Nursing Rehabilitation and Exercise Strategies in the Nursing Home

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Background. The purpose of this study was to evaluate how weight training or nursing-based rehabilitative care programs in nursing homes impact on resident performance of Activities of Daily Living (ADL) and objective tests of physical performance.

Methods. This study involved a quasi-experimental control, longitudinal comparison of functional status over a 10-month period, where baseline status was adjusted through a weighting procedure based on functional status, cognitive status, and age. All residents from six residential care nursing home facilities were eligible except those with a terminal prognosis, a projected stay of less than 90 days, or with health complications that prohibited contact. Homes were placed into matched triplets based on patient characteristics: two members of each triplet were randomly designated to be experimental sites, the third became the control site. Baseline data were available for 468 subjects, follow-up for 392. ADL self-performance measures derived from the Minimum Data Set, including indicators of early loss ADL, locomotion, and late loss ADL; a number of objective functional tests (including measures of balance, power, and endurance); and mood state as measured by the Geriatric Depression Scale.

Results. Mean ADL values in the two experimental groups declined at a significantly lower rate than did rates for the controls. Functional decline was also lower in more specific measures: locomotion, early loss ADL, and late loss ADL.

Conclusions. With both interventions, facilities were able to implement a broad-based intervention that resulted in a significant reduction in ADL decline rates. A facility-wide nursing rehabilitation program can play a useful role in reversing functional decline, helping residents to maintain their involvement in a broad spectrum of ADL activities.

For long-stay residents in nursing homes, functional decline is often viewed as an inevitable consequence of chronic disease, cognitive disability, and extreme age. Too frequently the forces driving functional decline are viewed as immutable and few strategies have been developed to reduce these rates of decline. From our view, the central issue is one of attention to the possibility of breaking this cycle of decline, and in this article we describe two rehabilitative strategies that are hypothesized to either improve underlying physical capacity or alter dependency-inducing behaviors.

These interventions are built around different compensatory mechanisms: a progressive resistance weight-training initiative ("Fit for Your Life"); and a nursing-based rehabilitation care program ("Self Care for Seniors"). In addition, key administrative personnel are instructed to encourage staff to believe that it is possible and desirable to maintain or improve resident self-involvement in Activities of Daily Living (ADLs), by overcoming perceptual and environmental barriers (1).

Ultimately, our goal is to provide staff with tools that will permit them to take steps to better maintain the balance between the resident’s capacity to perform ADL activities and the actual performance of those activities on a day-by-day basis. The findings reflect the efficacy of this program, looking at ADL performance over a 10-month period for residents in four experimental and two control nursing homes.

METHODS

Hypothesis

The central hypothesis is that residents in homes implementing the experimental interventions will better maintain their prior levels of involvement in ADLs, including ADLs that are lost early in the spiral of functional decline (e.g., dressing) as well as ADLs that tend to be maintained for a more protracted period of time (e.g., eating). The goal is not so much to improve function (although improvement will occur) but to maintain it. A secondary hypothesis, applying only to the exercise intervention, is that we will begin to observe positive effects in objective physical tests of balance, power, and endurance. Finally, assuming the above hypotheses are correct, we also hypothesize that we will begin to see an initial indication of a reduction in distressful symptoms as measured on the average problem count on the Geriatric Depression Scale (GDS) (2).

Study Sites

Six nursing facilities participated in this study: Two were randomly designated to be control sites, whereas four were randomly designated as experimental sites. These facilities were recruited from a pool of 15 interested nursing homes from within a 60-mile radius of Boston, each of which had 80 or more long-stay nursing home beds. Homes were matched into...
sets of triplets (from which sites were randomized to the three study conditions) based on reviewing 40 of their most recent federally required Minimum Data Set (MDS) resident assessments (3). This matching reduced the probability that the experimental and control sites would differ at a gross level with respect to resident characteristics—measures of ADLs, communication, cognition, and behavior symptoms. In each triplet, one home was randomly assigned as the site for the Fit for Your Life exercise intervention, a second for the Self Care for Seniors nursing rehabilitation intervention, and the third to be the control.

