

# Fall Prevention in Frail Elderly Nursing Home Residents

## *A Challenge to Case Management: Part II*

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*Parts I and II of this article examine the impact of a falls prevention program on the fall incidents among the residents in a nursing home. It was hypothesized that a diagnostic, therapeutic, and preventive approach should be used for nursing home residents identified as being at high risk for falls in order to reduce the number of fall incidents and to improve quality of life for this vulnerable population. The program effectively targeted both intrinsic and extrinsic factors to reduce risks facing the residents. The effectiveness of the program was evaluated by examining changes in the rate of falls after the program was implemented. The results identified that a multifaceted program, one that utilized multiple personalized interventions, was effective in reducing the falls rate of frail (those with complex medical and psychosocial problems) nursing home residents, and that muscle-strengthening interventions may be beneficial for this vulnerable population. Program outcomes verified that case managers can impact quality of life for frail elderly nursing home residents by promoting their independence and safety, and postponing problems resulting from inactivity. Part I (LCM, Nov-Dec 2001) discussed the background and process of a falls program and factors contributing to the occurrence of falls. This month we examine the interdisciplinary team approach to assessment, method, and implementing strategies for an effective fall prevention program. Tools used for prevention, monitoring, and investigation of falls are also detailed.*

In our last issue, the background and process of a falls program was introduced, including a literature review, and factors contributing to the occurrence of falls. This month, the program and its outcomes are detailed. The program's outcomes verified that case managers can impact quality of life for frail elderly nursing home residents by promoting their independence and safety, and by postponing problems resulting from inactivity.

### **PROGRAM IMPLEMENTATION**

It is important to recognize falls as preventable, according to Tinetti, Inouye, Gill, and Doucette (1995), not inevitable events. According to Funk, Tornquist, Champagne, and Wiess (1992), multiple factors are involved in fall incidents at least 80% of the time. Because the causes of falling and fall injuries are multifaceted, prevention programs must consider resi-

dents from biological, psychological, and sociological perspectives. Programs should center on increasing individual competence, modifying the environment, ensuring timely and effective post-fall assessment, and suggestions for individualized interventions. For implementation to be effective, fall prevention programs require the commitment and participation of the entire staff; it is a team effort, and all staff must have a sense of ownership and be provided feedback. In order to develop a falls program at Oak Brook Healthcare Centre, the case manager determined that a small committee would focus on the issues.

The interdisciplinary team selected by the case manager consisted of the medical director, admin-

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istrator, director of physical therapy, physical therapist, restorative care coordinator, assistant director of nursing, and the case manager. During weekly meetings, the various members were responsible for the development of the program, plus additional unique responsibilities in order to implement the program and ensure its ongoing success. For example:

- The director of physical therapy, physical therapist, and case manager produced a video and brochure to instruct staff on the correct technique for assisting the resident with the sit-to-stand exercises.
- The case manager developed the policies and continuous quality improvement (CQI) components, a letter for the physicians and families of residents about the program, tools for the program, a poster of the exercises, and nursing and certified nursing aides (CNA) education about the program and the policies.
- The physical therapist instructed the staff in transfer techniques. In addition, quarterly instruction is completed regarding transfers, positioning, back safety, etc.

The multidisciplinary team took a prospective approach by setting three short-term goals:

- identify patients at risk for falls,
- institute appropriate precautions to ensure patient safety, and
- evaluate the effectiveness of the program at regular intervals.

Long-term goals for the program were outlined as:

- incorporate incontinence assessment and treatment into the program, and
- evaluate bone density.

Incorporated into the falls initiative were a CQI Tool (Figure 1), CQI Monitoring Tool (Figure 2), and staff competencies that are used during the annual performance appraisal. The CQI Monitor Tool was used to ensure that the exercises are done and that appropriate supporting documentation was completed, as well as to assist in maintaining compliance with Omnibus Budget Reconciliation Act (OBRA) and Joint Commission Long-Term Care Standards. The falls multidisciplinary team met weekly to review the incident reports related to falls.

Falls Prevention CQI TOOL						
Facility: _____						
Date: _____						
Reviewer: _____						
Indicators	Residents (X = satisfactory; O = not met)					Comments
Environment is as free of accident hazards as possible.						
Resident receives adequate supervision, assistance, and devices to prevent accidents.						
Residents at high risk for falls are identified and care is planned.						
Assessment completed to help identify specific reasons why resident is falling.						
Specific approaches to prevent further falls are identified from the reasons for the falls as determined in the assessment.						
Residents in the Fall Prevention Exercise Program are receiving bid sit to stand exercises.						

**FIGURE 1**  
Example of a falls prevention CQI tool.

Quality Assurance Monitoring Criteria Summary			
	Date:	Date:	Date:
	Int:	Int:	Int:
Total no. of incidents/accidents			
No. of fall incidents			
No. of incidents requiring diagnostic intervention in the facility			
No. of incidents requiring emergency treatment/admission due to:			
Laceration/suture			
Fracture			
Observation/follow-up			
Number of residents with repeated falls during the month			
No. of residents who had fallen within the last 90 days			
Comments:			
Adapted from Oak Brooke Healthcare Centre Ltd, Oakbrook, IL.			

**FIGURE 2**  
Example of a quality assurance monitoring criteria summary form.

It was during this process that trends were identified, patterns noted, and recommendations made. Fitting with the concepts of CQI, the outcomes of the facility's fall program are regularly assessed and shared with the staff, administration, and owners.

