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Incidence and Remission of Urinary Incontinence in Middle-aged Women

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Abstract

Objective—To describe changes in urinary incontinence in middle-aged women.

Study Design—A prospective analysis of 64,650 women aged 36 to 55 years in the Nurses' Health Study II. Participants reported urine leaking in 2001 and 2003. Among continent women, we estimated 2-year incidence proportions; among incontinent women, we estimated proportions with remission.

Results—The 2-year incidence of incontinence was 13.7%. Incidence generally increased through age 50 years, then declined slightly between ages 51 and 55 years. Among women with incident incontinence at least once per week, the 2-year incidence of stress incontinence was 1.7%; this incidence increased through age 50 years. The incidence of urge incontinence was stable across age groups (overall 2-year incidence=0.4%). Complete remission of symptoms occurred in 13.9% of women with incontinence at baseline; remission was more common in younger than older women.

Conclusion—In our study, both incident urinary incontinence and remission of symptoms were common.

Keywords

Urinary Incontinence; Epidemiology; Incidence

INTRODUCTION

Urinary incontinence is a dynamic condition with a multitude of factors contributing to its development, progression, and recession.[1] Nonetheless, epidemiologic studies have focused primarily on estimating the prevalence of urinary incontinence in women at a single point in time, and devoted less attention to characterizing its development and natural history.[2] Among the few studies that have examined the incidence of urinary incontinence, limited

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sample sizes have prevented precise estimation of incidence proportions by incontinence severity or type. Furthermore, very little is known regarding changes in incontinence severity over time, including remission or improvement of symptoms. In particular, data on middle-aged women are rarely reported. Such information is critical for public health and healthcare planning, as well as for further research efforts.

Therefore, we described urinary incontinence incidence, including by incontinence type, and changes in incontinence severity over two years in a large, prospective cohort of women aged 36 to 55 years enrolled in the Nurses' Health Study (NHS) II.

MATERIALS AND METHODS

Study population

The NHS II cohort was established in 1989 when 116,671 female nurses aged 25 to 42 years in 14 states completed a mailed questionnaire about their medical history, lifestyle, and health behaviors. Questionnaires are sent to participants every two years and follow-up rates of the cohort have remained approximately 95% through 2001. To maintain high follow-up, five mailing cycles of the questionnaire are conducted; for later cycles, only an abbreviated version of the questionnaire is sent. Information on urinary incontinence was requested on the long versions of the 2001 and 2003 questionnaires. In 2003, we also mailed a supplementary questionnaire to incident cases with at least weekly incontinence to gather more detailed information about urinary incontinence symptoms.

These analyses are based on the 70,712 women who returned the long versions of both the 2001 and 2003 questionnaires. Of these women, we excluded those with missing data on incontinence at baseline or follow-up (n=349). We also excluded women whose continence status at baseline was unclear – that is, those who reported leaking less than once per month of quantities at least enough to wet the underwear (n=5,713). Thus, 64,650 women were considered in analyses. Compared to women not included in analyses, these women were highly similar in key risk factors for incontinence, including mean age, body mass index, parity, cigarette smoking status, and menopausal status; thus, it seems unlikely that there would be any meaningful bias in our population for analysis.

The study was approved by the Institutional Review Board of Brigham and Women's Hospital.

Urinary incontinence incidence

The 2001 and 2003 NHS II questionnaires included 2 questions about leaking urine. First, participants were asked, "During the last 12 months, how often have you leaked or lost control of your urine?"; response categories were: never, less than once per month, once per month, 2 to 3 times per month, about once per week, and almost every day. Women who reported leaking urine were then asked, "When you lose your urine, how much usually leaks?" Response categories were: a few drops, enough to wet your underwear, enough to wet your outer clothing, and enough to wet the floor.

A reliability study[3] conducted in a similar group of nurses demonstrated high reproducibility of self-reported frequency and quantity of leaking urine, with 90% responding similarly to the item regarding frequency and 98% responding similarly to the item regarding quantity of leaking, on two questionnaires several months apart.

For analyses of incident incontinence, participants who reported never leaking or leaking a few drops less than once per month in 2001 were considered at risk of developing incident incontinence (n=33,952). Among these women, incident incontinence was categorized as:

(1) incident occasional urine loss, defined as leaking 1 to 3 times per month in 2003, or (2) incident frequent urine loss, defined as leaking at least once per week in 2003. Severe leaking was further defined as frequent urine loss of at least enough to wet the underwear, corresponding to a validated severity index that correlates well with pad weights.[4]

Urinary incontinence type and subjective impact

In 2003, a supplementary questionnaire was mailed to a subset of incident cases with frequent leaking. Both for reasons of efficiency (i.e., the large number of incident cases) and accuracy (i.e., we believed that identification of symptoms would be easier for women with more frequent leaking), we only sent the supplementary questionnaire to incident cases of frequent leaking (n=1,224; response rate=79%). Important incontinence risk factors, including mean age and parity, were similar in incident cases of frequent leaking who did complete the supplementary questionnaire and those who did not.

