

## Lower Urinary Tract Symptoms and Related Factors in Iranian Female Nurses

### Abstract

**Background:** Lower Urinary Tract Symptom (LUTS) are common among female nurses. High levels of job stress in nurses may be associated with the prevalence of these symptoms. This study aimed to investigate the prevalence of LUTS and factors related to these symptoms in female nurses. **Materials and Methods:** A cross-sectional study in which 460 nurses and nursing assistants participated was conducted. A questionnaire consisting of socio-demographic data, International Consultation on Incontinence Questionnaire – Female Lower Urinary Tract Symptoms, and Toileting Behavior – Women’s Elimination Behavior Scale was used. Data analysis was performed by descriptive and inferential statistical tests at a significant level of  $p < 0.05$ . **Results:** The highest and lowest scores of LUTS were related to the urgency and nocturnal enuresis with a mean (SD) score of 1.85 (1.03) and 0.05 (0.26), respectively. Concerning toileting behaviors, the highest score was for the place preference for voiding with a mean (SD) score of 4.13 (0.66), which correlated with LUTS. Among controllable variables, years of practice, urinary tract infections, use of perineal pads for urinary leakage, lifting heavy objects at work, and medical history were identified as predictors of LUTS ( $p < 0.05$ ). **Conclusions:** LUTS was highly prevalent in the female nurses. The results revealed that unhealthy toileting behaviors may contribute to the prevalence of LUTS. Early identification of these symptoms and the development of an educational intervention program to enhance the knowledge of healthy toileting behaviors may prevent the occurrence of urinary symptoms.

**Keywords:** Lower urinary tract symptoms, nurses, toilet facilities

### Introduction

Lower Urinary Tract Symptoms (LUTS) are described as various problems that are related to urine storage and voiding.<sup>[1]</sup> These symptoms are common in both genders, have a negative impact on the quality of life, and are associated with high costs of health care.<sup>[2]</sup> Women are at higher risk for specific LUTS than men because of the anatomy and physiology of the female urogenital system. Women’s hormonal environment experiences during pregnancy and childbirth and gendered societal experiences are additional contributors.<sup>[3]</sup> Epidemiological studies have reported a prevalence of 40–70% of LUTS among women.<sup>[4]</sup> Evidence suggests that many factors, including age marital status, body mass index, type of delivery, work experience, fluid intake, previous Urinary Tract Infection (UTI), and chronic constipation, are associated with these

symptoms in women.<sup>[5-7]</sup> Behavioral and lifestyle factors can precipitate or exacerbate bladder conditions. The way women void and empty their bladder may be related to the development and worsening of LUTS.<sup>[8]</sup> Toileting behaviors, which are related to urination and used by women across their life course, have received increased attention from researchers in recent years.<sup>[9]</sup>

Much of the existing literature on LUTS focuses on older, often post-menopausal women and sub-groups of those who seek care for the symptoms.<sup>[10]</sup> The effect of job-related factors on these symptoms has been generally ignored. Unemployed women may be exposed to risks related to their personal characteristics and habits in the development of these symptoms; an employed woman, in addition to the aforementioned risks, may be exposed to risks related to environmental factors and job conditions.<sup>[5]</sup> These symptoms

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are more common in female nurses compared to other staff.<sup>[11]</sup> Several studies have reported the prevalence of the symptoms in nurses from 43.1 to 89.63%.<sup>[5,7,12]</sup> Nursing has been identified as one of the most stressful professions. Work-related stress among nurses affects both individual and organizational functioning and the healthcare provided.<sup>[13]</sup> Heavy workloads, long shifts, pressure demands, inadequate breaks and insufficient rest times, delaying voiding, and limited fluid intake are common unhealthy practices among nurses which affect the bladder.<sup>[11]</sup> Despite nurses' knowledge about the importance of healthy behaviors, it is not always applied in self-care.<sup>[14]</sup> It seems that Urinary Incontinence (UI) is treatable; new information in this area should be acknowledged and addressed in the workplace with implications for the workforce policy and education of workers.<sup>[15]</sup>

Identifying individual, behavioral, and environmental factors related to LUTS in female nurses can enhance the knowledge on the importance of preventing these symptoms. In this study, we hypothesized that toileting behaviors may be related to the occurrence of LUTS. The present study aimed to evaluate the prevalence of LUTS and factors related to these symptoms among female nurses working in the teaching hospitals affiliated to Guilan University of Medical Sciences.

