

# Medical conditions, medications, and urinary incontinence

## *Analysis of a population-based survey*

Murray M. Finkelstein, PHD, MD CM, CCFP

### ABSTRACT

**OBJECTIVE** To assess associations between various medical conditions and drug treatments and reports of urinary incontinence.

**DESIGN** Secondary analysis of responses to the second wave of the National Population Health Survey (NPHS). Odds ratios were calculated using survey-weighted multiple logistic regression; confidence intervals were calculated using bootstrap methods.

**SETTING** Canadian households in all 10 provinces, as assessed by Statistics Canada's NPHS.

**PARTICIPANTS** From among respondents to the NPHS, the 54 920 people aged 30 years or older.

**MAIN OUTCOME MEASURES** Responses to the question "Do you have urinary incontinence diagnosed by a health professional?" and analysis of variables related to medical conditions and medications.

**RESULTS** Urinary incontinence was associated with strokes, arthritis, and back problems in both sexes. Odds ratios for incontinence were elevated among men and women who reported having asthma. Narcotics and diuretics were strongly associated with incontinence in both sexes. Psychoactive medications were associated with incontinence in women; antidepressants were associated with incontinence in men.

**CONCLUSION** Physicians should consider the possibility that patients with common conditions, such as arthritis, back problems, or respiratory conditions associated with coughing, might also have urinary incontinence. Physicians should also be aware that urinary incontinence might be a side effect of therapies and make relevant inquiries. Medications associated with incontinence could be changed.

### RÉSUMÉ

**OBJECTIF** Évaluer les liens qui existent entre divers problèmes de santé, la pharmacothérapie et le signalement de l'énurésie.

**CONCEPTION** Une analyse secondaire des réponses à la deuxième ronde de l'Enquête nationale sur la santé de la population (ENSP). On a calculé les rapports de cotes à l'aide d'une régression logistique multiple pondérée à partir du sondage; les intervalles de confiance ont été calculés au moyen des méthodes d'auto-amorçage ou bootstrap.

**CONTEXTE** Des foyers canadiens dans les 10 provinces, tels qu'évalués par l'ENSP de Statistique Canada.

**PARTICIPANTS** Un total de 54 920 personnes de plus de 30 ans à même les répondants à l'ENSP.

**PRINCIPALES MESURES DES RÉSULTATS** Les réponses à la question «Souffrez-vous d'une incontinence urinaire diagnostiquée par un médecin?» et l'analyse des variables associées aux états de santé et à la médication.

**RÉSULTATS** L'énurésie était associée aux accidents vasculaires cérébraux, à l'arthrite et aux problèmes de dos chez les hommes et chez les femmes. Les rapports de cotes de l'énurésie étaient élevés chez les hommes et les femmes qui ont signalé souffrir d'asthme. Les narcotiques et les diurétiques étaient fortement reliés à l'incontinence chez les deux sexes. Les médicaments psychotropes étaient liés à l'incontinence chez les femmes et les antidépresseurs à cette affection chez les hommes.

**CONCLUSION** Les médecins devraient envisager la possibilité que les patients souffrant de problèmes courants comme l'arthrite, les maux de dos, les problèmes respiratoires accompagnés de toux, pourraient souffrir d'énurésie. Les médecins devraient aussi être au courant que l'énurésie peut être due aux effets secondaires de thérapies et poser les questions qui s'imposent. Les médicaments qui semblent causer l'énurésie pourraient être changés.

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*Cet article a fait l'objet d'une évaluation externe.*

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**L**oss of urinary control can seriously affect psychological and social well-being. In a survey of 36 000 Americans with incontinence,<sup>1</sup> 17% described their incontinence as a serious problem with important social implications. Reported incidence of urinary incontinence varies considerably depending on the age of the study population, study methods, and the definition of the problem.

