App-based treatment for urinary incontinence in women: A pragmatic, randomized, controlled, non-inferiority trial in primary care setting

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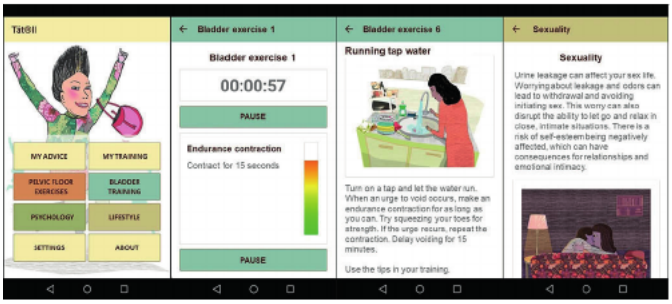
FIGURE 1



Screenshots from the Treatment App

FIGURE 2

Outcome measure	Allocation	Baseline Mean (SD)	Follow-up Mean (SD)	Comparison between groups at follow-up	
				Estimated difference (95% confidence interval)[2]	P value
ICIQ-UI SF	*Treatment app (n = 60)*	11.72 (3.48)	7.00 (3.71)[1]	-3.08 (-4.83 to -1.33)	p = 0.001
	Information app (n = 63)	11.44 (3.20)	9.81 (3.46)		

[1]Mean value based on the scores of the 58 Treatment App users who answered the follow-up questionnaire.
[2]Using a linear mixed model analysis to adjust for baseline values in the two groups.

Treatment outcome

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Funding The study was funded by Swedish Research Council for Health, Working and Welfare; The Kamprad Family Foundation; and the Region Jämtland Härjedalen **Clinical Trial** Yes **Registration Number Clinical Trials** (ID NCT 03097549) **RCT** Yes **Subjects** Human **Ethics Committee** Regional Ethical Review Board, Umeå, Sweden (Dnr 2016/523-31) **Helsinki** Yes **Informed Consent** Yes

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APP-BASED TREATMENT FOR URINARY INCONTINENCE IN WOMEN: A PRAGMATIC, RANDOMIZED, CONTROLLED, NON-INFERIORITY TRIAL IN PRIMARY CARE SETTING

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HYPOTHESIS / AIMS OF STUDY

Over 100 apps for urinary incontinence are available in the app store and google play, but evidence on their effectiveness is scarce. Available studies focused on the treatment of stress urinary incontinence only (1). Mobile applications may support women with urinary continence, but it is unclear if the effect of such treatment equals care as usual. In many countries, general practitioners (GPs) provide first line treatment of urinary incontinence.

We studied if the effectiveness of an app-based treatment for stress- urgency- and mixed urinary incontinence is non-inferior to care as usual provided by GPs after 4 months. To assess the benefit of an app in real clinical practice, we chose a non-inferiority comparison to care as usual.

STUDY DESIGN, MATERIALS AND METHODS

This trial was a pragmatic, block-randomized, two arm, parallel, non-inferiority design with participants receiving app-based treatment or care as usual for stress-, urgency- or mixed urinary incontinence (UI).

We recruited participants through primary care practices, lay press and social media. Adult woman, with ≥ 2 urinary incontinence episodes per week, with access to a smartphone or tablet and willing to receive treatment were eligible. We excluded woman with conditions possibly related to stress-, urgency- or mixed incontinence, those who had previous surgery for incontinence or any other treatment for incontinence in the previous year, or those that were unable to complete a questionnaire in Dutch or had a terminal or mental illness. Participants signed an informed consent form before entering the study.

The app contains a step-by-step program for the self-management of urinary incontinence. The app offered information on incontinence and lifestyle advices, exercises focusing on awareness of the pelvic floor muscle and exercises to train the pelvic floor muscle and/or bladder. The type of incontinence directed treatment advices.

Care as usual consisted of any or more of the following: instructions on pelvic floor muscle and/or bladder training;

prescribing a pessary, drugs, or absorbent products; or referral to a continence nurse, a pelvic physiotherapist, or to secondary care.

