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Clinical Methods

Non-pharmacological and non-surgical treatments for female urinary incontinence: an integrative review☆

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ABSTRACT

Review aim: To explore the outcomes of non-pharmacological and non-surgical resources used to treat female urinary incontinence (UI).
Design: It is an integrative review (IR) of literature.
Methods: The databases CINAHL, PubMed, PsycINFO, Sociological Abstracts, The Cochrane Library, Scopus, Lilacs, Scielo, IBECS, BDENF, and Medcarib were explored. The grey literature, hand searching, and backtracking of references of primary studies were also explored. The fifteen studies that fulfilled the inclusion criteria were submitted to appraisal of methodological quality and one was excluded, resulting in 14 empirical studies included in this IR.
Results: All the treatments, the corresponding instrumental resources, and the support provided by health care providers resulted in the improvement or cure of UI. The pelvic floor muscle training (PFMT) exercise was the main way to treat UI. The multiprofessional involvement, close relationship with patients, continuous monitoring and support associated with PFM training were the factors associated with better adherence to UI treatment and its outcomes.

1. Purpose

Urinary incontinence (UI) is defined as any involuntary loss of urine. UI can occur independently of age, and women are at greater UI risk than men (Tamanini, Lebrão, Duarte, Santos, & Laurenti, 2009). The prevalence of female UI is between 25% and 45%, and it increases with age (Buckley & Lapitan, 2010). UI is a public health concerning the current aging population worldwide. The adoption of preventive measures and adequate treatments minimizes the negative consequences (Tamanini et al., 2009) of this disease, which are not restricted to the medical dimension; it potentially affects quality of life and the social, physical, psychological, occupational, and sexual aspects of women's lives (Serati, Salvatore, Uccella, et al., 2009).

UI also interferes with health status due to the stigma associated with this condition (Tamanini et al., 2009). It is associated with depression, impaired emotional well-being, isolation, and difficulties in daily activities (Elbiss, Osman, & Hammad, 2013; Tamanini et al., 2009), and it interferes with the manner in which sexuality is experienced (Elbiss et al., 2013). The women affected by UI face difficulties in seeking medical care (Elbiss et al., 2013; Hunskaar, Lose, Sykes, & Voss, 2004; Imamura, Abrams, Bain, et al., 2010). Poor social status, lack of symptoms indicating the need for support, disinclination toward treatment options, and the perception of UI treatments as ineffective were the motives to avoid the search for support (Imamura et al., 2010).

Among the women living in Europe, the majority (75%) never sought or received UI treatment. The search for medical support was higher among women from France (33%) and Germany (40%) (Hunskaar et al., 2004). Other study reported that half of United Arab Emirates women never asked for medical care related to UI. Hope for spontaneous resolution of this problem (61.9%), embarrassment of being examined by a male or female clinician (35.9%), views about urine leakage as normal episodes (31.5%), embarrassment of being examined by a male clinician (29.3%), and unawareness regarding treatment availability (23.9%) were the motives for not seeking care (Elbiss et al., 2013). The women who ask for UI treatments have their preferences. Less invasive options, including non-surgical options, such as lifestyle changes and physical therapies (e.g., electronic devices and vaginal cones) were their preferred treatments (Imamura et al., 2010).

The outcomes of non-pharmacological and non-surgical treatments of all types of female UI were the focus of this integrative review (IR). The healthcare providers should consider the current premise related to the evidence-based practice (EBP) in UI related health services. EBP is a process composed by several steps, considering the best appraised and compiled international evidence as part of the daily health care decision making. The EBP consists on the generation of knowledge, the synthesis of the best evidence, and its application in health care. It also presumes the association among clinical expertise, background factors involved in the health issues and patients' choices. An up-to-date

☆ This manuscript reports all the non-pharmacological and non-surgical resources used to treat the female urinary incontinence, and the main outcomes of empirical studies done to analyze the effects of the treatments.

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guideline is also essential to provide clear practical guidance on the clinical care of people with UI (Lucas, Bosch, Burhard, et al., 2012).

The aim of this IR was to answer the following question: What are the outcomes of the application of non-pharmacological and non-surgical resources to treat female UI?

This IR involves no conflicts of interest.

2. Methods

An IR, a summary and synthesis of findings allowing the inclusion of empirical studies done using diverse methodologies, is done to fully understand a particular phenomenon (Whittemore & Knafl, 2005). The five stages of IR proposed by these authors were performed: (a) problem identification; (b) literature search; (c) data evaluation; (d) data analysis; and (d) presentation of the results.

2.1. Inclusion and exclusion criteria

Empirical studies written in English, French, Portuguese, and Spanish were considered for inclusion. Studies with women participants aged 18 years or more, from any country or sociocultural context, affected by any type of UI (stress, urge, and mixed), and treated in any care setting (community-dwelling, nursing homes, hospitals, outpatient departments) were also considered.

Empirical studies conducted using qualitative, quantitative, or mixed methods were included. Editorials and commentaries were not included. Empirical studies including pregnant women and/or people with neurological or psychiatric disorders were excluded. Studies that did not meet the above criteria or were not directly relevant to this review were also excluded.