## ASSESSMENT

The team identified the starting point for intervention as a multidimensional assessment at the time of admission, readmission from a hospital stay, or if the resident has health or functional status changes (e.g., a decline in performing activities of daily living, range of motion, or cognition). Improving physical function in any elderly person must start with an assessment of his or her individual risk factors and rehabilitation potential. The assessment provided a

standard, or objective criteria, for early identification and prevention management of those at high risk. It was designed to uncover general health problems as well as specific conditions and risk factors that might contribute to falls; thus, it was the key to prevention. The admitting nurse completes the Fall Risk Assessment Tool, which assesses patient factors, such as history of falls, ambulation status, medications, continence, and confusion. A summary score determines the resident's status for risk.

Those individuals identified as high risk by the assessment tool score of six or greater are assessed and care planned for nursing interventions. The team determined that blue dots (the correlation being that, when one falls, they become black and blue) placed on the outside of the medical record, arm bands, and the door name plate would be an easy visual re-

minder for the staff to identify which residents were assessed at high-risk for falls.

### CASE MANAGEMENT INTERVENTIONS

Successful intervention programs include a multifaceted approach, addressing medications, the environment, core assessment, tailored exercises, etc. (Feder, Cryer, & Carter, 2000). In addition, the program recommendations should be adapted to individual risk. "Because of the multifactorial nature of falls, it should be expected that there is no standard approach to treatment and prevention" (Rubenstein, Josephson, & Robbins, 1994, p. 447). The case manager developed a listing of suggested Case Management/Nursing Interventions for Fall Risk Residents (Figure 3); however, it is not an all-inclusive list. Some of the interventions include putting the bed in low position, a bedside commode, and a night-light. Interventions that are being used must be documented in the interdisciplinary care plan as well as the medical record. The clinical record and care plan documentation must be consistent and individualized to resident needs, considering intrinsic and extrinsic risk factors, the patient's functional level, and how the treatment will affect their quality of life. Global, generalized statements concerning falls risk and interventions, such as "We will monitor the resident more closely," are not acceptable. Rather, "We will monitor the resident every hour during the night as she tends to fall going to the toilet," is more specific and individualized. Another intervention example is, "Dr X called to discontinue the hypnotic, since the resident is more unsteady in the morning after a sleeper."

### POSTFALL ASSESSMENT

Falls must be considered a sentinel event, as they are often a marker for disease; thus it is vital to evaluate for changes from the resident's baseline thorough a post-fall assessment. Rubenstein, Robbins, Josephson, Schulman, and Osterweil (1990) stated that "falls indicate the presence of important treatable conditions and that some of the disability and costs associated with falls may be obviated by a thorough assessment" (p. 315). In addition, the same authors noted the "postulate that falls delineate a particularly high-risk subgroup, especially likely to benefit from an assessment, is supported by the fact that fallers as a group have a substantially higher risk for hospitalization and mortality than do non-fallers" (1990, p. 308). The postfall assessment tools for Oak Brook Healthcare Centre were developed by the case manager and the nurse risk manager from the company insuring the facility, and consist of a

#### Nursing Interventions for Falls Risk Residents

- Increase nursing rounds
- Call-light within reach
- Eyeglasses within reach
- Bed in low position
- Check hearing aid for proper function, keep within reach
- Low-boy bed
- Bed mobility monitor
- Chair mobility monitor
- Reposition bed in room to provide one exit side (against wall)
- Evaluate for environmental safety risks
- Non-skid shoes or slippers for ambulation
- Secure side rails when needed for self-positioning
- Monitor for medication side effects
- Monitor for pain medication needs
- Request physician evaluate for calcium 1000 mg and vitamin D 800 IU qd
- Request physician evaluate for new changes in behavior and/or function
- Psychiatric evaluation for underlying changes if indicated
- Reevaluate bowel and bladder routine
- Provide snack at: \_\_\_\_\_
- Return to bed for nap after lunch
- Leave bathroom light on
- Involve resident in activities to increase supervision
- Gait belt when transferring
- Transfer with 2 assist
- Transfer using lift
- Wedges for chair to prevent slipping

FIGURE 3

Example of a nursing interventions for falls risk residents checklist.

Unusual Occurrence Report and a Fall Accident/Incident Investigation Form (Figure 4). Prior to implementing the forms, the nurse risk manager from the insurance company provided an inservice for the nursing staff on documentation, legal aspects, and instructions on completing the forms.

The nurse who witnessed the fall or who learned of it from the resident or other staff member's records all knew information about the fall on both forms. The case manager instructed the staff that the window of opportunity for learning the reason for a fall

## ACCIDENT/INCIDENT INVESTIGATION FORM

Resident name: \_\_\_\_\_ Date of admission: \_\_\_\_\_  
 Date of occurrence: \_\_\_\_\_