After inclusion and baseline assessment, the randomization was carried out using the validated web-based computer program ALEA to ensure full allocation concealment.

The primary outcome was difference in change in urinary incontinence severity (assessed with the ICIQ-UI-short form) from baseline to 4 months. We used linear regression to compare the change of ICIQ-UI-SF symptom score between groups, in a per-protocol analysis, which is the most conservative for the non-inferiority design. For this, we included women from the app-group that logged in in the app at least once and women from the care as usual group that visited their GP for incontinence at least once.

The non-inferiority margin is set at 1.5 points difference of change in UI severity between groups. This is based on the 1.58 points between-treatment minimum important difference in change (MID) for the ICIQ-UI-SF, previously identified among participants with stress UI (2). Assuming a power of 0.80 with a one-sided type I error of 0.025, we needed a sample of 100 evaluable participants per group.

RESULTS

Participants were recruited through 88 GPs (n=201) and through (social) media (n=149). Of 350 participants screened, 262 were eligible and randomly allocated to either App-based treatment (n=131) or care as usual (n=131). The mean age of included women was 53 years (range 20-86), median duration of incontinence was 7 years (Interquartile range 4-14). Fifty percent of participants reported a mixed type of incontinence, 42% stress incontinence and 8% urgency incontinence.The incontinence severity was slight (10%) moderate (64%) or severe (26%). The per-protocol analysis included 96 (app-group) and 75 participants (care as usual).

Both groups showed improvement after treatment with a mean change in incontinence severity of -2.15 (SD 2.56) points in the app group and -2.75 (3.62) points in the care as usual group. The mean difference of change of incontinence severity between both groups was 0.071 points (95% CI: -0.837 to 0.979), which did not reach the pre-specified boundary of 1.5 points but did cross zero (Figure1). This means that the app-based treatment effect was non-inferior to the care as usual treatment effect, but not superior.

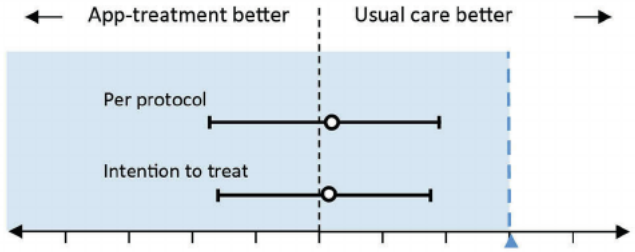
INTERPRETATION OF RESULTS

This RCT shows that an app-based treatment for woman with stress-, urgency and mixed urinary incontinence is at least as effective as the best current treatment provided by GPs at 4 months. This is the first study with a pragmatic comparison of an app-based treatment for urinary incontinence to care as usual and we believe our results provide a realistic reflection of the treatment effect in a real life setting. Symptom improvement shown was clinically relevant in both groups. The three main types of incontinence can be treated by the same app, therefore increasing the applicability and relevance of app treatment.

CONCLUDING MESSAGE

This is the first study on an app-based treatment for women with stress-, urgency-, and mixed UI, showing that it is non-inferior compared to care as usual in primary care after 4 months. Further research is needed to study long-term effectiveness, and the cost-effectiveness of app-based treatment, and to understand the process underlying treatment success.

FIGURE 1



Difference of change comparing change of UI-symptom score between usual care and App-based treatment. Blue dashed line at difference of change = 1.5 indicates non-inferiority margin. Blue tinted region to the left of margin indicates values for which App-treatment would be considered non-inferior to usual care. Adjusted for baseline scores.

Figure 2. Difference in change of ICIQ-UI-SF symptom score, 95% confidence intervals and non-inferiority margin.