2.2. Literature search and data evaluation

A systematic search of both published and unpublished literature was conducted in April, 2014. The following databases were explored: CINAHL, PubMed, (PsycINFO), Sociological Abstracts, The Cochrane Library, Scopus, Lilacs, Scielo, IBECS, BDENF, and Medcarib. The search terms included 'alternative therapies', 'complementary therapies', 'treatment', and 'urinary incontinence'. Studies published after 1998 were considered for inclusion. This limit was established due to the inclusion of UI in the International Classification of Diseases and Related Health Problems (ICD-10) in that year. The grey literature, namely, studies not formally published, such as electronic research reports, policy documentations, dissertations, and conference abstracts, was explored to identify potential studies. The references listed in the retrieved studies were also explored, and the hand searching of the literature not available in electronic databases was done.

The systematic search was initially conducted independently by two reviewers. Then, the titles and abstracts of the articles were screened, and a copy of the full paper of potentially relevant studies was examined. The inclusion criteria for the review were independently applied to the potentially relevant papers by two reviewers, and the data were extracted according to predefined criteria. Both reviewers discussed any discrepancies before the final decision regarding the inclusion or exclusion of an empirical study using the database exploration process (Harrison et al., 2014). Disagreements between reviewers did not arise in any step of the primary study assessment.

The assessment of empirical studies was conducted using the Framework for Research Critique (Caldwell, Henshaw, & Taylor, 2011). This framework is composed of 16 items for qualitative studies and 17 items for quantitative studies. Items requiring 'yes' or 'no' responses included the rationale for performing the research, appropriateness of the research design and sample, validity, reliability or auditability of the data collection, credibility/confirmability of the data analysis, results reporting, comprehensiveness of the discussion and conclusions, and the generalization or transferability of the study findings.

The study designs were heterogeneous, but only quantitative studies were found. A cut-off value of 80% (14 'hits' among 17 items) was established as the inclusion criterion. Usually, this value is sufficient for study inclusion in systematic reviews. The following study characteristics were recorded on data-coding sheets: author, year, country, setting, treatment analyzed, study design, participants and respective years of age, assessment parameters related to the treatment outcomes, and the main findings and conclusions.

2.3. Data analysis

The studies included in this review were conducted using quantitative methods. The results were described, compared item-by-item, and explored for similarities, differences and relationships between data (Whittemore & Knafl, 2005). The designs were as follows: cohort ($n = 1$), randomized controlled trial ($n = 8$), non-randomized clinical trial ($n = 3$), case series of a single-case experimental study ($n = 1$), and *quasi*-experimental study ($n = 1$). The data were synthesized to answer the review question by considering the nature of the primary studies' findings and the entire set of outcomes reported by the researchers.

3. Results

The exploration of databases resulted in 1592 empirical studies after removing duplicates. The review of titles resulted in 198 potentially relevant references. The screening of abstracts resulted in 51 studies, and after fully reading these studies, 15 were selected for critical appraisal. Two reviewers independently appraised each empirical study (Harrison et al., 2014). No disagreements arose between them, and the inclusion of a third reviewer was not necessary.

Only one study (Bernardes, Péres, Souza, & Souza, 2000) was excluded from this review. This decision was made based on the lack of matches in 4 items of the appraisal instrument (reliability of data analysis, lack of clarity in result reporting, lack of a comprehensive conclusion, and non-generalizable results). A total of 14 studies fulfilled the eligibility criteria and were included in this IR.

The results of the literature search and selection process are shown in Fig. 1.

Although few studies have been conducted worldwide, the existence of empirical studies indicates the international relevance of this theme. Studies were conducted in 10 countries: 1 each from Australia, India, Japan, Spain, Norway, United Kingdom, Turkey, and Portugal; 3 from Brazil; and 3 from Taiwan. The scale and dispersion of these studies indicates the need for further studies on this topic. The definitions of all the types of treatments utilized in the 14 studies are summarized below to aid in the understanding of the treatment outcomes presented in Tables 1 and 2. These definitions are based on the primary researcher's own reports.

Electrical stimulation (ES) – applied through percutaneous, intravaginal, or intrarectal methods. These routes activate the afferent pudendal nerve, facilitate the efferent response, and cause the contraction of smooth and striated muscles of the paraurethral and pelvic floor area. The percutaneous application through sacral roots or the posterior tibial nerve facilitates neuromodulation of detrusor urinae muscle activities (Santos et al., 2009).

Transvaginal electrical stimulation (TES) - non-painful application of electrical current using a sensor with electrodes placed in the vagina to directly stimulate the pelvic floor muscles (PFMs) to contract and relax. This stimulation improves muscle strength and control of stress UI through better control of urinary urgency. This improvement occurs because the stimulus acts on the nerves, and bladder irritability decreases (Herrmann et al., 2003).

Vaginal cone (VC) - The PFMs are activated to retain the cone. This treatment increases the sensorial feedback because the feeling of weight on the pelvic floor is perceived (Bø et al., 1999).