## Materials and Methods

The present descriptive cross-sectional study was conducted during May–November 2020. The study population consisted of all nurses working in different departments of the hospitals affiliated with the Guilan University of Medical Sciences (GUMS). The inclusion criteria were as follows: willingness to participate in the study, working in the hospital for at least 1 year, not being pregnant and not having a UTI during the study, and not having a history of diabetes and neurological disease. The exclusion criterion was the unwillingness to complete the questionnaires. Based on the study by Wan *et al.*,<sup>[7]</sup> who reported a 50% prevalence of incontinence symptoms, and after considering a precision level of 5% and a confidence level of 95%, the sample size was initially estimated at 385; taking into account a 15% drop in the data collection phase, the final sample size was calculated at 453.

The stratified random sampling method, in which each of the eight Rasht teaching and treatment centers was considered as a class, was used. To perform the stratified random sampling, the researchers took the number of all working nurses ( $n = 1460$ ) from the central nursing office of the province. Then, the number of nurses in each center was determined by visiting that center. Next, by dividing the total number of nurses in each teaching center by the total study population, multiplied by the total number of the samples, the number of samples needed from each teaching center was determined. Afterward, by using the community proportion and dividing the number of nurses in each

department by the whole nurses of that center, multiplied by the number of samples needed from each center, the number of samples required from each department was determined. Finally, in each department, questionnaires were filled out by the nurses who had the inclusion criteria and volunteered to participate in the study. The researcher visited different hospitals in various working shifts during May–November 2020. To observe the ethical principles, the researcher introduced herself and gave all participants a brochure explaining the purpose of the research and assured them of the confidentiality of their information. After the signing of the consent form by the participants, the questionnaires were distributed among them; the participants completed and returned the questionnaires.

The data were collected using a three-part questionnaire including the demographics data form, International Consultation on Incontinence Questionnaire – Female Lower Urinary Tract Symptoms (ICIQ-FLUTS), and Toileting Behavior – Women's Elimination Behavior Scale (TB-WEB). The first part of the questionnaire collected the participants' demographic characteristics (age, education level, marital status, number of pregnancies and type of delivery, UTI, body mass index, fluid intake, and working hours per week), medical history (chronic constipation, childhood enuresis, history of pelvic organ surgery, taking medications that contain estrogen), and working environment status (adequacy of bathroom breaks and toilet facilities, availability of relief persons, use of perineal pads for urinary leakage). The second part of the questionnaire consisted of the Persian version of ICIQ-FLUTS. It was further validated by Dr. Pourmomeny *et al.*<sup>[16]</sup> In Iran, the overall internal consistency of the Persian FLUTS questionnaire was 0.83 (Cronbach's alpha was 0.83 and 0.89 for the first and second sections, respectively). The internal consistencies for the incontinence, voiding, and filling sub-scales were 0.87, 0.67, and 0.70, respectively. As for the reliability, the agreement between the test–retest values was 0.77. The internal consistency of each question was examined separately, and the value of all questions was over 0.80. In assessing the qualitative face validity, none of the items in the Persian FLUTS questionnaire was unclear. This 12-item questionnaire contains three symptom sub-scales: filling symptoms (nocturia, urgency, bladder pain, and frequency), voiding symptoms (hesitancy, straining, and intermittency), and incontinence symptoms (urge urinary incontinence, frequency of urinary incontinence, stress urinary incontinence, unexplained urinary incontinence, and nocturnal enuresis). The responses for each symptom were graded on a 5-point scale (never: 0, all of the time: 4). There is no cut-off point in interpreting the ICIQ-FLUTS scores, so all scores were summed to calculate the overall severity of LUTS. Higher scores indicated more severe symptoms.<sup>[17]</sup> If a female nurse reported a frequency of “occasionally” or “sometimes” to any response, we

classified that nurse as having the corresponding symptoms. In this study, voiding seven or more times per day and one or more times at night was interpreted as a positive symptom of daytime frequency and nocturia, respectively. The ICIQ-FLUTS questionnaire also estimates the bother score of the symptoms considering the score of 0 for not at all severe and 10 for extremely severe.<sup>[4,17,18]</sup>

