

## Incidence and remission rates of lower urinary tract symptoms at one year in women aged 40-60: longitudinal study

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### Abstract

**Objectives** To determine the incidence and rates of remission of lower urinary tract symptoms at one year in women aged 40-60, and to assess factors associated with remission.

**Design** Ongoing longitudinal cohort study.

**Setting** One rural and one urban county in Denmark.

**Participants** 4000 women recruited on a random basis, 2860 of whom were followed up at one year.

**Measurements** Incidence and rates of remission of lower urinary tract symptoms.

**Results** Prevalence, incidence, and rates of remission of lower urinary tract symptoms in 2284 women were respectively 28.5% (95% confidence interval 26.7% to 30.4%), 10.0% (8.5% to 11.4%), and 27.8% (25.6% to 30.0%). Overall, symptoms were not significantly associated with events performed or initiated in the study period: medical consultation (1.6, 0.8 to 2.8), pelvic floor physiotherapy (0.9, 0.5 to 1.8), treatment with antibiotics on suspicion of a lower urinary tract infection (1.3, 0.8 to 2.2), or other treatment (1.7, 0.7 to 4.1). Many of the individual symptoms were, however, associated with seeking professional help.

**Conclusions** Lower urinary tract symptoms constitute dynamic conditions, with women experiencing more or fewer symptoms, and eventually a cessation of symptoms. The distinction between permanent and fluctuating cases may have important clinical and scientific implications.

### Introduction

Urinary incontinence and other lower urinary tract symptoms are common among women of all ages.<sup>1-7</sup> The impact of the clinical course of lower urinary tract symptoms has only been considered infrequently,<sup>8-12</sup> yet the extent to which symptoms arise and established symptoms decrease or cease influences outcome assessment. Studies have shown that despite an increased prevalence of urinary incontinence with age most individuals do improve.<sup>8-9-11</sup> To determine the proportion of women in whom symptoms change and eventually cease and to identify associated factors may help to target treatment resources and preventive steps.

Various factors associated with lifestyle are thought to precipitate lower urinary tract symptoms

and urinary incontinence—for example, weight, physical forces (exercise, work), smoking, caffeine and fluid intake, constipation, posture.<sup>13-18</sup> No randomised studies on intervention have been published. It seems feasible, however, that adjustment or adaptation to one or more factors may influence the frequency of symptoms over time.

The estimated annual incidence of urinary incontinence in women aged 42-74 is 2.0-2.5%,<sup>10-12</sup> and the estimated annual rate of remission of urinary incontinence in women aged 60 or more is 3.3-12.0%.<sup>8-9-11</sup> Longitudinal data on these common symptoms are, however, sparse.

We aimed to assess the dynamic clinical course of lower urinary tract symptoms by determining both the incidence and rates of remission of such symptoms at one year and the factors attributable to remission in women aged 40-60.

### Participants and methods

Between 15 and 20 June 1996 we sent a questionnaire to 4000 women selected at random from the Danish civil registration system, a system whereby Danish people are identified for life by a unique 10 digit number. Personal details of the women are published elsewhere.<sup>7</sup>

One year later 2860 women received a follow up questionnaire. Non-responders were sent a reminder after three weeks and if they still failed to respond were eventually asked to complete a short form comprising questions on urgency and incontinence. This procedure followed guidelines outlined by the local ethical committee. The baseline questionnaire included data on age, urinary incontinence, daytime frequency, nocturia, postmicturition dribble, straining, urgency, incomplete bladder emptying, and hesitancy. Women were asked about leakage caused by coughing or sneezing, moving, lifting, sleeping, sexual intercourse, urgency, and rest. We defined stress incontinence according to the International Continence Society as leakage caused by exertion (coughing or sneezing, moving, or lifting) and urge incontinence as leakage associated with urgency.<sup>19</sup>

We have suggested that an appropriate cut off point for lower urinary tract symptoms in an epidemiological context is symptoms occurring weekly or more.<sup>7</sup> Incidence was therefore defined as the proportion of women in whom symptoms arise or increase from

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**Table 1** Baseline data of 2284 women included in study and 576 who dropped out, at one year follow up. Values are numbers (percentages) unless stated otherwise

