

Peer reviewed article

Women's waterworks: evaluating an early intervention for incontinence among adult women

Abstract

Seventy six Australian women aged 27 to 72, with minimal to mild symptoms of incontinence as assessed by the Incontinence Severity Index (ISI), were recruited through general medical practices and randomly assigned on a 2:1 basis to intervention or waitlist control. The intervention, conducted by nurse continence advisors, included physical assessment, pelvic floor muscle training, and bladder training offered on three individual visits at Weeks 1, 9 and 16. The main outcome measures were pelvic floor muscle strength, endurance and contractility, self-reported incontinence severity, self-recorded bladder function, and participant evaluation of the programme. There were statistically significant improvements in all measures, and the women's evaluations of the programme were overwhelmingly positive.

From these results, it is concluded that an early intervention programme for urinary incontinence is effective among women who choose to attend. However, it appears that there are barriers to women seeking help and it was shown that public health interventions are needed to de-stigmatise and prevent the condition.

Key words: physiotherapy, nursing, evaluation, women, urinary continence.

Urinary incontinence is a chronic health problem that has major impacts on physical, psychological and economic well-being and has long-term implications for health care and quality of life¹. It is an important public health problem, particularly among women, who are affected at eight times the rate of men. The annual cost, to health care systems and to individuals, accrued by the two million women in Australia with some urinary incontinence is over \$700 million¹. Home care for incontinence is burdensome, especially if it occurs in combination with dementia or impaired mobility, and urinary incontinence is the most common immediate reason for admissions to institutional care².

Despite growing concern at a policy level³, there has been little policy or research emphasis on interventions to prevent incontinence. This paper evaluates a programme for early intervention and prevention which was piloted with a group of

adult female volunteers, some of whom had mild symptoms of incontinence but who generally did not reach clinical criteria.

The need for strategies to prevent incontinence is illustrated by data from the Australian Longitudinal Study on Women's Health. Participant-reported prevalence of leaking urine is 13% among women aged 18-23 years, 36% among women aged 45-50, and 35% among women aged 70-75⁴. A detailed survey of women who reported leaking urine⁵ demonstrated that mid-age women's symptoms interfered significantly with social and role-related activities⁶. Over a quarter of respondents avoided physical activity, while smaller numbers reported avoiding sexual activity, public transport and social activities. Over half reported poor bladder-hygiene practices such as going to the toilet 'just in case' and reducing fluid intake.

Only 58% of the mid-age respondents had sought professional help. Those who had not sought help stated it was because they were too embarrassed (20%) or feared that they might be recommended surgery (21%). Women reporting leaking urine also scored significantly lower than others on standardised self-report measures of physical and mental-related quality of life. Thus, prevention of clinical levels of incontinence through early intervention with women who have no or minimal symptoms may have a significant long-term impact on women's quality of life.

Recent Cochrane reviews concluded that pelvic floor muscle training was an effective treatment for adult women with stress or mixed incontinence⁷. While the evidence on bladder training was less definitive, it appears that it may be helpful⁸. However, a third Cochrane review concluded that there was insufficient research examining the use of similar treatments for prevention⁹.

Christina Lee

*School of Psychology and School of Population Health
University of Queensland, Qld*

Claire Johnson

*Research Centre for Gender and Health
University of Newcastle, NSW*

Pauline Chiarelli

*PhD
School of Health Sciences, University of Newcastle
Callaghan, NSW 2308
Tel: (02) 4921 6046
E-mail: Pauline.Chiarelli@newcastle.edu.au*

A successful trial of a physiotherapy intervention – with women deemed at high-risk after giving birth – showed reduced levels of incontinence¹⁰, but there is little evidence available on interventions to prevent incontinence with other groups of women. There was also little evidence on the use of early intervention among women with mild symptoms. Given the high rate of mild or occasional urinary leakage in the adult female population⁴, and the arbitrary nature of any differentiation between those women who report no incontinence and those reporting mild incontinence, it would seem most useful to adopt a multidisciplinary approach to educate women about incontinence prevention strategies throughout adult life, whether they are asymptomatic or have some mild or occasional urinary leakage. From the literature, it could be concluded that this may result in fewer older women suffering incontinence.