The third part of the questionnaire was the Toileting Behavior – Women’s Elimination Behavior Scale (TB-WEB). It was developed by Wang *et al.* (2011),<sup>[19]</sup> and the internal consistency reliabilities of its sub-scales ranged from 0.70 to 0.88. It has been used in numerous studies around the world.<sup>[7,10,20]</sup> This instrument was translated from English to Persian by a native Persian speaker. The validity of this questionnaire was examined by 11 nursing professors at GUMS (CVI  $\geq 90\%$ , CVR  $\geq 60\%$ ), and its test–retest reliability was measured at a 2-week interval on 20 nurses. The t-retest results showed no significant difference between the two stages ( $p = 0.895$ ), and the Cronbach’s alpha coefficient for determining the internal consistency was calculated at 0.78. The 18-item scale contains five domains: place preference for voiding (e.g., “avoiding the use of public toilets”), premature voiding (e.g., “emptying the bladder with little or no need to urinate before leaving home”), delayed voiding (e.g., “delaying bladder emptying when busy”), position preference for voiding (e.g., “crouching or hovering to empty bladder when not at home”), and straining to void (e.g., “pushing down or straining to start urinating”). The responses to the items were graded using a 5-point scale (1: Never, 5: Always) to indicate how often the women adopted the behaviors. The average score was calculated with higher scores indicating unhealthier toileting behaviors.<sup>[6,7,19]</sup> In this study, “often” and “always” answers were considered positive behaviors.

Data were analyzed using SPSS software (version 23, IBM Corporation, Armonk NY, USA). Descriptive statistics including mean, percentage, and standard deviation (SD) were used to summarize the participant’s characteristics, toileting behaviors, and lower urinary tract symptoms. To analyze the data, the Kolmogorov–Smirnov test for normality, Pearson correlation, regression analysis, ANOVA, and two independent t-tests were used at the significance level of  $p < 0.05$ .

### Ethical considerations

The ethics committee of Guilan University of Medical Sciences granted permission for conducting the research (with approval no. IR.GUMS.REC.1398.294). All the participants received a brochure explaining the purpose of the research and were also informed about the anonymity of the study. They were told that they were free to participate or not and to withdraw at any time. Informed consent was obtained from all the participants.

## Results

The final participants consisted of 460 nurses. Six participants were excluded from the study because of incomplete responses to the questionnaires. The final analysis was performed for 454 participants. The majority of the participants were in the ages of 30–39 years (204, 44.93%), with 340 (74.90%) married and 249 (54.85%) having more than 10 years of experience. Almost half of the female nurses had a history of pregnancy 188 (41.14%); the delivery type of most of them was the cesarean section 235 (51.76%), and most of the participants consumed less than 1500 ml of fluids per day 311 (68.50%). More than half of female nurses worked in shifts and worked more than 44 hours a week (265, 58.37%). A number of the participants (61, 13.44%) reported a history of UTI over the past 6 months, and 18 (3.88%) of them were taking medications that contained estrogen. More than half of the participants did not visit a physician if they had urinary tract problems and reported a lack of time as a reason. Most of the female nurses suppressed the desire for voiding in the workplace (300, 66.08%), and 128 (28.21%) of them reported high workload and inadequate W.C as reasons for the inappropriate behaviors. The majority of nurses did not drink enough fluids because of their high workload (276, 60.79%). The female nurses (114, 25.10%) sometimes used perineal pads for urinary leakage at work.

The results of the multiple linear regression coefficients showed that among the controllable variables, years in practice, medical history (including chronic constipation), heavy lifting at work, use of perineal pads for urinary leakage, and history of UTI during the past 6 months were the most important predictors associated with LUTS ( $p < 0.05$ ) [Table 1].

The nurses with more than 10 years of work experience ( $t_{453} = 4.63$ ,  $p < 0.001$ ) had a medical history (including chronic constipation) ( $t_{453} = 2.35$ ,  $p = 0.045$ ), lifted heavy loads at work ( $t_{453} = 2.77$ ,  $p = 0.006$ ), often or always used perineal pads for urinary leakage ( $t_{453} = 3.45$ ,  $p = 0.001$ ), had a UTI at least 6 months before the survey ( $t_{453} = 4.77$ ,  $p < 0.001$ ), and had experienced at least one more type of LUTS than the other nurses.