A questionnaire study<sup>2</sup> of women 40 to 60 years old reported an overall prevalence of urinary incontinence of 16.1%. In a survey of 1956 Michigan residents 60 years and older, 19% of men and 38% of women reported some loss of urine in the previous year.<sup>3</sup> Among subjects reporting incontinence, only 54% had ever discussed the problem with a physician. The most recent estimate of prevalence of incontinence among Canadians derives from the National Population Health Survey (NPHS) of 1994-1995. Wilkins and Park<sup>4</sup> reported that 3% of Canadians aged 55 to 75 and 5.5% of those older than 75 answered yes to the question "Do you have urinary incontinence diagnosed by a health professional?"

Many factors, such as age, childbirth, fecal difficulties, obstetric complications, obesity, pelvic surgery, functional impairment, chronic diseases, menstrual cycle, race, and family history have been proposed as risk factors for urinary incontinence and other lower urinary tract symptoms.<sup>2</sup> We suspect that some medications cause, or worsen, incontinence.<sup>5</sup> Many of these factors are related, so a full understanding of possible predisposing or inciting factors requires a model in which all potential associated factors are represented. Many studies published to date, however, have included only some factors, potentially overlooking confounding factors or correlations among predicting variables.

The aim of this study was to assess the association between various medical conditions and drug treatments and the prevalence of urinary incontinence as reported in a population-based survey of Canadian men and women.

## METHODS

### Data

This article is based on Statistics Canada's NPHS. The NPHS, which began in 1994-1995, collects information

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**Dr Finkelstein** teaches in the Family Medicine Centre at Mt Sinai Hospital in Toronto, Ont, in the Department of Family Medicine at McMaster University in Hamilton, Ont, and in the Department of Family and Community Medicine at the University of Toronto.

about the health of the Canadian population every 2 years.<sup>6</sup> It covers household and institutional residents in all provinces. This analysis is based on cross-sectional data from the household component of the second (1996-1997) cycle of the NPHS for the 10 provinces. Sociodemographic and some health information was obtained for each member of participating households; additional health information was collected for one randomly selected household member.

Data used in this analysis were weighted to reflect sample design, adjustments for nonresponse, and stratification and are representative of the population of Canadian household residents.<sup>7</sup> The goal of this analysis was to explore associations between health conditions, medications, and self-report of urinary incontinence. Because incontinence is relatively uncommon among young people, we selected for analysis those 54 920 respondents to the NPHS aged 30 and older. Questions asked by the interviewers are presented in **Table 1**.

### Statistical methods

Associations between incontinence and "explanatory" variables (age, sex, income, medical conditions, medications) were investigated with normalized weighted logistic regression using the sampling weights provided by Statistics Canada. Because the survey used a complex sampling design, confidence intervals (CI) for regression parameters were estimated using bootstrap resampling.<sup>8</sup> Regression models were analyzed for men and women separately and for both sexes together. All models were adjusted for age in 5-year categories and for household income in five categories. Some studies found an association between incontinence and body mass index,<sup>9</sup> but this index was included in the NPHS data file only for people <65 years old. In the NPHS data, there was no association between incontinence and body mass index, so it was not retained in the regression models. All other variables were retained, regardless of level of statistical significance, to control for confounding.

Calculations were done with Stata statistical software.<sup>10</sup> The statistics estimated by logistic regression models are odds ratios (ORs). Also interesting is the difference in risk between people using and not using medications. This difference can be calculated by selecting particular values for some variables, such as age and sex, and computing change in the probability of incontinence when use of medication is added. Risk differences associated with use of specific medications were estimated using the Clarify software program.<sup>11</sup>

## RESEARCH

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### Medical conditions, medications, and urinary incontinence

**Table 1. Questions about health conditions and medications: National Population Health Survey.**

#### INCONTINENCE

Do you have urinary incontinence diagnosed by a health professional?

#### HEALTH CONDITIONS

##### Musculoskeletal

Do you have arthritis or rheumatism diagnosed by a health professional?

Do you have back problems, excluding arthritis diagnosed by a health professional?

##### Cardiopulmonary

Do you have high blood pressure diagnosed by a health professional?

Do you have heart disease diagnosed by a health professional?

Do you have asthma diagnosed by a health professional?

Do you have chronic bronchitis or emphysema diagnosed by a health professional?

