A Trial of a Comprehensive Nursing Rehabilitation Program for Nursing Home Residents Post-Hospitalization

Victoria T. Grando, PhD, APRN, BC; Kathleen C. Buckwalter, PhD, RN, FAAN; Meridean L. Maas, PhD, RN, FAAN; Marybeth Brown, PhD, PT, FACSM, FAPTA; Marilyn J. Rantz, PhD, RN, FAAN; and Vicki S. Conn, PhD, RN, FAAN

ABSTRACT
This pilot study examined the feasibility of implementing a comprehensive nursing rehabilitation program (CNRP) designed to promote the physical functioning of moderately frail nursing home residents post-hospitalization. The 4-week to 8-week CNRP incorporated three interventions: the Capacity Intervention (improving strength and balance), Performance Intervention (fostering daily mobility and activity), and Facilitating Intervention (providing education, support, and stress management). A longitudinal design was used with a convenience sample of 24 moderately frail residents. The CNRP was found to be not practical as designed because the intervention occurred too close to hospital discharge, and many prospective participants did not “feel up” to participating in a voluntary nursing rehabilitation program in addition to other prescribed rehabilitation. Regardless, participants were found to be able to perform the exercises safely and the CNRP was easily implemented in nursing homes. Testing the efficacy of the CNRP with nursing home residents is recommended after the initial post-hospitalization period.
admitted to nursing homes from hospitals have more difficulties with physical functioning than those from other settings (Grando, 2001).

There is increasing evidence linking hospital care with frail older adults’ reduced physical functioning and nursing home placement. In just 2 days in an acute care hospital environment, the combined effects of enforced bed rest, immobility, and emotional stress negatively affect numerous body systems, including musculoskeletal, cardiovascular, respiratory, and digestive systems (Creditor, 1993; Kortebein et al., 2007; Suesada et al., 2007). Moreover, this decline happens independently of disease effects (Creditor, 1993; Suesada et al., 2007).

After hospitalization, nursing home residents, unfortunately, experience more than physical decline. It is commonly believed that the crisis of hospitalization can lead to emotional stress as a result of being in a strange environment, the loss of personal control, and uncertainty about how to cope (Bloomfield, 1997; Convertino, Bloomfield, & Greenleaf, 1997; Creditor, 1993; Mahoney, 1998). In addition, the rapid relocations from home to hospital and then from the hospital to a nursing home add the burden of relocation stress to the already compromised frail older adult (Castle, 2001). The result is a newly admitted nursing home resident with emotional stress and reduced physical functioning.

Numerous researchers have demonstrated the benefits of exercise in older adults who range in age from their mid 60s to late 90s. It is well established that older adults are able to improve muscle strength and size, balance, flexibility, gait speed, and stair-climbing power safely through a wide range of exercises in 4 to 12 weeks (Ota, Yasuda, Horikawa, Fujimura, & Ohara, 2007; Fahor et al., 2006; Rosendahl et al., 2006; Smith, Kennedy, Smith, Orent, & Fleshner, 2006). Furthermore, it appears that both high-intensity (four to six repetitions at 80% of maximum load) and low-intensity (8 to 12 repetitions at 40% of maximum load) exercise programs are effective (Hortobagyi, Tunnel, Moody, Beam, & DeVita, 2001; Seynnes et al., 2004). Low-intensity exercise has an additional benefit in reducing the risk of muscle soreness and injury. Keysor and Jette (2001) reviewed 31 aerobic and exercise intervention studies of older adults conducted between 1985 and 2000. The exercise programs included flexibility interventions, resistance training, endurance training, and balance/compression programs. The authors concluded that older adults who engaged in strength training and aerobic exercise could improve their muscle strength, endurance, balance, mobility, transfer, and range of motion.

Despite the clear evidence that older adults can benefit from physical activity and exercise, few researchers have looked at the outcomes of exercise for frail nursing home residents who recently have been hospitalized. The purpose of this pilot study was to establish the feasibility of implementing a comprehensive nursing rehabilitation program (CNRP) with nursing home residents post-hospitalization.

