



**Severity of urinary incontinence and its impact on work productivity among nurses and midwives in urban Australia.**

Journal:	<i>Australian and New Zealand Continence Journal</i>
Manuscript ID	ANZCJ-2017-0007.R2
Manuscript Type:	Original Article
Keywords:	Urinary incontinence, Workforce, Female, Nurses, Work productivity

SCHOLARONE™  
Manuscripts

View Only

**TITLE**

**Severity of urinary incontinence and its impact on work productivity among nurses and midwives in urban Australia.**

**Authors****Heather Pierce\***

PhD candidate, Faculty of Health, University of Technology Sydney, Sydney, NSW Australia

E: Heather.Pierce@uts.edu.au

**Lin Perry**

Professor of Nursing Research and Practice Development,

Prince of Wales Hospital & Sydney, Sydney Eye Hospitals;

Professor, Faculty of Health, University of Technology Sydney, Sydney, NSW, Australia

**Robyn Gallagher**

Professor of Nursing, Charles Perkins Centre, Sydney School of Nursing, University of Sydney.

Adjunct Professor, Faculty of Health, University of Technology Sydney, Sydney, NSW, Australia

**Pauline Chiarelli**

Conjoint Associate Professor, School of Health Sciences, University of Newcastle, Newcastle, NSW, Australia

Member Australian and New Zealand Continence Journal Editorial Committee

\* Corresponding author

**Competing interest statement**

Ms Pierce and Profs Perry and Gallagher have declared they have no actual or potential relationships or circumstances that present an actual or potential conflict of interest. A/Prof Chiarelli is a member of the ANZCJ Editorial Committee.

**ABSTRACT**

Urinary incontinence is prevalent in people at work, yet the impact of symptoms of urinary incontinence in the workplace is not well understood. The objective of this study was to

examine the relationship between urinary incontinence in female nurses and midwives, and their ability to do their job. An electronic and 600 paper surveys were distributed to a potential 2,750 female nurses and midwives at three urban hospitals between June and November 2016. Logistic modelling was used to estimate the predictive association between urinary incontinence in nurses with storage lower urinary tract symptoms at work and impaired work productivity. The productivity domains examined were: time management, mental concentration and physical demands. The model was adjusted for age, obesity, back pain, anxiety, depression and pelvic organ prolapse. Nurses with a current pregnancy or urinary tract infection were excluded from analyses. Of the included sample (n=322) the prevalence of urinary incontinence was 48% and of those 154 participants, 118 (77%) reported severity as slight and 36 (23%) reported severity as moderate. For nurses and midwives with storage symptoms at work (45.7%), moderate urinary incontinence predicted time management (OR: 5.76; 95% CI: 1.22-27.20) or concentration impairment (OR: 11.11; 95% CI: 2.14-57.74) when compared to slight or no incontinence, after accounting for demographic and clinical covariates. Moderate severity urinary incontinence was found to adversely affect ability to manage time or concentrate at work. Occupational health initiatives in this workforce to reduce severity of urinary incontinence may mitigate productivity loss.

**Key words:** urinary incontinence; nurses; female; workforce; work productivity.

**Word count:** 3,462

## INTRODUCTION

Urinary incontinence (UI) is prevalent among working women<sup>1</sup>, with negative effects on health-related quality of life<sup>2</sup>, yet the associated experience and impact of symptoms in the workplace is not well understood<sup>3</sup>. In a recent study of 2,907 female Australian nurses and midwives (mean age 47.4 years) with UI prevalence of 32% (95% CI: 30-34%), 40.5% had

moderate and 4.4% severe or very severe symptoms<sup>4</sup>. Of concern, those with severe or very severe UI were more likely to intend to leave their current job than those with slight or moderate symptoms, after accounting for age, health (back pain, anxiety, depression) and work factors (shift work and job satisfaction)<sup>4</sup>. Severe UI in a sample of 3,364 working American women (average age 44 years) had a negative impact on work, such as the ability to concentrate or perform physical activities<sup>5</sup>. Severity of UI not only exerted influence on workers' mental and physical ability to do their job<sup>5</sup>, but also on decisions regarding work role, hours and location<sup>6</sup>. Given that disclosure of UI is not common<sup>7</sup> it is likely that there are many hidden cases and costs for employees, employers, businesses and organisations.

Urinary incontinence, the involuntary leakage of urine, is a storage lower urinary tract symptom (Box 1)<sup>8</sup>. In the female nursing workforce LUTS are identified as more prevalent than in related general populations<sup>4,9,10</sup>, and linked to work stress and "poor bladder habits" such as delayed voiding and restriction of fluids<sup>9,11-15</sup>. Among Australian female nurses UI severity, measured as the frequency, amount and degree of "bother" of leakage, was not found to be associated with age or parity but was linked to raised BMI ( $\geq 30 \text{ kg/m}^2$ ), evidence of pelvic organ prolapse, diagnosis of diabetes, self-report of back pain, anxiety, depression and reduced job satisfaction<sup>4,16</sup>. Health status and job satisfaction in nurses has been directly linked to workforce retention and work productivity<sup>17,18</sup>.

