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BASIC Training: A Pilot Study of Balance/Strengthening Exercises in Heart Failure

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Abstract

Purpose: The aim of this pilot study was to evaluate the effect of a multicomponent balance and resistance training intervention on physical function, balance, and falls in older (≥65 years) community-dwelling heart failure (HF) patients.

Design: Randomized, two-group repeated-measures experimental design.

Methods: The intervention involved once weekly supervised group sessions with home sessions encouraged twice weekly. Focus groups held pre/post intervention. Outcome variables included measures of physical function, balance confidence, and falling risk.

Findings: In a sample size of 33, the Dynamic Gait Index change from baseline to 12 weeks was significantly different in the groups ($p = .029$). The number of reported falls declined from 0.92 to 0.54 per participant.

Conclusions: A supervised group session intervention can increase mobility and gait and reduce fall rate for HF patients.

Clinical Relevance: This study was designed to improve lower extremity strength, balance, and falls in elderly HF patients, thus reducing costs and improving quality of life for this population.

Keywords: Accidental falls; balance; heart failure; preventive therapy.

Introduction

Falling is a potentially avoidable event, which threatens elders' safety and independence. Falls are the leading cause of injury-related deaths in those older than 65 years of age (Centers for Disease Control and Prevention, 2013, 2016; Rogers, 2012). In the elderly patient with heart failure (HF), falls are even more likely to occur as the result of altered skeletal muscle function and deconditioning. In addition, loss of balance in this population may be compounded by the guideline-based pharmacologic therapy, which may have side effects of dizziness, orthostatic hypotension, or imbalance. This places the elderly patient with HF at even higher risk for morbidity and mortality related to falls than their healthy counterparts.

Those who fall have less muscle strength in the quadriceps, ankle, dorsiflexors, and plantar flexors (Aoyama, Suzuki, & Kuzuya, 2015; Orr, Raymond, & Fiatarone Singh, 2008). Studies have shown that resistance training (RT) can improve skeletal muscle strength in HF patients (Tabet et al., 2009; Toth et al., 2012). However, RT alone is not sufficient for modifying underlying balance issues. This is due to the fact that the ability to maintain balance involves multiple processes, including several sensory systems not usually affected by RT (Rogers, 2012). The balance system is composed of peripheral sensory input (vestibular, vision, and proprioception/somatosensation), central integration, and motor output (e.g., muscles and bones).

Because of the complexity of the etiology of falls, a multicomponent intervention was needed (Cadore, Rodriguez-Manas, Sinclair, & Izquierdo, 2013; Orr et al., 2008; Theou et al., 2011) to support static/dynamic balance and functional mobility. The Otago Exercise Program (OEP; Gardner, Buchner, Robertson, & Campbell, 2001) had been tested in four trials with over 1,000 elderly (65–97 years) community-dwelling men and women. Not only was it effective in reducing both the number of falls and injuries; but it had been effective both as a home-based (Gardner et al., 2001) and group-based program (Kovacs, Sztruhar Jonasne, Karoczi, Korpos, & Gondos, 2013). This pilot study was based on

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the premise that muscle strength, flexibility, balance, and reaction time are fall risk factors that can be modified (via the OEP).

The purpose of this pilot study was to evaluate the effect of a multicomponent balance and RT intervention on physical function, balance, and falls in older (≥65 years of age) community-dwelling patients with HF.

The study aims were as follows:

1. to test a multicomponent balance activities and RT intervention on the primary outcomes of physical function, balance confidence, and fall risk;
2. to explore participants' perceptions of balance confidence, fall risk, and the intervention through focus groups pre/post intervention;
3. to examine adherence (% attendance; % home activities) to the BASIC Training intervention; and
4. to test the feasibility of the BASIC Training intervention methods, recruiting and research strategies, and data collection.

Methods

This pilot study was approved by the institutional review boards at the two participating university institutions. A randomized, two-group with wait list control (WLC), repeated-measures design was used to test the effect of the intervention on balance and falls as an interim step to conducting a larger, fully powered study (Conn, Algase, Rawl, Zerwic, & Wyman, 2010; Feeley et al., 2009).