**CONCEPTUAL FRAMEWORK**

A theory of the problem was developed to guide the design of the CNRP, which was based on a concept analysis of frail older adults’ physical functioning. Physical functioning is generally understood to be one’s ability to carry out necessary daily activities, but it has not been consistently defined in the literature (Pearson, 2000). In an attempt to clarify this discrepancy, Glass (1998) argued that the different uses of the concept physical functioning reflect differing “tenses” of the term: hypothetical (what frail older adults believe they can do), experimental (what they are capable of doing), and enacted (what they are doing). Leidy’s (1994) analysis of a related concept, functional status, provides further insights. She maintained that functional status reflects more than simply a person’s physical capacity. Instead, she stated that the concept of functional status has four dimensions: functional capacity, functional reserve, functional performance, and functional capacity utilization. The interrelationship among all four dimensions influences a person’s functional status.

Extending the work of both Glass (1998) and Leidy (1994), we proposed that frail older adults’ physical functioning can best be understood by three subconcepts:

- **Physical capacity.**
- **Performance patterns.**
- **Facilitating beliefs.**

*Physical capacity* refers to frail older adults’ physical ability to engage in activity. It is the function of the frail older adults’ strength, endurance, cardiovascular fitness, body composition, and flexibility; it is influenced by their health state. *Performance patterns* are frail older adults’ patterns of daily activity, ranging from active to sedentary. Daily activity includes, but is not limited to, eating, dressing, exercising, and walking. *Facilitating beliefs* are frail older adults’ views about what they can and will do. Their belief system, values, knowledge, and stress level all influence their facilitating beliefs. Thus, frail older adults’ physical functioning decline (the problem) results from:
Grando et al.

Their reduced physical capacity related to hospital-enforced bed rest.

Their altered performance patterns related to the inactivity and change in daily routine resulting from the hospitalization.

Their unhelpful facilitating beliefs related to the stress of the hospitalization and the belief that recovery requires rest rather than activity.

DEVELOPMENT OF A COMPREHENSIVE REHABILITATION NURSING PROGRAM

On the basis of the theory of the problem, frail older adults’ physical functioning decline, a CNRP was developed. Because frail older adults’ physical capacity, performance patterns, and facilitating beliefs interact to affect their physical functioning, the CNRP addressed these subconcepts through the synergy of three interventions, which were integrated into a 5-day-per-week, one-on-one program that lasted 4 to 8 weeks, depending on the participant’s length of stay in the nursing home. The program, individualized to meet each frail older adult’s specific needs, was initiated shortly after hospitalization, thus preventing the continuation of patterns of inactivity that had begun during hospitalization.

The first intervention, the Capacity Intervention, was directed at improving the physical capacity of the frail older adults and involved individualized, one-on-one, biweekly exercise sessions. It incorporated upper-body and lower-body resistance and range of motion workouts that included warm-up, chair, standing, and cool-down exercises. These sessions involved demonstrations of the exercises, individual coaching, and protective supervision. The second intervention, the Performance Intervention, was aimed at promoting mobility and activities of daily living (ADLs). These biweekly, individualized, one-on-one sessions included endurance walking, balance exercises, and ADLs practice. The last intervention, the Facilitating Intervention, focused on education and stress reduction. It was designed to enhance frail older adults’ beliefs about their ability to engage in physical activity. The Facilitating Intervention involved weekly, one-on-one sessions that included:

- Instruction about the kinds of exercises and activities needed.
- A supportive relationship that reinforced desirable beliefs and values related to an active lifestyle.
- Stress-reduction techniques (progressive relaxation and guided imagery) to reduce emotional stress that might negatively influence older adults’ motivation to be active (Girard, 1997; Lieberman, 1991).

The Figure is a graphic representation of the CNRP practice model.

METHOD

Design

A longitudinal design with an experimental group and a nonequivalent comparison group was used in this pilot
study (Burns & Grove, 2005; Musil, 1998). The population of interest was moderately frail nursing home residents recently admitted from a hospital. Inclusion criteria were as follows:

- Age 55 or older.
- Admission into the nursing home directly from the hospital.
- The ability to understand and follow directions (a Minimum Data Set [MDS] Cognitive Performance Scale score of 0 to 4).
- Physician's consent that the resident is physically able to participate in the study.
- Moderate frailty (needing setup or one-person physical assistance with mobility, ADLs, or both).

All participants were involved in the pilot study from 4 to 8 weeks, with length of participation varying, depending on their length of stay in the nursing home. The experimental group received the planned CNRP. The comparison group received routine nursing home care, which consisted of meal preparation, medication delivery, assistance with mobility and ADLs, and rehabilitation services as ordered by the physician.