<b><u>Risk Factors</u></b>		
Check all that apply		
<input type="checkbox"/> Alzheimer's/dementia <input type="checkbox"/> Arthritis/joint pain <input type="checkbox"/> Cardiac dysrhythmia <input type="checkbox"/> Contractures <input type="checkbox"/> CVA <input type="checkbox"/> Decline in cognition <input type="checkbox"/> Delirium <input type="checkbox"/> Dizziness/vertigo <input type="checkbox"/> Foot disorders <input type="checkbox"/> Fractures <input type="checkbox"/> Paralysis (where?) _____ <input type="checkbox"/> Amputation (where?) _____ <input type="checkbox"/> Weakness (where?) _____ due to: _____ <input type="checkbox"/> Other (specify) _____	<input type="checkbox"/> Hypertension <input type="checkbox"/> Joint replacement (S/P) <input type="checkbox"/> Impaired vision/senses <input type="checkbox"/> Incontinence <input type="checkbox"/> Intermittent confusion <input type="checkbox"/> Loss of leg/arm movement <input type="checkbox"/> New activity <input type="checkbox"/> New medication <input type="checkbox"/> Medication side effect <input type="checkbox"/> Orthostatic hypotension	<input type="checkbox"/> Osteoporosis <input type="checkbox"/> Parkinson's disease <input type="checkbox"/> Seizure disorder <input type="checkbox"/> TIA's <input type="checkbox"/> Unsteady gait/gait changes <input type="checkbox"/> Impaired balance/coordination <input type="checkbox"/> Poor standing balance/ coordination <input type="checkbox"/> Decreased lower extremity strength <input type="checkbox"/> Poor trunk control <input type="checkbox"/> Shuffled gait

<b><u>History of fall:</u></b>	<b><u>Description of fall:</u></b>
<input type="checkbox"/> Prior history of falls <input type="checkbox"/> less than 30 days (# of falls) _____ <input type="checkbox"/> more than 30 days (# of falls) _____ <input type="checkbox"/> Is there a pattern to this resident's falls? _____	<input type="checkbox"/> Fall from bed _____  <input type="checkbox"/> Fall when transferred _____  <input type="checkbox"/> Fall when ambulating _____  <input type="checkbox"/> Fall when sitting _____  <input type="checkbox"/> Found on floor _____

<b><u>Environmental factors:</u></b>	<b><u>Smoking infraction:</u></b>
<input type="checkbox"/> Appliances/devices <input type="checkbox"/> cane <input type="checkbox"/> chair alarm <input type="checkbox"/> walker <input type="checkbox"/> bed alarm <input type="checkbox"/> geri-chair <input type="checkbox"/> bed on floor <input type="checkbox"/> wheelchair <input type="checkbox"/> wedge cushion <input type="checkbox"/> meri-chair <input type="checkbox"/> specialized seat device <input type="checkbox"/> prosthesis _____ <input type="checkbox"/> Environmental hazards _____ <input type="checkbox"/> Footwear (specify) _____ <input type="checkbox"/> Equipment malfunction (specify) _____ <input type="checkbox"/> Lighting <input type="checkbox"/> Slippery floor <input type="checkbox"/> Carpeting/flooring <input type="checkbox"/> Furniture <input type="checkbox"/> Pushed/abuse/struck by <input type="checkbox"/> another resident _____ <input type="checkbox"/> staff member _____ <input type="checkbox"/> visitor _____ <input type="checkbox"/> B & B program _____	<input type="checkbox"/> yes <input type="checkbox"/> no Smoking unsupervised <input type="checkbox"/> yes <input type="checkbox"/> no Smoking materials brought by family <input type="checkbox"/> yes <input type="checkbox"/> no Prior history of smoking infraction
<b><u>Elopement:</u></b> Prior history of elopement <input type="checkbox"/> yes <input type="checkbox"/> no If yes, date _____ Resident had alarming device on <input type="checkbox"/> yes <input type="checkbox"/> no Time resident missed: _____ Time resident found: _____ By whom: _____ Injuries: _____	

<b><u>Skin tear/abrasion:</u></b>	
Location _____ Treatment _____	History of skin tears <input type="checkbox"/> yes <input type="checkbox"/> no Behavior issue <input type="checkbox"/> yes <input type="checkbox"/> no

**FIGURE 4**  
 Example of an agency accident/incident investigation form. (Continued)

**Pressure ulcer (facility acquired-Stage II):**

Date lesion discovered \_\_\_\_\_

Location \_\_\_\_\_

Stage \_\_\_\_\_

Description of lesion \_\_\_\_\_

Other existing decubitus ☐ Yes ☐ No

Location \_\_\_\_\_

☐ Pressure reducing devices

☐ mattress

☐ wheelchair/chair

Weight loss ☐ yes ☐ no

Tube feeder ☐ yes ☐ no

Incontinent ☐ yes ☐ no

Photo taken-date \_\_\_\_\_

**Abuse/neglect:**

Date of occurrence \_\_\_\_\_

Description

☐ lost property \_\_\_\_\_

☐ physical \_\_\_\_\_

☐ verbal \_\_\_\_\_

Reported by: \_\_\_\_\_

*\*Must still complete investigation reports for IDPH\**

**Behavior Occurrence**

Describe \_\_\_\_\_

Bum ☐ yes ☐ no

Location \_\_\_\_\_

Causation if known \_\_\_\_\_

Unexplained death (discuss) \_\_\_\_\_

**Interventions:**

(Do not include enhanced monitoring & resident education)

☐ low-boy bed

☐ bed mobility monitor

☐ chair mobility monitor

☐ reposition bed in room to provide one exit side (against wall)