The sample was recruited over a 6-month period from an HF clinic located in the Midwest. Criteria for inclusion were 65 years of age or older, New York Heart Association Class II and Class III, community dwelling, and able to speak and read English. Exclusion criteria included the following: wheelchair dependency, history of significant residual neurologic deficits (e.g., recent stroke), recent history of whiplash or concurrent complaints of neck pain, and recent fracture or lower extremity surgery.

Measures

Participants were asked guided case history questions pertaining to their fall risk history (specifically including number of falls for the past 12 weeks), medical history, and comorbidities. Orthostatic blood pressure screening while lying, sitting, and standing was conducted. Measurements of systolic, diastolic, heart rate, and O2 saturation were obtained in each position with a period of 1–2 minutes of rest after moving into each position. Participants were asked to rate their perceived balance confidence with the Activities Specific Balance Confidence Scale (Powell & Myers, 1995). Scores <67 points suggest falling risk (Lajoie & Gallagher, 2004).

Measures of physical function, balance, and fall risk included the following. The Timed Up and Go (TUG) Test (Padsiadlo & Richardson, 1991) in which scores >12 seconds indicate falling risk (Centers for Disease Control and Prevention, 2017; Shumway-Cook, Brauer, & Woollacott, 2000). The Dynamic Gait Index (DGI; Shumway-Cook, Baldwin, et al., 1997; Shumway-Cook, Gruber, et al., 1997) evaluates balance (vestibular and nonvestibular), functional mobility, and gait; participants are scored on a 0–3 scale, with a total possible score of 24 points. Scores ≤19 points are used to classify falling risk (Shumway-Cook et al., 1997). The Modified Clinical Test of Sensory Interaction on Balance (MCTSIB; Shumway-Cook & Horak, 1986) measures body sway in degrees per second through various sensory conditions. The length of time participants were able to stand in each sensory condition (seconds) was recorded. Scores of the three trials per condition were averaged, generating an overall composite score. The 30-second Sit to Stand (STS) Test (Jones, Rikli, & Beam, 1999) was used to evaluate functional lower extremity strength. The number of fully completed sit-to-stand cycles were recorded and compared to normative data based on the participant's age range and gender for classifying falling risk (Jones et al, 1999). Participants wore a gait belt during all phases of balance and physical function assessment. Emergency equipment and trained personnel were available at all times to deal with any urgent situations that might have arisen during testing or balance activities and strengthening.

Intervention

Informed consent was obtained followed by screening for cognitive dysfunction with the Mini-Mental State Examination (required score ≥ 23; Folstein et al., 1975). Participants were randomized after completion of the data collection and physical function testing. A random allocation sequence for the group receiving the intervention in the first 12 weeks (BASIC) and the group that would receive the intervention in Weeks 13–24 (WLC) was generated, and the study statistician placed slips of paper in opaque envelopes sequentially numbered and stratified according to gender and age (≤75 and >75). Envelopes were distributed accordingly (see Figure 1 for details). The WLC group was asked to continue their usual activity level during the first 12 weeks and received the intervention during Weeks 13–24. All participants repeated the same testing at baseline, 12 weeks, and 24 weeks. This provided an opportunity to see if there was a residual effect (or a "detraining" effect) with the BASIC group.

Focus groups were conducted pre- and postintervention to discover perceptions of balance confidence, fall risk, and the intervention. These sessions were recorded and transcribed verbatim by an external service. Participants were