##### Other chronic conditions

Do you have diabetes diagnosed by a health professional?

Do you suffer from the effects of a stroke diagnosed by a health professional?

#### MEDICATIONS

In the past month, did you take:

- Pain relievers, such as aspirin or Tylenol (including arthritis medicine and anti-inflammatories)?
- Tranquilizers, such as Valium?
- Antidepressants?
- Codeine, Demerol, or morphine?
- Asthma medications, such as inhalers or nebulizers?
- Penicillin or other antibiotics?
- Medicine for the heart?
- Medicine for blood pressure?
- Diuretics or water pills?
- Sleeping pills?
- Laxatives?

## RESULTS

The 1994-1995 NPHS sample consisted of 27 263 households; 88.7% of them agreed to participate in the survey. For the longitudinal panel, a response rate of 93.6% was achieved in 1996-1997. The one-time participation of additional respondents in cycle 2 for cross-sectional purposes resulted in a total of 73 402 respondents aged 12 or older.

Distribution of subjects by age and sex and numbers reporting urinary incontinence are shown in **Table 2**. The two right-hand columns in **Table 2** show prevalence in the Canadian population, estimated using survey sampling weights. As expected, prevalence increased with age and was higher among women than men. In a logistic regression model, prevalence of incontinence was

**Table 2. Rates of incontinence reported in the National Population Health Survey of 1996-1997**

AGE (Y)	NO. OF SUBJECTS (NO. REPORTING INCONTINENCE)		ESTIMATED INCONTINENCE RATE/100	
	WOMEN	MEN	WOMEN	MEN
30-39	8218 (73)	7657 (35)	0.6	0.2
40-49	6233 (116)	6072 (40)	1.6	0.4
50-59	4948 (150)	4438 (56)	2.1	1.1
60-69	4328 (190)	3656 (121)	3.9	2.7
70-79	3892 (272)	2614 (150)	6.8	5.7
80+	1901 (222)	963 (81)	11.1	6.4
TOTAL	29520 (1896)	25400 (962)	2.5	1.4

inversely associated with income. After adjusting for age and sex, the OR for incontinence among subjects in the highest income quintile was 0.22 (95% CI 0.11 to 0.43) compared with subjects in the lowest income quintile.

**Table 3** shows associations between medical conditions, medications, and urinary incontinence in the Canadian population as estimated from weighted logistic regression. There were significant associations between incontinence and the musculoskeletal disorders "arthritis" and "back problems" in both sexes. Among cardiopulmonary conditions, there were no associations between "hypertension" or "heart problems" and incontinence. The ORs for incontinence among both men and women reporting asthma and chronic bronchitis or emphysema were about 1.35 and were of borderline statistical significance when both sexes were combined. Among subjects reporting diabetes, there was no association with incontinence among men, but a strong association among women. The strongest association of all was that between history of stroke and urinary incontinence; overall OR was about 4.5.

Associations between medication use and incontinence are shown in the lower portion of **Table 3**. There were significant associations between incontinence and psychoactive medications (tranquilizers, antidepressants, hypnotics) among women, but in men only the association with antidepressants was significant.

Odds ratios for incontinence were higher among people using narcotics, and use of narcotics was strongly associated with incontinence among those with back problems. Taking subjects without back problems as baseline, the ORs for incontinence among

**Table 3. Odds ratios and 95% confidence intervals for associations between urinary incontinence, medical conditions, and medications used in the month before the National Population Health Survey interview: Men and women aged 30 or older.**