The objective of this report was to evaluate a brief non-invasive intervention designed to prevent stress, urge and mixed urinary incontinence among women with minimal or mild urinary leakage. The intervention programme was based on an intervention for new mothers^{10,11}, which was revised to suit other adult women.

Method

Study design

This was a randomised waitlist control group design, in which participants were assigned on a 2:1 basis to the intervention or to a 4-week waitlist group. The immediate-intervention group each had three individual sessions with a nurse continence advisor (at Weeks 1, 9 and 16), while the waitlist group completed the Week 1 self-report measures (described below) and then waited 4 weeks to repeat the Week 1 self-reports and commence treatment. The waitlist group was used to assess the effects of repeated testing on responses to the self-report measures, in order to isolate any effects of treatment from those of repeated testing. Intervention data from the waitlist group are included with those from the immediate-intervention group in this report. Ethical approval was obtained from the human research ethics committees of the University of Newcastle and from FPA Health, due to the participation of the FPA Health Newcastle Women's Health Clinic.

Participants

The intervention was piloted with adult women who had not recently given birth, who expressed an interest and who did not have established clinical levels of incontinence. Ninety women responded to brochures distributed at a women's health clinic and GP surgeries in Newcastle. Of these, 76 (84%) attended the Week 1 appointment. Two withdrew because of pre-existing medical conditions (exclusions included diabetes, multiple

sclerosis, a history of stroke or spinal cord injury, or severe recurrent urinary tract infections), seven withdrew for other reasons, and the remainder failed to attend despite several rescheduled appointments. Sixty-two (69%) attended at Week 9 and 56 (62%) at Week 16.

Procedure

Potential participants telephoned the nurse continence advisor, who explained the programme in detail. Participants were allocated, on a sequential 2:1 basis, to either immediate treatment or to a 4-week waitlist. An appointment was made for participants in the immediate treatment group and an information package that included an information letter, an information booklet titled *Women's Waterworks*, a consent form, a 3-day bladder diary and pretest survey were posted, with the consent form, diary and survey to be returned at the first appointment.

The waitlist control group was asked to complete and return the same information by mail. These women had an appointment 1 month after the completion of the initial materials. Prior to that appointment, waitlist participant were sent another package, to be completed and returned at that first visit.

Assessment

Self-report

Participants completed a survey before each of the three appointments; this included several measures. The Incontinence Severity Index (ISI) was used to classify type and severity of incontinence⁶. The ISI has a range of 0 (no leaking) to 90 (leaking a considerable amount, often, in all specified situations).

The physical and mental component scores of the SF-36 were used as a measure of general well-being¹². These range from 0 (poor functioning capacity) to 100. At Week 1, questions relating to medical history, menopausal status and previous treatments for incontinence were asked. At Weeks 9 and 16, participants also evaluated the programme and booklet. They indicated whether they had read all or some of the booklet, and rated the booklet and individualised programme. They also: provided a subjective rating of change in their incontinence problem (from 100% worse to 100% better); indicated how often they had carried out the exercises prescribed; indicated the extent to which the programme met their expectations; and indicated whether they would recommend the programme to a friend. They were also invited to provide any other comments about changes to their health or bladder function.

Participants completed a 3-day bladder diary before each appointment. This recorded time and amount of urinary output, fluid intake, and leaks over 3 days. Derived variables were number of voids per day; daytime mean void volume; minimum time

between voids; number of voids overnight; overnight void volume (volume of the first void of the morning); and daily fluid intake.

Pelvic floor assessment

At each appointment, a comprehensive pelvic floor examination was conducted. Visual and digital examination assessed for prolapse, scarring, skin conditions and perineal abnormalities. Urinary leaking on cough was noted, as well as presence or absence of a reflex pelvic floor muscle lift and contraction against the cough – the ‘knack’¹³. The participant’s ability to perform the ‘knack’ on request was assessed visually – the nurse checked for a definite squeeze and lift on cough. Pelvic floor muscle strength was measured manually, by asking the participant to squeeze around the examining fingers, as well as with a perineometer. Pelvic floor muscle function was assessed using Laycock’s PERFECT model¹⁴. The strength of contraction was graded from 0 to 5, with 5 being a very strong squeeze with good upward movement.