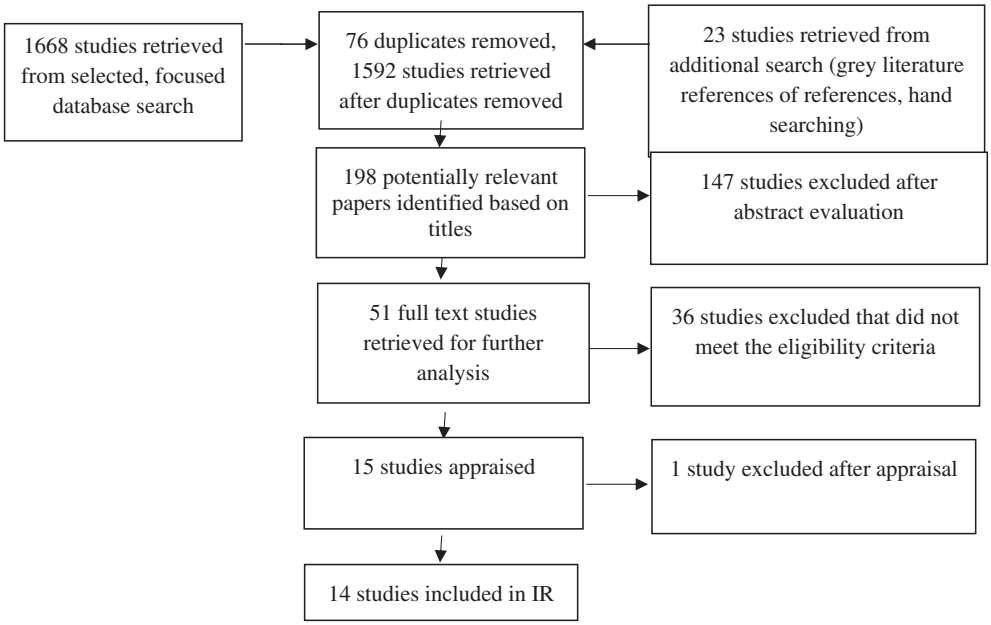

Fig. 1. Diagram flow of primary study selection process.

Global postural reeducation (GPR) - realigns the axis bones, removes exaggerated points of tension and muscle flaccidness, reorganizes muscular tension, and corrects the body's center of gravity (Fozzatti, Palma, Herrmann, & Dambros, 2008).

Biofeedback for PFM training - enables a person to identify and modify the body's functions. Biofeedback uses an instrument to record biological signs during voluntary PFM contraction. These signs are sent back through auditory or visual form (Herderschee, Hay-Smith, Herbison, Roovers, & Heineman, 2011).

Cognitive behavior therapy (CBT) **-** includes specific training techniques that are performed to re-establish continence, including the establishment of normal voiding intervals, elimination of bladder irritants from the diet, management of fluid intake and weight control, management of bowel regularity, and smoking cessation (Garley & Unwin, 2006).

Extracorporeal magnetic stimulation therapy (ExMST) - induces the depolarization of adjacent nerves and the contraction of adjacent muscles. As the magnetic field pulses, the innervation induces the flow of small eddy currents into the tissues. These currents induce depolarization of nerve axons, and the propagation of the nerve impulse occurs in both proximal and distal directions. The magnetic flux is regulated, and the muscular contraction rates are modulated (Hoscan et al., 2008).

PFMT - a technique used to strengthen the PFMs (Liao, Dougherty, Liou, & Tseng, 2006). This training promotes intentional and effective PFM contraction prior to and during the effort to contract the urethral sphincter. The exercises also increase urethral pressure and prevent urine leakage (Dumoulin & Hay-Smith, 2010).

Multidimensional exercise treatment (MET) - exercises that target the PFMs, stretching exercises, and fitness exercises that aim to strengthen abdominal muscles (Kim, Yoshida, & Suzuki, 2011).

Interferential therapy (IFT) - a medium-frequency current used to contract PFMs and increase cortical awareness to improve the ability to perform voluntary contractions (Patil, Nagrale, & Ganvir, 2010).

Interpersonal support (IS) - availability of another person to offer advice, cognitive guidance, and information that is tangible through material or instrumental support. In the scope of UI treatment, IS comprises the health practitioners' inquiries regarding the difficulties and/or improvements observed by patients during the treatment (Tsai & Liu, 2009).

Digital vaginal palpation (DVP) - vaginal palpation 3–5 cm inside the vagina while the patient is supine, which is used to support the patients in their recognition of specific PFM contractions (Tsai & Liu, 2009).

In Table 1, the UI treatments, intervention characteristics, and corresponding effects are summarized.

PFMT is the main resource used to treat UI. All the UI treatments aim to improve the skills required to perform PFMT appropriately or improve the frequency, duration, and appropriate application of the exercises. The effects of the use of some equipment and related resources could also be improved. All the treatments and equipment that were used resulted in the improvement of UI or its cure. The treatments analyzed in primary studies, the corresponding outcomes and associated statistical significances were the following:

- TVES: reduction of the frequency of UI (Herrmann et al., 2003).
- GPR: improvement in UI, improvement in PFMT results, decrease in UI episodes and changes in absorbents immediately after the treatment and 6 months of follow-up, pad use improvement, and improvements in general health perceptions, the impact of UI, and stress symptoms immediately after the treatment and at the 6-month follow-up (Fozzatti et al., 2008).
- CBT: improvement in I-QOL, maintained at 3 months of follow-up (Garley & Unwin, 2006).