Sample

A total of 190 nursing home residents were contacted to participate in the pilot study. Our goal was to recruit 48 participants; we were able to recruit 41. Of those who consented to take part in the study, 24 (59%) actually participated in the study. Seventeen (41%) withdrew before beginning the study: 12 were unexpectedly discharged from the nursing home before they could begin the study, 2 did not get physician approval to participate in the study, and 3 did not meet the study admission criteria. Of the 24 participants who took part in the study, 20 were in the experimental group, and 4 were in the comparison group. Three of the 20 (15%) participants in the experimental group voluntarily withdrew early from the study.

Regarding demographic data, the average age of the sample was 84 (age range = 67 to 95), 90% were women, 95% were Caucasian and 5% were African American, and average ADL scores on admission were 7 (range = 1 to 13). Possible ADL scores ranged from 0 to 28, with higher numbers indicating greater disability.

Procedures

Institutional Review Board approval for this pilot study was obtained before participant recruitment. Recruiting, consent, and enrollment used a three-stage process. The first stage was preliminary consent. Nursing home staff contacted potential participants to obtain verbal consent that would grant permission for the research staff to speak to them about the study. The second stage was written consent. The research staff explained the study protocols to potential participants. After that, they obtained potential participants’ written consent to participate in the study, as well as consent for research staff to verify whether the resident met the study criteria. The third stage was enrollment. The research staff performed a chart review and contacted potential participants’ primary care providers to determine whether the resident met the criteria for participating in the study. If potential participants met the study’s inclusion criteria, they were enrolled in the study. Research staff notified nursing home staff if any potential or consented study participants had any noteworthy symptoms such as pain, illness, or vital signs out of the normal range.

The principal investigator and first author (V.T.G.) trained the two research aides. One research aide worked exclusively with the experimental group, and the other worked exclusively with the comparison group. Participants were contacted in person to establish a time of day they would be able to participate. The study measures were administered for both the experimental and comparison groups at two to three assessment points, depending on participants’ length of stay in the study. The assessment points were at baseline, 4 weeks, and 8 weeks. Participants in the study for 4 weeks had two assessments; those in the study for 8 weeks had three assessments.

Each assessment was conducted in two separate 45-minute sessions, to avoid tiring the participants. The research aide met one on one with each participant in the experimental group five times per week for approximately 45 minutes each session to conduct the interventions. For example, in one 5-day period, the Capacity Intervention was done on Monday and Wednesday, the Performance Intervention was done on Tuesday and Thursday, and the Facilitating Intervention was done on Friday. The research aide and participants in the comparison group met one on one for administration of the study measures.

All participants wore an exercise belt during exercise and walking sessions and when taking the modified Physical Performance Test (Reuben & Siu, 1990). The exercise belt is a safety aid worn around each participant’s waist on which research staff could have a firm grasp to help prevent the participant from falling. The exercise interventions were done in each participant’s room when he or she was either sitting in an armchair or standing using a walker for stability. The walking intervention was done in the halls of the nursing home.
The research aide completed assessments with the experimental group before and after each session. The information obtained from these assessments was used to determine participants’ reactions before, during, and after the sessions, to monitor for adverse reactions and to track participants’ progress and readiness for movement to the next intervention level. When participants demonstrated that they could complete the exercises with tolerance and proficiency, they advanced to the next level.

**Measures**

The MDS-ADL Long-Form scale was used to measure participants’ performance patterns. It assessed their performance of activities such as dressing, personal hygiene, toilet use, ambulating on the unit, transfer, bed mobility, and eating over a 7-day period. The MDS-ADL Long-Form scale is reliable, as indicated by a 0.94 Cronbach’s alpha coefficient for internal consistency. The ADL self-performance items in the MDS were reliable, as indicated by intrarater reliabilities of 0.87 to 0.94. The MDS-ADL Long-Form scale has a possible range of 0 to 28, with higher numbers representing greater disability (Morris, Fries, & Morris, 1999).

