Link Between Safe Patient Handling and Patient Outcomes in Long-Term Care

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KEY WORDS

ergonomics
quality of care measures
safe patient handling

This study examined the relationship between safe patient handling and quality of care measures. A comprehensive patient care ergonomics program included six elements. Using a retrospective observational design, 10 quality domains were compared before and after implementation of the program for 111 residents living on 24 units in six Veterans Administration nursing homes using a general linear regression model with repeated measures clustered within time and adjusted for age. After implementation, we found lower levels of depression, improved urinary continence, higher engagement in activities, lower fall risk, and higher levels of alertness during the day. Additionally, four areas showed a decline in function: pain, combativeness, locomotion, and cognition. Findings from this study may be useful in enhancing organizational support for safe patient-handling programs and could be used to build a business case for improving caregiver safety.

Although convincing evidence exists that safe patient-handling programs result in fewer and less severe injuries to caregivers, no evidence links these programs to quality of care. Data that these safety interventions have a direct impact on patient care and staff safety would increase organizational support for them. Although evidence-based strategies exist, there are multiple barriers to implementation. Patient care ergonomic initiatives compete with many other demands in healthcare settings.

Several recent studies demonstrated that safe patient-lifting programs can be highly effective in reducing the frequency, severity, and cost of caregiver injuries (Collins, Wolf, Bell, & Evanoff, 2004; Evanoff, Wolf, Aton, Canos, & Collins, 2003; Li, Wolf, & Evanoff, 2004; Nelson et al., 2006; Yassi et al., 2001). Cost–benefit analyses also show that these programs can recover the initial capital investment in equipment and training costs in less than 3 years. Through the conduct of these studies, researchers, nursing home administrators, and caregivers have noticed improvements in quality of care, but these observations have been largely anecdotal. This study formally examined the impact of safe patient-lifting programs on quality of care in nursing home residents. We tested the hypothesis that quality of care would improve with implementation of an evidence-based patient care ergonomics program in seven long-term care facilities.

Background and Rationale

Patient-handling tasks, including lifting and transferring, are physically demanding and unpredictable, and they are often performed under unfavorable conditions. The healthcare industry is gradually accepting the reality that manually lifting physically dependent patients is a high-risk activity for both the nurse and the patient (Nelson, Owen, et al., 2003). Unlike in nonhealthcare industries, where the weight of the load lifted can be controlled, the average weight of an adult male patient is 185 pounds and cannot be altered to make the job safer. Patient factors that complicate patient-handling tasks include variations in size, functional status, cognitive functioning, and cooperation, as well as fluctuations in condition and fatigue. The performance of high-risk tasks by nurses is not a rare event; the cumulative weight lifted by a nurse in one typical 8-hour shift is equivalent to 1.8 tons, or 9 tons per week (Tuohy-Main, 1997). Furthermore, nurses perform many patient lifts in awkward positions such as bending over beds or chairs with the back flexed (Blue, 1996; Videman et al., 1984), thus increasing risk for injury. In one study, nurses spent an average of 1.6 hours per shift in a stooped posture (Stubbs, Buckle, Hudson, Rivers, & Worringham, 1983). Inadequate space and poorly designed work environments also contribute to awkward positions for performing nursing care.

High-risk patient-handling tasks are defined as duties that impose significant biomechanical and postural stresses on the care provider. Although manual patient transfers impose risk, other high-risk patient-handling tasks include repositioning a patient in bed or chair, applying antiembolism stockings, and transporting a patient in a bed or stretcher. The combination of frequency and duration of high-risk tasks predisposes a caregiver to musculoskeletal injuries and makes some clinical practice settings more dangerous than others (Nelson & Baptiste, 2004). Nursing home care units (NHCUs) are considered a particularly high-risk setting because of the number and seriousness of injuries to nurses who work in

these settings (Nelson, Lloyd, Menzel, & Gross, 2003; Nelson et al., 2006). Factors that increase the risk in NHCUs include a high concentration of physically dependent patients and a unit philosophy that the patients should be dressed and out of bed.