Data on the comparison between the effects of diverse treatments and supportive approaches are reported in Table 2.

The results of the comparison between two or more treatments were the following:

- PFMT versus ES versus VC versus no treatment: all the treatments improved muscle strength (Bø et al., 1999).
- Functional ES *versus* VC: in both treatments, the I-QOL at 4 months was improved, and pad weight and urinary leakage decreased (Santos et al., 2009).
- IS and DVP as part of the PMFT training *versus* PFMT with a printed instruction handout: a significant decrease in the weight of the 1-h pad was observed in the intervention group (IG) compared with the control group (CG) (Tsai & Liu, 2009).
- Nursing systematized care plan *versus* nursing conventional plan: both care plans showed efficiency in improving UI; the improvement was greater in the IG than in the CG (Blanco, Moriano, Molina, Alvarez, & Llorente, 2007).
- Practice program of home practice PFMT with nurse monitoring by phone twice a week *versus* practice program of home practice

Table 1
Summary of UI treatments, characteristics of interventions, and the intervention effects.

Author(s)/Year Country/Setting	Treatments/Study design/Participants/ Intervention/Assessment	Outcomes
Belo, Francisco, Leite, and Catarino (2005) Portugal Hospital outpatient clinic and Primary care unit	PFMT with cones • Cohort study • 75 women, 28–66 years • 4 sessions daily, 15 minutes each, 16 weeks • Pad text before and after exercises	Pad-test • Initial- 68.0% positive and 64% negative after treatment • Final- improved in 47.0% • After treatment- 68.0% better or had much better feelings regarding UI
Liao et al. (2006) Taiwan Hospital	PFMT • One group pre-test and post-test quasi-experimental design • 55 women, 35–75 years • 4-hour PFMT program - anatomy and physiology of urinary system, risk factors, treatments, managing strategies, rationale, technique, and effects Advice given: • Methods to reduce pressure on pelvic floor and dietary alternatives to reduce bladder irritation • 5 seconds of PFM contraction, 10 seconds of relaxation, and gradual extension of time • Recognition of PFM contractions in different postures (sitting, standing, or lying down) • Scale (personal characteristics, knowledge and attitudes toward UI and PFMT) • Sandvik's UI Index to perceive UI severity	PFMT program • UI severity (Sandvik's Index (p 0.046) and self-perception of UI improved ($p < 0.01$) • Significant difference in UI and PFMT knowledge ($p < 0.001$) • Attitudes toward UI and PFMT without meaningful difference • Group with 30–40 min of PFMT a day with meaningful difference - Sandvik Index ($p < 0.01$) and self-reported UI severity ($p < 0.05$) PFMT practice and self-perceived improvement • Correct contraction- 80.5% • Improvements in self-perception- 58.4%
Herrmann et al. (2003) Brazil Hospital outpatient clinic	Transvaginal electrical stimulation (TES) of pelvic floor • Prospective non-randomized clinical trial • 22 women, 22–74 years • 20-min sessions, 2 times/week, 8 weeks • Electrical parameters - pulse 700 microseconds, frequency 50 Hertz, and intensity 12–53 Ma • Assessments- history, clinical and urogynecological exam, weekly registration of UI frequency, stress test, and transperineal ultrasound before and after treatment	• Satisfied- 81.7% • Significant reduction in UI frequency- 81.7% ($p < 0.01$) • Stress test negative after treatment- 77.2% • Higher Valsalva leak-point pressure after treatment- 63.3%, no meaningful significance ($p = 0.37$) • Bladder neck mobility before and after electrical stimulation without significant change ($p = 0.30$) • TES of pelvic floor - effective and safe for women with SUI without sphincter deficiency, significant reduction of UI frequency
Hoscan et al. (2008) Turkey Hospital	Extracorporeal magnetic stimulation therapy (ExMST) • Prospective non-randomized clinical trial • 30 women, 23–80 years • 20-min sessions, twice a week, 6 weeks • Evaluation before and after treatment: 3-day bladder diaries, dynamic pad weight tests, and urodynamics • Follow-up at 3, 12, and 24 months after treatment with urodynamics only at first follow-up	Urodynamic test • Mean first desire to void and maximum cystometric capacities increased after treatment from 133.3 ± 25.4 to 148.5 ± 22.8 ml and from 351.9 ± 69.5 to 388.25 ± 57.8 ml, respectively ($p = 0.25$, $p = 0.25$) Mean Valsalva leak-point pressure • Increased from 85.8 ± 22.6 to 99.5 ± 27.8 cm H_2O in patients ($p = 0.22$) • Urodynamic parameters before and after treatment without meaningful difference • After ExMST treatment - 3 months- cured (29.7%), symptom improvement (48.1%), cumulative success rate (cure + improvement) (77.8%), unaffected (22.2%) - 12 months- cured (25.9%), symptom improvement (40.7%), cumulative success (66.6%), unaffected (33.4%) - 24 months- cured (14.8%), symptom improvement (25.9%), cumulative success (40.7%), unaffected (59.3%) Dynamic pad weight test • 3 months- reduced from 14.4 ± 10.7 to 6.5 ± 5.1 g ($p = 0.001$) • 12 months-increased to 7.6 ± 5.7 g • 24 months- increased to 12.3 ± 9.6 g
Fozzatti et al. (2008) Brazil Hospital outpatient clinic	Global postural reeducation (GPR) • Prospective non-randomized clinical trial • 25 women, 23–72 years • Individual 50-min sessions weekly for 3 months and twice a month in the following 3 months • King Health Questionnaire (KHQ): general impression of improvement, incontinence impact, general perception of health, functional evaluation of pelvic floor, number of leakage episodes, pad use - T0: before treatment - T1: immediately after treatment - T2: 6-month follow-up	• Cured after treatment (16%), improved significantly (72%), failed (12%) • 6 months- cured (24%), improved significantly (64%), failed (12%) ($p < 0.001$) • Functional evaluation of pelvic floor and pad- significant improvement ($p < 0.001$) Pelvic floor functional assessment - T0: degree 0 and 1 (3.8%), degree 2 (34.6%), degree 3 (26.9%), degree 4 (19.2%), degree 5 (11.5%) - T1: Significant change- degree 0, and 2 (no patients), degree 3 (24.0%), degree 4 (40.0%), and degree 5 (36.0%) - T2: degree 3 (16.0%), degree 4 (48.0%), and degree 5 (36.0%) • Pad use after treatment - significant decrease • KHQ- general perception of health, impact of UI, and stress loss symptom at three time points - significant improvement
Garley and Unwin (2006) United Kingdom Community service	Cognitive behavioral therapy (CBT) • Case series of single-case experimental design "AB" with a follow-up phase • 10 women, 20–57 years • Previous advice- bladder training and PFMT	HADS results • No overall pattern of improvement as a whole, and only 5 showed levels of anxiety or depression • 4 women- improvements between pre- and post-treatment, with clinical relevance of scores increasing across categories