Regarding the prevalence of LUTS among the female nurses, the results showed that approximately

**Table 1: Linear regression coefficients of factors related to LUTS\***

Independent Factors	B	t	p
Years in practice	0.26	4.63	<0.001
Medical history	0.11	2.35	0.045
Lifting heavy objects	0.12	2.77	0.006
Use of perineal pads for urinary leakage	0.15	3.45	0.001
UTI** in the past 6 months	0.21	4.77	<0.001

\*Lower Urinary Tract Symptoms, \*\*Urinary Tract Infection



442 (97.36%) had at least one symptom, 437 (96.26%) had filling symptoms, 233 (51.32%) had incontinence symptoms, and 106 (23.35%) had voiding symptoms. Among the most common filling symptoms, 395 (87.00%) of the female nurses reported urgency and 320 (70.48%) reported nocturia (voiding one or more times per night). Stress UI and urge UI were reported in 195 (42.70%) and 156 (34.50%) of the female nurses, respectively. [Table 2].

The highest bother score was for the urgency with a mean (SD) score of 3.66 (2.78), and the lowest bother score was for the nocturnal enuresis with a mean (SD) score of 0.16 (1.00).

As for TB, the results showed that place preference for voiding with a mean (SD) score of 4.13 (0.66) and delayed voiding with a mean (SD) score of 3.12 (0.93) had the highest score of toileting behavior among the female nurses, respectively [Figure 1].

The Pearson correlation coefficient analysis of the association between toileting behaviors and LUTS showed that premature voiding, delayed voiding, and straining to void had a significant positive association with LUTS in the female nurses. Place preference for voiding was not significantly associated with the symptoms [Table 3].

The association between position preference and LUTS was examined separately. The results of the Pearson correlation coefficient showed that the position of crouching/hovering or standing over the toilet for voiding at home or away from home had a significant positive association with LUTS.

## Discussion

In the present study, LUTS was highly prevalent in female nurses. In addition, the results indicated that there was a

significant relationship between LUTS and unhealthy toileting behaviors. Female nurses working in eight major hospitals affiliated with GUMS were invited to respond to the ICIQ-FLUTS and TB-WEB scales and a demographic questionnaire. Our findings in terms of the relationship between LUTS and older age, obesity, number of pregnancies, and number of vaginal deliveries correspond to previous findings.<sup>[6,7,21]</sup>

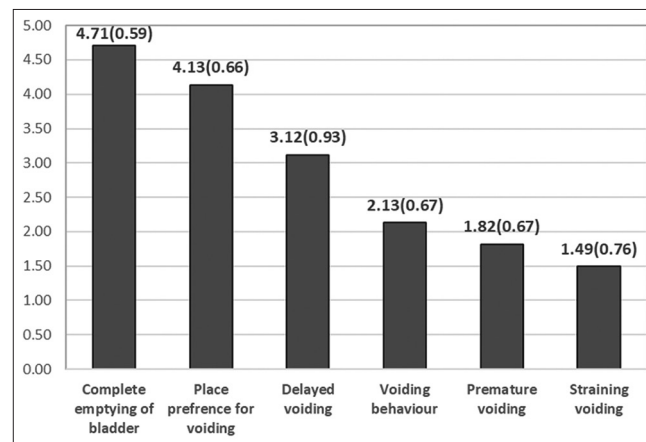
Among the controllable variables, years in practice, medical history (chronic constipation), heavy lifting at work, use of perineal pads for urinary leakage, and history of UTI during the past 6 months were significantly associated with LUTS. Female nurses with more than 10 years of work experience were more likely to experience the symptoms. In Zhang's study, there was a statistically significant difference between work experience and the probability of the symptoms mentioned in female nurses.<sup>[12]</sup> High job stress and psychological pressures on nurses and low resources to cope with these stresses during long years of work may account for this relationship. In this study, female nurses who had chronic constipation were more likely to develop LUTS. Ninomiya's findings in Japan on women aged 20–79 and Zhou's findings in China on female students also showed that constipation increases the risk of UI.<sup>[9,22]</sup> It is hypothesized that dilatation of the rectum by accumulated feces may cause over-active detrusor muscles as well as damage to the pelvic floor muscles because of the repeated abdominal pressure during defecation.<sup>[9]</sup>