Despite studies that addressed how these tasks can be performed more safely (Nelson, Lloyd, et al., 2003; Nelson et al., 2006), most healthcare facilities implement patient-handling strategies based on tradition and personal experience rather than scientific evidence. The most common patient-handling approaches in the United States include training in manual patient-lifting techniques, classes in body mechanics, and back belts. Unfortunately, none of these commonly used strategies have been documented to be effective (Nelson & Baptiste, 2004). A major paradigm shift is needed away from tradition-based approaches and toward evidence-based practices. Strong evidence supports the effectiveness of four safe patient-handling and movement interventions: patient-handling equipment and devices, ergonomic assessment protocols, safe lifting policies, and patient lift teams. The American Nurses Association (ANA), the National Institute for Occupational Safety and Health (NIOSH), and highly visible researchers have called for systematic changes in healthcare facilities to change the way high-risk patient-handling tasks are performed (ANA, 2003a, 2003b; DeCastro, Hagan, & Nelson, 2006; Nelson & Baptiste, 2004; U.S. Department of Labor, 2002).

Despite the strong evidence to support these interventions, few facilities have adopted them. The lag in implementing evidence-based strategies has been noted across health care; in fact, it is estimated that it takes more than 17 years for healthcare facilities to adopt new evidence (Grimshaw, Eccles, & Thomas, 2004). The significance of patient care provider injuries and the evidence that patient-handling interventions can reduce risk necessitates a decrease in such lag time. Efforts to connect work environment safety with increased quality of care will facilitate this change. Nurses are concerned about the safety of their environment as well as the quality of care they provide. In a survey of more than 4,800 nurses by the ANA, workplace safety was cited as a major concern: 76% reported that unsafe working conditions interfered with their ability to provide high-quality care, and 88% reported that health and safety concerns influenced their decisions to continue working in nursing (ANA, 2001).

Patient safety efforts have been the driving force to improve the quality of care in healthcare settings. Although research and anecdotal reports relate improvements in quality of care to safer work environments, little emphasis has been given to improving the quality of care by focusing on improving the work environment for care providers. Consequently, little is known about the influence of the patient care work environment on the quality of care provided in that environment. The Agency for Healthcare Research and Quality saw the need to address this issue and sponsored two conferences in October 1999 and 2000 that directly addressed quality of health care and safety in the workplace. To foster this connection, the September 2001 issue of the *Joint Commission Journal on Quality Improvement* was dedicated to the topic of relating improvements in healthcare quality to worker safety. A recurring theme in this journal was the dearth of information in this area. The articles were adapted from selected papers presented at the Agency for Healthcare Research and Quality conferences, and many cited the use of appropriate patient-handling technology (i.e., patient-handling equipment) as an effective method of providing a safer work environment and improving the quality of care (Eisenberg, Bowman, & Foster, 2001; Foley, Keepnews, & Worthington, 2001; Sainfort, Karsh, Booske, & Smith, 2001). Others have also noted this connection (Association for Occupational Health Professionals in Healthcare, 2004; DeCastro, 2004; Edlich, Winters, Hudson, Britt, & Long, 2004; Edworthy, Hignett, Hellier, & Stubbs, 2006; Garg, 1999; Health and Safety Executive, 1992; Moreno, 2003; Queensland Nurses Union, 1999; Weinstein, 2000; Worksafe Victoria, 2003). More recently, De Castro (2004) noted that using equipment during patient-handling activities often is a more secure process for patients, patients are less often subjected to awkward and forceful handling, anxiety over handling and movement often is decreased, patient autonomy can be increased, and the dignity of patients usually is better maintained. And, as does Garg (1999), the ANA (2003b) supports the use of patient-handling technology along with a policy or program to support such technology to promote safer work environments.

An accepted paradigm unique to the healthcare industry is the belief that worker exposure is acceptable. This paradigm often blocks efforts to improve working conditions in patient care environments. This paradigm is implicitly and explicitly taught through nursing curricula and is then perpetuated in the workplace. By using this unique symbiotic relationship between healthcare worker and patient and demonstrating patient benefits from safe patient-handling technology and policy, we can promote more timely and more widespread acceptance of safe patient-handling initiatives.