Reduced work productivity may be measured as "absenteeism" (non-attendance at work) or "presenteeism" (where employees are at work but unable to perform at the usual or expected level due to disability or impairment<sup>19</sup>). Storage LUTS, classified as overactive bladder (OAB) with or without UI, are consistently associated with higher rates of absenteeism and unemployment when compared to individuals without symptoms in general workforce studies. Symptoms of OAB had a negative impact on working life in a multi-national

population study of 11,521 people aged 40 to 64 years from France, Germany, Italy, Spain, Sweden and the United Kingdom (UK), with 21% worried about interruption of meetings with frequent trips to the toilet, and 3% changing their job or being fired<sup>6</sup>. In a similar study population, significant differences were identified in the employment characteristics of 1,434 individuals with OAB symptoms and case-matched controls: 42% of those with OAB were unemployed compared to 33.6% of controls; a mean score of 11% work impairment due to ill health<sup>20</sup> was calculated for those with OAB compared to 5.3% for case controls<sup>21</sup>.

Loss of work productivity through days off work due to OAB may be a substantial cost to an employer. In multivariate cost comparisons of the work patterns of 1.2 million beneficiaries of nine insurance companies in the United States of America (USA), employees with OAB had 2.2 more days off work per year attributable to medical related absenteeism, and 3.4 more days attributable to disability compared to those without OAB. The estimated indirect costs of this loss of productivity was \$US391 per employee per year (data based on claims 1999 to 2002)<sup>22</sup>. The experience of storage LUTS has been linked to both absenteeism and presenteeism, with substantial economic burden for employees and employers.

In combination with other storage LUTS, UI compounds the potential impact on work productivity. Multiple general workforce studies have linked OAB with UI to greater productivity loss, compared to OAB and no UI, after adjusting for demographic and clinical covariates<sup>23-25</sup>. While UI clearly impacts workers and the workforce, there remains limited knowledge of the relationship between UI and the ability of workers to do their job. We therefore sought to examine the relationship between UI symptom severity and work productivity in female nurses and midwives with storage LUTS at work. Definitions for this report conform to the International Continence Society (ICS) guidelines for standardised terminology<sup>8</sup> (Box 1).

## METHOD

### *Data collection*

This research formed part of an exploratory, mixed method observational study of the relationship between pelvic floor dysfunctions and work productivity in female nurses and midwives (hereafter referred to collectively as nurses). A cross sectional survey was administered which included questions related to sociodemographics, work, health and other relevant clinical information. Data collected included: age, BMI, ethnicity, work role, contract and shift pattern and work productivity. Health and female gender related data known to influence the occurrence of UI were collected. Questions included: “Have you had any of the following health problems in the past 12 months: urinary tract infections (UTI), constipation, back pain, anxiety, depression.”<sup>26</sup>. Response options “sometimes or often” were coded as having the problem. Diabetes was determined by a positive response to: “Have you ever been diagnosed with: diabetes (Type I or Type II)”. Gender-related data included: current pregnancy, number and mode of births, presence of pelvic organ prolapse<sup>27</sup>, history of pelvic surgery (hysterectomy, bladder or prolapse repair), menopausal status (periods ceased for more than 12 months) and use of hormone replacement therapy.

### *Prevalence of UI and storage LUTS at work*

The presence and severity of UI was determined by responses to the International Consultation on Incontinence Questionnaire Urinary Incontinence- Short Form (ICIQUI-SF)<sup>28</sup>. Symptom severity was calculated as a score out of 21, then categorised as slight (0-5), moderate (6-12), severe (13-18) or very severe (19-21)<sup>16</sup>. Subtypes of UI include leakage of urine: with coughing, sneezing, physical effort or exercise (“stress UI”); before reaching the toilet (“urgency UI”); as a combination of stress and urgency UI (“mixed UI”, or “other

UI”)<sup>8</sup>. The overall prevalence of storage LUTS in the last month (not just during work hours) was identified by responses to questions from the International Consultation on Incontinence Questionnaire - Female Lower Urinary Tract Symptoms (ICIQ-FLUTS)<sup>29</sup>. The prevalence of storage LUTS “at work” was determined by the question: “In the last month, did you experience urinary symptoms at work? By urinary symptoms we mean feeling the need to pass urine more frequently than usual; feeling discomfort because of the need to delay passing urine; needing to rush or hurry to pass urine when you get the urge; or leaking urine with work activities or with the need to hurry to pass urine.”<sup>10,30</sup>

#### *Work productivity (impairment)*

Nurses with storage LUTS at work were asked about the influence of urinary symptoms on their ability to carry out their work using questions adapted from the Work Limitations Questionnaire (Long Form) which has demonstrated Cronbach’s alpha: 0.92 – 0.97 and moderate to high correlations with other work-specific measures<sup>31,19</sup>. We followed the example of Coyne and colleagues 2011 EpiLUTS study<sup>32</sup> for selection of questions. Domains included in the current study were time management (five questions), physical demands (six questions), and one question on mental concentration (a sample of questions used is provided in Box 2). Domains excluded were the mental-interpersonal scale and the output scale. A urinary symptom-specific work impairment score (US-WLQ) was computed for each domain as a scaled percentage (range 0 to 100) where “0” meant no limitation and 100% most limited<sup>33</sup>. The survey was reviewed by a pelvic floor physiotherapist and urogynaecologist and piloted with 20 nurses, with minor revisions prior to final distribution.

#### *Characteristics of participants*

The sample comprised female registered and enrolled nurses, midwives and assistants in nursing at three urban hospitals in Sydney, Australia. In 2016 an estimated 2,750 nurses and midwives worked in these three facilities: all females were eligible to participate. We used a pragmatic, multi-mode data collection strategy to maximise participation and the representative nature of the sample of nurses and midwives. With the support of the Directors of Nursing or Midwifery at each site, information sessions were provided at nurse leadership meetings to encourage managers and educators to engage with the study by hosting study information sessions. Email invitations were sent to nurse and midwifery managers and educators to support distribution of the survey: invitations were sent electronically via staff email lists (with a link to the survey) or available at the workplace as paper copies (with reply-paid envelopes) or handed directly to staff at study information sessions. This approach provided choice for the preferred mode of survey completion and maximised recruitment; nonetheless, distribution depended on the cooperation of senior staff and it is not known how many staff accessed their emails. A repeat email invitation for information sessions with the survey link was sent two weeks following initial contact, and a final reminder at the end of the recruitment period.