☐ evaluate for environmental safety risks

☐ non-skid shoes or slippers for ambulation

Environmental changes made \_\_\_\_\_

Other \_\_\_\_\_

☐ Transfer with 2 assist

☐ Transfer using mechanical lifting device

☐ Positioning device (specify) \_\_\_\_\_

☐ Evaluate pain medication orders

☐ Referred to physical therapy

☐ Referred to rehabilitation nurse

☐ Programmed changes made \_\_\_\_\_

Did injury occur? ☐ yes ☐ no

Describe \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Additional comments about this investigation:

\_\_\_\_\_

\_\_\_\_\_

Nurse assessment of cause of fall:

☐ Acute illness ☐ Orthostatic hypotension

☐ Weakness ☐ Drugs

☐ Other \_\_\_\_\_

Signature of investigator \_\_\_\_\_

Date of investigation \_\_\_\_\_

Signature of reviewer \_\_\_\_\_

Date of investigation \_\_\_\_\_

FIGURE 4 (Continued)

occurs *immediately after* the fall. The careful evaluation of the resident helps to ascertain the cause and circumstances of the fall and to determine strategies for prevention of future falls. "The fall is a symptom, if you don't find out 'why' on the first fall, the resident will fall again" (Doty, 2001, p. 55). If staff do not take the time to get to the real reason for why a fall incident has occurred, then it is difficult to have an effective prevention program. Documentation on the resident's condition can demonstrate that the root cause has been identified and intervention has been implemented. For example, postprandial hypotension can result in falls for residents who take medications following meals. Immediately assessing postural vital signs might identify this as the cause, in which case a schedule change in the routine could help reduce fall risk.

The resident's physical assessment must be done immediately in order to avoid further injury to the resident, and appropriate intervention sought if injury is involved. For example, if the resident experienced a head injury due to a fall, then neurologic checks must be done. The attending physician and family are notified of the fall incident, even if no injury was identified.

The falls team reviews weekly all of the Unusual Occurrence Reports and the Accident/Incident Investigation Forms related to falls. Based on the data, additional multifaceted interventions may be established for the resident by the team. The team and staff found that it was not possible to select all the right interventions on the first try; however, they kept trying to improve the care with each reiteration.

Tracking and trending is done by the assistant director of nursing for each resident fall in the facility, regardless if the resident sustained an injury. The tracking and trending of the comprehensive investigation is used as a basis for identification of root cause and specific facility or resident risk factors. This information is reported to the Safety Committee and the Quality Improvement Committee for oversight, review, recommendations, and approval.

## EXERCISE

Rubenstein, Josephson, and Robbins (1994) reported that the "prevalence of detectable lower extremity weakness ranges from 48% among community living older persons to 57% among residents of an intermediate care facility to more than 80% of residents of a skilled nursing facility" (p. 443). The cause of muscle weakness and gait problems is multifaceted. "Although many factors, including chronic illness, a sedentary lifestyle, nutritional deficiencies, and aging itself, may contribute to muscle weakness and loss of

skeletal muscle mass in people of advanced age, currently only skeletal muscle disuse and undernutrition are potentially preventable or reversible with targeted interventions" (Fiatarone et al., 1994, p. 1769). Much of the weakness seen in the nursing home stems from deconditioning due to prolonged bedrest or limited physical activity; secondary to this are resident depression, the lack of stimuli within a nursing home to promote physical activity, and chronic debilitating medical conditions.

Elderly patients have dramatic weakness in the quadriceps making it difficult for them to rise from a chair. However, strength and range of motion exercises, particularly those that improve gluteal muscle and quadriceps strength, as well as ankle range of motion are effective in nursing home residents with multiple conditions, even for those with marked functional dependency and cognitive impairment (Bayne, 1997; Burke & Walsh, 1997; Butler, 2000; Edelberg, 2001; Fiatarone et al., 1994; Glaser, 1998; Kannus, 1999; Mulrow et al., 1994; Rose & Clark, 2000). "Physical activity and exercise may ameliorate diseases and delay debility in the geriatric population...balance is also likely to be improved with increased muscle strength" (Christmas & Andersen, 2000, p. 318). Throughout the reviewed literature, there was little documented regarding the specific exercises recommended for the frail elderly, the duration of exercise, or the intensity of the exercise program. However, the act of rising from a chair or bed has been identified in the literature as a time when falls frequently occur. The muscles used to rise from a seated position differ from those used for ambulating. As a result, the team determined that increasing quadriceps strength through sit-to-stand exercises would result in safer transfers, fewer falls when starting to stand, and improved ambulatory status. Thus the emphasis was placed on improving the patient's motor functioning, coordination, strengthening muscle groups, and improving physical health.

Each patient was evaluated by the physical therapist, including all new admissions or readmissions. The therapist reviews the resident's data, and develops a structured, individual treatment plan. The therapist then reviews the plan with the staff and the resident. Based on the assessment, the resident was enrolled in one of the following modalities for strengthening and safety:

- Level 1: Skilled therapy
- Level 2: Restorative services
- Level 3: Activities

**Level 1:** If the therapist determined that the patient would benefit from skilled therapy, then the attending physician was contacted for authorization,

and skilled treatment was done by the therapist to correct a problem, such as the need for instruction with a different walking aid. Therapy sessions could include active and progressive resistance exercises, active and passive range of motion, endurance activities, motor control activities, transfer techniques, and gait training. Incorporated into the skilled session, the therapist included sit-to-stand exercises that involved moving from a sitting position to standing one. The goal was for the resident to perform the sit-to-stand exercises usually unassisted but supervised at least twice a day, 7 days per week. The number of repetitions of the sit-to-stand exercise varied per resident, based on the assessment by the physical therapist. The maximum number of sit-to-stand exercises consisted of 10 repetitions performed twice a day.

