Falls Reduction in Long-Term Care Facilities: A Preliminary Report of a New Internet-Based Behavioral Technique

Irwin J. Mansdorf, PhD, Ravil Sharma, PsyD, Melanie Perez, PhD, and Anne-Marie Lepore, PhD

Objective: To investigate an Internet-based psychological intervention targeting behavioral factors related to falls among residents of long-term care communities.

Design: Retrospective A-B design with 90-day look-back.

Setting: Long-term care communities in New York State (N = 4, 3 SNF, 1 ALF).

Participants: Nursing home residents (N = 26).

Intervention: Internet-based programmed learning system using cognitive- and behavioral-based techniques.

Measurements: Direct measures of documented falls in the medical record, perceived risk and burden scales, Falls Efficacy Scale-International (FES-I), Attitudes to Falls-Related Interventions Scale (AFRIS).

Results: Reductions in documented falls by 52% along with substantial reductions in staff ratings of risk and burden.

Conclusion: Behavioral treatment of risk factors related to falls within a structured delivery using Internet-based intervention may be an effective and efficient mechanism for treating fall risk in long-term care settings. **(J Am Med Dir Assoc 2009; ■: ■–■)**

Keywords: Falls reduction; behavioral; cognitive; Internet

Falls represent a serious problem for the elderly and an especially serious problem for institutionalized residents of long-term care communities such as skilled nursing facilities and assisted living centers. Whereas more than one third of people older than 65 suffer a fall that often leads to serious injury,[1] the incidence of falls in long-term care (LTC) settings is even more acute. According to Rubenstein,[2] an average 100-bed nursing home reports from 100 to 200 falls per year. Because many LTC residents are more compromised medically than community-based individuals, it stands to reason that suffering a fall for them may carry serious consequences. From 10% to 25% of falls in LTC settings result in hospital admission and/or fractures.[3] Considering that each fall, even minor ones, carry a cost,[4] the potential costs attributable to falls incurred by a LTC facility may range into the tens of thousands of dollars or higher.

Although cognitive- and behavioral-type interventions that can be considered "psychological" approaches have been conducted in community settings,[5] most institutional-based interventions focus on environmental and medical factors (see Neyens et al,[6] Ray et al[7]) and have not looked into modifying individual, personal behavior as a means to reduce falls. Factors such as fear of falling,[8] self-efficacy,[9] and adherence to safety protocol[10] are all behavioral issues dealt with outside of LTC settings that have not received serious attention in facility-based protocols for dealing with falls. Although formal data as to why this is so is lacking, it may be that the impression of greater cognitive impairment and disability in residents of LTC communities may be a factor accounting for the lack of attention to psychological and behavioral variables in these settings.

INTERVENTION AND TREATMENT

Our intervention strategy uses a systematic behaviorally oriented and structured programmed learning format for falls based on cognitive and behavioral methodology. We use a combination of modeling, programmed instruction, reinforced practice, and compensatory cognitive rehabilitation delivered in a structured format via an Internet-based system

Park Avenue Medical Associates, While Plains, NY (I.J.M., R.S., A.-ML.).

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Address correspondence to Irwin J. Mansdorf, PhD, Park Avenue Medical Associates, 3 Barker Avenue, While Plains, NY 10601. E-mail: imansdorf@gmail.com

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(the "2WayView Rehabilitation Program"). The program consists of a series of animated modules that systematically focus on behavioral issues related to falls. The use of the animated Internet-presented protocol served to ensure attention to the task, further increasing the likelihood of retention of information and successful integration of the behavioral technique taught into the resident's behavioral repertoire. Psychologists were individually trained for the intervention. Training involved first being introduced to the program and the technical issues involved in accessing and navigating the program. Background on the theoretical basis of the approach along with the scientific foundation for the clinical tools integrated into the exercise was presented. The psychologists were then given virtual "mock practice" patients with which to conduct dry runs on the program and the exercises. Once proficient in the administration of the program, each psychologist observed a "live" session of the program before being assigned individual patients for treatment.

With our intervention, residents of long-term communities are taught to implement safety techniques that are necessary for maintaining well-being and reducing risk of falls. The program is designed to be effective for individuals with mild cognitive impairments as well as those who show no evidence of any neuropsychological deficits. It is thus especially suited for LTC settings. We report here on a 6-month trial of the program in LTC communities.

METHODS

Subjects

A total of 26 residents of 3 skilled nursing facilities and 1 assisted living facility were treated in this study. Ages ranged from 59 to 95, with a mean age of 80.65 years. There were 10 males and 16 females in the sample. These residents were chosen by facility staff, all carried a diagnosis of falls risk (V15.88) and were generally considered to be individuals for whom other approaches were not successful. They all had medical diagnoses related to falls risk (eg, Parkinson's, gait instability, syncope). Although some of the residents may have had some cognitive issues, all were oriented and did not present any cognitive problems that would be considered an impediment to treatment. Any resident who was suspected of having cognitive impairment at a level that would not be appropriate for the program first underwent a neuropsychological screening to determine if the requisite cognitive skills for learning were present. The neuropsychological procedure involved a qualitative evaluation using the cut-off scores for dementia for the St. Louis University Mental Status Examination (SLUMS).[11] In isolated cases where the neuropsychologist felt that the score did not represent the true capacity of the individual to benefit from the program, a qualitative evaluation was made by allowing a trial exercise to be administered.