A sample size of 600 was required to achieve a 95% confidence interval (CI) for estimating a proportion (margin of error) of plus or minus 4.1%<sup>34</sup>. A paper response of 56% (n=336), and electronic response of 5% (n=138), was estimated to be in line with postal surveys of health care professionals<sup>34</sup> and electronic surveys of Australian nurses<sup>35,36</sup>. Data collection occurred between June and November 2016. Ethics approval was provided by the University of Technology Sydney Human Research and Ethics Committee: HREC 2015000478 and South Eastern Sydney Local Health District HREC: Reference No. 15/283(LNR 15/POWH/540).

### *Statistical analyses*



Descriptive statistics were used to analyse the data for the health and work characteristics of nurses with storage LUTS at work, and the prevalence, severity and subtypes of UI.

Independent t tests and Chi Square tests were used to compare differences in the health and work characteristics of nurses with or without storage LUTS at work, with or without UI.

Analysis of variance (ANOVA) with Tukey post hoc examination was used to determine any significant differences in the mean US-WLQ scores for nurses with storage LUTS at work who reported slight, moderate or no UI.

Logistic regression modelling was performed to determine whether the severity of UI independently predicted time management, mental concentration or physical demand impairment. Scores for each domain were coded as binary outcomes: “0” indicating no impairment or “1” for any calculated work impairment score (range 4% - 100%). Predictor variables had independent bivariate associations of  $P < 0.25$  with the outcome variables of each US-WLQ domain. Covariates included in the model were age, obesity ( $BMI \geq 30$  kg/m<sup>2</sup>), parity, back pain, anxiety, depression and pelvic organ prolapse. Diabetes was not included due to small numbers. There was no evidence of strong co-linearity between predictor variables (Pearson’s  $r$  or Spearman’s  $\rho < 0.5$ ; Co-linearity tolerance 0.70-0.97)<sup>37</sup>. The proportion of variance in dependant variables associated with the predictor variable was calculated as Nagelkerke’s  $R^2$ . Missing data for symptoms were coded as not having the condition and other missing data were dealt with on a case-by-case basis where individual cases were excluded if data required for each analysis were missing. All analyses were performed using SPSS version 22.0®. A  $P$  value of  $<0.05$  (two tailed) was considered statistically significant.

## RESULTS

### *Characteristics of participants*

We distributed 600 paper surveys and used email lists to inform female nurses about online access to the survey. In total we received 365 responses: 243 (40.5%) paper and 122 (4.4%) electronic. Those nurses reporting a current pregnancy (n=10) or urinary tract infection (n=32) “sometimes or often” in the last 12 months and one incomplete survey were excluded. This left 322 surveys for analysis, for a combined approximate response rate of 12%, although we had no way to know how many of the 2750 potentially eligible nurses actually received an invitation to participate. The mean (SD) age of respondents was 42.4 (12.6) years (with range 21 to 67 years), mean (SD) BMI 25.6 ( $\pm$ 5.1) kg/m<sup>2</sup>, (with range 17.7 to 59.8 kg/m<sup>2</sup>) and 180 (55.9%) were nulliparous. In terms of work characteristics the mean (SD) hours worked each week was 35.5 (10.1) hours (with range 8 to 80 hours): 266 (86.1%) were clinical nurses, 188 (58.4%) worked shifts (not office hours only), 197 (61.2%) worked full time contracts, 108 (33.5%) part-time and 17 (5.3%) casual, pool or agency.

#### *Prevalence and severity of UI and storage LUTS at work*

Of the total participants, 147 (45.7%) reported storage LUTS while at work (Table 1) and 155 reported UI (not just at work), a prevalence of 48.1% with mean (SD) ICIQUI-SF severity score 4.3 (2.5), ranging from 0 to 12. Of the participants who reported UI, 13 (8.7%) were aged 21 to 29 years; 46 (30.9%) were aged 30 to 44 years; 74 (49.7%) were aged 45 to 59 years; and 16 (10.7%) were aged 60 years or older. The majority of participants 117 (75.5%) had slight severity UI (scoring 0 to 5), and 38 (24.5%) had moderate UI (scores 6 to 12). No participant experienced severe or very severe UI (scores 13-21). The health and work characteristics of participants with and without UI are presented in Table 1. As BMI increased, the likelihood of LUTS and UI also increased, but increased UI severity was not linked to obesity (BMI  $\geq$ 30kg/m<sup>2</sup>) ( $X^2 = 2.69$ , df=1,  $P=0.101$ ). Participants with moderate UI were more likely than those with slight symptoms to report anxiety ( $X^2 = 5.74$ , df=1,

$P=0.017$ ), to have had an assisted birth ( $X^2 = 6.53$ ,  $df=1$ ,  $P=0.011$ ) or be menopausal ( $X^2 = 4.06$ ,  $df=1$ ,  $P=0.044$ ).