**Level 2:** Restorative services involved organized exercise programs by the rehabilitation staff aimed at restoring or maintaining function or providing supportive care. The sit-to-stand exercises are included into the activities done by the restorative staff. The therapist supervises the exercise programs led by the restorative staff.

**Level 3:** Residents also perform the sit-to-stand exercises daily as part of the exercises planned by the activities department. If a resident was demonstrating difficulties participating in any exercise program for 2 weeks, then the restorative or activities staffs are responsible for notifying the therapist. The therapist reviews the documentation regarding the completion of the exercises, and makes adjustments in the number of repetitions, if needed. Each resident was enrolled in his or her level for 3 months. If the falls program exercises are successful (i.e., the resident does not fall again during the 3-month time-span), the level is reassessed by the therapist, and the patient is discharged to a lower-risk program, if appropriate. However, if the interventions are not successful as evidenced by additional falls, other interventions are implemented and monitoring continues. This process of monitoring and intervention continues until the resident has stabilized or the risk status improves. A key factor in the success of the program was to ensure that frontline staff members are aware of the changes and plans. Otherwise, all the assessments, exercises, and planning are worthless. Positive outcomes cannot be realized without a sense of awareness on everyone's behalf.

All staff is taught how to do the sit-to-stand exercises; however, the major responsibility fell to the restorative staff and activity aids. In order to perform the function, the case manager showed a video of the exercises, gave the staff a pamphlet containing photos that depicted the exercises, and held inservices on responsibilities and related policies. "Education is the

cornerstone and truly the most important part of any fall management program" (Anonymous, 1999, p. 58). The inservices provided a general discussion of the causes and consequences of falls as well as practical safety suggestions. In addition, posters were placed in key locations as visual reminders. During orientation, new staff members view the video, receive a copy of the pamphlet, and attend an inservice on the policies. Finally, yearly competencies were developed for the exercises.

## **SAFETY COMMITTEE**

The facility had an active maintenance and housekeeping department; however, the nurse risk manager from the facility's insurance company recommended that a multidisciplinary safety committee be formed to make monthly safety rounds. The falls committee and the safety committee overlap in composition and complement each other nicely in assessing both the intrinsic and extrinsic risks. With concern for fall reduction in mind, the safety committee's purpose was to make monthly careful inspections of the environment and notify appropriate parties if corrections of environmental hazards are needed. Collaboration is critical to the success of the program as various disciplines and services must interact to address various risk factors. The falls coordinator and the head of the safety committee discuss any incident report that relates to falls secondary to environmental hazards and seek appropriate corrections.

## **BED TRANSFERS**

Among frail elderly, even normal activities of daily living such as getting out of bed are hazardous if done without proper assistance or modification. Funk, Tornquist, Champagne, and Wiese (1992) documented that "approximately 50% of the bed-based falls in the long-term care setting occurred during the transfer process" (p. 70). These falls are primarily due to problems with the transfer process and misuse of equipment. This statement was supported by the data gathered in our program; as a result, the workers compensation insurance company for the facility was contacted for equipment instruction and transfer training. This also complemented efforts to decrease rates of staff back injuries. Problems with transfers seemed to occur when the staff:

- had a false sense of resident cooperativeness during the process,
- were rushing through the task, and
- had call-ins or were short of assistants.



The case manager met with the ergonomic representative from the insurance company to develop a Resident Handling Policy and a transfer labeling system for the resident's beds. The staff received inservices regarding the policy, the bed labeling, transfers techniques, gait belt use, and proper use of the mechanical equipment. Based on the resident's screening of transfer ability and ambulation status, the bed was labeled, and updated when changes occurred, with one of the following categories:

- 1: one-person transfer
- 1+: one-person with assistive device, such as walker or quad cane
- 2: two-person transfer
- M: mechanical transfer, either the hooyer or the electric lift
- I: independent resident
- C: combative resident