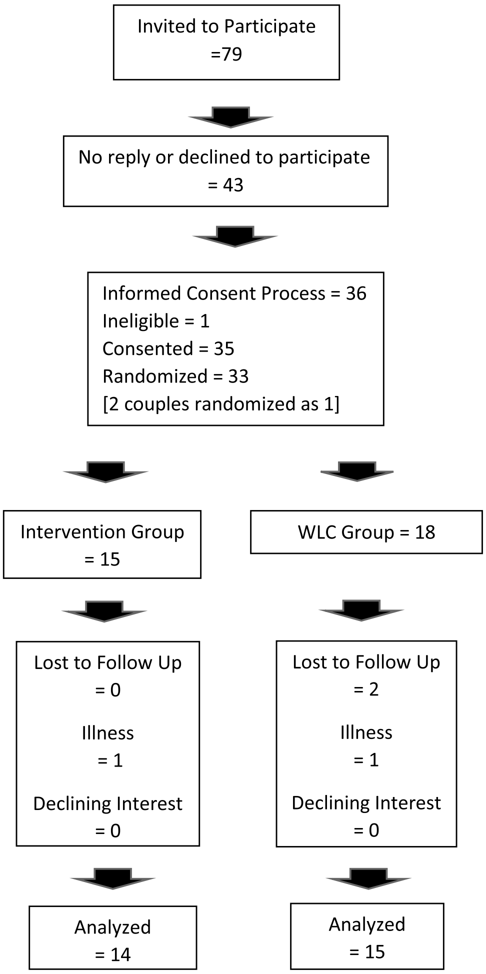

Figure 1. Participant Flow Diagram.

asked to attend a focus group immediately prior to the first supervised group session and after completion of the intervention at 12 weeks. Spouses, caregivers, or significant others were invited to attend a separate focus group session occurring simultaneously. Similar questions were asked to gather their thoughts and ideas, which were recorded with field notes only.

The supervised group exercise sessions met one time per week for an hour, and participants were asked to exercise two more times per week at home. The sessions were conducted by two exercise trainers at a medically based (hospital-owned) health, wellness, and fitness center. Sessions focused on improving static balance in the initial stages, progressing to dynamic balance. Balance retraining exercises were employed with attention on endurance, gait, functional skills, and avoiding falls. The RT component was composed of five exercises for major lower leg muscles concentrating on functional movements and walking.

Participants progressed through the training exercises depending on individual conditioning and functional status and the use of Ratings of Perceived Exertion. Exercises were progressed in difficulty by decreasing type of support (e.g., use of two hands, one hand, none) and increasing weight or the number of sets performed for the strengthening exercises. Exercise diaries were filled out at each Supervised Group Session for the participant to use to guide and record home exercise.

Data Analysis

Statistical Analysis

Sample size was based on guidelines for pilot studies (Hertzog, 2008). Allowing for 20% attrition, target enrollment was 50 based on the work of Kieser and Wassmer (1996) that found a sample size within the 20–40 range adequate to obtain variability estimates to use in more precise effect size and power calculations. As this was a pilot study, it was assumed that statistical tests would not be fully powered; however, with a sample size of 40, an independent t test of change between groups would have power of .80 (at alpha = .05) to detect a large effect (d = .9) and a dependent t test of change within the combined groups would have sufficient power to detect a slightly smaller than medium effect (d = .45).

To address Aim 1, a two-tailed independent t test was used to compare change scores from baseline to the end of the first 12-week period on physical function, balance confidence, and fall risk outcomes for the BASIC group with those in the WLC group. A second analysis combined the data from the delayed intervention period for the WLC group (Weeks 13–24) with that from the first 12 weeks for the BASIC group to test change from beginning to end of the intervention using a dependent t test (single group, pre- to postintervention). A supplemental analysis, involving only data from the BASIC group, used a dependent t test to test whether change was sustained from the end of the intervention (12 weeks) to follow up at 24 weeks. Effect sizes were estimated by dividing the differences in group means by the pooled standard deviation of the change scores (for the independent t test) or the mean change in the combined groups by the standard deviation of the change scores (for the dependent t test). Because the number of falls during this limited period was likely to be small, falls were examined only for the combined groups. A Wilcoxon signed-ranks test was used to test for change in the number of falls reported pre- to postintervention. In addition, a dichotomous variable was created, indicating whether or not any falls were reported. A McNemar test (using the binomial distribution) tested whether change from falls to no falls was greater than the reverse.

The adherence to the intervention (attendance at the 12 sessions; home exercises reported at least one time per week on the weekly diary) was calculated for Aim 3. Data were collected on the feasibility of the methods, strategies, and data collection for Aim 4.

