Behavioral Training With and Without Biofeedback in the Treatment of Urge Incontinence in Older Women

A Randomized Controlled Trial

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Context Previous research on urge urinary incontinence has demonstrated that multicomponent behavioral training with biofeedback is safe and effective, yet it has not been established whether biofeedback is an essential component that heightens therapeutic efficacy.

Objective To examine the role of biofeedback in a multicomponent behavioral training program for urge incontinence in community-dwelling older women.

Design Prospective, randomized controlled trial conducted from April 1, 1995, to March 30, 2001.

Setting University-based outpatient continence clinic in the United States.

Patients A volunteer sample of 222 ambulatory, nondemented, community-dwelling women aged 55 to 92 years with urge incontinence or mixed incontinence with urge as the predominant pattern. Patients were stratified by race, type of incontinence (urge only vs mixed), and severity (frequency of accidents).

Interventions Patients were randomly assigned to receive 8 weeks (4 visits) of biofeedback-assisted behavioral training (n=73), 8 weeks (4 visits) of behavioral training without biofeedback (verbal feedback based on vaginal palpation; n=74), or 8 weeks of self-administered behavioral treatment using a self-help booklet (control condition; n=75).

Main Outcome Measures Reduction in the number of incontinence episodes as documented in bladder diaries, patients' perceptions and satisfaction, and changes in quality of life.

Results Intention-to-treat analysis showed that behavioral training with biofeedback yielded a mean 63.1% reduction (SD, 42.7%) in incontinence, verbal feedback a mean 69.4% reduction (SD, 32.7%), and the self-help booklet a mean 58.6% reduction (SD, 38.8%). The 3 groups were not significantly different from each other (P=.23). The groups differed significantly regarding patient satisfaction: 75.0% of the biofeedback group, 85.5% of the verbal feedback group, and 55.7% of the self-help booklet group reported being completely satisfied with treatment (P=.001). Significant improvements were seen across all 3 groups on 3 quality-of-life instruments, with no significant between-group differences.

Conclusions Biofeedback to teach pelvic floor muscle control, verbal feedback based on vaginal palpation, and a self-help booklet in a first-line behavioral training program all achieved comparable improvements in urge incontinence in community-dwelling older women. Patients' perceptions of treatment were significantly better for the 2 behavioral training interventions.

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URGE URINARY INCONTINENCE IS a common condition that affects millions of US individuals, especially older women.[1,2] It is usually treated with drugs that inhibit detrusor contractions,[3] but adverse effects are common and behavioral treatments have also proven effective by changing voiding habits or teaching new continence skills.[4-11] Biofeedback-assisted behavioral training uses biofeedback to teach patients how to control the physiologic responses of the bladder and pelvic floor muscles that mediate incontinence.[5-9,11] It is effective for treating urge incontinence, producing improvements ranging from 76% to 86%, is at least as effective as drug therapy, and in 1 trial, it was more effective than immediate-release oxybutynin chloride.[6-9,11]

Biofeedback-assisted behavioral training has multiple components. A primary component is teaching patients how to identify and exercise pelvic floor muscles, and most important, how to use them to prevent urine loss by aborting detrusor contractions

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and occluding the urethra during contractions that cannot be inhibited. Although biofeedback is clearly an effective technique for teaching pelvic floor muscle control, it is not established whether it is an essential component of training for urge incontinence or whether muscle control can be taught adequately by other methods, such as verbal feedback during pelvic examination or written instructions. One small study (n=27) found that biofeedback did not enhance outcomes.[8]

The role of biofeedback in the treatment of urge incontinence is an important issue because biofeedback is more expensive and slightly more invasive than other teaching methods in that it involves placement of electrodes. Medicare reimburses for biofeedback used to treat urinary incontinence, based on studies of stress incontinence, but very little is known about the role of biofeedback in the treatment of urge incontinence.[12,13]

The present study used a randomized controlled trial to test whether biofeedback enhances the outcome of behavioral training for urge incontinence in older women. Specifically, it evaluated the relative effects of training with and without biofeedback compared with a control condition consisting of self-administered behavioral treatment.

METHODS

Participants

Participants were older community-dwelling women with persistent urge incontinence. They were recruited through local advertisements, community outreach, and professional referrals and then screened by telephone to determine eligibility. To be eligible, patients were at least 55 years old, ambulatory, and had described a pattern of predominant urge incontinence that occurred at least twice per week and persisted for at least 3 months. All participants provided informed consent according to procedures approved by the University Institutional Review Board for Human Use. The study was conducted between April 1, 1995, and March 30, 2001.