(continued on next page)

Table 1 *(continued)*

Author(s)/Year Country/Setting	Treatments/Study design/Participants/ Intervention/Assessment	Outcomes
	(13 individual sessions, 1 hour each, weekly intervals- 4 sessions at baseline; five sessions of treatment; 4 sessions of follow-up) • Treatment protocol: Psychoeducation of anatomy and UI - Psychoeducation - behavioral approaches (PMT, bladder training, relaxation, and the role of stress and anxiety) - Mediation of thoughts between events and emotions - Recognition of negative automatic thoughts - Discussion if unhelpful thinking styles - Exploration of personal assumptions and rules - Development of blueprint for relapse prevention • Final 4 sessions - Revision of bladder diaries, without therapeutic techniques - Hospital Anxiety and Depression Scale (HADS) - Incontinence Quality of Life (I-QOL) - Unstandardized questionnaire at 3-month follow-up to assess participants' opinions regarding the usefulness of interventions and their satisfaction	• 2 women- clinical exacerbation in psychological distress as demonstrated by HADS scores at the 3-month post-treatment follow-up • Wilcoxon Signed Rank Test- no significant effect on levels of anxiety and depression Satisfaction Questionnaire results • 7 women rated the intervention as 'very useful', with the remainder rating it as 'quite useful' or 'useful' • Positive difference in lives I-QOL results • Improvement of score post-treatment in 9 women, modest improvement in 2 of 9 women • Reduced total score post-treatment in 1 woman • Greater scores for all women, although for 1 woman, the improvement between pre-treatment and the 3-month follow-up was negligible • Improvement in median total score at post-treatment administration and further improvements at the 3-month follow-up • Significant improvement in score post-treatment ($z = -2.501$, $p < 0.012$), maintained at the 3-month follow-up ($z = -2.803$, $p < 0.005$) • Changes in Avoidance and Limiting Scores (A&L) and Social Embarrassment (SE) Subscale - significant improvement in score after treatment (A&L, $z = -2.807$, $p < 0.05$; SE, $z = 2.668$, $p < 0.008$) was maintained at 3 months post-treatment (pre-treatment and 3-month follow-up (A&L, $z = -2.812$, $p < 0.005$; SE, $z = -2.366$, $p < 0.018$)

PFMT: improvement in UI symptoms (frequency, nocturia, and incontinence), Bristol questionnaire domains (worry of and effect on restricted activity), and quality of life (QOL) index (Ng et al., 2008).

- Multidimensional exercises (PFMT, stretching exercises, and fitness exercises) *versus* general education classes concerning cognitive function, osteoporosis, and oral hygiene: IG showed urine linkage cure rates after treatment (44%) and after follow-up (39.3%) (Kim et al., 2011).
- PFMT with IFT *versus* PFMT: improvement in incontinence episodes with respect to the frequency volume in both groups, with greater improvement in the IG; greater improvement in urine loss in the pad test and QOL in the IG (Patil et al., 2010).