Resident Recruitment

For all samples, we attempted to enroll all residents in long-stay beds, excluding residents who had a terminal prognosis, a projected length of stay of less than 90 days, or health complications that prohibited contact. Residents for which a baseline assessment was obtained were scheduled for a 10-month follow-up assessment, and our findings are based on the experience of this follow-up cohort. From an intervention perspective, although all residents were eligible for the nursing rehabilitation intervention, residents with severe cognitive disability (i.e., had an estimated Mini Mental score of 5 or less based on the Cognitive Performance Scale (4) or who had an unstable cardiac condition were excluded from participation in the exercise intervention. (Note: These residents have not been excluded from the evaluation sample; nor were any other residents who failed to take part in the intervention component of the study.)

At the point of initial contact, 849 residents were in the subject pool in the six facilities. Our enrollment window covered a 90-day period, during which time 100 residents died or left the facilities, staff judged 55 to be too sick to participate, 162 refused to participate, 32 were not contacted because families were unavailable for the institutional review board required consent process, and 32 did not meet study criteria. After these exclusions, the sample included 468 residents with required informed consents and baseline assessments (Table 1). At 10 months, follow-up data were available for 392 (83.8%) residents—124 controls, 124 residents in exercise intervention homes, and 144 residents in nursing rehabilitation homes. Only nine subjects were lost to follow-up due to refusal (three of these had moved to another facility).

Program Interventions

Nursing Rehabilitation Care Initiative ("Self Care for Seniors").—Although certified nurse assistants (CNAs) are the major providers of personal ADLs (5–7) they often receive inadequate direction and their work can be inadequately monitored (8–10). The emphasis is on getting things done—making sure residents look well cared for, well nourished, and ready for activities. For sake of expediency, many residents receive help with care even when they would be able to do for themselves (11–13).

In the “Self Care for Seniors” (SCS) program, facility nursing staff are taught how to break the cycle of dependence and functional decline. This dynamic rehabilitative program provides a structured approach to ongoing rehabilitative care to all residents. Nursing staff are guided through the process of assessing functional capacity and linking specific rehabilitation care protocols to assessed capacity. Protocols assist both licensed and nonlicensed nursing staff to: (i) identify residents with a capacity for greater involvement in ADLs, (ii) evaluate the gap between current performance and capacity for greater independence, (iii) target and individualize rehabilitation interventions; and (iv) incorporate rehabilitation approaches into daily nursing and resident routines.

The SCS initiative is a five-step assessment and care-planning process based on explicit protocols (SCS protocols are available from the authors). Step One builds on the federally mandated MDS assessment process. The protocol directs nursing staff to review the most recent MDS assessment, focusing on current function in ADLs and related areas (e.g., cognition, communication and sensory patterns, balance). The MDS ADL emphasizes performance (what the resident actually does for him/herself) rather than capacity (what the resident is able to do).

Step Two directs two pairs of nurses and CNAs from the day and evening shift, to complete a bedside assessment of capacity. Each ADL activity is broken into a series of performance subtasks. This protocol requires collaboration between the nursing staff on the day and evening shifts as the resident’s capacity may vary as the day wears on. The two sets of assessors then compare their results, resolve disagreement, and compare the resident’s capacity with current performance. Residents fall into two categories: those performing at capacity, and those performing below capacity. Both groups are included in the program. Staff select one of nine rehabilitation protocols for eating or dressing based on the resident’s capacity for involvement in self-care.

In Step Three, nursing staff tailor the selected protocol to meet the individual needs of the resident. Staff select environmental, communication, and motivational guidelines as directed in each protocol to assist the resident in ADL self-care.