Procedure

As noted, our programmed learning instruction took place with the use of an Internet-based system where exercises in the form of animated skits were presented. Each skit had a number of characters, beginning with a narrator that presented a situation or problem related to falling. Other characters then weighed in on the problem, leaving the solution open. A clinical psychologist presented these exercises to the subject, using a laptop computer with wireless Internet connection. The goal of each exercise was for the resident, with the aid of the psychologist, to correctly solve the problem or question posed. Exercises focused on different behavioral and psychological factors related to falls risk, such as learning to ask for assistance, planning one's environment to maximize safety, and learning to appropriately scan for and assess environmental hazards. Each set of exercises was reviewed and practiced until the subject correctly understood the concept behind the specific behavioral factor being presented. Once mastery of a specific concept was attained, subjects moved on to a subsequent set of exercises. The exercises used behavioral and cognitive techniques and included a variety of psychological and cognitive approaches including but not limited to behavioral rehearsal, modeling, self-instruction, trial and error, cognitive restructuring, and repeated practice. Therapy sessions were individual, held approximately once a week for 35 to 45 minutes for a period averaging 12 weeks per resident. There was no set or predetermined amount of sessions that any resident was required to complete. Treatment time was a clinical determination, made according to the response to treatment that was observed by the psychologist.

Assessment

Assessment was conducted on a number of variables. Direct clinical variables included documenting the number of falls in the medical record for the 90 days before treatment and noting the documented falls 90 days after treatment. In addition, ratings by staff of perceived risk and perceived staff burden were conducted at the beginning of treatment at a 90-day follow-up. The scale was a Likert-type question on a 1 to 10 scale, with 1 representing little or no risk/burden and 10 representing maximal risk/burden. After initiating the clinical trial, we also introduced a scale that measured self-efficacy (FES-I)[12] as well as one that measured attitude toward treatment (AFRIS).[13] Because not all residents were administered these measures, we present only partial data on the latter 2 variables in this report.

RESULTS

Improvement was noted in all clinical variables (Table 1). Actual documented falls for the sample, as gleaned from facility medical records, fell by 52% from a total of 25 falls in the 90 days before treatment to only 12 falls in the 90 days following the initiation of behavioral treatment. The staff measure of perceived falls risk and burden also showed reductions, with 18 (69.2%) of the 26 subjects showing improvement in at least one of the scales, 6 (23.0%) of 26 remaining stable on both scales and 2 (7.6%) of the 26 showing a decline in at least one of the scales. Examining all the individual items on the risk/burden scales, 34 (62.9%) of 54 individual ratings among the sample showed improvement, 13 (24.0%) of 54 were

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Table 1. *Summary of Results for Falls Intervention (N = 26)*

Clinical Measure	% Change	Direction of Change
Documented falls	52.0	Improvement
Staff rating of risk/burden	69.2	Improvement
Individual risk/ burden ratings	62.9	Improvement
Self-efficacy (N=17)	47.0	Decline
	32.5	Improvement
Attitude toward treatment (N=12)	83.3	Positive

stable, and 7 (12.9%) of 54 showed a decline. For the "risk" scale, scores were reduced from a mean of 6.32 at baseline to a mean of 3.92 at follow-up. For "burden," the baseline mean of 5.42 was reduced to a follow-up mean of 4.45.

On the partial data we collected for self-efficacy and attitude toward treatment, we found the following. For self-efficacy, the scale ranged from little or no concern (7) to very strong concern (28). In our sample, 8 (47.0%) of 17 subjects had slight changes in perceived falls efficacy, with less overall favorable scores (mean of 18.6 at baseline versus 21 at follow-up), whereas 6 (32.5%) of 17 reported slightly better scores (mean 18.8 at baseline versus 13.5 at follow-up). Three subjects showed no change. For the 12 subjects administered the AFRIS, the mean score was 27.9, with 10 (83.3%) showing high scores (defined as a score at or above 24/36) indicating a positive attitude toward treatment, whereas only 2 showed a low score, indicating dissatisfaction with treatment.

DISCUSSION

Notwithstanding the relatively small number of individuals treated in this preliminary study, the data demonstrate that a substantial reduction in both documented falls and staff perception of risk and burden followed use of the programmed instruction technique used here. Of importance is that this study demonstrates that focusing on behavioral variables can reduce falls risk and documented falls among institutionalized residents. Furthermore, it shows that the structured format provided by an Internet-based program is appropriate for delivering an effective system of intervention in this population. Considering the clinical trends seen in the data, additional clinical gain is likely with additional treatment time.