Clinical Evaluation

Potential participants who met initial criteria were scheduled for evaluation in an outpatient continence clinic. The evaluation consisted of a continence and medical history, physical examination, postvoid catheterization for residual urine, urodynamic evaluation, hemoglobin A_{1C} in the presence of diabetes, and urinalysis (urine dipstick on clean-catch specimen with microscopic evaluation, if indicated). In addition, the Mini-Mental State Examination was used to screen for dementia.[14] If patients had a urinary tract infection (urine colony count >10000), fecal impaction, severe atrophic vaginitis, or a correctable metabolic problem, they were offered treatment for the condition and reconsidered for study participation at a later date if the incontinence persisted.

Urodynamic testing was performed to document bladder dysfunction (for inclusion) and to classify the type of incontinence for stratification (urge only vs mixed stress and urge). Two-channel supine water cystometry was performed using a 12F double lumen urodynamic catheter, a rectal balloon, and room temperature sterile water at a continuous filling rate of 50 mL/min up to a maximum of 500 mL. Threshold volumes were recorded for first desire to void, strong desire to void, cystometric capacity (the highest volume achieved), and detrusor contraction. Strength of the external anal sphincter was assessed by using manometry. The catheter was removed and several maneuvers were performed to provoke urge or stress incontinence.

Bladder Diary and Quality-of-Life Measures

To measure pretreatment frequency of incontinence, patients were provided with 2 weeks of bladder diary booklets.[15] Patients documented the time of every void and incontinent episode, the volume of each episode of urine loss (large or small), and the circumstances of each episode. The Hopkins Symptom Checklist (SCL-90-R, for psychological distress),[16] Incontinence Impact Questionnaire,[17] and the Short-Form Health Survery (SF-36)[18] were completed by patients at home and returned with baseline diaries.

Inclusion and Exclusion Criteria

To be included, patients had to have at least 2 urge accidents per week on average documented in the 2-week bladder diary, and urge incontinence had to be the predominant pattern (the number of urge accidents had to exceed the number of stress and other accidents). Also, there had to be urodynamic evidence of bladder dysfunction (detrusor instability during filling or provocation or maximal cystometric capacity of ≤400 mL). Patients were excluded if they had continual leakage, postvoid residual urine volume greater than 150 mL, severe uterine prolapse past the vaginal introitus, decompensated congestive heart failure, or impaired mental status (Mini-Mental State Examination score <24).

Design

Prior to randomization, participants were stratified by race (black or white) because of possible differences in the pelvic floor,[19,20] type of incontinence, and severity of incontinence. Baseline bladder diaries and urodynamic test results were used to classify incontinence as urge only or mixed stress and urge. To be sure that the groups were similar on pretreatment severity of incontinence, the bladder diaries were used to stratify participants as having mild (<5 episodes per week), moderate (5-10 episodes per week), or severe (>10 episodes per week) incontinence. Patients were randomized to behavioral treatment with biofeedback, behavioral treatment without biofeedback (verbal feedback based on vaginal palpation), or a control condition consisting of self-administered behavioral training.

Intervention

For all patients, treatment was implemented for an 8-week period. Patients completed a daily bladder diary throughout treatment.

Behavioral Training With Biofeedback. Treatment consisted of 4 clinic visits at 2-week intervals during the

8-week period. At each visit, clinic staff reviewed bladder diaries to ensure that entries were clear and interpretable. Interventions were implemented by nurse practitioners. During clinic visits, patients in the biofeedback group were taught skills and strategies for preventing incontinence and provided with oral and written instructions for daily home practice.