The importance of the involvement of a multiprofessional staff in UI treatment, as well as the close relationship between health care providers and patients at the beginning and/or across the entire treatment, became evident. The individual or group PFM training and the monitoring and adequate support of the women were also essential in improving UI treatment outcomes. The treatments that involved multidimensional exercises (Kim et al., 2011), nurse monitoring (Ng et al., 2008), interpersonal support (Tsai & Liu, 2009), and systematized and integrated nursing care (Blanco et al., 2007) resulted in a significant difference compared with treatments performed without these supports.

4. Discussion

The PFMT is a first-line conservative treatment for female UI. TES is a therapy that aims to increase urethral resistance by strengthening the PFMs and, consequently, improve incontinence associated with stress (Terlikowski, Dobrzycka, Kinalski, Kuryliszyn-Moskal, & Terlikowski, 2013). This treatment is also effective to improve QOL and reduce UI's symptoms (Santos et al., 2009; Terlikowski et al., 2013), but its results can vary widely, even if the same devices are used in treatments. Comparisons between studies using TES are difficult due to the diverse therapies and related variables. The lack of evidence on this topic is due to the differences in the stimulation parameters and treatment durations (Terlikowski et al., 2013).

Treatments using VC provide important gains in PFM strength. Significant improvements in daily activities and urgency perceptions, reductions in nocturia and urine leakage, and improvements in the subjective evaluation of urine loss were obtained (Gameiro et al., 2010). Limited evidence exists about the use of VCs as beneficial for women with stress UI. The use of VCs in conjunction with PFMT appears to provide no additional benefit (Herbison & Dean, 2013).

GPR has highlighted as an important intervention to reduce stress UI (Fozzatti, Herrmann, Palma, Riccetto, & Palma, 2010). Therefore, GPR appears to represent an alternative method with which to treat stress female UI. GPR also showed more improvement than PFMT with respect to subjective improvements, leakage episodes, pad use, and general perception of health (Fozzatti et al., 2008). Women's involvement in a CBT intervention improved incontinence-related QOL and bladder function (Garley & Unwin, 2006). Women with UI undergoing bladder training obtained cure or substantial improvement in UI symptoms. But caution was suggested considering the limited number of trials and available data on the topic (Wallace, Roe, Williams, & Palmer, 2004).

The effectiveness of adding PFMT to other active treatments compared with the same active treatment alone was clear. The interpersonal support and PFMT performed correctly increase the effectiveness of PFMT in urine leakage reduction, even in patients who have very few symptoms of SUI (Tsai & Liu, 2009). Multidimensional exercises (e.g., stretching exercises and fitness exercises) in addition to PFM exercises were effective to reduce all types of UI (Kim et al., 2011). The home-based PFMT practice program with nurse monitoring significantly improved the efficacy of UI treatment (Ng et al., 2008). Integrated and standardized nursing interventions that include PFMT reduced urine leakage and the use of protective materials (Blanco et al., 2007).

Health care providers should to take into account that the available best evidence should be associated with other elements involving the UI patients. These elements include the health care provider's clinical expertise, and the patient's background factors, such as the religious, educational, cultural, and personal issues involved. These elements strongly influence the health issues involving UI, and the patients' choices. The knowledge of all these elements involving the patients affected by the UI, and its consideration in the planning and implementation of healthcare are crucial to the quality of health care.

Table 2
Comparison of the required resources for and methods to treat PFMT and corresponding outcomes.