A number of refinements are planned in the program, given that the treatment is ongoing. First, greater numbers of individuals will be evaluated and followed in order to arrive at more robust conclusions regarding the effectiveness of the intervention. Second, more sturdy experimental design procedures, such the use of post hoc comparison groups, will be considered. Third, ratings will be obtained by multiple direct care staff in order to account for possible individual biases. Finally, additional forms of information, such as MDS records, would provide another aspect of evaluation that the current study did not provide.

Additional clinical approaches are also being considered. Coordination and collaboration with the rehabilitation department to add "exercise time" (possibly in group format) would likely result in strengthening clinical gains. Plans are currently under way for adding rehabilitation treatment, using the programmed-instruction technique, to supplement treatment time. The plan here would be to have rehabilitation staff learn the approach by being paired during portions of treatment with a psychologist. The anticipation is that the psychologist will work with the resident in treatment to identify critical cognitive and behavioral issues and then to use the exercises as a tool to apply appropriate clinical strategies. With the addition of a rehabilitation professional, additional clinical time will be invested where the psychologist will suggest specific exercises for the rehabilitation therapist to use in order to integrate treatment into the desired functional outcome specific for the resident. Thus, the psychological aspect of treatment could be viewed as the teaching of identified cognitive and behavioral strategies, with the rehabilitation aspect more of a laboratory to provide additional opportunities to apply those exercises and strategies to real-life function and to integrate the program into the comprehensive falls program for that specific resident. The goal for the psychologist would be to first identify and then begin to change or modify the actual behavioral pattern related to falls safety, whereas the goal for the rehabilitation therapist is to use those identified strategies in integrating rehabilitation approaches such as gait and balance training with desired functional outcomes, especially as they relate to safety and compliance. Additional work could be done with direct care staff, specifically in providing a general overview of the program and educating them to the types of behaviors that are being worked on, so that they may be able to provide additional reinforcement opportunities for the residents in treatment. This is especially important in light of our impression that residents view direct care staff as generally inaccessible and unresponsive. Some of our exercises address the issues of noncompliance by focusing on having residents reach out more to staff for assistance rather than take risks by trying certain things on their own (eg, going to the bathroom alone). However, our feeling is that despite our review of this issue, residents have a difficult time really believing that staff will be available to assist when they call for assistance. This probably represents the most difficult and challenging issue to date we have faced in our programmed exercises and is consistent with an Office of Inspector General report that cites "failure to respond to call lights or requests for assistance" as the top complaint in nursing homes in the category of resident care.[14]

Although we have only limited data on variables of self-efficacy and attitudes toward treatment, the partial results seem to tell us something. Despite the very strong clinical trend of improvement in falls risk and decrease in actual falls, it appears that there was a slight decrease in perception of self-efficacy in our sample. Because self-efficacy is a function of self-confidence and lowered anxiety over safety issues, we can say that the limited sample showed clinical improvement despite having a slight increase in these factors. Although in community samples, improvement in self-efficacy is clearly associated with clinical improvement, Zijlstra and colleagues[15] explain that this should be accompanied by greater social participation and activity. We did not measure changes in activity level, and it is possible that the clinical improvement is

a result of reduced self-efficacy resulting in limiting behavior and thus also limiting possibilities of falling for the sample. However, as the change in self-efficacy was not very strong, there may be other explanations for this finding. Because self-efficacy as a concept includes self-confidence and fear, it is possible that the increased understanding of hazards and risks actually slightly, but appropriately raised anxiety, subsequently improving awareness of safety risks and leading to adopting appropriate behaviors that resulted in clinical improvement. Future studies will include a measure of resident activity levels, so for the moment these are still open questions that will be resolved with further experience with the program.

CONCLUSION

One anecdotal finding of importance is the impression that psychological interventions for falls risk would be limited in LTC settings because of the preponderance of dementia in residents at risk. Although dementia is certainly a factor, we have found that the levels of impairment are often far less than the medical record would suggest. ~~This is consistent with previous findings~~[16] that showed that diagnoses and levels of dementia in nursing home residents are less severe than the medical record would seem to indicate. We also feel that while the intervention by clinical psychologists is valuable, supplementing the program exercises with additional work by rehabilitation staff, such as occupational therapists, would buttress the clinical effects of the intervention. We are currently working on developing collaborative mechanisms where the psychologist would work with rehabilitation staff in implementing and maintaining gains from the program. We have not tested the program without the participation of a psychologist and using rehabilitation staff alone, although this too should be an area of future focus. In order to ensure that our clinical gains are indeed accompanied by appropriate activity levels, we will be introducing a measure of social and activity interaction as well. Finally, the use of computer- and Internet-based technology creates a standardized method of intervention that psychological and rehabilitation specialists can use in identifying and modifying behavioral variables related to falls and falls risk in LTC settings.

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