001–2004, we identified women who had at least one out-patient service claim at hospital of different accreditation levels, or local medical clinics, with the coding of LUTS. LUTS with storage symptoms include: frequency and polyuria (International Classification of Diseases, 9th Revision, Clinical Modification, ICD-9 CM code 788.4), stress urinary incontinence, female (625.6), urge incontinence (788.31), nocturnal enuresis (788.36), mixed incontinence (788.33) and hypertonicity of bladder (596.51). Voiding symptoms include: retention of urine (788.2), splitting and slowing of urine stream (788.6) and post-void dribbling (788.35). The comparison group included women without LUTS, who were matched for age, gender, hypertension and diabetes. All cases were followed for the next 2 years, except for women who expired during the follow-up period. Confidentiality was assured by abiding by the data regulations of the Bureau of National Health Insurance, and International Review Board approval was waived.

## Results

Total admission rates (per 1000 person-years) were significantly higher in women with LUTS, as compared with the controls (309.7 versus 173.6, respectively). The adjusted incidence rate ratio (IRR) = 1.79 and the 95% confidence interval (CI) = 1.63–1.95. Values = 120.4 versus 67.6, with adjusted IRR = 1.78, 95% CI = 1.56–2.03 in the department of internal medicine; 57.7 versus 28.7, with adjusted IRR = 2.02, 95% CI = 1.75–2.33 in the department of gynecology; 31.6 versus 20.5, with adjusted IRR = 1.53, 95% CI = 1.29–1.81 in the department of surgery; 25.6 versus 12.3, with adjusted IRR = 2.09, 95% CI = 1.13–3.86 in the department of psychiatry; 23.8 versus 17.0, with adjusted IRR = 1.40, 95% CI = 1.21–1.63 in the department of orthopedics; and 15.8 versus 3.6, with adjusted IRR = 4.48, 95% CI = 3.37–5.96 in the department of urology;  $p < 0.05$  for all.

Meanwhile, the total operation rates (per 1000 person-years) were also higher in women with LUTS, as compared with controls (92.3 versus 48.6, respectively). The adjusted IRR = 1.90 and the 95% CI = 1.77–2.05. Values = 33.0 versus 12.5, with adjusted IRR = 2.64, 95% CI = 2.30–3.04 in the department of gynecology; 18.3 versus 13.8, with

adjusted IRR = 1.33, 95% CI = 1.14–1.55 in the department of orthopedics; 17.5 versus 11.1, with adjusted IRR = 1.56, 95% CI = 1.34–1.82 in the department of surgery; 9.4 versus 1.9, with adjusted IRR = 5.02, 95% CI 3.65–6.91 in the department of urology;  $p < 0.05$  for all.

## Discussion

Our study offers an observation that women with LUTS had a significantly higher admission rate, as compared with controls. This is in concordance with the report by Kannan et al, that the presence of LUTS was significantly associated with increased admissions, with odds ratio = 1.56, 95% CI = 1.43–1.69 [4]. Nevertheless, this is only correlated data. We cannot draw any conclusion for the causal effect relationship from the observation so far.

The possible explanations were: firstly, there were more co-morbidities among women with LUTS. LUTS share a number of risk factors with cardiovascular diseases [2]. Ng et al reported the associated co-morbidities were present as hypertension 43%, diabetes 17%, dyslipidemia 16%, and hyperuricemia 5%. In total, 86% had at least one cardiovascular risk factor and patients with moderate-to-severe LUTS had a higher probability of harboring at least one cardiovascular risk factor [5]. The role of vascular risk factors for LUTS is increasingly recognized, and LUTS have been linked to obesity, hypertension, hyperlipidemia, diabetes mellitus, and nicotine abuse [6, 7]. Ponholzer et al reported that an individual with a higher International Prostate Symptom Score (IPSS), may also have more vascular risk factors [8]. Coyne et al in the EPIC study reported that asthma and prostatitis were predictors for a bothersome overactive bladder (OAB), while neurological conditions, history of recurrent urinary tract infection and uterine prolapse, were predictors for seeking treatment [9].

Secondly, women with LUTS may be at risk for more falling accidents, due to urgency, and/or nocturia. This was supported by the increased risks of orthopedic surgeries in our study. Hu and Wagner reported that OAB is associated with increased health risks, e.g., urinary tract infection, falls and fall-related injuries, including broken bones, as well as admission to nursing homes and prolonged hospital stays [10]. Karatas et al explained the higher prevalence of cardiovascular disease in patients with LUTS, than in the general population, in old age. Nocturia-induced sleep disturbance causes repeated waking and voiding attacks, non-dipping blood pressure variations and increased sympathetic activity [11]. These studies suggest that vascular risk factors seem to be associated with the presence and degree of LUTS. Meanwhile, the National Overactive Bladder Evaluation (NOBLE) Program found that patients with an OAB, with and without urge incontinence, had a poorer HRQL, by clinically and significantly lower SF-36 quality-of-life scores [12]. Therefore, they had a lower threshold for requesting admissions [3]. Coyne et al reported that men and women with bothersome OAB were significantly more likely to seek treatment, e.g., number of healthcare visits, urinary symptoms-related healthcare visits, treatment for urinary symptoms [9].

Thirdly, LUTS may predispose the development of some potential medical or surgical conditions. Wehrberger et al reported a higher risk of cardiovascular disease or stroke events (adjusted hazard ratio = 3.82,  $p = 0.01$ ) for men with severe LUTS, after adjusting for age, diabetes and total and low-density lipoprotein cholesterol, in a longitudinal analysis for 10-year follow-up [2]. Although moderate LUTS do not seem to be a risk factor for cardiovascular disease and stroke (adjusted hazard ratio = 0.63,  $p = 0.16$ ) men with severe LUTS were at increased risk for both, according to a cross-sectional and longitudinal analysis [2]. It has been shown that urinary incontinence is a predictor of greater mortality and poor functional recovery, and institutionalization following a stroke [13]. Meanwhile, LUTS was considered as a prognostic factor after an acute first-ever stroke. Nevertheless, patients who regain normal bladder control in the first week have a comparable prognosis to patients who do not have micturition disturbances following a stroke [13].

In conclusion, modern understanding better complies with a broader understanding of LUTS with multiple and overlapping systems, instead of the traditional concept of bladder and urethra only [14]. LUTS are now considered as a variety of diseases, e.g., sexual desire, sexual pain disorders and other female sexual dysfunctions [14]. Besides, LUTS may also imply the potential coexistence or risk of some other vascular or neurologic conditions, etc. The negative effect of LUTS is apparent across several domains of HRQL and on overall perception of bladder problems, general health status and mental health [15]. The appropriate diagnosis and treatment of symptoms could lead to better clinical, economic, and humanistic outcomes [4].

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