Author/Country setting	Resources and treatments	Outcomes
Bø et al. (1999) Norway Multicenter study	PFMT *versus* electrical stimulation (ES) *versus* vaginal cones (VC) *versus* no treatment (CG) • Stratified, single-blind, randomized controlled trial • 107 women, 24–70 years • PFE through 812 contractions 3 times a day and exercise in groups once a week • ES group: vaginal intermittent stimulation with MS 106 Twin at 50 Hz 30 minutes a day • VC group: cones for 20 minutes a day • CG group: offered the use of a continence guard • Muscle strength measured by vaginal squeeze pressure once a month • Pad test with standardized bladder volume and self-report of severity	• Muscle strength after PFMT significantly improved ($p = 0.03$) (11.0 cm H2O (95% confidence interval 7.7 to 14.3) before versus 19.2 cm H2O (15.3 to 23.1) after) compared with either ES (14.8 cm H2O (10.9 to 18.7) *v* 18.6 cm H2O (13.3 to 23.9)) or VC (11.8 cm H2O (8.5 to 15.1) *v* 15.4 cm H2O (11.1 to 19.7)) • PFMT group had a greater reduction in urine leakage (− 30.2 g; −43.3 to 16.9) than the ES group (−7.4 g; − 20.9 to 6.1) and VC group (−14.7 g; − 27.6 to −1.8) • End of trial – 1 woman in control group, 14 in PFMT group, 3 in ES group, and 2 in VC group no longer considered to have a problem • PFMT superior to ES and VC as a genuine stress incontinence treatment
Santos et al. (2009) Brazil Hospital outpatient clinic	Functional electrical stimulation (FES) of PFMs *versus* treatment with vaginal cones (VC) • Randomized controlled trial • 45 women, average age 55.2 (FEZ) and 52.6 (VC) years • FES: 2 20-minute weekly sessions for 4 consecutive months. The electrode was 10 cm long and 3.5 cm wide with a double metallic ring and a cylindrical shape, positioned in the medium third of the vagina. Electrical parameters - intensity varying from 10 to 100 mA and 50 Hz of fixed frequency, with a pulse duration of 1 ms. • VC: two 45-minute sessions per week • Cone weight from 20 to 100 g • Evaluation- clinical data (micturition diary, pad test, and I-QoL)	• FES of PFM and VC for UI treatment without difference ($p > 0.05$) • After 4 months- significant improvement in I-QoL of patients treated both with FES (40.3 *versus* 82.9) or with VC (47.7 *versus* 84.1) • Significant decrease in pad weight in both groups after treatment (28.5 and 32 g *versus* 2.0 and 3.0 g for FES and VC group), respectively • Significant decrease in UI frequency in both groups ($p < 0.0001$) • Both FES and VC - effective for treating SUI
Tsai and Liu (2009) Taiwan Outpatient clinic	IS and DVP as part of PMFT (IG) *versus* PFMT with a printed handout instruction (CG) • Randomized experimental study • 99 women, 50 (IG), 49 (CG), 20–80 years • IG: individual monthly PFMT support guided by DVP to ensure proper performance of exercises • CG: Printed handout of PFMT instructions • Urinary diary to record number and length of PFMT performed each day in minutes • 12-week follow-up (urinary diaries and evaluation through 1-h pad test)	• If the amount of urine leakage in the "1-hour pad test" was less than 0.12 g before the intervention, the amount of urine leakage in the IG was lower than that in the CG after the intervention, resulting in a non-significant difference • If the amount of urine leakage before intervention in the "1-hour pad test" is greater than 0.12 g, after the intervention, the amount of urine leakage in the IG was lower than that in the CG, resulting in a significant difference • If the amount of urine leakage was greater than 0.12 g before the intervention, the effects were significant, and the greater the amount of urine leakage before the intervention, the greater the effect • 12 weeks of interpersonal support and DVP as part of PFMT training alleviated UI better than PFMT with a printed handout instruction • Significant decrease in the pad test weight between baseline and 12 weeks in the IG ($p < 0.001$) • CG, no difference over the same time period ($p = 0.514$)
Blanco et al. (2007) Spain Primary care unit	Nursing systematized care plan (IG) *versus* nursing conventional care plan (CG) • Randomized controlled trial • 103 women, 48 (IG) 55 (CG), average age 54 (IG) 52 (CG) years • IG: group and structured care plan: 4 educational sessions of 1 hour, once per week (anatomy and physiology, risk factors, changeable habits, PFMT practical demonstrations (slow contraction with maintenance for 5 seconds, 10 seconds of relaxation, 5 repetitions; quick and strong contraction followed by immediate relaxation, 5 repetitions, 10 times daily)) • CG: registered nurses' habitual intervention (brief oral explanation of how to perform exercises and handout of written explanation of exercises) • Sandvik scale to assess UI degree changes • Changes grouped as "improved or cured" and "remained same or got worse"	• Average difference in urine loss before and after intervention of 5.7 g ($n = 22$) in the IG, compared with 1.8 g ($n = 27$) in the CG, with no significant difference ($p = 0.12$), IC of 95% CI [−1.09–8.92] • Pad use decreased in both groups after the intervention (60.7% in the IG and 36.4% in the CG), no significant difference ($p = 0.16$) • 40.5% of IG - improved or cured, compared with 21% in the CG ($p = 0.059$) • Both care plans – effective in improving UI • Greater improvement in the IG than the CG, relevant clinical difference
Ng et al., 2008 Taiwan Community	Monitored *versus* not monitored nursing intervention with respect to the efficacy of home-based PFMT • Randomized clinical trial • 68 women, 34 each group, average age 54.0 (IG) and 52.3 (CG) years • Identical home practice training course (1-hour session, twice weekly, 4 weeks) for both groups, gradually working up to 50 to 75 contractions, 3 times a day • IG: monitoring of practice program by phone twice a week, and positive reinforcement through verbal instruction and encouragement to exercise persistently • CG- Encouraged to contact the registered nurse (RN) by phone if any problem or question emerged • Bristol Female Urinary Track Symptoms Questionnaire	3 months - Reduction of urinary symptoms between IG and CG - no significant difference (all $p > 0.05$) - Measurements of symptom impact index between two groups after home practice of PFMT - no significant differences 6 months IG - Symptoms improved (frequency, nocturia, urge incontinence, stress UI (odds ratio = 0.57, 0.52, 0.4, and 0.49; 95% confidence interval = 0.35–0.95, 0.30–0.93, 0.24–0.66, and 0.31–0.76; respectively) - Items of each domain (worry of, effect on, restricted activity) of the symptom impact index questionnaire were significantly different between groups