	Women in study	Women who dropped out	P value*	
			Symptoms or no symptoms	Weekly or daily symptoms
<b>Incontinence:</b>				
Stress	297 (13.0)	66 (11.5)	0.32	0.48
Continuous	68 (3.0)	11 (1.9)	0.18	0.46
Nightly	20 (0.9)	5 (0.9)	0.98	0.73
Sexual	46 (2.0)	7 (1.2)	0.21	0.84
Urge	162 (7.1)	35 (6.1)	0.41	0.28
One or more types	374 (16.4)	84 (14.6)	0.24	0.41
<b>Other lower urinary tract symptoms:</b>				
Hesitancy	38 (1.7)	12 (2.1)	0.47	0.51
Straining	22 (1.0)	5 (0.9)	0.85	0.99
Incomplete bladder emptying	97 (4.2)	24 (4.2)	0.92	0.99
Postmicturition dribble	55 (2.4)	17 (3.0)	0.44	0.99
Urgency	411 (18.0)	87 (15.1)	0.09	0.77
Daytime frequency	79 (3.5)	20 (3.5)	0.91	0.74
Night time frequency	57 (2.5)	12 (2.1)	0.56	0.54
Overall symptoms	650 (28.5)	144 (25.0)	0.17	0.78
<b>County of residence:</b>				
Copenhagen	1113 (48.7)	317 (55.0)	0.58	
Storstrøm	1165 (51.0)	265 (46.0)		
<b>Age (years)†:</b>				
40	500 (21.9)	116 (20.1)	0.01	
45	472 (20.7)	109 (18.9)		
50	467 (20.4)	106 (18.4)		
55	437 (19.1)	112 (19.4)		
60	402 (17.6)	139 (24.1)		

\* $\chi^2$  test, df=1. †df=4.

sometimes to weekly or more. Conversely, the rate of remission was defined as the proportion of women with symptoms occurring weekly or more at baseline in whom symptoms decreased to less than weekly and eventually ceased at one year follow up.

Our questionnaire was based on detailed questionnaires tested in England and Denmark.<sup>20 21</sup> To calibrate the questionnaire we interviewed 13 women aged 45-55 who were admitted to the Glostrup County Hospital for a variety of lower urinary tract diseases.

Validity and reproducibility of the final questionnaire tested fair.<sup>7</sup> The kappa statistics of the main outcome measures ranged from 0.58 to 0.92.

The follow up questionnaire at one year was similar to the baseline questionnaire. During the study period activities performed or initiated with the intention to treat lower urinary tract symptoms were recorded: consulting a doctor, drugs prescribed, and pelvic floor physiotherapy. Our study was approved by the local ethical committee.

### Statistical methods

We applied the  $\chi^2$  test, McNemar's test, the Mann-Whitney test with correction for ties, and multivariate logistic regression analysis with Statview when appropriate. We considered a 5% level as significant.

### Results

Overall, we included 2860 of 4000 (71.5%) women at baseline. Non-responders did not differ from participants in age and county of residence but had significantly fewer complaints about incontinence and urgency.<sup>7</sup> After one year 2284 (79.9%) women completed the follow up questionnaire and were included in the follow up study. Women who dropped out tended to be older than included women. However, we found no significant difference in the occurrence or severity of baseline symptoms (weekly or daily) between included women and those who dropped out (table 1).

The prevalence, incidence, and rate of remission of lower urinary tract symptoms were 28.5% (95% confidence interval 26.7% to 30.4%), 10.0% (8.5% to 11.4%), and 27.8% (25.6% to 30.0%) respectively (table 2). The difference in frequency of symptoms at baseline and at one year follow up were insignificant (table 2). The incidence of and rates of remission of the subtypes of lower urinary tract symptoms ranged from 0.6% to 6.1% (median 4.5%) and 29.0% to 59.7% (median 39.5%) respectively (table 2).