In the first visit, anorectal biofeedback was used to help patients identify pelvic floor muscles and teach them how to contract and relax these muscles selectively while keeping abdominal muscles relaxed.[6] A 3-balloon probe was inserted into the rectum and used to measure external anal sphincter responses, simultaneously with rectal (abdominal) pressures.[21] Tracings were displayed on a computer monitor. The second visit was devoted to teaching patients how to respond adaptively to the sensation of urgency (urge suppression strategies).[6,8,22] Instead of rushing to the toilet, which increases intra-abdominal pressure and exposes patients to visual cues that can trigger incontinence, patients were encouraged to pause, sit down if possible, relax the entire body, and contract pelvic floor muscles repeatedly to diminish urgency, inhibit detrusor contraction, and prevent urine loss. When urgency subsided, they were to proceed to the toilet at a normal pace. Patients with mixed incontinence were also taught stress strategies, which consisted of contracting pelvic floor muscles just before and during any physical activities such as coughing or sneezing that had triggered stress incontinence. In the third visit, patients who had not achieved at least 50% improvement underwent combined bladder-sphincter biofeedback to teach them to contract pelvic floor muscles against increasing volumes of fluid, in the presence of increasing urgency, and during detrusor contraction.[6] The fourth visit was used to review progress, "fine-tune" home practice, and encourage persistence.

Recommendations for pelvic floor muscle exercises included 45 exercises every day divided into manageable sessions, typically sets of 15 exercises, 3 times per day. The initial duration of each individual contraction was determined based on the ability demonstrated by each patient in the original training session. Across sessions, the duration was increased gradually to a maximum of 10 seconds, with an equal period of relaxation between contractions. Patients were advised to practice in various positions including lying, sitting, and standing, and whenever possible to integrate the exercises into other daily activities. They were instructed to actively contract pelvic floor muscles during activities that had resulted in incontinence and to practice interruption or slowing of the urinary stream during voiding once a day.

Behavioral Training Without Biofeedback. This treatment included all the components of behavioral training minus the biofeedback. In lieu of biofeedback, verbal feedback based on vaginal palpation was used in the first treatment session to help patients identify and contract pelvic floor muscles. If, after several attempts, no contraction could be detected vaginally, the examiner placed a finger just inside the anal opening and gave verbal feedback of voluntary external anal sphincter contraction. Home practice and all other instructions were the same as for the biofeedback group. If patients did not improve by at least 50% by their third visit, the teaching was repeated.

Self-administered Behavioral Training: Control Condition. The control group received written instructions for an 8-week self-help behavioral program, with the same content as the behavioral training program described above, but completely self-administered without benefit of professional expertise or equipment. It was a step-by-step self-help program written for incontinent individuals who do not have access to a professional with this expertise or who simply wish to try such a program on their own. In language geared to a fifth-grade reading level, it presents basic information about urge and stress incontinence, how to complete bladder diaries, how to locate their pelvic floor muscles (including vaginal palpation), how to do daily pelvic floor muscle exercises, how to use their muscles to prevent accidents, and how to respond to urgency. The complete text is published in *Staying Dry: A Practical Guide to Bladder Control*.[22] Patients were given an instruction booklet and an appointment for a return visit in 8 weeks. They were also given a supply of bladder diaries and stamped envelopes for returning completed diaries biweekly.

Posttreatment Assessment

Following the last intervention visit, patients completed 2 weeks of posttreatment bladder diaries and a patient satisfaction questionnaire, and repeated the 3 quality-of-life measures. When they returned for their posttreatment visit, these materials were collected and patients were asked to repeat urodynamic testing.

Data Management and Analysis

The sample size was calculated to allow detection of 15% differences in improvement between groups with 85% power and a significance level of .05, assuming a 2-sided hypothesis test and a pooled within-group SD of 20%. The 3 treatment groups were first compared using χ^2 analysis and analysis of variance to determine whether there were any group differences before treatment on key variables. After treatment, the bladder diaries were used to calculate change in the frequency of incontinence episodes, which was the primary outcome measure. The pretreatment and posttreatment frequency of incontinence were used to calculate a percentage reduction for each patient ([pretreatment frequency – posttreatment frequency]/[pretreatment frequency] × 100%).[6,11] Thus, 100% represented total continence, 0% represented no improvement, and a negative percentage indicated regression. One-way analysis of variance was used to test for differences among the 3 groups on reduction of incontinence. The analysis was based on intention-to-treat. When patients did not complete treatment, the most recent bladder diaries were used to calculate outcome, including baseline diaries when no data were available postbaseline.

Differences between the groups on patient satisfaction and perceptions were tested using the χ^2 statistic for categorical variables or the Kruskal-Wallis test for ordinal variables. Other outcomes measures, including the Hopkins Symptom Checklist, the Incontinence Impact Questionnaire, the SF-36, and bladder capacity, were examined using 3 (treatment group) × 2 (pretreatment vs posttreatment) repeated measures analyses of variance. SPSS version 10.0.5 (SPSS Inc, Chicago, Ill) was used for all statistical analyses.