Lifting heavy objects at work was statistically significant related to LUTS in this study. These findings are consistent with the conducted results of the study by Kaya on female nurses and secretaries and Kim on working women.<sup>[5,23]</sup> Zhou believes that pelvic floor muscle dysfunction develops in jobs in which women frequently have to lift heavy objects, which in turn can contribute to the development of an Over-Active Bladder (OAB).<sup>[24]</sup> In the present study, the female nurses, who used perineal pads for urinary leakage,

**Table 2: The prevalence of LUTS\* among female nurses (n: 454)**

Variables	n (%)
At least one type of LUTS	442 (97.36)
At least one type of filling symptoms	437 (96.26)
Nocturia	320 (70.48)
Urgency	395 (87.00)
Bladder pain	216 (47.58)
Frequency	266 (58.59)
At least one type of voiding symptoms	106 (23.35)
Hesitancy	112 (24.67)
Straining	144 (31.72)
Intermittency	133 (29.30)
At least one type of incontinence symptoms	233 (51.32)
Urge urinary incontinence	156 (34.50)
Frequency of urinary incontinence	100 (21.80)
Stress urinary incontinence	195 (42.70)
Unexplained urinary incontinence	32 (7.04)
Nocturnal enuresis	17 (3.74)

\*Lower Urinary Tract Symptoms



**Figure 1: Mean of severity of toileting behaviors in each domain and in total (n: 454)**

**Table 3: Pearson's correlation coefficient between LUTS\* and toileting behaviors in each domain and in total (n: 454)**

Toileting behaviors/lower urinary tract symptoms	Place preference for voiding	Premature voiding	Delayed voiding	Straining to void	Complete emptying of bladder	Voiding behaviors
Filling						
<i>r</i>	0.06	0.21	0.23	0.30	-0.06	0.30
<i>p</i>	0.167	<0.001	<0.001	<0.001	0.001	<0.001
Voiding						
<i>r</i>	0.11	0.15	0.20	0.62	-0.09	0.41
<i>p</i>	0.019	0.001	<0.001	<0.001	0.042	<0.001
Urinary incontinence						
<i>r</i>	0.09	0.21	0.15	0.39	-0.02	0.30
<i>p</i>	0.042	<0.001	0.001	<0.001	0.577	<0.001
Over-active bladder syndrome						
<i>r</i>	0.07	0.25	0.21	0.32	-0.08	0.33
<i>p</i>	0.129	<0.001	<0.001	<0.001	0.07	<0.001
Urinary tract symptoms						
<i>r</i>	0.11	0.26	0.26	0.51	-0.14	0.44
<i>p</i>	<0.001	<0.001	<0.001	<0.001	0.002	<0.001

\*Lower Urinary Tract Symptoms

were more likely to develop LUTS. In this regard, Palmer, Zhou, and Grzybowska reported a significant correlation between using perineal pads or wearing panty liners and leakage of urine and UI.<sup>[6,24,25]</sup> The use of absorbent pads is one of the self-management mechanisms in relation to the OAB syndrome and UI,<sup>[10]</sup> but the nature of this relationship needs further investigation.

We realized that having a history of UTI increases the risk of developing LUTS. Similarly, Wan found that UTI was a risk factor for LUTS in female nurses which may be related to infection increasing detrusor contraction and decreasing sphincter pressure.<sup>[7]</sup>

The prevalence of LUTS varies between 41.3 and 89.63% among female nurses.<sup>[5,7,12]</sup> In the present study, nearly 97.36% of the female nurses reported experiencing at least one type of LUTS, which was similar to the findings of Zargham in the general female population in Iran<sup>[4]</sup> and higher than the findings of Wan, Zhang, and Kaya in female nurses.<sup>[5,7,12]</sup> According to Zhang, job stress in nurses may be a contributing factor in the development of LUTS.<sup>[12]</sup> Work conditions for nurses such as heavy workloads, high stress, and poor bladder habits were thought to influence the presence of the symptoms.<sup>[15]</sup>

Urgency showed the highest frequency in comparison with other symptoms. In other studies, this symptom has also been reported as either the first or second most common presentation.<sup>[4,12,26]</sup> The environmental factors including the adequacy of bathroom breaks, adequacy of toilet facilities, and availability of relief persons can cause prolonged voiding intervals, large volume urine storage, and eventually the symptoms of urgency and stress UI.<sup>[5]</sup> In the present study, nocturia comprised the second most common symptom after urgency. Its prevalence in this study is higher than in other studies.<sup>[4,5,20]</sup> These differences

could be because of differences in the LUTS data collection tools, the study populations, and the definition of nocturia (was defined as voiding one or more times per night).