To examine the effects of patient-handling equipment and programs on quality of care, we selected outcome measures of interest included in the Minimum Data Set (MDS): patient demographics, cognition, depression and anxiety, behavior,

physical functioning, continence, patient safety (adverse events), activity, patterns, healthcare utilization, discharge potential, and participation in therapy. But, as noted earlier, the impact of the patient care work environment on the quality of care provided in that environment is sparse, as are established parameters for the study of such outcomes. However, in conducting patient care ergonomic studies, researchers, nursing home administrators, and caregivers have noticed that quality of patient care has been positively affected by safe patient-handling programs. Lifting devices are said to increase the frequency and ease of moving a patient out of bed, and heartwarming accounts of improvements in the quality of life of previously bedridden nursing home residents have been communicated. Most of the outcome measures selected, including cognitive functioning, depression and anxiety, and behavior, can be linked to improvement in the quality of life. With greater frequency of being out of bed, physical functioning may also be improved. More mobile and better-functioning patients are more likely to increase their level of activity, decrease health care use, increase their discharge potential, and increase participation in therapy, and their health status may improve. Also, common benefits relayed by staff include improvements in toileting outcomes and skin integrity, as seen in the incidence and seriousness of skin tears and pressure ulcers. Use of lifting equipment, friction-reducing devices, and other patient-handling devices reduces the shear forces on skin when a patient is being moved and also allows more frequent repositioning in bed, improving skin integrity. Staff members and a few researchers have relayed data linking a decrease in combativeness with use of lifting equipment (Collins et al., 2004; Owen, 1999). Improved behavior is thought to be a result of reducing unwanted personal contact and moving a resident in a less painful manner when using lifting equipment. Other anecdotal data relate use of lifting devices to a reduction in falls and thus an increase in patient safety. Researchers studying other nursing issues such as staffing levels include adverse events such as falls, injury, and pressure ulcers (Cho, Ketefian, Barkauskas, & Smith, 2003).

A qualitative study addressing the implications of implementing the Manual Handling Operations Regulations in the United Kingdom concluded that for some using lifts in the home, the use of lifting devices involved physical, social, and psychological levels of response (Conneeley, 1998). We extrapolate such responses to the nursing home care environment.

Significance

Work-related musculoskeletal disorders in nursing persist as the leading and most costly occupational health problem in the United States. Nurses suffer a disproportionate number of musculoskeletal disorders as a consequence of the cumulative effect of repeated patient-handling events (Smedley, Egger, Cooper, & Coggon, 1995), often involving unsafe loads. Nursing care entails a variety of patient-handling tasks, such as lifting, transferring, and repositioning patients. Continuous, repeated performance of these activities throughout one's working lifetime causes or exacerbates musculoskeletal disorders. Because patient-handling tasks conventionally are performed manually, nurses are significantly exposed to the biomechanical hazards associated with this high-risk duty. Manual patient handling is the lifting, transferring, and repositioning of patients without the use of assistive equipment. Although nurses historically have been trained to use proper body mechanics and manual techniques to prevent injury when lifting and transferring patients, the true value of these methods and applicability to the practice of nursing are questionable (Nelson, Fragala, & Menzel, 2003).

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NIOSH has recognized the extent to which U.S. workers are exposed to hazards in the workplace. By conducting intramural research, funding extramural research, developing the NIOSH lifting equation, organizing conferences, and offering numerous publications, NIOSH has demonstrated the commitment needed to address the problem of work-related musculoskeletal disorders. Furthermore, NIOSH's National Occupational Research Agenda includes musculoskeletal disorders and lower back disorders as priority areas of research. The Occupational Safety and Health Administration has also acknowledged the seriousness of work-related musculoskeletal disorders in the American workforce. Efforts to promulgate a standard, appointment of the National Advisory Committee on Ergonomics, and development of industry-specific ergonomic guidelines for nursing home personnel (U.S. Department of Labor, 2003) illustrate the attention that the Occupational Safety and Health Administration has given to this matter.

Although some progress has been made to develop and disseminate preventive approaches to reduce the risk of biomechanical hazards, continued endeavors that seek to disseminate them into high-risk industries are needed. Since 1990, injury and illness rates in the healthcare industry, specifically nursing and personal care homes and hospitals, have consistently been higher than in private industry (Institute of Medicine, 1996; U.S. Department of Labor, 2003). Representing a large percentage of the healthcare workforce, nursing personnel suffer a disproportionately greater number of injuries and illness, particularly musculoskeletal disorders. Although evidence-based approaches exist (Nelson & Baptiste, 2004), healthcare facilities, home care, and schools of nursing have not fully embraced these new approaches.