#### *UI severity and work productivity*

Of the 147 participants who reported storage LUTS at work, 58 (46%; 95% CI: 37-55%) had urinary-specific time management impairment, 50 (39.7%; 95% CI: 31-48%) mental concentration impairment, and 45 (35.7%; 95% CI: 27-44%) physical demand impairment. Using Tukey post hoc analysis, a significant difference in mean work impairment scores for each domain was found between participants with moderate UI compared to slight UI or no UI, but not between slight compared to no UI (Table 2). Moderate UI compared to slight or no UI independently predicted time management ( $X^2 = 20.48$ ,  $df=9$ ,  $P=0.015$ , Nagelkerke  $R^2 = 0.237$ ), or mental concentration ( $X^2 = 25.09$ ,  $df=9$ ,  $P=0.003$ , Nagelkerke  $R^2 = 0.287$ ) but not physical work impairment ( $X^2=23.22$ ,  $df=9$ ,  $P=0.006$ ; Nagelkerke  $R^2=0.272$ ) after accounting for age, obesity ( $BMI \geq 30\text{kg/m}^2$ ), parity, back pain, anxiety, depression and pelvic organ prolapse (Table 3).

## **DISCUSSION**

Almost half of the participants in this study experienced storage LUTS at work, one-in-two had UI, and UI impacted work capacity through reduced time management and concentration. This new information has important implications for workforce policy and the education of workers considering that LUTS and UI are treatable conditions.

#### *UI and work productivity in nurses*

This is the first published study to examine the independent association of UI severity with the ability of female nurses to do their job. Moderate severity UI in female nurses with storage LUTS at work predicted time or concentration work impairment after accounting for UI and work 20171004

age, obesity, health and gender-related variables. With heavy workloads, high occupational stress and time pressure demands, the ability of these nurses to manage time, concentrate and perform physical tasks is fundamental to patient care, and if productivity is suboptimal flow on effects are likely for quality and safety of patient care and provider healthcare costs.

Mean work limitation scores for employed women in the USA diagnosed with OAB and incontinence are reported as significantly higher than for those who are continent and have an OAB (12.6% versus 10.8%), measured using a similarly modified WLQ tool<sup>25</sup>. In British (n=4,394) and Swedish (n=2,820) employed women aged 40 to 65 years (the EpiLUTS study), higher WLQ scores were found for women who reported bothersome symptoms compared to those without bothersome symptoms (mean urinary WLQ score 10.7% versus 3.8% in British women; 7.1% versus 1.4% in Swedish women)<sup>32</sup>. The EpiLUTS study used 5 questions adapted from the WLQ to calculate a non-domain-specific work limitation score; whereas, we used 12 questions from three domains. The total mean US-WLQ score of 7.9% in our sample was similar to the findings of the EpiLUTS study; however, we were able to describe specific work productivity loss for time management (US-WLQ mean score of 6.5%), mental concentration (mean score 12.5%) and physical demands (mean score 4.8%), providing further insights into the negative impact of UI on work productivity<sup>5,38</sup>.

Identification of specific domains where work is limited in an occupational group such as nursing enables more comprehensive understanding of the potential impact of UI in a workforce.

The proportion of nurses in this study with moderate UI (23% mean age 42.4 years) is higher than in a study of Taiwanese nurses (14.8% mean age 31 years)<sup>10</sup>, but lower than a recent Australian nurse workforce study (40.5% mean age 47.4 years).<sup>4</sup> Variations in results may be explained by nurses in the present study being recruited from urban hospitals alone

(no regional areas sampled), and by variations in age and BMI, as these factors are known to influence UI prevalence and severity. The finding that moderate UI was associated with work limitations in this workforce is new, as previous investigations have only identified severe UI as impacting work<sup>5</sup>. It is possible that we did not identify any cases of severe UI in our study due to sample size; alternatively, nurses with severe symptoms may have left their job, potentially supporting the conclusion that severe UI predicts nurses' "intention to leave"<sup>4</sup>. We anticipate that strategies to assist reduction of UI severity in workers will not only increase the ability for these women to perform their role, but may also retain them in the workforce.

#### *UI and implications for occupational health policy*

The findings of this study are critically important for the workforce given that UI can be prevented, managed or cured<sup>39</sup>. If continence promotion and workplace management strategies for LUTS and UI are introduced into occupational health programs, the potential impact of UI severity on productivity loss may be reduced or eliminated. Education programs are effective to improve awareness of bladder health<sup>40</sup>, but implementation and evaluation of such programs in workforce groups is lacking. Given that poor disclosure is common, inclusion of education programs by occupational health and safety departments may raise awareness of the potential negative impacts of symptoms. This would particularly benefit an ageing workforce such as nursing. In 2014 the average age of an Australian nurse or midwife was 44.5 years<sup>41</sup>; in the present study, almost one-in-three nurses were aged 30 to 44 years and one-in-two nurses aged 45 to 59 years had UI. Nurses make up the largest component of the healthcare workforce and so nurses who are better educated about the importance of bladder and pelvic floor health are well positioned to educate the communities they serve and where necessary refer individuals to healthcare professionals with expertise in assessment and management of symptoms of UI.

*Study strengths and limitations*

Limitations of this study include its cross sectional design which precluded examination of causality, and the potential for uncontrolled confounding. We used self-report questionnaires and the ICIQ-FLUTS and ICIQUI-SF, and while these international tools are well-established, they may not accurately reflect diagnoses of LUTS conditions. We adapted the WLQ to be urinary-specific, and included minimal impairment (floor value of 4%) in a dichotomised score for regression analyses. Sampling and response effects may have biased findings and there is a possibility that findings may be influenced by chance effects from multiple statistical testing. Response rates for different modes of survey data collection vary; our sampling strategy meant that the number of nurses with access to the survey could not be determined, and comparison of respondent and non-respondent groups was not possible. Our findings are strengthened by demographic similarities to the Australian nursing and midwifery workforce. In 2014, the average age of nurses and midwives working in Australian major cities (not rural or remote areas) was 43.8 years compared to our study mean age of 42.3 years; average weekly work hours 33.7 hours compared to our sample mean of 35.51 hours and the proportion of clinical nurses was the same as our study at 89.8%<sup>41</sup>.