CONDITION	MEN	WOMEN	MEN AND WOMEN
<b>MUSCULOSKELETAL</b>			
Arthritis	1.59 (1.07-2.38)*	1.87 (1.38-2.54)*	1.86 (1.45-2.37)*
Back problems	2.10 (1.50-2.93)*	1.76 (1.33-2.32)*	1.79 (1.43-2.23)*
<b>CARDIOPULMONARY</b>			
Hypertension	1.88 (0.81-4.36)	0.75 (0.48-1.18)	1.07 (0.69-1.64)
Heart problems	1.01 (0.58-1.76)	0.87 (0.48-1.61)	0.89 (0.56-1.39)
Asthma	1.30 (0.73-2.32)	1.36 (0.92-1.99)	1.35 (1.00-1.95)*
COPD	1.33 (0.74-2.40)	1.35 (0.88-2.07)	1.34 (0.95-1.89)
<b>OTHER CHRONIC DISORDERS</b>			
Diabetes	0.94 (0.53-1.67)	1.97 (1.27-3.05)*	1.43 (1.00-2.05)*
Stroke	8.26 (3.63-18.8)*	2.73 (1.60-4.66)*	4.43 (2.65-7.40)*
<b>MEDICATIONS</b>			
Pain medication	0.77 (0.52-1.15)	0.94 (0.68-1.31)	0.92 (0.71-1.20)
Tranquilizers	1.16 (0.58-2.35)	1.65 (1.06-2.57)*	1.64 (1.11-2.41)*
Antidepressants	1.79 (1.00-3.23)*	1.75 (1.04-2.94)*	1.68 (1.08-2.61)*
Hypnotics	1.09 (0.65-1.84)	1.52 (1.07-2.16)*	1.42 (1.05-1.92)*
Narcotics	2.03 (1.28-3.20)*	1.37 (0.89-2.13)	1.48 (1.06-2.07)*
Laxatives	2.34 (1.46-3.75)*	1.67 (1.18-2.37)*	1.89 (1.42-2.51)*
Asthma medication	1.55 (0.84-2.87)	0.82 (0.51-0.33)	0.99 (0.67-1.83)
BP medication	0.45 (0.20-1.0)	1.14 (0.70-1.87)	0.82 (0.53-1.26)
Heart medication	1.38 (0.81-2.35)	0.99 (0.49-2.02)	1.11 (0.67-1.83)
Diuretics	2.11 (1.28-3.47)*	1.44 (0.96-2.17)	1.64 (1.18-2.30)*
Antibiotics	1.11 (0.74-1.66)	1.64 (1.25-2.16)*	1.53 (1.20-1.94)

BP—blood pressure, COPD—chronic obstructive pulmonary disease.  
 \*P < .05.

those with back problems *not using* narcotics were 1.93 (95% CI 1.36 to 2.74) among men and 1.69 (95% CI 1.27 to 2.26) among women; and *using* narcotics were 4.99 (95% CI 2.62 to 9.50) among men and 2.59 (95% CI 1.51 to 4.46) among women. The link between narcotics and incontinence is probably constipation, which is known to be associated with incontinence.<sup>12</sup>

Additional evidence of this association is seen in **Table 3** with increased risk of incontinence among men and women using laxatives. There were no associations between use of medications for asthma, hypertension, or heart disease and urinary incontinence, but there was a significant association between incontinence and use of diuretics. Among women, there was a significant association between incontinence and use of antibiotics.

**Table 3** shows ORs. The risk differences between those using a medication and those not using it was calculated, as an example, by setting sex as female

and age as 60 to 64 years. Risk difference was then estimated at 1.9 women per 100 using diuretics (95% CI 0.4 to 4.4) and 1.2 women per 100 using sleeping medications (95% CI 0.1 to 3.1). This might seem a relatively small difference, but then only four women per 100 in this age range reported incontinence.

## DISCUSSION

This analysis of data from the NPHS found significant associations between reports of urinary incontinence and certain medical conditions and medications. Regression analysis does not indicate the direction of any possible causal association between outcome and predictor variables. It is implausible that incontinence could cause conditions such as arthritis or chronic obstructive pulmonary disease (COPD), but it is possible that use of certain medications might be due to incontinence rather than a cause of incontinence. For

## RESEARCH

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### Medical conditions, medications, and urinary incontinence

example, respondents might have been prescribed antidepressants because of the effect of incontinence on their moods, or antibiotics to treat infection either causing incontinence or associated with a physiologic disorder causing incontinence. Important for interpreting the findings is biologic plausibility, prior knowledge, and concordance between the sexes.