Health education materials

The *Women’s Waterworks* booklet provided information about:

- The various causes of urinary incontinence.
- How the urinary system and pelvic floor muscles work.
- What makes urinary incontinence worse.
- How to carry out pelvic floor exercises.

The booklet also included space to record an individually recommended exercise programme. This was based on an existing continence promotion pamphlet for postnatal women^{10,11}.

Clinical notes and protocol

A detailed intervention protocol was developed in order to ensure standardisation. A standard form was completed by the continence nurse advisor at each assessment. Details of the protocol and forms are available from the corresponding author on request.

Programme

The programme involved three individual sessions with one of two nurse continence advisors, using the facilities of a women’s health clinic. Appointments were made at Weeks 1, 9 and 16. There was no charge for the programme.

Week 1

The first appointment was scheduled for 1 hour, and included comprehensive assessment and education. A history of continence-related symptoms was recorded. The participant was advised of good bladder habits and, where appropriate, taught bladder training techniques. A vaginal examination and pelvic floor muscle assessment was performed. During this, women were taught to squeeze correctly and to perform the ‘knack’. Women were also given an individually tailored pelvic

floor muscle exercise programme and bladder training exercises. This was recorded in the booklet provided to each participant.

Weeks 9 and 16

At a half-hour appointment at each of Weeks 9 and 16, assessments were repeated and changes discussed. Exercises and behavioural strategies for improving bladder hygiene or coping with leaks were recommended as required. One participant who showed no improvement was referred to her medical practitioner.

Statistical analyses

Data were analysed with repeated-measures analysis of variance, and, where significant, followed by Tukey’s post hoc tests. Descriptive statistics were also calculated. The Statistical Package for the Social Sciences (SPSS), Version 11.5 for Windows, was used for all analyses¹⁵.

Results

Participant demographics

Details of participant demographics appear in Table 1. Mean age was 50.5 years (range 27–72), most were Australian-born, married, and in paid employment. Education levels were higher than Australian norms for mid-aged women. There was no significant difference in employment, education, marital status or country of origin between those who completed the programme and those who did not.

Initial continence status

Consistent with the preventive aim of the programme, 28 (37%) participants reported symptoms of incontinence that were too mild to be classified. Thirty one (41%) participants were classified as experiencing ‘mixed’ incontinence, presenting with mild symptoms of both stress and urge incontinence. Eight (11%) participants reported stress incontinence only and seven (9%) urge incontinence only. At Week 1, ISI scores ranged from 0–51 (mean=12.4; median=10).

Intervention and waitlist comparisons

Repeated-measures analysis of variance showed no significant differences between the two pre-treatment assessments on any variable for the 19 women in the waitlist sample. Pearson’s correlations indicated moderate to high levels of reliability over 4 weeks for all continuous variables listed in Table 2 (correlations ranged from 0.61 for number of voids overnight, to 0.93 for daytime mean void volume). Thus, any changes over the course of the programme were unlikely to result from repeated testing.

Programme outcomes

Table 2 summarises the main outcome variables at Weeks 1, 9 and 16 for those who attended all three sessions. At Week 1,

93% of participants presented with pelvic floor muscle strength of a Grade 3 (squeeze and some upward movement) or less on digital exam. Only 12 (16%) participants could perform the knack spontaneously. Self-reported incontinence severity fell significantly between Weeks 1 and 9, and was maintained at Week 16. Clinical measures indicated sustained improvement in pelvic floor muscle strength and contractility.

There was an increase from 52% at Week 1 to 88% at Week 16, of participants achieving a Grade 3 or better on digital examination. The number of squeezes performed continued to increase throughout the 16 weeks of the programme, as did the proportion

of women who could perform the knack spontaneously when coughing. Mean perineometer readings increased significantly between Weeks 1 and 9, and were maintained at Week 16. Contractile endurance improved markedly between Weeks 1 and 9 and, to a lesser extent, at Week 16.