Qualitative Analysis

To address Aim 2, participants and caregivers were included in focus groups to discuss perceptions before and after participating in the exercise sessions to provide contextual information. Focus group interviews were audio-recorded and fully transcribed by a transcription service. The data were then organized into a Microsoft Word document for examination of text data. An applied thematic analysis of the data was conducted (Guest, MacQueen, & Namey, 2012). Three members of the research team independently coded data. These members explored the data set for codes, subthemes, and themes. The three then collaborated and discussed their findings internally until they were able to reach a consensus on determining the pattern of themes derived from the focus group data.

Table 1 Baseline characteristics

Baseline Characteristics	*n*	%
Gender		
Female	16	48.5
Male	17	51.5
Marital status		
Married	19	57.6
Divorced	8	24.2
Widowed	6	18.2
Education, ≥12 years	32	97.0
Ethnicity, non-Hispanic/Latino	33	100.0
Race, Caucasian	33	100.0
NYHA functional class		
II	16	48.5
III	17	51.5
Medications		
Beta blocker	33	100.0
Diuretics	29	87.9
Digoxin	4	12.1
ACE inhibitor/ARBs	24	69.1

Note. NYHA = New York Heart Association; ACE = angiotensin-converting enzyme; ARBs = angiotensin II receptor blockers.

Findings

Thirty-five individuals were consented. Scores on the Mini-Mental State Examination for the 33 randomized (two spouses allocated to same group; not included in analysis) were mostly in the upper range (10 with a score of 29 and 12 with a score of 30). The sample was 54.5% male, with a mean age of 79.36 years (range 68–90) and 100% Caucasian. Education ranged from 11 to 23 years, with a high school education as the most predominant (27.3%). Thirty-one reported being retired, with three working part time. Nineteen (57.6%) were married, 24.2% were divorced, and 18.2% were widowed (see Table 1).

Fifteen participants (45.5%) were assigned to the BASIC group to start the exercise group sessions. Eighteen (54.5%) were randomized to the WLC group. Two participants dropped out due to health issues during the exercise sessions (one BASIC group and one WLC). Two others in the WLC group were lost between baseline and 12 weeks—one did not respond to calls for the 12-week data collection and another became too ill to participate. One participant in the BASIC group was excluded from the analysis at 12 weeks due to knee issues not related to the study.

Aim 1

Independent *t* tests indicated significant change ($p = .029$) in DGI between groups during the first 12 weeks (see Table 2 for details), with a large effect size (.92). A medium effect was found for both MCTSIB time (.63) and sway velocity (.40). When the groups were combined (data from WLC group during intervention phase [Weeks 13–24] with that from the first 12-week period for the BASIC group) for analysis, DGI was the only outcome approaching significance ($p = .068$) and had a medium effect size (.38). In the analysis to test whether change was sustained from the end of the intervention (12 weeks) to follow up at 24 weeks, the DGI showed significant decline ($p = .042$; see Table 3). There was essentially no change in the TUG Test and sway velocity at 24 weeks. The other outcomes also declined, showing small to medium effects (ABC effect size = .18, STS Test = .38, MCTSIB Test = .40, and DGI = .70) for decline from the 12-week data.

Total falls declined over the 24-week study. The mean number of falls reported at baseline was 0.92 ($SD = 1.12$) and fell to 0.54 ($SD = .88$) after 12 weeks of the intervention. At baseline, 15 participants reported 0 falls, increasing to 21 (58% with zero falls to 81%) during the study. Falls for the combined groups decreased in eight participants, increased in one participant, and did not change in 17 participants. With a one-tailed test, there was a significant decrease ($p = .040$) in the number of falls pre to post in the combined group using the Wilcoxon signed-ranks test. Using the dichotomized outcome (falls or no falls), there was significantly more change from the fall to the no-fall category in the combined group analysis (McNemar Test, $p = .035$, one-tailed test).

Aim 2

Twenty-nine of the 31 participants (94%) participated in the preintervention focus groups, and 28 (90%) participated in the focus groups postintervention. Individual attendance was not recorded for the spouse/caregiver focus groups.