**Table 2** Follow up data at one year for 2277 women. Values are percentages (95% CIs) unless stated otherwise

	No	Cross sectional data			Longitudinal data	
		Prevalence at baseline	% at one year follow up	P value*	Incidence	Remission rate
<b>Incontinence:</b>						
Laughing or coughing	2200	12.1 (10.7 to 13.4)	10.4	0.102	3.6 (2.8 to 4.4)	38.9 (36.7 to 41.0)
Moving	2190	5.7 (4.7 to 6.6)	3.7	0.003	1.5 (1.0 to 2.1)	59.7 (57.6 to 61.8)
Heavy lifting	2245	3.3 (2.6 to 4.1)	3.0	0.630	1.2 (0.8 to 1.7)	45.3 (43.2 to 47.4)
<b>Stress†:</b>						
At rest	2275	13.1 (11.7 to 14.4)	11.0	0.046	4.0 (3.2 to 4.9)	41.4 (39.2 to 43.6)
Nightly	2218	3.1 (2.3 to 3.8)	2.4	0.188	1.0 (0.6 to 1.4)	50.0 (47.9 to 52.1)
Sexual	2226	3.1 (2.3 to 3.8)	2.4	0.188	0.4 (0.1 to 0.7)	55.0 (52.9 to 57.1)
Urge	2240	2.1 (1.5 to 2.6)	1.7	0.388	0.7 (0.4 to 1.1)	47.8 (45.7 to 49.9)
One or more types	2205	7.3 (6.3 to 8.4)	6.7	0.486	2.7 (2.0 to 3.4)	42.0 (39.8 to 44.1)
Overall symptoms	2277	16.4 (14.9 to 17.9)	14.8	0.184	5.8 (4.7 to 6.8)	37.7 (35.5 to 39.9)
<b>Other lower urinary tract symptoms:</b>						
Hesitancy	2235	1.7 (1.2 to 2.2)	2.3	0.189	1.4 (0.9 to 1.9)	39.5 (37.4 to 41.5)
Straining	2223	1.0 (0.6 to 1.4)	1.0	0.881	0.6 (0.3 to 1.0)	59.1 (57.0 to 61.1)
Incomplete bladder emptying	2266	4.3 (3.4 to 5.1)	4.5	0.802	2.6 (2.0 to 3.3)	51.5 (49.4 to 53.6)
Postmicturition dribble	2251	2.4 (1.8 to 3.1)	2.8	0.459	1.5 (1.0 to 2.0)	40.0 (38.0 to 42.0)
Urgency	2268	18.1 (16.5 to 19.7)	17.3	0.545	6.1 (5.0 to 7.2)	29.0 (26.9 to 31.0)
Daytime frequency	2235	3.5 (2.8 to 4.3)	3.8	0.655	1.7 (1.1 to 2.2)	36.7 (34.7 to 38.7)
Night time frequency	2196	2.6 (1.9 to 3.3)	3.1	0.372	1.6 (1.1 to 2.2)	36.8 (34.8 to 38.9)
Overall symptoms	2277	28.5 (26.7 to 30.4)	27.5	0.542	10.0 (8.5 to 11.4)	27.8 (25.6 to 30.0)

\*McNemar's test.

†One or more of laughing or coughing, moving, or lifting heavy objects.

Table 3 shows the changes in incontinence symptoms reported at one year follow up compared with baseline data; one woman (0.8%) with daily incontinence at baseline reported no symptoms and 26 women (20.6%) reported symptoms only sometimes at one year, and 11 women (4.5%) with weekly incontinence at baseline reported no symptoms and 116 (46.9%) reported fewer than weekly symptoms at one year. Most, but not all, types of lower urinary tract symptoms improved during the study period as a consequence of medical awareness, performance of pelvic floor physiotherapy, or drugs (table 4).

## Discussion

This is the first longitudinal study to assess the clinical course of lower urinary tract symptoms in middle aged women. We studied 4000 women aged 40-60 years randomly selected from the general population. The estimated incidence and rates of remission of symptoms were 10.0% and 59.7% respectively.

Evidence is continuously growing on the prevalence of urinary incontinence and lower urinary tract symptoms in women of all ages,<sup>1-7</sup> yet few studies have dealt with outcome in the long term.<sup>8-12</sup>

In longitudinal studies based on a questionnaire design it is essential to know if differences between answers are real or due to inadequate instrumentation. We therefore calibrated, validated, and tested the questionnaire even though it had been validated previously.<sup>20-21</sup> The reproducibility of the revised questionnaire was fair to excellent.<sup>7</sup> Reproducibility had not been evaluated in previous longitudinal studies.<sup>8-22</sup>

Our estimated annual incidence of urinary incontinence of 5.8% corresponded well with the 2.0-2.5% reported in other studies.<sup>10-12</sup> Rates of remission in women aged 60 or more range from 3.3% to 12.0%.<sup>8-9-11</sup> Our study found a rate of remission in women aged 40-60 of about 30%. These large differences are probably related to differences in study design and definitions.

No intervention was scheduled as we wanted to study the normal clinical course of lower urinary tract symptoms. It is likely, however, that by simply receiving

**Table 3** Urinary incontinence in women at one year follow up compared with baseline data. Values are percentages

Prevalence	One year follow up			
	Never	Sometimes	Weekly or more	Daily or more
Never	69.0	28.9	1.4	0.7
Sometimes	11.8	79.8	7.6	0.8
Weekly or more	4.5	46.9	39.9	8.6
Daily or more	0.8	20.6	31.0	47.6

and answering questionnaires the women may have become aware of our aim. As part of the validation of our questionnaire we interviewed a subgroup of women with lower urinary tract symptoms, focusing on specific items. Some of these women asked for and received simple advice. To determine the magnitude of the influence of this advice on symptoms, we assessed the effects of consulting a doctor, drugs, and pelvic floor physiotherapy.