The diaries indicated improvements in bladder function between Weeks 1 and 9, with improvements either maintained or increased at Week 16. Mean overnight volume and mean daytime volume increased, without any change in mean fluid intake, which remained close to the recommended 2000mls per day.

There were significant improvements in the mental component scale of the SF-36, while the physical component scale remained close to the population mean of 50 across all three measurements.

Table 1. Demographic characteristics of participants.

Variable/category	n	%
<i>Age</i>		
20-39	8	11
40-59	53	71
60+	15	18
<i>Country of birth</i>		
Australia	59	78
England	5	7
Europe (non-English speaking background)	6	8
New Zealand	6	8
Other	3	4
<i>Marital status</i>		
Married	52	68
De facto	3	4
Divorced/separated	16	21
Never married	4	5
Widowed	1	1
<i>Employment status</i>		
Full-time paid work	26	34
Part-time paid work	21	28
Unpaid in family business	2	3
Home duties/retired	24	31
Student	3	4
<i>Education</i>		
Up to 11 years' schooling	23	30
12 years' schooling	6	8
Diploma or certificate	17	22
Degree	30	39

Evaluation and acceptability

Participants reported improvement in symptoms of incontinence at Week 9 (mean improvement=34%, range 17% worse to 100% better) and Week 16 (mean=50%, range 10% to 100% better). They reported completing a mean of 72% (range 20-100%) of the recommended exercises at Week 9, and 69% at Week 16 (range 20-100%). When asked if they would recommend the programme to a friend, 88% confirmed they definitely would at both Weeks 9 and 16. The one woman who reported that her symptoms had worsened at Week 9 had also shown little improvement on the outcome measures, and was referred to her general practitioner for further advice.

The booklet was read in its entirety by 71% of participants. Only one had not read it at all. Participants rated the booklet as easy to read (98%), relevant (96%), clear (98%) and appropriate (94%), and would recommend it to a friend (96%).

Discussion

The *Women's Waterworks* prevention programme was shown to improve pelvic floor muscle function, decrease self-reported incontinence severity, and improve self-recorded bladder function among adult women with minimal to mild symptoms of incontinence. The data indicate improvement in bladder habits, and increased pelvic floor muscle strength, endurance and contractility. The most significant improvements occurred between Weeks 1 and 9, suggesting that two sessions may be enough for most women who do not have significant presenting problems. Evaluation was overwhelmingly positive.

Quantitative data were supported by comments such as these two responses:

My condition was probably mild compared to others, but this programme definitely nipped it in the bud. Consistently working on pelvic floor muscles needs constant reminders – a participant at Week 9.

Table 2. Main outcome variables at Week 1, Week 9 and Week 16, for those who participated in all three assessments (n=56).