In Step Four, staff identify and review the rehabilitation goals and objectives (with the resident, family and CNAs). For residents performing at capacity, the focus is on keeping abilities
intact in order to prevent decline. For residents functioning below capacity, the focus is on achieving improvements needed to function at capacity.

In Step Five, nursing staff implement the plan of care and track progress toward goals through communication, documentation, and regular review of care objectives.

The following example illustrates SCS processes. Mrs. B is an octogenarian with moderate cognitive impairment. An MDS review (Step One) reveals that she is dependent in dressing self-performance despite having adequate balance and range of motion. The assessment of capacity (Step Two) staff learn that Mrs. B. can dress herself when she receives physical and verbal prompts throughout the activity. As she has been functioning below capacity, staff select a rehabilitation protocol that builds on her newly identified strengths for responding to specific prompts (Step Three) and set the goal for her to dress herself with this type of staff support (Step Four). The details of the new care approach are communicated to all caregivers, documented in the plan of care, and progress monitored quarterly (Step Five).

Exercise intervention initiative ("fit for your life").—The rationale for the use of exercise rests upon the central role of disuse atrophy (14). The plasticity of the musculoskeletal and cardiovascular systems permits a robust training adaptation (15), and makes alteration of physiological capacity via exercise training an attractive target in this population. The emphasis is placed on muscle strengthening exercise, because muscle weakness appears even more limiting than cardiovascular endurance in the performance of functional tasks and mobility. Additionally, resistance training is feasible even in nonambulatory elders, whereas weight-bearing exercise such as aerobic activities may be impossible to initiate.

The exercise regime involves progressive resistance training of the major muscle groups related to clinical function and mobility in the elderly. The emphasis is on strength training as a way to maintain physical capacity (16). Because of the specificity of the training response, muscle groups that are of particular relevance to gait [hip and knee extensors, ankle dorsiflexors; (17–19)] or the performance of ADLs [forearm and shoulder muscles; (20)] are emphasized.

Coordinators are chosen by each home and serve as supervisors of other staff members and volunteers who are trained to carry out the exercise regimen on 3 nonconsecutive days per week. The team of exercise leaders, including staff, families, and volunteers, are encouraged to take a 10-hour course for which continuing education credit is given. A multimedia approach of slide lectures, videos, workshops, manuals, and graphic materials are used to facilitate skill acquisition.

The resistance training consists of dynamic (concentric and eccentric) progressive resistance exercise (PRE) of the upper and lower extremities using incremental lead shot weights worn around the ankles and a variety of dumbbell weights for the upper body. Two sets of eight repetitions of each exercise are done at each exercise session, using progressively heavier weights as tolerated.

Endurance training is accomplished in separate sessions from the weight-lifting exercise via the initiation of walking groups on alternate days. Residents are monitored by staff while they gradually increase the durations of walks from initial tolerance (1–5 minutes) to continuous 20-minute sessions. All exercise training sessions are documented daily in a log book by the exercise trainers. Rewards for resident participation are made accordingly.

Establishing a supportive institutional context.—Each intervention utilized a comparable approach to increase the likelihood that the facility would stand behind the intervention. Research staff worked with administrators to prepare them to accept the program and answer staff questions (e.g., staff questions about whether rehabilitation is possible; institutional focus on issues other than rehabilitation; competing demands). We helped them “gear up” for the philosophical and programming changes required by the intervention including, (i) selecting a facility Program Coordinator, (ii) developing a facility-wide planning committee for introducing the program and integrating it into daily routines, and (iii) conducting a system analysis to assure that the necessary structures and processes are in place.

Analysis Strategy and Study Measures

To evaluate these programs we used a quasi-experimental approach to compare the experience of residents in six matched facilities with and without one of the two rehabilitation initiatives. Impact findings have been adjusted through a subject-weighting process that accounts for residual cross-sample baseline variations in the distribution of resident subgroups based on a limited set of key parameters. We did not expect, even after the random assignment of nursing homes to treatment groups, that the distribution of residents on key characteristics would be identical. More specifically, we believe that facilities could differ in terms of resident impairment status, cognitive disabilities, and baseline proximity to death.