Urinary incontinence was found to be strongly associated with the musculoskeletal disorders arthritis and back problems in both sexes. While disk disease can interfere with bladder function, the most likely interpretation of the association is that mobility disorders related to arthritis and back problems interfere with reaching the toilet. The increased risk of incontinence among respondents reporting strokes could also be due, in part, to mobility problems.

There were no significant associations between incontinence and diagnoses of hypertension and heart problems; the association with diabetes was significant only in women. Odds ratios for incontinence were elevated among men and women reporting asthma.

Most reports in the literature concerning medications and incontinence are either case reports<sup>13</sup> or case series<sup>14</sup> from incontinence clinics with no age-matched reference population. Among NPHS respondents, a variety of medications were associated with urinary incontinence. Psychoactive medications, including tranquilizers, hypnotics, and antidepressants, were associated with incontinence in women; antidepressants were associated with incontinence in men. These medications are associated with sedation and retention, the latter being associated with overflow incontinence. Narcotics can cause constipation and could also lead to retention resulting in overflow.<sup>15</sup> Finally, a strong association was seen with use of diuretics in men and women; these medications increase urine volume and might contribute to frequency and urgency.

There was no association between incontinence and use of antihypertensives among NPHS respondents, although  $\alpha$ -blockers cause relaxation of the bladder neck and urethra, and doxazosin<sup>16</sup> and prazosin<sup>17</sup> have been reported to be associated with incontinence. Angiotensin-converting enzyme (ACE) inhibitors can cause chronic cough and have been associated with stress incontinence.<sup>16</sup> Perhaps the heterogeneity of antihypertensive medications masked any association with specific agents in the NPHS population. A limitation of this study is the minimal information on the specific medications used by each subject. Future research should collect information about the particular medications used.

### Editor's key points

- This is the first study to describe associations between certain medical conditions, some common drug treatments, and the prevalence of urinary incontinence (UI) in a Canadian population.
- Prevalence of UI was greater in women (2.5% overall) than men (1.4%) and with increased age in both sexes. Estimated prevalence among those >80 years was 11.1%. Incidence varied inversely with income.
- Medical conditions associated with increased prevalence of UI included strokes, arthritis, back conditions, and asthma in both sexes and diabetes in women.
- Narcotics and diuretics were strongly associated with incontinence in both sexes. Psychoactive medications were associated with incontinence in women; antidepressants were associated with incontinence in men.

### Points de repère du rédacteur

- Il s'agit de la première étude décrivant les liens entre certains états de santé, certains médicaments courants et la prévalence de l'énurésie dans la population canadienne.
- La prévalence de l'incontinence urinaire était plus élevée chez les femmes (2,5% dans l'ensemble) que chez les hommes (1,4%) et augmentait avec l'âge chez les deux sexes. La prévalence estimée chez les personnes de plus de 80 ans était de 11,1%. L'incidence était inversement proportionnelle au revenu.
- Au nombre des états de santé associés avec une hausse de la prévalence de l'énurésie figuraient les accidents vasculaires cérébraux, l'arthrite, les problèmes de dos et l'asthme chez les deux sexes et le diabète chez les femmes.
- Les narcotiques et les diurétiques étaient fortement associés à l'énurésie chez les deux sexes. Les psychotropes étaient liés à l'incontinence urinaire chez les femmes et, dans le cas des hommes, les antidépresseurs y étaient associés.

There are several important lessons for physicians in these findings. First, surveys commonly find that only about half of patients with incontinence discuss the condition with their physicians.<sup>3</sup> Physicians should consider the possibility that their patients with limited mobility (arthritis, stroke) or conditions associated with chronic cough (asthma, COPD) might be suffering from incontinence and inquire about it.

Second, physicians should consider the possibility that medications might be causing or exacerbating incontinence. Drugs that stimulate  $\alpha$ -receptors, located primarily in the urethra and bladder neck, increase urethral tone. In contrast, medications that stimulate  $\beta$ -receptors, located primarily in the bladder body, result in decreased tone in the bladder muscle. Acetylcholine is the main neurotransmitter used by the parasympathetic nervous system to promote bladder emptying. Drugs that influence the autonomic nervous system can have profound effects on lower urinary tract function. Some drugs can cause incontinence indirectly, for example, in patients who have stress-induced incontinence from chronic cough because of ACE inhibitor use. Among respondents to the NPHS, associations between commonly prescribed medications and incontinence were observed in both sexes.