Table 2 Independent *t* tests of differences in change from baseline to 12 weeks for BASIC intervention and waiting list control groups

Outcome	Group	*n*	Baseline Mean (*SD*)	Week 12 Mean (*SD*)	Mean Change (*SD* Change)	Mean Difference in Change (SE of difference)	*t*	*p*
Dynamic Gait Index	BASIC	13	18.9 (3.8)	20.9 (1.8)	2.0 (3.0)	2.3 (1.0)	2.356	.029*
	WLC	15	19.1 (4.6)	18.9 (4.4)	−0.3 (1.9)			
Sit to Stand	BASIC	14	6.9 (4.2)	7.9 (4.5)	0.9 (2.0)	−0.2 (0.9)	−0.262	.795
	WLC	13	6.5 (3.6)	7.7 (5.4)	1.2 (2.4)			
Timed Up and Go	BASIC	13	11.6 (2.4)	11.6 (2.0)	0.015 (1.97)	−0.4 (0.8)	−0.469	.637
	WLC	15	13.5 (5.2)	13.9 (6.0)	.418 (2.49)			
ABC Scale	BASIC	14	74.9 (17.3)	74.1 (12.6)	−0.836 (14.1)	0.03 (5.0)	0.007	.995
	WLC	15	72.1 (13.3)	71.2 (15.8)	−0.868 (12.5)			
CTSIBM Time	BASIC	12	8.7 (0.9)	9.0 (1.0)	0.219 (0.9)	0.5 (0.3)	1.414	.172
	WLC	12	9.0 (0.9)	8.7 (0.9)	−0.247 (0.7)			
CTSIBM Sway Velocity	BASIC	7	1.9 (0.6)	1.7 (0.6)	−0.176 (0.7)	0.3 (0.4)	0.893	.387
	WLC	9	1.7 (0.6)	1.2 (0.7)	−0.500 (0.8)			

Note. ABC Scale = activities specific balance confidence scale; CTSIBM = clinical test of sensory interaction on balance - modified; WLC = wait list control.
*$p < .05$.

There were seven preintervention focus groups offered, and six had attendees. Of the seven offered postintervention, four had spouse/caregiver participants.

Preintervention participant focus group themes were (1) concern for falls; (2) increasing weakness, unsteadiness; and (3) the need for consistency and accountability to actively participate in the balance training. Postintervention themes included (1) better balance; (2) stronger; and (3) more at ease, steadier. Themes from "what did you like about the exercise sessions" included (1) small class size, (2) camaraderie, and (3) progressive exercises. Participants indicated that (1) the book (illustrations of the exercises) and (2) accountability helped them with home exercise. When asked what changes they would make, the following themes emerged: (1) time of day for the class (prefer morning) and (2) include education/support group. Themes from the spouse/caregivers group included (1) the social aspect, (2) doing exercises in a group, and (3) assistance with technique.

Aim 3

Session attendance was similar between groups with the BASIC group at 81% and the WLC group at 80%. The range of attendance was 8%–100%. Adherence for the combined groups was 65% for completion of at least one or more home sessions per week.

Aim 4

Assessment of recruitment and data collection logistics (e.g., recruit/enroll; training team, completion of balance testing and survey instruments; monitoring adherence records and intervention fidelity) was recorded for consideration in the next study. In summary, the program was helpful to participants and is a valuable first step toward a full-scale study.

Discussion

To our knowledge, this is the first study to investigate the use of a multicomponent balance and RT intervention (OEP) in an HF population. The most notable improvement was the decrease in the number of reported falls during the study. This is in concordance with previous studies using the OEP when falls were reduced 32% (Campbell, 1997, 1999), 46% (Robertson, Devlin, Gardner, & Campbell, 2001), and 30% (Robertson, Gardner, Devlin, McGee, & Campbell, 2001). A meta-analysis (Thomas, Mackintosh, & Halbert, 2010) of seven OEP trials in 65 and older

Table 3 Dependent *t* tests of postintervention maintenance from Week 12 to Week 24 (BASIC group only)