By limiting the analysis to residents who were alive at 10 months, we effectively handled the issue of differential proximity to death. (Note: There was some outer sample differences on this factor [Table 1].) For the other factors, we had two possible control options—covariance adjustment or multivariate weighting. We chose the latter, believing that this approach would best permit us to address the full interactions of the biasing factors. The actual weighting factors include measures of functional status (as measured by a three-item ADL summary scale, including measures of dressing, transfer, and eating), cognitive status (as measured by the MDS four-category Decision Making measure, which has a weighted kappa reliability of .93), and age. Using this methodology, the three samples were weighted to achieve equivalence in overall distribution of the subgroups of residents as defined by the cross-sectional distribution of these baseline characteristics. After weighting, all samples are equivalent along these dimensions. For example, although there might have been a preweighting difference in the distribution of residents across the three groups who had minor ADL deficits and who were cognitively intact, the weighting procedure equated all three samples along these parameters. Although the immediate effect of this weighting procedure is to equate the samples on the specific weighting parameters; the more profound consequence is our finding of nonsignificant differences across the samples on a wide variety of factors that have been shown to be relevant to subsequent functional decline. More specifically, for a set of in-
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independent measures selected to indicate risk status, there were no significant differences for bowel and bladder incontinence, congestive heart failure (CHF), osteoporosis, Alzheimer’s disease, stroke, Parkinson’s disease, emphysema, depression, acute disease status, unstable chronic disease, bed fast, use of arms, use of legs, unsteady gait, amputations, and wheelchair use.

In this article, the reported longitudinal findings are based on changes in the outcome measures between baseline and the 10-month follow-up assessment. This ensures a minimum program exposure period of 4 or more months (additional time during this 10-month window was required by staff to initiate the program).

The analytic design involves a repeated-measure analysis of variance which compares baseline and follow-up mean scores for the selected outcome measures. The ADL measures are derived from the MDS measurement system (3,21,22), gathered by our trained assessors, and include indicators of bed mobility, transfer, two measures of walking (walk in room, walk in corridor), two measures of locomotion (self-walking or self-propelled wheelchair mobility on and off the unit), dressing, personal hygiene, toilet use, and eating. Each measure is scored on a 5-point continuum, with scoring based on all episodes of the activity that occurred over the prior 7-day period. The code options include Independence (no help or oversight), Supervision (oversight, encouragement, or cuing), Limited Assistance (resident highly involved, but receives physical help or guided maneuvering of limbs), Extensive Assistance (resident performed part of activity, but received weight-bearing support), and Total Dependence (full performance of activity by others). Using this scoring system, all measures have been shown to have inter-rater weighted kappa reliability values that are greater than .90 when the recommended data gathering protocol is followed. This protocol, as followed in this study, involves a review of the recent clinical record, interaction with the resident, discussion with direct care staff, and discussion with a knowledgeable clinical coordinator (3,21). These assessments were completed by trained research staff, all of whom were blinded to the intervention status of the study subjects. Finally, these measures were aggregated into an overall ADL summary scale (Kinder-Richardson-20 [K.R. 20] alpha reliabilities = .96) and a series of stage-of-loss ADL indicators (23). The stage-of-loss measures, each of which is a sum of multiple ADL indicators, reference early loss ADLs (K.R. 20 alpha reliability = .89), late loss ADLs (K.R. 20 alpha reliability = .90), and Locomotion (K.R. 20 alpha reliability = .88).

In addition to these ADL measures, we also evaluated resident functioning based on objective tests. Included are measures of: Power (time required to stand up five times in a row), Balance (time able to stand normally in five different feet placements), and Endurance [number of feet walked; (24–26)]. These measures are presented in a collapsed format in light of skewed distributions and high numbers of residents who were unable to even start to initiate these activities. Our field protocol required an extensive period of training on all measures, including a review by one of the coinvestigators of videotapes of measurement sessions. Staff had to achieve an acceptable level of interassessor reliability and had to demonstrate an appropriate ease of interaction with the subject population.