Information about specific urinary symptoms was collected using questions based on validated surveys for assessing incontinence type.[5–7] Participants were asked about the primary circumstances surrounding urine loss: the presence of urge incontinence symptoms, including urine loss that occurred when a toilet was not accessible or with a sudden feeling of bladder fullness, or stress incontinence symptoms, including urine loss caused by coughing or sneezing, lifting things, laughing, or brisk walking or exercise. When women reported equal predominance of urge and stress symptoms, incontinence type was classified as mixed; otherwise, incontinence type classifications were determined by the women's characterizations of their dominant symptoms.

The supplementary questionnaire also included a question about the amount of bother associated with urine leakage;[8] response options were: not at all, slightly, moderately, or greatly.

Urinary incontinence remission and improvement

In analyses of incontinence remission and improvement, we included women reporting at least monthly incontinence in 2001 (n=30,698). Complete remission was then defined as a report of no leaking in 2003. In addition, incontinence improvement was defined as either complete remission or a decrease in leaking frequency from 2001 to 2003.

Data analysis

Two-year incidence proportions were calculated by dividing the number of cases by the total number of women at risk in 2001. Proportions were calculated separately for each case definition based on frequency of symptoms, severity of symptoms, and incontinence type. Incident cases of frequent incontinence who did not complete the supplementary questionnaire were excluded from the calculations (i.e., from both the numerator and denominator) of incontinence type and subjective impact of incontinence. Analyses of incontinence remission and improvement were conducted similarly to those above. Specific comparisons of groups (e.g., age 51–55 versus age 46–50 years) were conducted using the two-sample test for binomial proportions.

RESULTS

Overall, there were 64,650 women included in these analyses, among whom 33,952 were at-risk for developing incident incontinence in 2001. Among all women, the mean age was 46.4 years (Table I). The prevalence of overweight and obesity (body mass index ≥ 25 kg/m^2) was 50.3%, 79.0% were parous, and 34.2% were former or current cigarette smokers. Among continent women in 2001, the mean age was 46.0 years and 42.8% were overweight

or obese (Table I). Of these women, 76.4% were parous and 32.8% had ever smoked cigarettes.

Urinary incontinence incidence

The overall 2-year incidence of urinary incontinence was 13.7%, which corresponds to an average incidence of 6.9% per year (Table II). Incidence generally increased across ages 36 through 50 years; however, after age 50 years (i.e., 51 to 55 years), there was a small decline. This decline was significant for severe incontinence ($p = 0.01$ comparing the two oldest age groups).

Although current definitions of incontinence[9] do not consider subjective bother, we asked women with incident frequent incontinence to provide information on the extent of bother caused by incontinence. A substantial proportion of women with frequent and severe incontinence did not consider their leaking to be moderately or greatly bothersome. For example, 3.7% of continent women in 2001 reported at least weekly incontinence in 2003 compared with an incidence of 1.1% when only those who further reported that their incontinence caused moderate or great bother were included as cases.

We classified urinary incontinence by type among women with incident frequent incontinence during the follow-up period (Table III). Similar to the overall pattern, the incidence of stress incontinence increased with age (from 1.2% to 1.9% across age 36 to 50 years). However, the incidence of urge incontinence was lower, and nearly identical across age categories. Slightly more women reported incident mixed incontinence compared with urge incontinence, and the incidence increased steadily with increasing age.

Urinary incontinence remission and improvement

We also examined changes in incontinence frequency among women with incontinence at baseline (Table IV). Change patterns were similar in women older than age 45 years and in younger women; therefore we collapsed the data into 10-year age categories. Overall, 13.9% of women who reported leaking at least once per month at the beginning of follow-up reported no leaking 2 years later. Furthermore, complete incontinence remission was more common in younger women than in older women. For example, among women who reported incontinence in 2001, 17.1% of women aged 36 to 45 years reported no leaking in 2003 compared with 11.9% of women aged 46 to 55 years ($p < 0.001$). Interestingly, remission was more common in women with frequent than occasional incontinence; 18.3% of women with frequent incontinence in 2001 reported incontinence remission compared with only 7.4% of women with occasional incontinence in 2001. This might be partly due to greater use of treatment for incontinence in those with frequent leaking, although we do not have treatment data available from these women.