RESULTS

Of 474 women who were evaluated clinically, 252 were ineligible or did not participate and 222, aged 55 to 92 years, were randomized (FIGURE 1). The attrition rate was 15.1% in the biofeedback group, 12.2% in the verbal feedback group, and 9.3% in the self-help booklet group. Twenty-seven patients did not complete treatment. All were included in the intention-to-treat analysis. Characteristics of the participants are presented in TABLE 1. Before treatment, there were no significant differences among the 3 treatment groups on the key parameters, with the exception of bladder capacity. Therefore, this variable was included as a covariate in the primary analysis of treatment outcome.

Reductions of Incontinence

Before treatment, the weekly frequency of incontinence was similar across the 3 groups, although the verbal feedback group had slightly more accidents than the other 2 groups (mean [SD], 17.3 [16.3] per week compared with 15.4 [14.2] and 15.1 [13.5] per week, TABLE 2). After treatment, the biofeedback and verbal feedback groups were almost identical (6.1 [10.3] and 6.0 [10.7] accidents per week) and 6.7 (11.4) accidents per week were reported in the self-help group.

Behavioral treatment with biofeedback resulted in a mean (SD) 63.1% (42.7%) reduction in frequency of accidents, 69.4% (32.7%) reduction in treatment with verbal feedback, and 58.6% (38.8%) reduction in treatment with the self-help booklet. The analysis of covariance indicated that the 3 groups were not significantly different from each other ($P=.23$). Similarly, a larger proportion of participants in the verbal feedback group achieved at least 50% and 75% reductions of incontinence, but differences were small and nonsignificant (FIGURE 2).

We also investigated whether baseline characteristics were associated with treatment outcomes. Treatment outcome was not related to diuretic use ($P=.40$), previous surgery ($P=.87$), or uterine prolapse ($P=.69$). Furthermore, no interaction was found by therapist. Results did not differ substantially when we excluded patients lost to follow-up after baseline only.

Bladder Capacity

A total of 48% of patients completed a posttreatment cystometrogram (30 in biofeedback, 35 in verbal feedback, and 42 in self-help booklet group). This subsample who completed pretreatment and posttreatment urodynamics was compared with the remaining patients on outcome (reduction of incontinence) and the baseline characteristics. Patients who completed a posttreatment cystometrogram had significantly shorter durations of incontinence ($P=.006$), were more likely to have a urethrocele ($P=.03$), and had greater reductions of incontinence with treatment ($P=.005$) than those who did not complete posttreatment urodynamics. These 2 groups did not differ significantly on the remaining variables. Bladder capacity increased by a mean 47.8 mL in the biofeedback group, 63.2 mL in the verbal feedback group, and 37.0 mL in the self-help booklet group. The improvements across all 3 groups were statistically significant (overall, $P=.001$), but the increases did not differ among the 3 interventions ($P=.54$).

Patient Satisfaction and Perceptions of Progress

Several aspects of the patient's perspective were assessed by a questionnaire (TABLE 3). After completing treatment, the biofeedback and verbal feedback groups were very similar in their descriptions of progress in therapy and comfort level for continuing treatment. For example, 62.3% and 63.2%