The final outcome measure is the Yesavage Geriatric Depression Scale [GDS; (2)], where higher values indicate a greater problem.

RESULTS

In the baseline sample, the average age was 84.7 years and 79% were female. Thirty-one percent of the subjects had independent cognitive skills and 38% had severely impaired cognitive skills. Sixty-six percent had a short term memory problem. Twenty-six percent were independent in transfer and 20% were totally transfer dependent. Twelve percent could dress independently and 27% were dependent on others to dress. Fifty-eight percent could eat independently and 16% were dependent in eating. Concerning diseases and conditions, 21% had CHF, 22% had arthritis, 7% had osteoporosis, 24% had Alzheimer’s disease, 27% had dementia other than Alzheimer’s disease, 4% had Parkinson’s disease, 22% were depressed, 4% had cancer, 16% had unstable conditions or diseases, and 10% had pressure ulcers.

Table 2 presents baseline and follow-up mean scores for the four ADL measures. In each instance, the effect estimate that represents the interaction of the experimental group by time is significant at the .02 level or lower. For the nursing rehabilitative group, experimental decline was at a significantly lower level than the decline rates observed for the control group. For example, on the ADL summary measure, which has a range between 0 and 40 points, where 40 is the most dependent, control subjects increased by an average of 3.5 points between baseline and follow-up, whereas subjects in the nursing rehabilitation sample, increased by only 4/10 of one point. Looking at the separate ADL indicators of locomotion, early loss ADLs and late loss ADLs, we find a similar set of findings in all ADL areas: The experimental groups in the nursing rehabilitative program were significantly less likely to decline than were the controls.

For the exercise intervention group, we also observe a significant beneficial effect when contrasted with controls for the ADL summary measure. For this measure, although controls increased by an average of 3.5 points, residents in the exercise intervention group increased by an average of 1.7 points. For the four other disaggregated ADL measures, however, only the contrast for late loss ADLs was significant at the .05 level. All other contrasts were slightly less significant.

For the three objective functional tests (Table 3), Experimental Group by Time interactions were significant (p = .01) for two of the measures—Balance and Endurance. The contrast analysis shows that the exercise therapy group is maintaining endurance, as measured by the 6-minute walk (p = .07), whereas for the balance measure, the nursing rehabilitation group actually declined at a higher rate than the controls.

Finally, for the Geriatric Depression Scale, the cross-group comparison was not significant (p = .40). The control group was largely unchanged over 10 months (going from an average score of 4.03 to 4.10), whereas both experimental groups experienced a slight decline in the average problem summary (the exercise group went from 3.55 to 3.11, the nursing rehabilitation group went from 3.55 to 3.25). (No table).

DISCUSSION

In this article we describe the efficacy of exercise and nursing-based rehabilitative care programs in helping residents to maintain their baseline levels of self-involvement in ADLs. The systems approach to intervention involves an initial step of preparing the facility to go forward with the program, as well as more specific program initiatives for delivering rehabilitative
Table 2. Longitudinal Comparison of Mean ADL Dependency Levels for Residents in Control and Experimental Groups (N = 392)