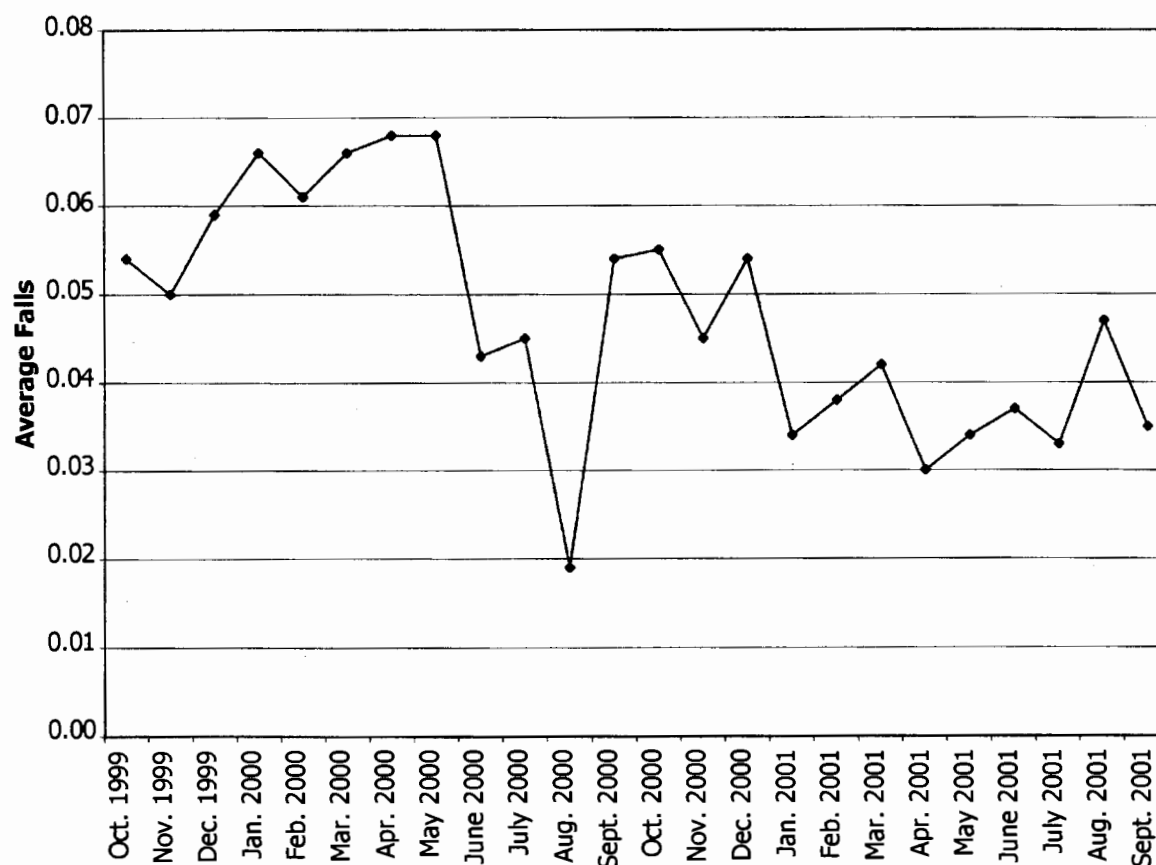
In addition to the above intervention, the team suggested purchases of low-profile beds and bed alarm systems for residents who fell while getting out of bed unattended. They also recommended more frequent bed checks for these residents. Floor night-

lights were purchased for residents who ambulated to the bathroom during the evening hours.

## RESULTS

After the interventions of the falls exercise program, 173 falls occurred over the next 27 weeks, with an average weekly census of 141.34, resulting in 0.0473 falls per resident per week. The 27-week preprogram mean, 0.060, had a standard deviation of 0.022. While the 27-week postprogram mean, 0.047, had a standard deviation of 0.026. A paired *t* test and Mantel-Haenszel Chi-Square analysis were done to determine statistical significance of effectiveness of the program. The paired *t* test resulted in a *p* value of 0.0486. The two-tailed Mantel-Haenszel Chi-Square test showed a significant effect with a *p* value of 0.009. The new program clearly enhanced the safety of the residents and was predicted to continue doing so (Figure 5).

Of the 173 falls that occurred over the study period, 85% were female, and the average age of the fallers was 92. Several of the very old residents fell repeated times, thus skewing the results. For exam-



**FIGURE 5**

October 1999 to March 2000 results are prior to the initiation of the Falls exercise program. The results after the initiation of the program demonstrate that a continual regimen of exercise improves muscle strength, even in the frail elderly population.

ple, two of the female patients are ages 102 and 103, respectively. They both tend to fall at the rate of once per month. Despite their ages, they have the strength to transfer independently, but have balance difficulties. More falls (51%) occurred on the evening shift hours (1500-1000), than during the day shift (31%), or night shift (18%). On the evening shift, 50% of the falls occurred between 3:00 P.M. and 5:00 P.M., and the remaining 50% occurred from 5:00 P.M. to 11:00 P.M. Nevertheless, a significantly greater number of falls from bed occurred during the night than during afternoon naps. All the residents who fell from bed had safety devices in place, such as half-side rails, low-profile beds, and bed alarms at the time of their fall. Regarding days of the week, surprisingly, Monday had the greatest number of falls, followed in order by Saturday, Tuesday, Sunday, and Friday. Wednesday and Thursday were equal and significantly the lowest. This was surprising as the case manager expected Saturday and Sunday to be the highest secondary to staffing issues.

Over one-half of the patient's fell while they were ambulating (70%), 25% fell from a chair, merri-walker, wheelchair, or commode. The remaining 5% fell due to a variety of causes, such as during assisted transfers from bed, improper use of equipment, or while exercising. It was believed that a high percentage of those patients who fell while ambulating were attempting to travel to or from the bathroom. The majority of the patients (65%) fell in their bedroom area. The hall (14%) and bathroom (12%) were the next-most frequent sites and were comparably equal. The remaining percentage included such sites as the day room, dining room, and activity room.

Thirty percent of the fallers were considered very dependent and were confined to a wheelchair, while another 65% had very limited mobility, although they were able to ambulate with assistive devices or the assistance of one to two individuals. Only 5% were categorized as able to walk independently. The majority of the patients (96%) had some form of impaired gait, and 5% were patients requiring total assistance for any kind of transfer movement. Approximately one-half of the patients who fell were considered confused. Such figures are consistent with the mobility status of patients in nursing homes.