When we examined general improvement of incontinence from 2001 to 2003 (Table IV), we considered both complete remission as well as any decrease in the frequency of leaking. Among women who initially had 1 to 3 incontinence episodes per month, improvement was reported by 32.8%. This percentage was similar in women across age groups. Among women who reported incontinence at least once per week at baseline, nearly half reported an improvement in leaking frequency (i.e., to ≤ 3 episodes/month or no leaking) at the end of the follow-up period. For these participants, symptoms were more likely to decrease in younger women compared with older women: 53.1% of women aged 36 to 45 years improved compared with 43.8% of women aged 46 to 55 years ($p < 0.001$). Although part of these improvements may be due to treatment, we did not collect information on treatment for incontinence among women with incontinence at baseline. However, we requested information on treatments for women with incident frequent incontinence in 2003; just 13%

of those women reported any medical treatment, thus treatment for incontinence was not very common.

Recent pregnancies and childbirths may have influenced the observed incidence and remission proportions, particularly among the younger women in our study population. However, only a small proportion of the women in this cohort reported a pregnancy within the last two years (n=1,096), and thus estimates excluding these women were quite similar to those reported above.

COMMENT

Overall, in this prospective study, 13.7% of women aged 36 to 55 years who reported no leaking or minimal leaking developed at least monthly incontinence over the next two years, corresponding to an average incidence of 6.9% per year. The incidence of occasional and frequent incontinence tended to increase with age through age 50 years; however, the incidence stabilized or declined from age 51 to 55 years. Among women with incontinence at least once per week, the incidence of both stress and mixed incontinence increased with age; however, the overall 2-year incidence of stress incontinence (1.7%) was three times higher than the incidence of mixed incontinence (0.6%). The incidence of urge incontinence was low (overall 2-year incidence=0.4%) and stable across these age groups.

Little data exist on urinary incontinence incidence in women under age 60 years and, in particular, women under age 40 years. Nevertheless, these limited studies have generally reported incidence estimates similar to ours. McGrother et al[10] reported a 1-year incontinence incidence of 8% among female patients aged 40 to 59 years registered with 108 general practices. Two population-based studies[11,12] of women younger than age 60 years reported mean annual incidences ranging from 4% to 5%. Also, similar to our observation of a 1.8% average 1-year incidence of leaking at least once per week, Moller et al[13] observed a 2.1% incidence of at least weekly incontinence during 1 year of follow-up among women aged 40 to 60 years.

In our study, 13.9% of women with prevalent incontinence in 2001 had complete resolution of symptoms by 2003 (i.e., an average of 7.0% per year) and this percentage tended to decrease with age. Similarly, among 70 women aged 30 to 59 years who did not receive treatment for incontinence, Samuelsson et al[14] observed a decline in the mean annual remission proportion from 8.5% in women aged 30 to 39 years to 5.7% in women aged 50 to 59 years. These estimates of remission, however, are much lower than the 26.9% 1-year proportion that McGrother et al observed in women aged 40 to 49 years.10

Several limitations of this study should be considered. Classification of incontinence frequency and type was based on self-report. However, in a similar population of nurses, we have established high reliability of reports of incontinence symptoms.[3] Moreover, Diokno et al[15] reported 83% agreement between self-reported incontinence and a clinician's diagnosis among 456 women aged 60 years and older. Furthermore, Hanley et al[16] observed significant associations between changes in self-reported incontinence severity over time and changes in objective measures, including the 48-hour pad-weighing test ($\chi^2 = 8.4$, p=0.015) and 48-hour urinary diaries ($\chi^2 = 24.1$, p<0.001), among 129 women who received treatment for urinary incontinence.

Validation studies of self-reports of type of incontinence compared with clinical diagnoses indicate that self-reported stress and urge symptoms tend to have good specificity and low sensitivity.[6,17] These findings suggest that incidence estimates based on self-reports may somewhat underestimate stress and urge incontinence. However, we collected data on type

of incontinence only from women with incontinence at least once per week, among whom it may be easier to identify accompanying symptoms.

Utilization of treatment for incontinence among the women with prevalent incontinence at baseline is unknown in our participants; however, just 38% of women in our study with incident frequent incontinence mentioned their urine loss to a physician and only 13% reported receiving treatment. These data are in agreement with one other study that requested information on medical or surgical treatment.18 Furthermore, several studies[18–20] have also indicated that relatively few women even mention incontinence to their physicians (45% to 50% of women with incontinence). Together these findings suggest that treatment for incontinence may explain little of the observed proportion of women who reported a decrease in leaking frequency during the study period. For example, if 20% of the women who experienced a decrease in leaking frequency from at least weekly incontinence at baseline used incontinence treatment, the proportion of women with "spontaneous" incontinence improvement changes from 47% to 42%.