<table>
<thead>
<tr>
<th>Functional self performance measures</th>
<th>Time period</th>
<th>Control group</th>
<th>Exercise group</th>
<th>Nursing rehabilitation group</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADL summary*</td>
<td>Baseline</td>
<td>19.96</td>
<td>20.48</td>
<td>21.37</td>
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<tr>
<td></td>
<td>Follow-up</td>
<td>23.43</td>
<td>22.17</td>
<td>21.76</td>
</tr>
<tr>
<td>Early loss ADL†</td>
<td>Baseline</td>
<td>4.66</td>
<td>4.95</td>
<td>4.89</td>
</tr>
<tr>
<td></td>
<td>Follow-up</td>
<td>5.44</td>
<td>5.38</td>
<td>5.11</td>
</tr>
<tr>
<td>Late loss ADL§</td>
<td>Baseline</td>
<td>6.83</td>
<td>7.14</td>
<td>7.18</td>
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<tr>
<td></td>
<td>Follow-up</td>
<td>8.16</td>
<td>7.83</td>
<td>7.41</td>
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<tr>
<td>Locomotion**</td>
<td>Baseline</td>
<td>4.25</td>
<td>4.08</td>
<td>4.93</td>
</tr>
<tr>
<td></td>
<td>Follow-up</td>
<td>4.99</td>
<td>4.38</td>
<td>4.74</td>
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Significance Levels

<table>
<thead>
<tr>
<th>Study group</th>
<th>Time</th>
<th>Group by time interaction</th>
<th>Exercise vs control</th>
<th>Nursing rehabilitation vs controls</th>
<th>Exercise vs nursing rehabilitation</th>
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<tr>
<td>ADL summary*</td>
<td>0.98</td>
<td>&lt;0.001</td>
<td>0.01</td>
<td>&lt;0.001</td>
<td>0.07</td>
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<td>Early loss ADL†</td>
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<td>0.02</td>
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<td>&lt;0.001</td>
<td>0.005</td>
<td>0.05</td>
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<tr>
<td>Locomotion**</td>
<td>0.25</td>
<td>0.01</td>
<td>0.11</td>
<td>0.001</td>
<td>0.07</td>
</tr>
</tbody>
</table>

*Sum of Dressing, Hygiene, Walk on Corridor, Walk in Room, Locomotion on Unit, Locomotion off Unit, Transfer, Toilet Use, Bed Mobility, Eating; range 0-40; KR 20 alpha reliability = 0.95.
†Sum of Dressing, Personal Hygiene; range 0-6; KR 20 alpha reliability = 0.89.
§Sum of Transfer, Toilet Use, Bed Mobility, Eating; range 0-16; KR 20 alpha reliability = 0.89.
**Sum of Locomotion on Unit, Locomotion off Unit; range 0-8; KR 20 alpha reliability = 0.88.

Table 3. Longitudinal Comparison of Mean Objective Measures of Performance for Residents in Control and Experimental Groups (N = 370)

<table>
<thead>
<tr>
<th></th>
<th>Time period</th>
<th>Control group</th>
<th>Exercise group</th>
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<tr>
<td>Power*</td>
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<tr>
<td>Time required to stand up five times in a row</td>
<td>Baseline</td>
<td>2.44</td>
<td>2.36</td>
<td>2.52</td>
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<td></td>
<td>Follow-up</td>
<td>2.51</td>
<td>2.43</td>
<td>2.61</td>
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<td>Balance†</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Time able to stand normally in 5-feet positions (max. of 15) seconds per position (N = 55)</td>
<td>Baseline</td>
<td>2.41</td>
<td>2.55</td>
<td>2.63</td>
</tr>
<tr>
<td></td>
<td>Follow-up</td>
<td>2.09</td>
<td>2.37</td>
<td>1.84</td>
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<tr>
<td>Endurance§</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Number of feet walked in 6 minutes</td>
<td>Baseline</td>
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Significance Levels

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<th>Time</th>
<th>Group by Time interaction</th>
<th>Exercise vs control</th>
<th>Nursing rehabilitation vs controls</th>
<th>Exercise vs nursing rehabilitation</th>
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<tbody>
<tr>
<td>Power</td>
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<td>0.02</td>
<td>0.93</td>
<td>0.96</td>
<td>0.76</td>
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<tr>
<td>Balance</td>
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<td>0.001</td>
<td>0.01</td>
<td>0.50</td>
<td>0.03</td>
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<tr>
<td>Endurance</td>
<td>0.67</td>
<td>0.001</td>
<td>0.01</td>
<td>0.07</td>
<td>0.20</td>
</tr>
</tbody>
</table>