Overall, 100% of the subjects were thought to need some type of treatment or intervention. However, not all the residents were appropriate or agreeable to any form of exercise or activity. For example, 8% of the residents refused to do any exercises, some were too ill, in pain, combative, contracted, or on hospice services. A mean of five recommendations was made for each resident, even if

they were not involved in the exercise interventions. For example, the nursing interventions, such as hourly nighttime checks or wheelchair cushions, were put in place for every resident.

## OUTCOMES

The outcomes of the program were identified as a decrease in the number of falls, fewer hospitalizations, and less functional loss. The multiple interventions, especially the increase in exercise, significantly improved the muscle strength, gait, balance, safety, and well being among the residents. These changes were accompanied by improvement in mobility and an increased level of spontaneous physical activity. The results demonstrated that a continual regimen of exercise improves muscle strength, even in frail elderly people. The subjects who were initially the weakest but did not have severe muscle atrophy had the largest benefit from the sit-to-stand exercises. These outcomes corresponded with those of Fiatarone et al., (1994), who concluded that "the aging musculoskeletal system retains its responsiveness to progressive resistance training, and most important, the correction of disuse is accompanied by significant improvement in the levels of functional mobility and overall activity" (p. 1775). However, any benefits accrued from the exercises are probably rapidly lost with this vulnerable population if the exercises are not continued. Due to multiple factors (primarily cognition), it was believed that the participants would not continue to exercise independently. As a result, the sit-to-stand exercises have been incorporated into the daily care of all residents, not just those at high risk. In addition, any effects of exercise treatment on outcomes such as falls are not likely to manifest themselves immediately on start of exercise, but over time, as strengthening increases and the effects become more dramatic. This was validated by the ongoing results of the program.

Inherent to all of the residents was a common desire to move. The confused residents wanted to get up, turn, or stretch, while the oriented residents wanted to move, even if the movement was more than their limited capabilities would permit. The team decided to channel the resident's desire for movement into positive and productive activities. Thus, all the residents capable of doing so are walked with assistance from the dining room door to their chair for meals, rather than bringing them in their wheelchairs as is typically done. Rubenstein, Josephson, and Robbins (1994) noted that, in addition to skilled therapy or restorative programs, simple walking programs, such as Oak Brook's walk-to-dine routine, might also improve strength and

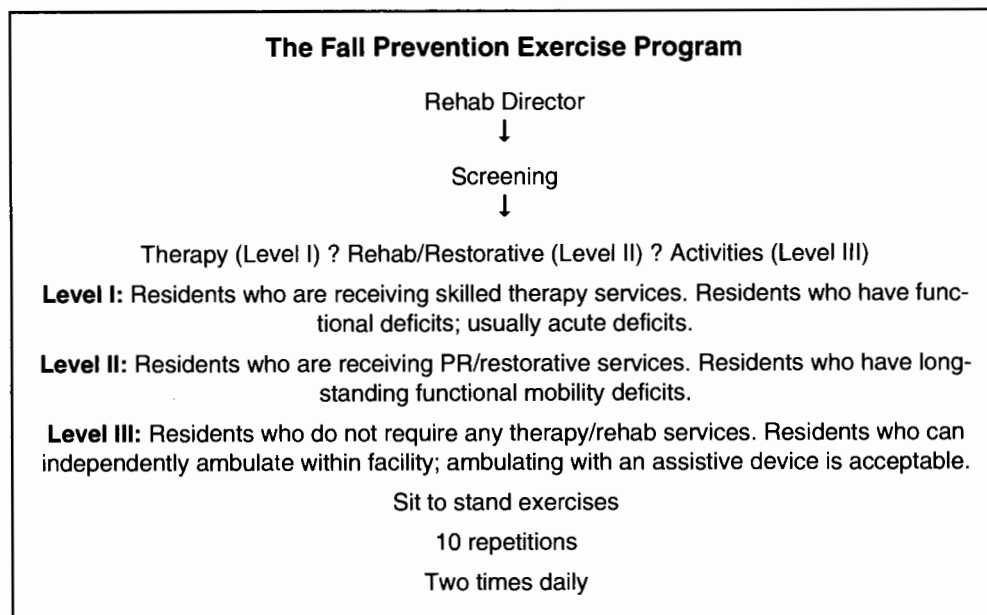
function. The CNAs also encourage residents to incorporate walking with a purpose, with staff assistance, to the washroom or down the hallways to maximize their functional independence. Outcomes of the walking-with-a-purpose-to-the-toilet program were a decrease in the number of diapers used, fewer urinary tract infections, less skin irritations, decrease in constipation, and less lifting (with the potential for back injury) by the CNAs. All of these successes can be translated into cost savings.

The environmental safety outcomes included repair and adjustment to three wheelchairs, including the installation of antitip rods and brake extensions, the replacement or repair of two pieces of furniture, and the purchase of five low-profile beds and four additional merriwalkers. Yearly the therapist reviews the proper use of transfer equipment, transfer techniques, and the sit-to-stand exercises for the staff. The outcomes regarding psychotropic medication adjustment resulted in tapering and discontinuing several medications. The outcomes related to transferring and ambulating resulted in numbering each bed with the proper number of persons needed for a safe transfer, assisting residents to the toilet every 2 hours, and reminding residents of safe transfer techniques.