**CONCLUSION**

Moderately severe UI can impact the capacity of a nurse to work resulting in impaired time management and mental concentration which are each fundamental to providing optimal patient care and health system efficiency. The potential impact of UI severity on reduced productivity may be mitigated as LUTS and UI can be prevented, managed or cured. Strategies to reduce UI severity in this workforce are needed and will become increasingly urgent as the workforce is ageing. Future research should examine the relationship between LUTS, related PF dysfunctions, work environments and work practices, and investigate other

workforce groups so that occupation-specific risks and recommendations can be identified for managers and employers. Implementation of recommendations of occupational health initiatives will require evaluation so that future health benefits to workers and cost savings to employers and heath care systems can be demonstrated.

For Review Only

## References

1. Irwin DE, Milsom I, Hunskaar S, et al. Population-Based Survey of Urinary Incontinence, Overactive Bladder, and Other Lower Urinary Tract Symptoms in Five Countries: Results of the EPIC Study. *Euro Urol.* 2006;50(6):1306-1315.
2. Abrams P, Smith AP & Cotterill N. The impact of urinary incontinence on health-related quality of life ( HRQoL) in a real-world population of women aged 45-60 years: results from a survey in France, Germany, the UK and the USA. *BJU Int.* 2015;115(1):143-152.
3. Pierce H, Perry L, Chiarelli P & Gallagher R. A systematic review of prevalence and impact of symptoms of pelvic floor dysfunction in identified workforce groups. *J Adv Nurs.* 2016;72(8).
4. Pierce H, Perry L, Gallagher R & Chiarelli P. Urinary incontinence, work and intention to leave current job: A cross sectional survey of the Australian nursing and midwifery workforce. *Neurourol Urodyn.* 2017;999:1-8.
5. Fultz N, Girts T, Kinchen K, et al. Prevalence, management and impact of urinary incontinence in the workplace. *Occup Med (Oxf).* 2005;55(7):552-557.
6. Irwin DE, Milsom I, Kopp Z, et al. Impact of overactive bladder symptoms on employment, social interactions and emotional well-being in six European countries. *BJU Int.* 2005;97(1).
7. Hagglund D, Walker-Engstrom ML, Larsson G, et al. Changes in urinary incontinence and quality of life after four years. A population-based study of women aged 22-50 years. *Scand J Prim Health Care.* 2004;22(2):112-117.



8. Haylen BT, de Ridder D, Freeman RM, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. *Int Urogynecol J*. 2010;21(1):5-26.
9. Zhang C, Hai T, Yu L, et al. Association between occupational stress and risk of overactive bladder and other lower urinary tract symptoms: A cross-sectional study of female nurses in China. *Neurourol Urodyn*. 2013;32(3).
10. Liao Y-M, Yang C-Y, Kao C-C, et al. Prevalence and impact on quality of life of lower urinary tract symptoms among a sample of employed women in Taipei: A questionnaire survey. *Int J Nurs Stud*. 2009;46(5):633-644.
11. Kaya Y, Kaya C, Baseskioglu B, et al. Effect of Work-Related Factors on Lower Urinary Tract Symptoms in Nurses and Secretaries. *Low Urin Tract Symptoms*. 2016;8(1):49-54.
12. Wan X, Wu C, Xu D, et al. Toileting behaviours and lower urinary tract symptoms among female nurses: A cross-sectional questionnaire survey. *Int J Nurs Stud*. 2017;65:1-7.
13. Palmer MH & Newman DK. Women's toileting behaviours: an online survey of female advanced practice providers. *Int J Clin Prac*. 2015;69(4):429-35.
14. Bendtsen AL, Andersen JR & Andersen JT. Infrequent voiders syndrome (nurses bladder). Prevalence among nurses and assistant nurses in a surgical ward. *Scan J Urol Nephrol*. 1991;25(3):201-204.
15. Milsom I, Kaplan SA, Coyne KS, et al. Effect of bothersome overactive bladder symptoms on health-related quality of life, anxiety, depression, and treatment seeking in the United States: results from EpiLUTS. *Urology*. 2012;80(1):90-96.

16. Klovning A, Avery K, Sandvik H, et al. Comparison of two questionnaires for assessing the severity of urinary incontinence: The ICIQ-UI SF versus the incontinence severity index. *Neurourol Urodyn*. 2009;28(5):411-415.
17. Coomber B & Barriball K L. Impact of job satisfaction components on intent to leave and turnover for hospital-based nurses: A review of the research literature. *Int J Nurs Stud*. 2007;44(2):297-314.
18. Letvak S & Buck R. Factors influencing work productivity and intent to stay in nursing. *Nurs Econ*. 2008;26(3):159-165.
19. Tang K, Beaton DE, Boonen A, et al. Measures of work disability and productivity: Rheumatoid Arthritis Specific Work Productivity Survey (WPS-RA), Workplace Activity Limitations Scale (WALS), Work Instability Scale for Rheumatoid Arthritis (RA-WIS), Work Limitations Questionnaire (WLQ), and Work Productivity and Activity Impairment Questionnaire (WPAI). *Arth Care Res*. 2011;63 S337–S349. doi:10.1002/acr.20633.
20. Reilly MC, Zbrozek AS & Dukes EM. The validity and reproducibility of a work productivity and activity impairment instrument. *Pharmacoeconomics*. 1993;4:353-365.
21. Coyne KS, Sexton CC, Irwin DE, et al. The impact of overactive bladder, incontinence and other lower urinary tract symptoms on quality of life, work productivity, sexuality and emotional well-being in men and women: results from the EPIC study. *BJU Int*. 2008;101(11):1388-95.
22. Wu EQ, Birnbaum H, Marynchenko M, et al. Employees with overactive bladder: Work loss burden. *JOEM*. 2005;47(5):439-446.