Outcome	*n*	Week 12 Mean (*SD*)	Week 24 Mean (*SD*)	Mean Change (*SD* of change)	*t*	*p*
Dynamic Gait Index	11	20.7 (1.8)	19.3 (3.4)	−1.45 (2.07)	−2.334	.042*
Sit to Stand	14	7.9 (4.5)	7.0 (4.5)	−0.86 (2.28)	−1.405	.183
Timed Up and Go	13	11.6 (2.0)	11.7 (2.7)	0.09 (1.96)	0.173	.866
ABC Scale	14	74.1 (12.6)	71.6 (13.7)	−2.49 (13.57)	−0.685	.505
CTSIBM Time	9	9.0 (1.1)	8.8 (1.1)	−0.22 (0.60)	−1.101	.303
CTSIBM Sway Velocity	4	1.0 (0.3)	1.0 (0.3)	0.004 (0.39)	0.021	.984

*$p < .05$.

community-dwelling adults showed a significant reduction in fall rates (incidence rate ratio = 0.68, 95% CI [0.91, 1.22]).

The intervention group scored significantly higher on the DGI measure than the WLC group. This result was similar to the study of Kwak, Kim, and Lee (2016) demonstrating a significantly higher ($p < .05$) DGI score for those participating in an elastic band resistance exercise testing balance, gait function, flexibility, and fall efficacy in persons ≥65 years. Keller and Bastian (2014) reported improvements in DGI ($p < .001$) in a home balance exercise program for people with cerebellar ataxia. Very few balance studies using DGI as a measure were found in the literature for comparison, but results from this pilot study suggest that the exercises may have improved the mobility of participants and influenced their ability to adapt to changes while walking. The decline from 12 to 24 weeks (maintenance testing) in the BASIC group suggests that the 12 weeks of exercise was not sufficient to effect long-term changes in this sample.

The TUG Test, frequently used in OEP studies, was not significant in this pilot study. This was also the case in OEP home-based studies with an Alzheimer population (Suttanon et al., 2013), hemophilia/blood disorder (Hill et al., 2010), and patients ≥70 with recent falls (Liu-Ambrose et al., 2008).

When the data for the 12 weeks of the intervention were combined for both groups, the STS Test increased from pre- to postintervention, but the effect size was small and the change was not significant. This finding contrasts with most studies using OEP; however, nonsignificant results occurred in a 6-month home-based study with an Alzheimer population (Suttanon et al., 2013) and a 4-month home-based study in the hemophiliac population (Hill et al., 2010). Participants were hesitant to perform the STS Test without arms on the chair. Lord, Murray, Chapman, Monro, and Tiedeman (2002) reported that STS Test performance can be influenced by multiple sensorimotor, balance, and psychological processes and might entail addressing all these issues. Although this was a multicomponent intervention, it did not encompass psychological processes and might have included more sensorimotor elements (e.g., surface and visual changes). Perhaps the skeletal effects of the disease require more intense lower extremity strengthening to affect change. Because these were patients with HF, we did not encourage them to walk 30 minutes twice a week as recommended in the OEP, and this may have also been a contributing factor in this sample not demonstrating significant change in lower leg strength testing (STS Test and TUG Test).

The ABC scores did not change significantly. Mean scores at baseline were above cutoff score of <67% indicative of fall risk (84% sensitivity and 87.5% specificity) reported by Lajoie and Gallagher (2004). Jung, Lee, Shi, and Lee (2015) also reported nonsignificant change ($p > .05$) in their treadmill exercise control group of stroke patients. It is also possible that the small change in balance confidence scores reflect an increased awareness of balance limitations, and findings are thus an indirect effect of participation. Participants reported they were “stronger,” “steadier,” and “more aware of risk/issues” when asked to describe their balance in postintervention focus groups. This sample had a moderate-level physical functioning score (50%–80%), so participants may not have changed much in the 6 months of data collection, confidence may not have changed at the same rate as physical function, or participants may need further balance exercises to increase confidence.

A curious finding for the MCTSIB was that the effect size for sway velocity in the combined groups showed performance worsening. Participants reported dreading standing on the foam at 12- and 24-week testing, and the sample size diminished over the course of the study, which may have affected results.