(continued on next page)

Table 2 *(continued)*

Author/Country setting	Resources and treatments	Outcomes
	• Disease-specific questionnaire with a symptom impact index of stress incontinence in women	- Less worry about getting wet and pad or towel leakage 3 and 6 months - Improvement in the negative impacts of mixed symptoms related to QOL (according to t test for each of the items) in the IG ($p < 0.05$) - IG with improvement in the following domains: worried of smell of urine ($p < 0.075$), wet clothes ($p < 0.021$), pad or towel leakage ($p < 0.011$), and pad or towel exposure ($p < 0.0403$) - Difference between groups in symptom of urgency was not significant (odds ratio = 0.73, 95% confidence interval = 0.45–1.17) - Difference between groups in the domain of symptom impact index related to restricted activity and of urine leakage was not significant ($p < 0.56$)
Kim et al. (2011) Japan Urban community	Participation in MET (stretching + PFM + fitness) *versus* general education on muscular cognitive function • Randomized controlled follow-up trial • 127 women, 63 (IG) 64 (CG) years, average age 76.1 (IG) 75.7 (CG) years • IG: PFMT (force only on PFMs without excessively straining the abdomen) and fitness exercises 2 times a week for 3 months • CG: General education on muscular cognitive function, once a month for 3 months	3 and 7-month follow-up • 3 months: IG = 44.1, CG = 1.6 • 7 months: IG = 39.3, CG = 1.6 • Cure of urinary leakage in IG - significant difference ($p < 0.001$) - Stress UI 3 months 63.2, 7 months 66.7 ($p < 0.001$) - Urge UI 3 months 35.0, 7 months 26.1 ($p = 0.032$) - Mixed UI 3 months 40.1, 7 months 30.0 (=0.016)
Patil et al. (2010) India Outpatient clinic	PFMT with interferential therapy (IFT) *versus* PMFT • Randomized clinical trial • 102 women, 52 (IG) 50 (CG), 30–70 years • IG: PFE with IFT • CG-PFE only • Both 3 times a week for 4 weeks • Visual Analogue Scale (VAS)	• Both groups- improvement in incontinence episodes on the frequency volume chart and VAS score at the 1-, 2-, 3-, and 4-week follow-ups ($p < 0.05$) • Between-group analysis- improvement in incontinence episodes on the frequency volume chart and VAS score, best in the group receiving PFMT with IFT at the 1-, 2-, 3-, and 4-week follow-ups ($p < 0.05$) • Both urine loss in the pad test and QOL incontinence impact questionnaire pre-training and post-training measurements- greater improvement in PFMT in the IFT group ($p < 0.001$) • Calculated effect sizes for incontinence episodes on the frequency volume chart and VAS scores favorable for PFMT in the IFT group - moderate treatment effect in the first week (0.31 and 0.42, respectively), second week (0.40 and 0.55, respectively), and third week (0.48 and 0.57, respectively) • Four weeks of PFMT with IFT yielded a larger treatment effect compared with PFMT alone - magnitude measures of 0.61 (incontinence episodes on frequency volume chart) and 0.80 (VAS score) • Four weeks of calculated effect sizes - medium treatment effect favorable for PFMT in the IFT group for the pad test with an effect size of 0.53, and larger treatment effects for the Incontinence Impact Questionnaire (effect size of 0.70)
Galea and Tisseverasinghe (2013) Australia Hospital outpatient clinic	Visual feedback versus DVP as biofeedback for PFM training • Randomized, controlled, assessor-blinded trial • 22 women, 11 each, 60–85 years • IG: Visual feedback (VF) • CG: DVP • Daily 10-week training, 3-month follow-up • Bladder function assessment Kings Health Questionnaire	• No significant difference within or between groups over time except a significant reduction in leakage episodes from baseline (T1) to follow-up (T3) in the VF group ($p = 0.002$, Wilcoxon signed rank test) • No significant difference in any domain of the King's Health Questionnaire between groups at baseline (T1) and 3 months post-intervention (T3) • No significant between-group differences in the adherence to routine home exercises (SC 63.4%; VF 76.8%, $p = 0.28$), self-reported application of home advice (mean SC 7.2; VF 8.5, $p = 0.50$), or in-home PFMT intensity (mean SC 8.0; VF 9.4, $p = 0.10$)

The specialists of the European Association of Urology have disseminated and recommended the following of a new guideline with up-to-date summary of the available evidence about the assessment and non-surgical management of UI. In summary, their recommendation consists of a systematized assessment of the UI condition, and the choice of the better treatment, considering the best available scientific evidence, or the following of a consensus of expert opinion when evidences are not still available (Lucas et al., 2012).

5. Conclusion

The UI treatment requires multiprofessional involvement and close relationship among health care providers. The individual/group PFM training, monitoring, and provision of educative support are crucial factors to improve the effects of treatments. The evidences have demonstrated that all treatments, and related resources used resulted in the improvement of the condition or cure of UI.

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