23. Tang DH, Colayco DC, Khalaf KM, et al. Impact of urinary incontinence on healthcare resource utilization, health-related quality of life and productivity in patients with overactive bladder. *BJU Int.* 2014;113(3):484-491.
24. Coyne KS, Sexton CC, Thompson CL, et al. Impact of Overactive Bladder on Work Productivity. *Urology.* 2012;80(1):97-103.
25. Sexton CC, Coyne KS, Vats V, et al. Impact of Overactive Bladder on Work Productivity in the United States: Results From EpiLUTS. *Am J Manag Care.* 2009;15:98-107.
26. Brown W, Bryson L, Byles J, et al. Women's Health Australia: Establishment of The Australian Longitudinal Study on Women's Health. *J Women's Health* 1996;5:467-472.
27. Price N, Jackson S, Avery K, et al. Development and psychometric evaluation of the ICIQ Vaginal Symptoms Questionnaire: the ICIQ-VS. *BJOG: Int J Obstet Gynaecol.* 2006;113(6).
28. Avery K, Donovan J, Peters TJ, et al. A brief and robust measure for evaluating the symptoms and impact of urinary incontinence. *Neurourol Urodyn.* 2004;23:322-30.
29. Brookes ST, Donovan JL, Wright M, et al. A scored form of the Bristol Female Lower Urinary Tract Symptoms questionnaire: Data from a randomized controlled trial of surgery for women with stress incontinence. *Am J Obstet Gynecol.* 2004;191(1):73-82.
30. Liao Y-M, Dougherty MC, Boyington AR, et al. Developing and validating a Chinese instrument to measure lower urinary tract symptoms among employed women in Taiwan. *Nurs Outlook.* 2006;54(6):353-361.
31. Lerner D, Amick BC, Rogers WH, et al. The Work Limitations Questionnaire. *Med Care.* 2001;39(1):72-85.

32. Coyne KS, Sexton CC, Kopp ZS, et al. The impact of overactive bladder on mental health, work productivity and health-related quality of life in the UK and Sweden: results from EpiLUTS. *BJU Int.* 2011;108(9):1459-1471.
33. Lerner D, Rogers W & Chang H. Technical Report: Scoring the Short Form of the Work Limitations Questionnaire (WLQ-SF). Boston, MA: The Health Institute of the Tufts-New England Medical Center. 2009.
34. Cook JV, Dickinson HO & Eccles MP. Response rates in postal surveys of healthcare professionals between 1996 and 2005: An observational study. *BMC Health Serv Res.* 2009;9(160). URL: <https://doi.org/10.1186/1472-6963-9-160>
35. Bogossian FE, Hepworth J, Leong GM, et al. A cross-sectional analysis of patterns of obesity in a cohort of working nurses and midwives in Australia, New Zealand, and the United Kingdom. *Int J Nurs Stud.* 2012;49(6):727-738.
36. Perry L, Gallagher R, Duffield C, et al. Does nurses' health affect their intention to remain in their current position? *J Nurs Manag.* 2016; 24 (8):1088-97.
37. Midi H, Sarkar SK & Rana S. Collinearity diagnostics of binary logistic regression model. *J Interdisciplinary Mathematics* 2010;13(3): 253-267,
38. Fultz NH, Fisher GG & Jenkins KR. Does urinary incontinence affect middle-aged and older women's time use and activity patterns? *Obstet Gynecol.* 2004;104(6):1327-1334.
39. Sievert K-D, Amend B, Toomey PA, et al. Can we prevent incontinence? ICI-RS 2011. *Neurourol Urodyn.* 2012;31(3):390-99.
40. Geoffrion R, Robert M, Ross S, et al. Evaluating patient learning after an educational program for women with incontinence and pelvic organ prolapse. *Int Urogynecol J.* 2009;20(10):1243-52.

41. Australian Institute of Health and Welfare. Health workforce. 2015; URL: <http://www.aihw.gov.au/workforce/>. Retrieved 21 April 2015.

For Review Only

**Boxes and figures**

Box 1: Terminology and definitions from the International Continence Society<sup>8</sup>.

Box 2: Sample of questions adapted for a urinary specific version of the Work Limitations Questionnaire<sup>30</sup> (US-WLQ).

**Tables**

Table 1: Demographic, health and work characteristics of female nurses and midwives with and without urinary storage symptoms (at work) and with and without urinary incontinence (at any time).

Table 2: Comparison of work impairment scores for female nurses and midwives with storage LUTS at work, with or without urinary incontinence.

Table 3: UI severity as predictor of work impairment for nurses and midwives with storage LUTS at work.