A systematic review of exercise programs to prevent falls (Shier, Trieu, & Ganz, 2016), reported adherence from 18% to 100%, with the Otago specific program reporting 72% adherence to two times per week, higher than our 65% at least once a week. Some participants reported during focus groups that their main reason for enrolling in the study was because it was a research study or because their health provider had suggested that they enroll. This response suggests they may have been politely complying (Walker, Porock, & Timmons, 2011) rather than being concerned about their balance and fall risk, which may have influenced their adherence to the home sessions. Increasing the time spent in supervised sessions with additional instruction and encouragement of greater intensity may be needed. For example, Kyrdalen, Moen, Roysland, and Helbostad (2014) conducted 12 weeks of twice weekly supervised sessions resulting in functional balance ($p = .014$), muscle strength ($p = .005$), and physical health ($p = .004$) more effectively improved than with home training three times per week, despite similar compliance to 16 hours of exercise per period.

Feasibility data collected in preparation for a full-scale study (Feeley et al., 2009) provided support for offering BASIC to a larger audience. This was an opportunity to test recruitment methods and the appropriateness of the measures for this particular population. Initially, there was some thought that the measures may not have been useful in detecting change in the HF population. However, it may be that some enhancements are needed to deal with the challenges HF patients have with lower extremity leg strength, cognition, and possible depression.

Key Practice Points

- Multicomponent balance training intervention (BASIC) reduced self-reported fall rate.
- Balance activities and strengthening exercises helped mobility and gait, decreasing fall risk.
- Participant performance in testing declined after 12 weeks without supervised group exercise sessions.
- A larger-scale study is needed to further develop and enhance the intervention.

With regard to acceptability of the intervention (Feeley et al., 2009), the focus group data indicated that the population was happy with the program as offered (except for time of day) and had indicated the same to family. The facility involved was accepting of the program and provided space for the supervised sessions along with personnel to lead the sessions.

The limitations of the study include the relatively small sample size of a pilot study and the lack of blinding to assignment by the research assistants conducting the balance and physical function testing (due to small study, they also had the task of distributing randomization envelopes after initial testing). Another potential limitation is that no enhancements were made to the OEP protocol to compensate for the skeletal deconditioning that accompanies HF.

This pilot study contributes to the literature, as it is the only one we are aware of to focus on delivering an exercise program for fall prevention to the older, community-dwelling HF patient. Additional research is needed with a larger sample size and enhancements to the program, such as the following: (1) increase dose to enhance sustainment of functional changes and provide greater memory retention of exercises; (2) enhance the intervention with multisensory training (e.g., surface, visual, tasking) and include more specific visual/vestibular testing to hone in on the affect in HF patients; (3) augment strengthening exercises for lower extremities to combat the skeletal muscle loss related to HF; (4) integrate educational component into exercise session so participants know the relevance of the exercises to their daily activities and don't have to ask "Why do I need to stand on my toes?"; and (5) add (depression, frailty) and change (cognition) some data collection instruments.

In conclusion, our findings indicate that a supervised group session RT and balance retraining program can reduce the fall rate for HF patients. It helped participants increase their mobility and gait as demonstrated in the DGI findings. However, it is noted that these improvements declined after participants went 12 weeks without weekly supervised sessions. Further study is needed to confirm and further develop the findings of this study.

Clinical Relevance

Implications for rehabilitation professionals include awareness of the increased risk of falls in HF patients related to medication side effects, decreased lower extremity strength, and increased sway in postural balance. It is important to identify fall risk (as with the DGI) to provide an appropriate level of assistance and improve quality of care. Fall prevention programs should be in place when caring for this population. This feasibility study demonstrated reduction of fall risk and falls through a supervised program for elderly HF patients. Rehabilitation nurses may observe and recognize balance issues in community-dwelling HF patients and can educate them on the benefits of participating in balance and strengthening exercises to promote physical function. Rehabilitation professionals can take an active role in advocating for patients to participate in programs for balance and strengthening, provide balance and strengthening programs in their communities, and promote self-management by encouraging patients to do balance exercises and incorporate strengthening exercises for the lower extremities. The prevention of future falls will reduce costs, as well as the physical and emotional burdens related to falls, and make a major difference in the quality of life for this population.

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Conflicts of Interest

The authors declare no conflict of interest.

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