Compared with other workers, nursing personnel are at higher risk for musculoskeletal disorders. Nursing aides, orderlies, and attendants ranked first and registered nurses sixth in a list of at-risk occupations for strains and sprains (U.S. Department of Labor, 2002). Additional estimates for the year 2000 showed that the incidence of back injuries involving lost work days was 181.6 per 10,000 full-time workers in nursing homes and 90.1 per 10,000 full-time workers in hospitals, whereas incidence rates were 98.4 for truck drivers, 70.0 for construction workers, 56.3 for miners, and 47.1 for agriculture workers (U.S. Department of Labor, 2000). In 2001, for cases involving days away from work among registered nurses, 4,547 were categorized as overexertion in lifting, and 14,832 were listed as sprains or strains (U.S. Department of Labor, 2001).

Associated primarily with dependent patient care, the risk of musculoskeletal injury secondary to manual patient handling crosses all specialty areas of nursing. Therefore, no nurse is free of the risk of injury. The impact on the nursing workforce also has adverse consequences at the organizational level through increased absenteeism, lost work time, burnout, decreasing retention, high turnover, and low recruitment. Moreover, the occurrence of musculoskeletal injuries may have a profoundly discouraging effect in the context of the current nursing shortage, aging nursing workforce (average age greater than 45 years), and waning numbers of professional entrants (Powell-Cope, Nelson, Tiesman, & Matz, 2003). It has been estimated that 12% of nurses leave the profession annually because of back injuries (Stubbs, Buckle, Hudson, Rivers, & Baty, 1986). Nurses accept back pain as part of their job and use sick leave; different studies reported that 52%–63% of injured nurses have pain that lasts for more than 14 days, and in 67% of cases pain was a problem for at least 6 months (Institute of Medicine, 2001).

Methods

Study Design

A retrospective observational design was used to compare quality of patient care before and after implementation of a patient-handling program on 24 units of six Veterans Administration (VA) nursing homes. Patient data were abstracted from MDS version 2.0. Because the program was implemented in the first 6 months of 2002, the preintervention period was limited to 2000–2001, and the postintervention period was limited to 2003–2004. The unit of analysis was the nursing home.

Sample

We included only VA nursing home residents who could have benefited from the safe patient-handling interventions. These residents typically have mild to severe limitations in mobility, necessitating partial to full assistance with patient-handling tasks, including lifting and activities of daily living. They are identified in Section G of the MDS 2.0, which addresses physical functioning and structural problems. This section includes modes of transfer and provides an indication of independent mobility of the patient. We limited the study population to residents who were identified as needing mechanical aids in transfer. We limited our study to residents who were subjected to the intervention and were residents both before and after intervention. These criteria resulted in a final sample size of 111 unique patients, yielding 222 observation points (preintervention and postintervention). Finally, we excluded residents who had missing values for the majority of patient quality indicators listed in **Table 1.**

Intervention

A multifaceted safe patient-handling program was implemented in 24 nursing home care units in six VA nursing homes in the first 6 months of calendar year 2002. The intervention included six program elements: ergonomic assessment protocol; patient-handling assessment criteria and decision algorithms; peer leader role "back injury resource nurses"; state-of-the-art equipment; after-action reviews; and a no-lift policy. The impact of this program on caregiver safety has been reported in a separate publication (Nelson et al., 2006). Details of the program elements can be found at www.visn8.med.va.gov/patientsafetycenter/.

Measurement

Patient data were abstracted from the MDS version 2.0. The Centers for Medicare and Medicaid Services sponsor the Resident Assessment Instrument (RAI), which helps facility staff gather definitive information on a resident's strengths and needs, which must be addressed in an individualized care plan. It also helps staff members evaluate goal achievement and revise care plans accordingly by enabling the facility to track changes in the resident's health status. The RAI consists of three basic components: MDS version 2.0, resident assessment protocols, and utilization guidelines. The MDS is a standardized primary screening and assessment tool of health status; it measures physical, medical, psychological, and social functioning of nursing home residents. The general domains of data and health status items in the MDS include demographics and patient history, cognitive patterns, communication and hearing, vision, mood and behavior patterns, psychosocial well-being, physical functioning, continence, disease diagnoses, health conditions,