Variable	Week 1 Mean (s.d.)	Week 9 Mean (s.d.)	Week 16 Mean (s.d.)	F (df=2,165)
<i>Self-report data</i>				
Incontinence severity (range 0-90)	12.7 (11.4)	8.7 (10.4)	7.2 (7.0)	12.6 (p<.001)
SF-36 physical component scale (range 0-100)	48.6 (10.3)	48.6 (9.7)	50.0 (9.0)	1.5 ns
SF-36 mental component scale (range 0-100)	44.1 (8.8)	49.5 (9.5)	51.0 (8.0)	15.5 (p<.001)
<i>Clinical notes</i>				
Perineometer reading (cm H ₂ O)	23.8 (12.1)	30.5 (14.7)	31.2 (15.0)	16.0 (p<.001)
Endurance: Number of squeezes	3.8 (1.3)	4.5 (1.0)	5.2 (1.2)	36.4 (p<.001)
Maximum contraction duration (sec)	3.3 (1.2)	4.3 (1.4)	4.7 (1.3)	45.1 (p<.001)
	Freq (%)	Freq (%)	Freq (%)	
Pelvic floor muscle strength (digital exam) Grade 0-5:				
• 0 nothing	0 –	0 –	0 –	– –
• 1 flicker	5 (9%)	1 (2%)	1 (2%)	– –
• 2 weak squeeze	22 (39%)	14 (25%)	11 (20%)	– –
• 3 squeeze, some upward movement	27 (48%)	36 (64%)	35 (62%)	– –
• 4 good squeeze and lift	2 (4%)	4 (7%)	9 (16%)	– –
• 5 very strong squeeze and lift	– –	1 (2%)	– –	– –
‘Knack’ (contraction and elevation):				
• Present on cough	11 (20%)	38 (68%)	42 (75%)	– –
• Present when requested (after training)	38 (68%)	47 (84%)	48 (86%)	– –
	Mean (s.d.) (n=51)	Mean (s.d.) (n=51)	Mean (s.d.) (n=51)	F (df=2, 150)
<i>Bladder diary</i>				
Voids per day (number)	8.0 (2.8)	6.9 (2.8)	6.8 (2.3)	8.0 (p<.001)
Daytime mean void volume (ml)	231.2 (92.2)	290.4 (86.8)	290.6 (78.9)	22.3 (p<.001)
Minimum time between voids (hours)	0.87 (0.51)	1.31 (0.66)	1.31 (0.66)	12.3 (p<.001)
Voids overnight	0.69 (0.62)	0.48 (0.55)	0.40 (0.48)	6.07 (p=.003)
Overnight void volume (ml) (first void of morning)	388.4 (127)	440.5 (161)	444.8 (157)	9.6 (p<.001)
Daily fluid intake (ml)	1998 (618)	2097 (516)	2030 (547)	1.3 (ns)

Minor waterworks problems are part of getting old and will only get worse I thought. This is not true. The Women's Waterworks programme has provided me with information and an exercise programme to enable me to take control. I feel confident and committed to keeping myself healthy and comfortable – a participant at Week 16.

Long-term assessment has yet to be conducted, in order to evaluate the potential of the programme to have a long-term effect on maintained urinary continence. However, this small study adds to the limited body of knowledge on the effects of pelvic floor muscle and bladder training on prevention and early intervention of urinary incontinence⁹.

While the effectiveness of these interventions is well established for women with clinical levels of urinary incontinence^{7,8}, there has been very little research with women who are continent or those who have a very mild incontinence. Of the women who volunteered for this project, half had ISI scores lower than 10, and none considered herself as having a major problem. Thus, the outcomes suggest that it is possible to have a measurable impact on variables which are known to be related to continued urinary continence¹³, even among women who do not meet clinical criteria and thus have less room for improvement than those with more established problems.

One issue is that of participant bias. Despite brochures being distributed broadly, those who chose to participate were highly educated, both by comparison with the Australian population and by comparison with the areas of Newcastle from which they were recruited. Prevention strategies for women with lower levels of education, and those who are less likely to access services, may need to be explored.

Another concern was the recruitment rate. From 1200 brochures, distributed to clinics with a high proportion of middle-aged women, 76 women attended a first appointment. While the programme was effective for those who participated, this suggests a general unwillingness to address the problem at a preventive level. Impressions from initial telephone contact, including reluctance to leave messages and instructions not to mention the programme to third parties if returning the call, suggest that many women were embarrassed by the topic. At Week 1, most participants actively requested reassurance of confidentiality. This secrecy may serve as a barrier to prevention and help-seeking. Public information campaigns might be a useful strategy to de-stigmatise the condition and to emphasise that mild leakage is common among young and middle-aged women, that it is treatable and that non-invasive preventive or early intervention have positive effects.

In conclusion, this non-invasive, nurse-administered intervention to prevent the onset or to treat mild levels of stress or mixed urinary incontinence was effective for the majority of women who chose to participate. However, strategies are needed to recruit women with lower levels of education and others who are unlikely to be proactive about their health and

access programmes that prevent the onset of symptoms. Public information campaigns that convey the message that urinary incontinence is common and frequently preventable may increase the willingness of women to participate in such positive health programmes.

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