Figure 1. Patient Flow Diagram

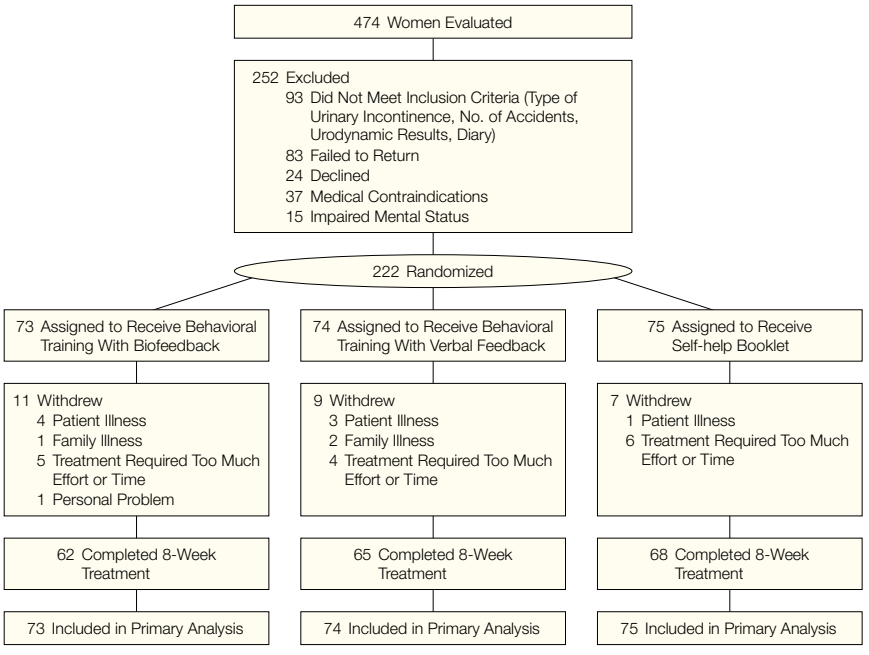


Table 1. Baseline Characteristics of the Study Sample*

Characteristic	No. (%) Biofeedback (n = 73)	Verbal Feedback (n = 74)	Self-help Booklet (n = 75)	Total (N = 222)	*P* Value
Demographics					
Age, mean (SD), y	64.8 (7.1)	65.8 (7.6)	65.8 (8.5)	65.4 (7.7)	.66
High school graduate†	60 (87.0)	67 (91.8)	66 (93.0)	193 (90.6)	.59
Black	11 (15.1)	13 (17.6)	11 (14.7)	35 (15.8)	.87
History					
Parity, mean (SD)	2.5 (1.7)	3.0 (2.0)	2.7 (2.0)	2.7 (1.9)	.33
Duration of symptoms, mean (SD), y	7.1 (7.8)	6.6 (7.7)	6.6 (8.7)	6.8 (8.1)	.91
Using diuretics	8 (11.0)	17 (23.0)	15 (20.0)	40 (18.0)	.13
Using estrogen	52 (72.2)	51 (68.9)	44 (59.5)	147 (66.5)	.23
Previous treatment with medication	16 (21.9)	18 (24.3)	21 (28.0)	55 (24.8)	.69
Previous treatment with surgery	16 (21.9)	13 (17.6)	12 (16.0)	41 (18.5)	.63
Activity restricted by UI	46 (63.9)	52 (70.3)	44 (59.5)	142 (64.6)	.67
Pelvic examination					
Urethrocele	20 (27.4)	14 (18.9)	20 (27.0)	54 (24.4)	.40
Cystocele, 2° or 3°	30 (41.1)	26 (35.1)	29 (38.7)	85 (38.3)	.76
Rectocele, 2° or 3°	13 (17.8)	11 (14.9)	12 (16.0)	36 (16.2)	.89
Atrophic mucosa	3 (4.1)	2 (2.7)	0	5 (2.3)	.23
Uterine prolapse	4 (5.5)	0	4 (5.3)	8 (3.6)	.12
Bladder capacity, mean (SD), mL	282 (117)	238 (100)	266 (105)	262 (109)	.04
Type of UI (on diary and urodynamics)					
Urge UI only	50 (68.5)	50 (67.6)	50 (66.7)	150 (67.6)	.97
Mixed stress and urge UI	23 (31.5)	24 (32.4)	25 (33.3)	72 (32.4)	
Severity classification, accidents per week					
Mild (<5)	14 (19.2)	14 (18.9)	16 (21.3)	44 (19.8)	
Moderate (5-10)	20 (27.4)	21 (28.4)	21 (28.0)	62 (27.9)	>.99
Severe (>10)	39 (53.4)	39 (52.7)	38 (50.7)	116 (52.3)	

*UI indicates urinary incontinence.
†There were 9 cases missing from education because of incomplete patient forms.

described their condition as "much better," respectively, whereas only 30.8% of patients in the self-help group considered themselves "much better" (overall, $P=.002$). On all 5 measures with significant group differences, the verbal feedback group was found to be significantly better than the self-help booklet group (description of progress, $P<.001$; accidents are smaller, $P=.006$; comfortable with treatment, $P=.01$; satisfaction with progress, $P<.001$; and restriction of activities, $P=.002$), and on 3 of the 5 measures (description of progress, satisfaction with progress, and restriction of activities), the biofeedback group was also found to be superior to the self-help group ($P<.001$, $P=.03$, and $P=.047$, respectively). The verbal feedback group did not differ from the biofeedback group on any measure. Thus, from the patients' point of view, both verbal feedback and biofeedback led to better outcomes on important measures of progress and patient satisfaction compared with the self-help group.