*0 seconds through 13=0; 1 through 27=1; 27.1 through 179=2; 180 or more=3.
†Each of five stance position scores: 0=not able; 1=less than 15 seconds; 2=15 seconds. The five are summed so that 0=not able to stand and 10=stood for 15 seconds in all five stance positions.
§0 feet=0; 1 through 135=1; 136 through 272=2; 273 through 435=3; 436 or more=4.
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care services. The large majority of elderly nursing home residents are physically vulnerable, cognitively impaired, and at risk of premature functional loss and institutionally induced dependency; and our two interventions seek to counter those forces that would otherwise promote progressive ADL declines. Despite the Nursing Home Reform Law of 1987, and demonstrated efficacy of exercise intervention in this setting (15,27), many nursing homes have yet to develop institutional philosophies and programs that promote individualized resident rehabilitation for most residents. Barriers include lack of institutional support, lack of professional staff training in specific rehabilitative methodologies, misconceptions about the benefits of initiating rehabilitative practices, and lack of availability of exercise equipment and space.

The physiologic benefits of strength training have previously been documented in more focused trials using intensive one-on-one training with volunteers in nursing homes (15,27). This study is the first to report on the relative benefit to residents in a facility-wide intervention. What was not known prior to this effectiveness trial was whether the results of earlier small-scale trials could be translated to interventions that may benefit the average resident in a facility. That is one of the crucial research questions to which this aspect of our work contributes. Such a transferrance has now been shown to be possible for real-world ADL outcome measures.

In addition, for the first time, we have shown that a facility-wide nursing rehabilitation program can play a useful role in reversing functional decline, helping residents to maintain their involvement in a broad spectrum of ADL activities.

It is also important to acknowledge that our program of intervention goes beyond the two rehabilitation initiatives. Our goal has been to bring consistency and order into processes that are often idiosyncratic by developing an organizational infrastructure to support meaningful rehabilitative care. We worked with the administrator and director of nursing to assist them in articulating a rehabilitative focus of care and enabling them to take the necessary steps to encourage staff to provide the required care services (11).

Potential limitations of the study need to be addressed. First, although measurements and data collection were performed as accurately as possible following the study protocols, some degree of measurement error in information ascertainment occurs in every study. This level of misclassification is likely to be non-differential and could be a problem if no differences were found between the experimental and control groups, but does not invalidate differences that were observed.

Secondly, concerning the Nursing Rehabilitation Care Initiative, all the nursing staff members of the facilities included in this study were consistently taught how to break the “cycle of dependence” and consequential functional decline. However, we did not measure the degree of transference of new skills into everyday clinical practice over time. Thus, it is difficult to accurately assess the degree to which the intervention was implemented within the entire facility. Likewise, in the Exercise Intervention Initiatives, although facility staff were consistently trained to implement the exercise regimen across nursing homes, efforts to motivate and implement the regimen may differ. However, in both regimens, there is no reason to believe that these differences were greater in a particular nursing home. In addition, for the first time, we have shown that a facility-wide nursing rehabilitation program can play a useful role in reversing functional decline, helping residents to maintain their involvement in a broad spectrum of ADL activities.

Finally, in subsequent work under our National Institute on Aging Roybal Center, we will be able to extend the time period to 18 months. The very idea that functional decline can be delayed in the nursing home, even for 10 months, is important and is in full accord with the governmental mandates of the 1987 Nursing Home Reform Law. For the average resident, applying appropriate interventions significantly improves functional status.

ACKNOWLEDGMENTS

This work was supported by Grant AG11719 from the National Institute of Health, National Institute on Aging, HRCA Roybal Center of Research on Applied Gerontology. Dr. Morris holds the Alfred A. and Gilda Slifka Chair in Social Gerontological Research.

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Received May 16, 1998
Accepted October 2, 1998