Although effective on individual symptoms no single treatment modality had a beneficial effect on lower urinary tract symptoms overall. This may be because the definition of lower urinary tract symptoms is commonly used to describe several symptoms with a variety of causes. As many items on the questionnaire were interrelated it was not possible from this analysis to assess the importance of each individual item. Our analysis does, however, indicate that some bias may have been introduced.

The effect of several factors on rates of remission have been studied: age, parity, body mass index, change in body mass index, functional limitations as measured by the Rosow-Breslau scale and by impairment in activities of daily living, stroke, Parkinson's disease, myocardial infarction, constipation, oestrogen use, and drugs.<sup>11</sup> The only factors significantly associated with an increased incidence and rate of remission were age and improvement in activities of daily living respectively.<sup>11</sup> These factors were only examined at baseline interview. In perimenopausal women a change in hormonal status may be an important cause of fluctuating lower urinary tract symptoms, but this was not studied.

In conclusion, we found that during the clinical course of lower urinary tract symptoms women experi-

**Table 4** Remission of lower urinary tract symptoms at one year follow up stratified to possible associated factors (each factor adjusted for age). Values are odds ratios (95% CIs) unless stated otherwise

	Attended doctor	P value	Pelvic floor physiotherapy	P value	Antibiotics*	P value	Treatment†	P value
Incontinence:								
Stress	2.4 (1.3 to 4.3)	0.005	2.0 (1.1 to 3.6)	0.462	1.0 (0.5 to 2.0)	0.952	2.1 (0.8 to 5.5)	0.154
Urge	2.8 (1.3 to 5.7)	0.009	2.8 (1.4 to 5.7)	0.006	2.1 (1.1 to 4.1)	0.044	2.2 (0.7 to 7.3)	0.243
Continuous	4.7 (2.0 to 11.0)	0.001	6.7 (2.7 to 13.2)	<0.0001	2.8 (1.2 to 6.5)	0.015	4.8 (1.4 to 16.3)	0.038
Nightly	6.6 (1.7 to 25.2)	0.016	6.1 (1.6 to 23.1)	0.040	3.9 (1.0 to 14.9)	0.050	10.9 (2.3 to 52.0)	0.015
Sexual	5.4 (2.0 to 14.9)	0.001	1.6 (0.4 to 6.7)	0.459	2.4 (0.8 to 7.1)	0.110	7.9 (2.3 to 27.8)	0.001
Other lower urinary tract symptoms:								
Hesitancy	2.7 (0.6 to 12.0)	0.217	—	0.986	1.6 (0.4 to 7.1)	0.584	3.3 (0.4 to 25.4)	0.311
Straining	5.3 (1.4 to 19.3)	0.012	1.5 (0.19 to 11.6)	0.713	0.9 (0.11 to 6.7)	0.880	3.9 (0.5 to 30.5)	0.193
Incomplete bladder emptying	2.9 (1.2 to 6.7)	0.012	1.4 (0.5 to 4.0)	0.560	1.8 (0.8 to 4.0)	0.154	4.4 (1.5 to 12.7)	0.008
Postmicturition dribble	4.0 (1.3 to 11.9)	0.018	5.0 (1.8 to 13.9)	0.004	4.2 (1.6 to 11.0)	0.004	8.0 (2.3 to 28.3)	0.002
Urgency	2.3 (1.2 to 4.2)	0.009	1.5 (0.8 to 3.0)	0.25	1.9 (1.1 to 3.2)	0.028	1.7 (0.6 to 4.8)	0.37
Daytime frequency	3.7 (1.4 to 9.8)	0.011	1.8 (0.6 to 6.2)	0.397	1.2 (0.4 to 4.0)	0.786	1.7 (0.2 to 12.5)	0.699
Night time frequency	3.0 (0.9 to 10.1)	0.132	2.7 (0.8 to 9.2)	0.217	2.4 (0.8 to 7.3)	0.148	4.9 (1.1 to 21.9)	0.070
Overall	1.6 (0.8 to 2.8)	0.147	0.9 (0.5 to 1.8)	0.747	1.3 (0.8 to 2.2)	0.343	1.7 (0.7 to 4.1)	0.268

\*Infection suspected.

†Non-infectious cause suspected.