## CONCLUSION

Urinary incontinence is a problem that can have substantial effects on quality of life but that might not be discussed with physicians. Physicians should consider the possibility that some of their patients presenting with common conditions, such as arthritis, back problems, or respiratory conditions associated with coughing, might also be experiencing urinary incontinence. Physicians should also be aware that urinary incontinence might be a side effect of their therapies and make relevant inquiries. Substituting other medications for offending agents might improve our patients' quality of life. ♦

*Correspondence to: Dr Murray Finkelstein, Family Medicine Centre, Suite 413, Mt Sinai Hospital, 600 University Ave,*

*Toronto, ON M5G 1X5; telephone (416) 326-7879; fax (416) 326-7761; e-mail murray.finkelstein@utoronto.ca*

### Competing interests

*None declared*

### References

1. Jeter KF, Wagner DB. Incontinence in the American home. A survey of 36,500 people. *J Am Geriatr Soc* 1990;38(3):379-83.
2. Moller LA, Lose G, Jorgensen T. The prevalence and bothersomeness of lower urinary tract symptoms in women 40-60 years of age. *Acta Obstet Gynecol Scand* 2000;79(4):298-305.
3. Herzog AR, Fultz NH, Normolle DP, Brock BM, Diokno AC. Methods used to manage urinary incontinence by older adults in the community. *J Am Geriatr Soc* 1989;37(4):339-47.
4. Wilkins K, Park E. Chronic conditions, physical limitations and dependency among seniors living in the community. *Health Rep* 1996;8(3):7-15.
5. Agency for Health Care Policy and Research. *Urinary incontinence in adults: acute and chronic management. Clinical practice guideline number 2 (1996 Update)*. Washington, DC: Agency for Health Care Policy and Research; 1996. No. 96-0682.
6. Tambay JL, Catlin G. Sample design of the national population health survey. *Health Rep* 1995;7(1):29-38.
7. Statistics Canada. *National population health survey 1994-95*. Ottawa, Ont: Statistics Canada; 1995.
8. Efron B, Tibshirani RJ. *An introduction to the Bootstrap*. London, Engl: Chapman and Hall; 1994.
9. Brown JS, Grady D, Ouslander JG, Herzog AR, Varner RE, Posner SF. Prevalence of urinary incontinence and associated risk factors in postmenopausal women. Heart and Estrogen/Progestin Replacement Study (HERS) Research Group. *Obstet Gynecol* 1999;94(1):66-70.
10. Stata Corporation. *Stata statistical software*. College Station, Tex: Stata Corporation; 2000.
11. Clarify. *Software for interpreting and presenting statistical results*. Cambridge, Mass: Clarify; 2001. Available at <http://gking.harvard.edu>. Accessed 2001 November 7.
12. Cardozo L, Staskin D, Kirby M. *Urinary incontinence in primary care*. Oxford, Engl: Isis Medical Media Ltd; 2000.
13. Fossaluzza V, Di Benedetto P, Zampa A, De Vita S. Misoprostol-induced urinary incontinence. *J Intern Med* 1991;230(5):463-4.
14. Dwyer PL, Teele JS. Prazosin: a neglected cause of genuine stress incontinence. *Obstet Gynecol* 1992;79(1):117-21.
15. Culligan PJ, Heit M. Urinary incontinence in women: evaluation and management. *Am Fam Physician* 2000;62:2433-44.
16. Menefee SA, Chesson R, Wall LL. Stress urinary incontinence due to prescription medications: alpha-blockers and angiotensin converting enzyme inhibitors. *Obstet Gynecol* 1998;91(5 Pt 2):853-4.
17. Wall LL, Addison WA. Prazosin-induced stress incontinence. *Obstet Gynecol* 1990;75(3 Pt 2):558-60.