Symptom group	Term	Definition
Storage lower urinary tract symptoms (LUTS)	Urinary frequency	Micturition occurs more frequently during waking hours than previously deemed normal.
	Nocturia	Interruption of sleep one or more times because of the need to micturate.
	Urinary urgency	A sudden, compelling desire to pass urine which is difficult to defer.
Urinary incontinence (UI) symptoms	Overactive bladder (OAB)	Urinary urgency, usually accompanied by frequency and nocturia, with or without urgency UI, in the absence of urinary tract infection or other obvious pathology.
	Stress UI	Involuntary loss of urine on effort or physical exertion.
	Urgency UI	Involuntary loss of urine associated with urgency.
	Mixed UI	Involuntary loss of urine associated with both stress UI and urgency UI.

Box 1: Terminology and definitions from the International Continence Society<sup>8</sup>.

210x297mm (200 x 200 DPI)

<b>“Time management” and “mental demands” questions for the US-WLQ:</b>	
In the past 2 weeks, how much of the time did your urinary symptoms make it difficult for you to do the following at your job?	<b>Response options:</b>
- Do your work without taking numerous bathroom breaks	- Able all of the time (100%)
- Stick to a routine or schedule	- Able most of the time
- Concentrate (keep your mind) on your work	- Able some of the time (50%)
<b>“Physical demands” questions for the US-WLQ:</b>	- Able a slight bit of the time
In the past 2 weeks, how much of the time were you able to do the following while working without difficulty caused by urinary symptoms?	- Able none of the time (0%)
- Walk or move around different work locations	- Does not apply to my job
- Use hand held equipment	

Box 2: Sample of questions adapted for a urinary specific version of the Work Limitations Questionnaire<sup>30</sup> (US-WLQ).

210x297mm (200 x 200 DPI)



Table 1: Demographic, health and work characteristics of female nurses and midwives with or without urinary storage symptoms (at work), and with or without urinary incontinence (at any time).

Characteristic	Total		No symptoms at work		Storage LUTS at work		t	P value	95% CI	No UI		UI		t	P value	95% CI
	N	(%)	Mean	(SD)	Mean	(SD)				Mean	(SD)	Mean	(SD)			
<b>Age</b>	<b>307</b>		41.5	(12.6)	43.4	(12.6)	-1.26	0.208	-4.66- 1.02	38.2	(12.8)	46.8	(10.8)	-6.33	<0.001	-11.20- -5.89
<b>BMI</b>	<b>296</b>		24.9	(4.2)	26.5	(5.8)	-2.63	0.009	-2.73- -0.42	24.6	(4.2)	26.7	(5.7)	-3.54	<0.001	-3.22- -0.92
<b>Health problem</b>	<b>322</b>		<b>N</b>	<b>(%)</b>	<b>N</b>	<b>(%)</b>	$\chi^2$			<b>N</b>	<b>(%)</b>	<b>N</b>	<b>(%)</b>	$\chi^2$		
			<b>175</b>	<b>(54.3)</b>	<b>147</b>	<b>(45.7)</b>				<b>167</b>	<b>(51.9)</b>	<b>155</b>	<b>(48.1)</b>			
Back pain	195/322	(60.6)	98	(56.0)	97	(66.0)	3.34	0.068	0.97- 2.40	95	(56.9)	100	(64.5)	1.96	0.162	0.88- 2.16
Diabetes	8/322	(2.5)	1	(0.6)	7	(4.8)	5.79	0.016	1.06- 71.55	2	(1.2)	6	(3.9)	2.37	0.124	0.66- 16.71
Anxiety	82/322	(25.5)	39	(22.3)	43	(29.3)	2.04	0.153	0.8- 2.38	40	(24.0)	42	(27.1)	0.42	0.518	0.72- 1.95
Depression	56/322	(17.4)	23	(13.1)	33	(22.4)	4.82	0.028	1.0- 3.43	27	(16.2)	(29)	(18.7)	0.36	0.548	0.67- 2.13
Constipation	79/322	(24.5)	36	(20.1)	43	(29.3)	3.25	0.071	0.96- 2.66	38	(22.8)	41	(26.5)	0.59	0.441	0.73- 2.03
Pelvic organ prolapse	47/322	(14.6)	16	(9.1)	31	(21.1)	9.14	0.002	1.39- 5.08	6	(3.6)	41	(26.5)	33.70	<0.001	3.96- 23.49
<b>Other</b>	<b>322</b>															
Parity $\geq$ 1 birth	142/322	(44.1)	65	(37.7)	76	(51.7)	6.34	0.012	1.13- 2.76	49	(29.3)	93	(60.0)	30.65	<0.001	2.27- 5.74
Pelvic surgery	90/322	(28.0)	43	(24.6)	47	(32.0)	2.17	0.140	0.88- 2.35	44	(26.3)	46	(29.7)	0.44	0.506	0.73- 1.92
Menopause	97/322	(30.1)	47	(26.9)	50	(34.0)	1.94	0.163	0.87- 2.26	39	(23.4)	58	(37.4)	7.56	0.006	1.21- 3.18
Hormone therapy	322	(8.1)	13	(7.4)	13	(8.8)	0.21	0.642	0.54- 2.70	15	(9.0)	11	(7.1)	0.38	0.535	0.34- 1.74
<b>Work role</b>	<b>309</b>															
Clinical	266/309	(86.1)	150	(90.4)	116	(81.1)				146	(90.7)	120	(81.1)			
Non clinical	43/309	(13.9)	16	(9.6)	27	(18.9)	5.48	0.019	1.12- 4.24	15	(9.3)	28	(18.9)	5.94	0.015	1.16- 4.48
<b>Work contract</b>	<b>322</b>															
Full time	197/322	(61.2)	113	(64.6)	84	(57.1)				119	(71.3)	78	(50.3)			
Part time	108/322	(33.5)	54	(30.9)	54	(36.7)				41	(24.6)	67	(43.2)			
Casual/pool	17/322	(5.3)	8	(4.6)	9	(6.1)	1.91	0.385		7	(4.2)	10	(6.5)	14.89	0.001	
<b>Work shift</b>	<b>315</b>															
Days only	127/315	(40.3)	68	(39.8)	59	(41.0)				52	(32.1)	75	(49.0)			
Shift work	188/315	(59.7)	103	(32.7)	85	(27.0)	0.047	0.828	0.61- 1.49	110	(67.9)	78	(51.0)	9.36	0.002	0.31- 0.78
<b>Storage LUTS (at any time) <sup>a</sup></b>	<b>265/322</b>	<b>(82.3)</b>	<b>132</b>	<b>(75.4)</b>	<b>133</b>	<b>(90.5)</b>	<b>12.42</b>	<b>&lt;0.001</b>	<b>1.62- 5.92</b>							
Urinary urgency	85/265	(32.1)	30	(22.7)	55	(41.4)	10.55	0.001	1.41- 4.09							
Increased day frequency	82/265	(30.9)	42	(31.8)	40	(30.1)	0.09	0.759	0.55- 1.55							