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EFFECTIVENESS AND COST-EFFECTIVENESS OF BIOFEEDBACK-ASSISTED PELVIC FLOOR MUSCLE TRAINING FOR FEMALE URINARY INCONTINENCE: A MULTICENTRE RANDOMISED CONTROLLED TRIAL

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HYPOTHESIS / AIMS OF STUDY

Urinary incontinence (UI) is a common, distressing condition affecting a third of women (1). Current national guidelines (2) recommend a minimum of 3 months' pelvic floor muscle training (PFMT) for women with UI. The addition of electromyography (EMG) biofeedback may support women's exercise motivation and performance, potentially improving their continence compared with PFMT alone, but may have greater associated costs (3). This study aimed to determine the effectiveness and cost-effectiveness of EMG biofeedback-assisted PFMT (biofeedback PFMT) compared to PFMT alone (PFMT) for female stress or mixed UI (SUI, MUI).

STUDY DESIGN, MATERIALS AND METHODS

A multicentre randomised controlled trial compared biofeedback PFMT with PFMT in terms of UI severity at 2 years. A mixed-methods process evaluation and longitudinal qualitative case study were carried out in parallel (not reported here). Participants were recruited between February 2014 and July 2016 at 23 community and outpatient centres. Women 18 or older with a new diagnosis of SUI or MUI, who were able to contract their pelvic floor muscles, were eligible. Excluded were women who had received PFMT within the past year, had urgency UI or prolapse > stage II, were pregnant or <6 months postnatal, undergoing treatment for pelvic cancer, had cognitive impairment, a neurological disease, or a known nickel intolerance, or were participating in other UI research.

Participants were randomly assigned (1:1) via remote computer allocation (minimised by type of UI, centre, age <50/≥50 years, and UI severity) to the biofeedback PFMT or PFMT group. All participants were offered six therapist appointments over 16 weeks and received an individually tailored PFMT programme. The biofeedback PFMT group additionally received biofeedback during appointments and were given a biofeedback unit for home use. Recognised Behaviour Change Techniques (BCTs) were incorporated into the PFMT protocols delivered for both groups. Outcome data were collected via questionnaire at 6 months, 1 and 2 years. Primary outcome: International Consultation on Incontinence Questionnaire UI Short Form (ICIQ-UI SF) score at 2 years. Secondary outcomes included: ICIQ-UI SF at 6 months and 1 year, global impression of improvement (PGI-I), uptake of other UI treatment, and pelvic floor muscle function (blinded assessment at 6 months). Primary health economic outcome: incremental cost per quality-adjusted-life-year (QALY) gained at 2 years based on EQ-5D-3L.Participants completed diaries to record their home PFMT and biofeedback use. Blinding of participants, treating therapists and researchers to group allocation was not possible.

The primary analysis was by intention-to-treat, with participants' observed data analysed according to their randomised group. Group differences in ICIQ-UI SF scores at 2 years were assessed using a linear mixed model adjusting for minimisation variables, therapist type (physiotherapist/other therapist) and baseline score. Centre was fitted as a random effect. Secondary outcomes were analysed similarly, using appropriate generalised linear models (GLMs).

A sample size of 468 (234 per group) was needed to detect a difference of 3 points on the ICIQ-UI SF between the groups with 90% power and 5% significance level, assuming a standard deviation of 10. We aimed to randomise 600 women to allow for over 20% dropout. Sensitivity analyses of the primary outcome measure were conducted to examine the effect of missing data and non-compliance. Exploratory subgroup analyses by age (<50/≥50 years), UI type and severity (ICIQ-UI SF score <13/≥ 13), and type of therapist used a stricter 1% significance level. Cost-effectiveness analyses used GLMs, adjusting for minimisation variables and baseline EQ-5D-3L scores. Sensitivity analyses gauged the impact of varying key assumptions and/or parameter values in the base case analysis.

RESULTS

600 women were randomised, 300 per group. The participant mean age was 47.7 years (SD 11.5), and 61.3% had MUI. The trial group characteristics were well-balanced at baseline. Adherence (fully explored in the process evaluation) was comparable between groups in terms of appointment attendance and undertaking the home programme.