An abnormal daytime frequency (more than seven times per day) was found in 23.56% of our studied population. Our findings are close to the findings in a study by Zhang which was in a general population of Chinese women and the findings in a study by Sjögren which was in Young Swedish women and higher than the findings of a study by Kaya in Turkish female nurses and secretaries.<sup>[5,27,28]</sup> This symptom is strongly affected by the level of fluid intake, and it needs to be determined whether this symptom is associated with lower urinary tract disease and is a physiological mechanism in response to water and salt intake or is a pathological consequence of systemic medical problems such as chronic kidney disease.<sup>[29]</sup> Nearly half of all female nurses reported experiencing bladder pain at least occasionally during the past month. It has been reported to be 3.9 to 39.25% in other studies,<sup>[7,12,30]</sup> but it is not clear what sort of pain. It has been found that an explanation for this pain could be the high rate of inflammatory bladder problems in this age group or the stimulating symptoms of the genital tract after sexual activity.<sup>[27]</sup> We found that stress UI and urge UI were prevalent among female nurses, which were slightly higher than the results of the studies conducted by Wan in China and Pierce in Australian nurses.<sup>[7,15]</sup> The findings were closer to the findings of a study carried out by Zargham in Iran.<sup>[4]</sup> Nurses frequently delay urination which may lead to urinary urgency and urge UI if they are unable to have access to the bathroom as desired.<sup>[15]</sup>

With regard to being a bothersome experience, the results showed that urgency was most annoying for the female nurses, which is consistent with the results of a study conducted by Zargham, Agarwal, and

Zhang.<sup>[4,28,31]</sup> However, the most bothersome experience caused by the symptoms is not defined well as the most common symptoms may not cause the most bothersome experience.

Our results indicated a wide range of abnormalities in toileting behaviors. The majority of the nurses often or always were concerned about the cleanliness of public toilets and avoided using them; they emptied their bladders before leaving home or held their urine until they returned home. The results showed that the risk of LUTS increases with a rise of unhealthy toileting behaviors, especially delayed voiding. Our findings in this regard were consistent with the results of other studies carried out in the general female population and working women.<sup>[6,7,20]</sup>

There was a significant difference between the type of toilet and the average incidence of LUTS for this study. The use of a squat toilet had a much lower average compared to the use of a sitting toilet. This may be because squatting position is significantly associated with maximal urinary flow and less remaining urine volume in healthy adult women.<sup>[9]</sup> Our findings in this area are novel and warrant further investigation. As hypothesized, there were significant relations between toileting behavior and LUTS among the female nurses. The occurrence of LUTS in the workplace is a major problem because employed women with LUTS report decreased work productivity, worry about interrupting meetings, and voluntary termination of work or early retirement.

The results of this study do provide important information on bladder habits and perceptions of occupational toilet environments among female nurses that may inform future studies and policies. Occupational environments may present several barriers to adequate toilet access, including factors related to facilities and time. This is an interesting finding and could have important clinical implications. The squat toilets are still more common in the Eastern world, possibly because of a better anatomical status for defecation and/or possibly related to Islamic jurisprudence in the field of sanitation; however, very few studies have been performed on the use of squat toilets and its relationship to LUTS. Therefore, further studies are recommended to address this issue.

Similar to any other study, this study has a number of limitations. This was a cross-sectional study, and some causal relationships between toileting behaviors and LUTS might have been missed. Longitudinal studies can yield more accurate results. This study examined only female nurses working in eight hospitals in Rasht, and more extensive studies are needed to generalize the results to other female populations. In addition, symptoms were assessed using a self-reporting questionnaire, and no clinical tests were used to confirm the presence of the symptoms.

## Conclusion

In general, the findings of the present study demonstrated a high prevalence of LUTS among Iranian female nurses. Furthermore, our study revealed that unhealthy toileting behaviors (especially delayed voiding, premature voiding, and straining to void) were associated with LUTS. Therefore, unhealthy toileting behaviors among female nurses should not be ignored because addressing these behaviors may help prevent and improve LUTS in this population.

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## Conflicts of interest

Nothing to declare.

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