The tools developed for the program have enabled the staff to maintain better reporting of patients at risk for falls, postfall assessment, and unusual occurrences (Figure 6). The fall exercise program has not only been vital to reduce the num-

ber of falls experienced by the residents, but has also been cost effective in regard to several factors. First, the cost of the program is minimal compared to the cost of falls and their sequela. Rubenstein, Robbins, Josephson, Schulman, and Osterweil (1990) found a 50% reduction in the annual number of hospital days for their intervention group. "If we extrapolate this finding to the national nursing home population, it would represent a reduction of about a million hospital days per year or a savings of over \$600 million nationally at a conservative hospital-cost estimate of \$700 per day" (p. 315).

A cost benefit that is difficult to measure, yet is important, is the improvement in quality of life for the residents. Because many of the risk factors for falling also contribute to immobility and functional decline, the interventions used here resulted in an improvement in functional independence among frail elderly. This has a mushrooming effect in that the total body is improved with strengthening, exercise, safety, and reduction of psychotropic medications. The outcome was increased confidence, decreased depression, overall improved health, and reduction in the need for hospitalization. "Improving quality and reducing costs of nursing home care are crucial as the nursing home population expands in the upcoming decades" (Mulrow et al., 1994, p. 519). The families and physicians with patients at Oak Brook Healthcare Centre have also expressed satisfaction with the program. "Patient and family satisfaction



**FIGURE 6**  
Example of a falls prevention exercise program.

and quality of life measures also can reflect a successful fall prevention and management program" (Musher & Ousley, 1998, p. 9).

Another cost benefit of the program has been a positive marketing means to attract new residents, not only from word of mouth of satisfied families, but from local case managers who have noted fewer admissions to acute care secondary to falls from the study site. Case managers from third-party reimbursers are more likely to refer patients to the facility if there is evidence of savings due to treatments that are preventative. The facility case manager sent information about the program and its outcomes to the contracted insurance case managers.

Finally, insurance premiums and liability for the facility have been reduced. "Pat Carlson, vice-president of marketing at Senior Technologies, notes that the average cost of liability claims assessed against nursing homes for a fall is now \$50,000..." (Anonymous, 1999, p. 61). Thus, the program is a risk-reduction strategy. A paper compliance fall program will not protect a facility in court; however, one that can show a systematic process in applying effective solutions based on investigations as to cause of fall *will* protect the facility.

## CONCLUSION

Nearly all-elderly residents can derive health benefits, physically and psychologically, from improving their level of activity and fitness. The falls program established at Oak Brook Healthcare Centre assessed a clinical issue, devised and implemented a plan of action, and measured patient outcomes. The team concluded that the program was successful in identifying patients at risk for falls and can guide implementation of prevention measures. A major factor in the study's success was the support from administration, the medical director, and the staff, from nursing to maintenance. The strategies used significantly increased the entire staff's awareness of patients at risk for falls, which also improved the patient outcomes. Conversely, the outcomes may not have been as influenced by the interventions, but simply the fact that the staff's awareness of fall prevention was heightened. In addition, due to the lack of validated instruments to measure risk factor abatement, the study was not able to measure changes in the safety practices (e.g., transfer technique training and environmental assessments).

Future recommendations include development of the long-term goals established at the onset of the program (i.e., assess residents for bone density on admission [if not done within the last year] and remeasure every 2 years). If funding is an issue, a grant

might be worth pursuing. "Bone density measured at the femoral neck is the best predictor of future hip fracture, according to an evidence-based report published by the agency for Healthcare Research and Quality" (Anonymous, 2001, p. 19).

The other long-term goal to be pursued is an incontinence assessment and treatment program. Until recently, falling and urinary incontinence were thought to result solely from distinct anatomic or physiologic abnormalities. Currently, they are felt to result from the accumulated effect of impairments in multiple domains (Tinetti, Inouye, Gill, Doucette, 1995). Many older adults assume that incontinence is a normal part of aging and do not pursue treatment for it. If treated, the risk of falls from rushing to the toilet or slipping in dribbled urine would be significantly decreased.

In addition, a future idea that was not identified by the team was discussed in the literature—that of resistance training and balance training to further reduce the number of falls by increasing strength and balance. For resistance training, ankle and wrist weights were used in exercise programs. Balance programs included instruction in ballroom dancing and Tai Chi. "The researchers found that ...[there was] a 10% reduction in the falls incidence ratio for those studies that included endurance, resistance, and flexibility training programs, and a 17% reduction for those that exposed patients to balance training" (Edelberg 2001, p. 49). For example, multifaceted interventions, including dance, walking, and other aerobic exercises could also influence strength, balance, gait, and coordination (Gregg, Pereira, & Caspersen, 2000). Tinetti et al. (1994), suggested that an additional assessment for balance should include having the patient reach for an object placed on the floor from both the sitting and standing positions.

Although there is evidence about the effectiveness of certain interventions in elderly people, and many advances have been made in the care of elderly people, many gaps in our knowledge remain. We need to encourage research in elderly people and encourage our elderly patients to participate in this research. In particular, we need to encourage the inclusion of frail elderly patients in studies assessing interventions, prognosis, and quality of life.

## Acknowledgment

The author thanks the staff of Oak Brook Healthcare Centre, especially Joann Bedrosian, Administrator, and Dr. G. McCray, Medical Director. It is their professional dedication to improving quality of care and willingness to collaborate that created standards of excellence for this facility.

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