The Physical Performance Test (Reuben & Siu, 1990) was used to assess participants’ physical capacity because it measured what they were capable of doing at one point in time. It is a 7-item scale that includes writing a sentence, simulating eating, turning 360 degrees, putting on and removing a jacket, lifting a book and putting it on a shelf, picking up a penny from the floor, and walking 50 feet. Reliability was demonstrated by a Cronbach’s alpha coefficient of 0.79, and intrarater reliability was 0.93. Scores of the Physical Performance Test were highly correlated with the modified Rosow-Breslau scale (0.69), the Tinetti Gait score (0.69), the Hierarchical Instrumental and Basic Activities of Daily Living Scales (0.56), and the Katz Activities of Daily Living scale (0.50) (Reuben & Siu, 1990). Performance on the Physical Performance Test was modified to measure the time it took to complete each task in addition to the actual behavior scale.

The Frail Elderly Functional Assessment Questionnaire (Gloth, Walston, Meyer, & Pearson, 1995) was used to determine participants’ facilitating beliefs because it measured their perception of their performance of ADL and instrumental ADL (IADL) functioning. This 19-item, reviewer-administered questionnaire is capable of measuring very low ADL and IADL performance levels. It was tested on frail older adults in the community and in inpatient rehabilitation settings. Test-retest reliability was 0.82 overall. Using Cohen’s kappa to estimate construct validity, the measure was highly correlated with the Katz Activity of Living scale (0.86), Lawton’s Instrumental Activity of Living scale (0.67), and the Barthel Index (0.91) (Gloth et al., 1995). The Frail Elderly Functional Assessment Questionnaire was also found to have a high (0.90) correlation with direct observations by researchers. It has a possible range of 0 to 55, with lower numbers indicating better functioning (Gloth et al., 1995).

**FINDINGS**

We found that the CNRP was not practical for the intended population because the intervention occurred too close to the time of hospital discharge, and participants did not “feel up” to participating in a voluntary nursing rehabilitation program in addition to other prescribed rehabilitation. In fact, 78% of the 190 nursing home residents approached to take part in the study were unwilling to participate. They gave the following reasons for not wanting to participate:

- They believed they were too old.
- They were already receiving physical therapy and felt it wore them out.
- They did not want to do anything extra.
- They were hurting too badly to do exercises.
- They did not have the strength to do any more.
- They were too tired to do exercises.

Nonetheless, the CNRP proved to be feasible within the nursing home environment. It was easily implemented and required no extra equipment. Moreover, the frail older adult nursing home residents who participated in the CNRP were able to perform the exercises safely with direction and supervision and believed the program helped improve their physical functioning, as described in the following participant statements about the interventions:

- “I feel like it’s just brought me back to life again.”
- “I found that I thoroughly enjoyed it and see where it could help me.”
- “Yes, I would say my strength has improved since I’ve been in the program.”
- “Well, I think I have more ambition and more desire to get up and move around.”
- “I think it’s helped physically and mentally.”

In addition, participants reported that their activity goal was to be able to ambulate. As one stated, “I hope that I can get up and move around.”

Some participants perceived the CNRP, a one-on-one exercise program, was more beneficial than the traditional
group exercise programs frequently offered in the nursing homes, as indicated in the following statements: “Well, the exercise [CNRP] probably has helped me more than down there as a group [exercise],” and “One-on-one is more helpful, or has been to me.”

Testing of the small convenience sample suggested that participants’ ADL functioning may have improved. Using the Wilcoxon matched-pairs test (Munro, 2005), we found a significant improvement in ADL functioning between the pretest and posttest scores (\( p \leq 0.05 \)) after 4 weeks of participating in the study. These preliminary findings need to be verified in a larger study designed to test the efficacy of the CNRP.

We observed that both experimental and comparison group participants had considerable difficulty with chair rise, walking with a walker, and standing balance. They were slow, unsteady, or both when performing these activities. Only 1 participant in the experimental group was able to walk without a walker by the end of 4 weeks.

In addition, we found that a few participants were unable to participate in every scheduled exercise session because they were not feeling well that day. The reasons given included complaints of being tired, as well as illnesses such as the common cold or an upset stomach. The complaints of being too tired to participate were not surprising, as self-reported exhaustion is one of the symptoms of frailty (Fried et al., 2001), and it appears that feelings of fatigue may vary from day to day.