Table 2. Results of Behavioral Treatment on Frequency of Incontinent Episodes

Results	Biofeedback (n = 73)	Verbal Feedback (n = 74)	Self-help Booklet (n = 75)	*P* Value
No. of accidents per week, mean (SD)				
Pretreatment	15.1 (13.5)	17.3 (16.3)	15.4 (14.2)	.62
Posttreatment	6.1 (10.3)	6.0 (10.7)	6.7 (11.4)	.78
Percentage reduction				
Mean (SD)	63.1 (42.7)	69.4 (32.7)	58.6 (38.8)	.23
Median (interquartile range)	75.0 (–120.0 to 100.0)	82.8 (0 to 100.0)	70.4 (–29.4 to 100.0)	

Psychological Distress, Impact of Incontinence, and Quality of Life

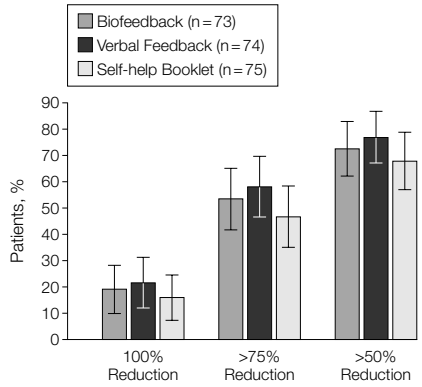
Repeated measures analyses of treatment effects revealed statistically significant main effects for pretreatment vs posttreatment on 9 of 10 scales of the Hopkins Symptom Checklist ($P<.05$; not hostility, $P=.13$), on all 4 subscales of the Incontinence Impact Questionnaire (all $P<.001$), and on 5 of 8 scales of the SF-36 (all $P<.05$). These effects indicated significant improvements across all 3 treatment groups. One significant group × time interaction effect was found on the vitality subscale, indicating that vitality scores increased more for the verbal feedback group ($P=.01$). Otherwise, no differential treatment effects were observed.

COMMENT

This study demonstrates that all 3 behavioral interventions were effective for

helping patients identify the pelvic floor muscles and use them to prevent episodes of urge incontinence. The use of biofeedback did not enhance efficacy more than what was achieved using careful training with verbal feedback or a detailed self-help program. In fact, the biofeedback and verbal feedback groups had almost identical rates of incontinence after treatment. The verbal feedback training did not consist merely of a cursory pelvic floor muscle contraction during a pelvic examination, but involved a more comprehensive session in which exercises were carefully and thoroughly taught, with time devoted to guiding patients through a series of exercises. Furthermore, the training was done in the context of an 8-week program in which patients were taught other continence skills and encouraged to persist in their efforts.

Figure 2. Reduction in Incontinence at 8 Weeks by Intervention Group



Error bars indicate 95% confidence intervals.

In this study, the self-administered behavioral treatment program was also very effective. The practitioner should note that this self-help program included keeping continuous bladder diaries that were mailed in biweekly, and patients were called if the diaries were not received. Furthermore, when patients were given the self-help booklet, they were also given an appointment to return after 8 weeks, which could have helped sustain their motivation. It is possible that the highly motivated volunteers who participated in this clinical trial may not be representative of the general clinical population.

Like any intervention, each of these teaching methods may not be the best approach for every patient. Some may learn more readily by interacting closely with the therapist; others may be more comfortable with the instrumented biofeedback and the more intricate variations the biofeedback provides. While many patients may prefer verbal feedback over being instrumented, clearly there are those who cannot identify the pelvic floor muscles because of extreme weakness, who lack the proprioceptive feedback that allows them to control pelvic floor muscles, and who may do better with biofeedback. Many clinicians have observed patients who cannot identify or adequately control pelvic floor muscles without biofeedback but subsequently are able to gain control through biofeedback. After completion of this trial, patients were offered the opportunity to crossover to these treatments. Five patients who completed treatment with verbal feedback elected to crossover into the treatment with biofeedback. These patients showed a mean 54.2% reduction of incontinence after the first treatment and 73.4% mean reduction after treatment with biofeedback. Patients who received biofeedback first were not offered the option of a second intervention in this trial.