Finally, our incidence estimates may not be generalizable to all women because our participants are a select group of largely Caucasian health professionals. However, the prevalence of many incontinence risk factors in our subjects are fairly similar to those in the general population (e.g., prevalence of obesity and type 2 diabetes[21,22]). The most notable difference is cigarette smoking; 8% of Nurses' Health Study II participants reported current cigarette smoking, while there is an estimated 21% prevalence of current smoking among U.S. women aged 45 to 64 years.23 Several cross-sectional studies[24–26] have reported modest increases in the risk of severe incontinence (odds ratios of approximately 1.3 to 1.4) among current smokers compared with never smokers; thus, it is possible that our data slightly underestimate the incidence of incontinence. Yet, our findings are consistent with the limited available incidence studies, and moreover, our estimates of incontinence prevalence[24] are nearly identical to those reported in many other studies of middle-aged women.1 Thus, all these observations suggest that the incidence estimates reported here are likely not materially different from those in broader populations of middle-aged, Caucasian women.

In conclusion, our data suggest that development of urinary incontinence is fairly common among women aged 36 to 55 years; in this age group, overall, about one in seven continent women appear to develop at least monthly incontinence. In addition, many incontinent women may experience remission or regression of symptoms. Future research and prevention efforts should carefully consider incontinence in this middle-age group and seek to better understand the dynamic nature of this condition.

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Table I

Characteristics of Nurses' Health Study II participants in 2001

	Study population (N = 64,650)†		At risk for incident UI* (N = 33,952)†	
Characteristic	**N**	**%**	**N**	**%**
Age (years)				
36–40	8,555	13.2	5,034	14.8
41–45	18,832	29.1	10,387	30.6
46–50	22,490	34.8	11,413	33.6
51–55	14,773	22.9	7,118	21.0
Body mass index (kg/m^2)				
<22	14,718	22.8	9,417	27.7
22–24	16,920	26.2	9,730	28.7
25–29	17,295	26.8	8,697	25.6
= 30	15,226	23.6	5,823	17.2
Missing	491	0.8	285	0.8
Parity				
None	11,826	18.3	7,083	20.9
1 Birth	8,555	13.2	4,458	13.1
2 Births	25,140	38.9	12,637	37.2
= 3 Births	17,350	26.8	8,840	26.0
Missing	1,779	2.8	934	2.8
Type 2 diabetes mellitus	1,821	2.8	735	2.2

*UI = Urinary Incontinence

†Study population includes women with leaking frequency information in 2001 and 2003; At risk population includes the subset of the study population with no leaking or leaking a few drops less than once per month in 2001

Table II

2-year incidence of urinary incontinence by severity of incontinence

		Any Incontinence*		Occasional Incontinence*		Frequent Incontinence*		Severe Incontinence*	
Age (years)	**N**	**Cases**	**%**	**Cases**	**%**	**Cases**	**%**	**Cases**	**%**
36–40	5,034	593	11.8	473	9.4	120	2.4	42	0.8
41–45	10,387	1,374	13.2	1,006	9.7	368	3.5	127	1.2
46–50	11,413	1,681	14.7	1,207	10.6	474	4.2	177	1.6
51–55	7,118	1,020	14.3	738	10.4	282	4.0	78	1.1
Total	33,952	4,668	13.7	3,424	10.1	1,244	3.7	424	1.2

* *Any incontinence* defined as leaking at least once per month; *occasional incontinence* defined as leaking 1 to 3 times per month; *frequent incontinence* defined as leaking at least once per week; *severe incontinence* defined as frequent leaking of quantities at least enough to wet the underwear

Table III

2-year incidence of frequent* urinary incontinence by incontinence type†

		Stress		Urge		Mixed	
Age (years)	**N**	**Cases**	**%**	**Cases**	**%**	**Cases**	**%**
36–40	5,012	58	1.2	22	0.4	17	0.3
41–45	10,307	189	1.8	38	0.4	58	0.6
46–50	11,301	219	1.9	58	0.5	79	0.7
51–55	7,056	123	1.7	30	0.4	62	0.9
Total	33,676	589	1.7	148	0.4	216	0.6

*Defined as leaking at least once per week

†Cases of incident frequent incontinence with missing data on incontinence type symptoms are excluded from these calculations

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Table IV

Changes in urinary incontinence between 2001 and 2003 among women with prevalent urinary incontinence at baseline

	2003 (N (%))				
2001	**None**	**< 1/month**	**1–3/month**	**= 1/week**	**Total**
Age 36–45 years					
1–3/month	398 (8.0)	1,267 (25.5)	2,070 (41.7)	1,229 (24.8)	4,964 (100.0)
= 1/week	1,648 (23.5)	843 (12.0)	1,225 (17.5)	3,286 (46.9)	7,002 (100.0)
Age 46–55 years					
1–3/month	513 (6.9)	1,877 (25.3)	3,061 (41.3)	1,964 (26.5)	7,415 (100.0)
= 1/week	1,710 (15.1)	1,154 (10.2)	2,090 (18.5)	6,363 (56.2)	11,317 (100.0)