Nocturia $\geq$ twice/night	48/265	(18.1)	27	(20.5)	21	(15.8)	0.972	0.324	0.39- 1.37						
Bladder pain	76/265	(24.5)	20	(15.2)	45	(33.8)	12.49	<0.001	1.58- 5.20						
<b>Urinary incontinence</b>	<b>155/322</b>	<b>(48.1)</b>	<b>53</b>	<b>(30.3)</b>	<b>102</b>	<b>(69.4)</b>	<b>48.93</b>	<b>&lt;0.001</b>	<b>3.24- 8.40</b>						
Stress UI (only)	82/155	(52.9)	31	(58.5)	51	(50.0)	1.01	0.315	0.36- 1.39						
Urgency UI (only)	36/155	(23.4)	9	(17.0)	27	(26.5)	1.76	0.184	0.76- 4.08						
Mixed UI	27/155	(17.4)	7	(13.2)	20	(19.6)	0.99	0.319	0.63- 4.08						
Other UI	9/155	(5.8)	5	(9.4)	4	(3.9)	1.94	0.164	0.10- 1.53						
<b>Severity UI</b>	<b>155</b>														
Slight UI (0-5)	117/155	(75.5)	48	(90.6)	69	(67.6)									
Moderate UI (6-12)	38/155	(24.5)	5	(9.4)	33	(32.4)	9.90	0.002	1.67- 12.61						

BMI, Body Mass Index; CI, Confidence Interval of the common odds ratio; LUTS, Lower urinary Tract Symptoms; SD, Standard Deviation; t, t test statistic; UI, Urinary incontinence;  $\chi^2$ , Pearson Chi Square. (a) At least one storage LUTS in the last month

Table 22: Comparison of work impairment scores for total female nurses and midwives with storage LUTS at work, with or without and severity of urinary incontinence ( $\pm$ ) UI

LUTS at work	Total ( $\pm$ UI) <sup>b</sup>	LUTS with no UI	LUTS $\&$ + Slight UI <sup>a</sup>	LUTS $\&$ + Moderate UI	ANOVA		Post Hoc Tukey HSD		
							Moderate & no UI	Moderate & slight UI	Slight & no UI
N (%)	110 (100) <sup>b</sup>	20 (18.2)	63 (57.3)	27 (24.5)					
US-WLQ:	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	F	P value	P values		
Time management;	6.47 (10.01)	5.06 (8.43)	4.50 (7.24)	12.08 (14.14)	6.19	0.003	0.038	0.002	0.972
Mental concentration	12.50 (17.51)	8.75 (14.68)	8.33 (12.70)	25.00 (22.99)	10.75	<0.001	0.003	<0.001	0.994
Physical demands	4.76 (8.56)	3.75 (7.27)	2.49 (4.57)	10.83 (12.93)	10.80	<0.001	0.008	<0.001	0.807

LUTS, Lower Urinary Tract Symptoms; SD, Standard Deviation; UI: Urinary Incontinence; US-WLQ: Urinary Specific Work Limitations Questionnaire. (a) Severity measured by ICIQUI-SF. International Consultation on Incontinence-Short Form; (b) 19 cases missing due to incomplete data for score calculation.

Table 3: UI severity as predictor of work impairment for nurses and midwives with storage LUTS at work

US-WLQ	Predictor	OR	95% CI	P value
Time management	LUTS with no UI	1.0		
	LUTS & Slight UI	0.99	0.29-3.36	0.987
	LUTS & Moderate UI	5.76	1.22-27.20	0.027
Mental concentration	LUTS with no UI	1.0		
	LUTS & Slight UI	1.34	0.37-4.92	0.658
	LUTS & Moderate UI	11.11	2.14-57.74	0.004
Physical demands	LUTS with no UI	1.0		
	LUTS & Slight UI	0.66	0.81-2.43	0.662
	LUTS & Moderate UI	3.69	0.77-17.61	0.101

CI: Confidence interval; LUTS: Lower Urinary Tract Symptoms; OR: Odds ratio; UI, Urinary incontinence; US-WLQ: Urinary Specific Work Limitations Questionnaire; Covariates: age (metric), obese (BMI  $\geq 30\text{kg/m}^2$ ), parous, back pain, anxiety, depression, pelvic organ prolapse.