Although the biofeedback and verbal feedback interventions were not significantly more effective than the self-help condition for reducing accidents as documented in bladder diaries, they did result in better outcomes in the patients' perceptions of and satisfaction with progress. Patient satisfaction with their progress is likely to be highly related to accident reduction; therefore, it could be that they were less satisfied because they did not reduce accidents to a critical threshold. However, other aspects of patient satisfaction might have been affected by their having had less contact with clinical staff. Personal interactions with care providers may contribute to patient satisfaction through encouragement and support, which are

Table 3. Patient Perceptions of Treatment*

Patient Perceptions	No. (%) Biofeedback (n = 53)	Verbal Feedback (n = 57)	Self-help Booklet (n = 65)	*P* Value
Patient description of progress				
Much better	33 (62.3)	36 (63.2)	20 (30.8)	<.001
Better	18 (34.0)	20 (35.1)	36 (55.4)	
About the same	2 (3.8)	1 (1.8)	8 (12.3)	
Worse	0	0	1 (1.5)	
Having fewer accidents	51 (96.2)	57 (100.0)	58 (92.1)	.09
Accidents are smaller	42 (79.2)	49 (89.1)	42 (67.7)	.02
Able to wear less protection	33 (71.7)	40 (83.3)	34 (70.8)	.29
Comfortable enough with treatment to continue indefinitely	49 (98.0)	54 (100.0)	54 (88.5)	.009
Patient satisfaction with progress				
Completely	39 (75.0)	47 (85.5)	34 (55.7)	.001
Somewhat	12 (23.1)	8 (14.5)	24 (39.3)	
Not at all	1 (1.9)	0	3 (4.9)	
How much does incontinence restrict your activities?				
Not at all	36 (69.2)	43 (78.2)	31 (50.8)	.007
Some or all of the time	16 (30.8)	12 (21.8)	30 (49.2)	
How disturbed do you feel about the incontinence?				
Not at all	26 (49.1)	32 (59.3)	23 (39.0)	.18
Somewhat	26 (49.1)	22 (40.7)	32 (54.2)	
Extremely	1 (1.9)	0	4 (6.8)	

*Not all items were completed on the patient questionnaire; therefore, percentages may not all total 100.

often critical to sustain a patient's motivation in a behavioral program.

Because all 3 treatment approaches appear to be clinically useful and acceptable, a practical strategy would be to initiate training with an instruction booklet or verbal feedback and reserve biofeedback for those who have difficulty learning pelvic floor muscle control in this way or who do not progress adequately in their attempts to reduce incontinence in their daily lives. This approach is consistent with the current reimbursement policies issued by the Centers for Medicare and Medicaid Services, which state that biofeedback is reimbursable after patients have failed a course of pelvic floor muscle training. However, patients whose efforts are not producing results may lose motivation and these patients are likely to reject alternative behavioral training.[13]

This study was specific to the treatment of urge incontinence and results should not be generalized to stress incontinence. Previous studies are inconsistent in determining the role of biofeedback in treatment of stress incontinence.[12,13,23,24] Although some research provides evidence that biofeedback results in higher success rates than training without biofeedback,[12,13] other studies are equivocal.[23,24] Thus, conclusions regarding the treatment of stress incontinence should be reserved for more definitive studies.

Furthermore, there is reason to believe that biofeedback may play different roles in the treatment of urge vs stress incontinence. It is clear that biofeedback makes it possible for patients to gain better control over pelvic floor muscle contraction, especially in the ability to maximize force and to sustain contractions, which is important for building strength. Treating stress incontinence relies on voluntary periurethral contractions to occlude the urethra. Thus, strength, the ability to sustain contractions, and a higher degree of muscle control would seem to be important for preventing stress accidents. In treating urge incontinence, mechanical occlusion of the urethra may be a less important function of pelvic floor muscle contraction than the fact that it inhibits detrusor contractions. It may not be necessary to achieve such a high degree of control or strength or to sustain a contraction, but only to activate the reflex pathway. The urge suppression strategy, consisting of pelvic floor muscle contraction adequate to inhibit the detrusor, may be the most essential component of this therapy.

The finding that biofeedback did not enhance the effectiveness of behavioral training for reducing urge incontinence indicates that behavioral training has excellent potential for becoming more widely disseminated and may be implemented using existing coding using time spent in patient education and counseling as the key factor for determining the specific level of service provided. Because verbal feedback and the self-help program can be implemented without the equipment and expertise needed to perform biofeedback, they are both appropriate and practical for use in most any outpatient clinical practice.

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