LESSONS LEARNED

Our findings suggest that the CNRP can be implemented easily in nursing homes and that frail older adults can safely perform exercises post-hospitalization as well as perceive a benefit from an individualized one-on-one program. The most important lessons to be learned from this study, however, derive from what did not work, including problems with recruitment, the intervention, and the measurement tools.

Problems with Recruitment

Three factors influenced the decision of the many frail older adults post-hospitalization who were reluctant to engage in a voluntary exercise program. First, we recruited participants immediately after discharge from the hospital. It became obvious that residents needed more time to recover from the stress of the hospitalization before asking them to begin an exercise program. For example, 2 residents were approached to participate in the study but declined. Both had been active at home before their hospital stay, and their families asked us to try again in a week. At the first interview they were closed and guarded, but at the second interview they were very friendly and open. They both willingly agreed to participate and enjoyed doing the exercises.

Second, because many older adults of this generation are not familiar with exercise programs, the verbal description of the CNRP given at recruitment may not have sufficiently explained the program and encouraged involvement. A video demonstration would have been more informative and would have demonstrated older adults successfully doing the exercises, which may have helped potential participants understand the program.

Third, participants who were admitted to the nursing homes to receive physical therapy, occupational therapy, or both were reluctant to participate in additional exercise. Typically, however, physical therapy and occupational therapy are done for a limited time once per day, and most frail older adults post-hospitalization can benefit from rehabilitation services twice daily. This underscores the importance of the Facilitating Intervention, which addresses frail older adults’ beliefs about engaging in low-intensity exercises.

Although part of our intervention had to do with changing beliefs about the need to perform low-intensity exercises, this intervention did not help potential participants give the program a chance. Perhaps exercise interventions with frail older adults post-hospitalization would be best addressed in two stages, with the Facilitating Intervention independent of the Capacity and Performance Interventions. The first stage would address the frail older adults’ belief systems about the necessity for being physically active following hospitalization. After they had completed this stage and if they agreed to the second stage, the exercise and activity interventions would then be implemented.

Problems with the Intervention

One component of the CNRP proved not to be needed. We had proposed the Performance Intervention to help participants regain the ability to perform ADLs and enhance mobility. We found that none of the treatment participants needed assistance with ADL functioning. Instead, because of participants’ difficulty with chair rise and mobility, they would have benefited from additional assistance with frequent, short periods of ambulation throughout the day.
Problems with the Measurement Tools

Our findings indicate that the modified Physical Performance Test was not sensitive to changes in this frail population. For example, most participants’ walking speeds fluctuated over time. As a result, gait speed might have been associated more with the participant’s energy level on a particular day rather than his or her actual capacity. This may have resulted from the frail older adult’s fatigue variability. The fact that we found change with the MDS-ADL Long-Form scale, which measures ADL performance over 7 days, lends some support to this conclusion. Fatigue variability may not have influenced a performance measure that captures change over 7 days. Future studies need to evaluate the influence of older adults’ fatigue variability on measurement of changes in physical functioning.

LIMITATIONS

Limitations of this study include the aforementioned difficulties with recruitment, the intervention, and the measurement tools. In addition, the study sample was small and regional without a comparison group to control for confounding effects. Another limitation may have been having only one research aide conduct the interventions and the potential influence it could have on participant performance.

RECOMMENDATIONS FOR FUTURE RESEARCH

We have the following recommendations for future studies:

- Delay the program until the older adults recover from relocation effects.
- Administer the Facilitating Intervention independent of other interventions.
- Replace the ADL assistance intervention with a leisure walking program.
- Develop a recruitment video that demonstrates sample exercises to help the older adults comprehend what the CNRP entails.

These findings will help inform future research needed to keep this frail population active and ensure that nursing home residents maintain their health, functioning, and quality of life post-hospitalization.

CONCLUSION

This pilot study examined the feasibility of implementing a CNRP aimed at promoting the physical functioning of moderately frail older adult nursing home residents after hospitalization. Although we found that the CNRP was easy to implement in nursing homes and that frail older adults found the interventions beneficial, our most important findings resulted from what did not work well. The timing of the intervention proved to be a barrier to participation, the CNRP included ADLs practice the participants did not require, and the modified Physical Performance Test did not capture changes in frail older adults’ physical functioning. These findings provide direction for the development of future studies needed to improve the daily functioning of this frail population and ensure nursing home residents maintain their health, independence, and quality of life after hospitalization.

REFERENCES