Table 1. Patient Quality Indicators

Variable	Operational Definition	Data Source
Patient demographics	Gender, race or ethnicity, date of entry into long-term care, admission source (7 options), education (8 options), history of mental health problems (yes or no), marital status (5 options)	MDS Section AB MDS Section A
Cognition	Comatose (yes or no), short-term memory problem (yes or no), long-term memory problem (yes or no), cognitive skills for decision making (independent, modified independent, moderately impaired, severely impaired), change in cognitive status (no change, improved, deteriorated)	MDS Section B
Depression or anxiety	Depression (overall score on 16 items), change in mood (none, improved, deteriorated)	MDS Section E
Behavior	Wandering (frequency in past 7 days), verbal abuse (frequency in past 7 days), physical abuse (frequency in past 7 days), resisting care (frequency in past 7 days)	MDS Section E
Physical functioning	Each of the following is evaluated for self-performance of ADLs (5-point scale from independent to dependent) and ADL support provided (4-point scale from none to 2 or more people): Bed mobility Transfer Locomotion on unit Dressing Toilet use Personal hygiene Bathing Balance (score of 0–3 while standing and sitting) Range of motion (overall score for neck, arm, hand, leg, foot, other) Mode of locomotion (cane or walker, self-wheeled, other wheeled) Mode of transfer (bedfast, lifted manually, lifted mechanically, transfer aid, none) Change in ADL function (none, improved, deteriorated)	MDS Section G
Continence	Bowel (scale 0–4), bladder (scale 0–4), change in urinary incontinence (none, improved, deteriorated)	MDS Section H
Patient safety (adverse events)	Pneumonia Recurrent lung aspiration Dehydration Pain (frequency and intensity) Fall (past 30–180 days), hip fracture (yes or no), other fracture (yes or no) Pressure ulcers (number and stage)	MDS Section I #2 MDS Section J #1 MDS Section J #1 MDS Section J #2 MDS Section J #4 MDS Section M #1
Activity patterns	Time awake (morning, afternoon, evening), average time involved in activities (scale 0–3)	MDS Section N
Health care utilization	Number of times admitted for overnight stay in hospital within 90-day period, number of emergency room visits, number of doctor visits	MDS Section P
Discharge potential	Overall resident status (no change, improved, deteriorated)	MDS Section Q
Participation in therapy	Number of days and minutes of participation in therapies that were ordered: Recreational therapy Physical therapy Occupational therapy Speech therapy	MDS Section T #1

Note. ADLs = activities of daily living; MDS = Minimum Data Set.

medications, nutritional and dental status, skin condition, activity patterns, special treatments and procedures, and discharge potential. An extract of the MDS data, the Nursing Home Resident Profile Table, is used to make estimates of long-term care measures. This extract includes information about active residents of nursing homes. RAIs normally are conducted quarterly or if a significant change occurs in the resident's health status, as when a resident has a decline or improvement in health in two or more assessment areas of the MDS. Sangl, Saliba, Gifford, and Hittle (2005) reported that the reliability of most data elements from MDS is considered acceptable in research studies, although mixed evidence exists for the reliability and validity of the quality measures contained in the MDS. Also, the absence of clinical benchmarks limits the interpretation of the quality measures.

The patient quality indicators abstracted from the MDS and the relevant data source in MDS are listed in Table 1. Variables were selected based on potential

Key Practice Points

1. Although they are designed to reduce the incidence, severity, and cost of nursing injuries associated with patient handling, safe patient-handling programs also improve patient care.
2. Implementation of a safe patient-handling program in a long-term care facility significantly improves the quality of patient care provided to residents for the following quality-of-care indicators: (1) physical functioning, (2) activity level, (3) ability to maintain activities of daily living, (4) fall prevention, and (5) more wakefulness in the morning.
3. It is often difficult to show improvements in functional levels in nursing home residents because of the natural downward decline in health status, which can overpower any potential positive benefits derived from the intervention.
4. Linking quality of care to programs designed to reduce occupational injuries to nursing staff could be useful in enhancing organizational support for implementation of safe patient-handling programs and could be used to build a business case for improving caregiver safety.

impact on mobility-related adverse events because the intervention was likely to affect the timing, frequency, and length of time spent out of bed. The majority of variables contained in Table 1 are recorded as nominal variables or ordinal variables. For example, seven different options exist for possible sources of admission in the variable denoting patient demographics: a private home (with and without home health services), hospital (acute, psychiatric, and rehab), assisted living or group home, and nursing home.

Approvals for Study

We obtained the necessary data use agreement from the Veterans Administration for use of the MDS 2.0 used in VA nursing homes and obtained approval from the local institutional review board.

Data Analysis Plan

A general linear regression model with repeated measures was used. Analysis was limited to a mutually exclusive set of observations in both time periods; only patients who were residents in nursing homes in both preintervention and postintervention time frames were retained. The effects of the intervention in the multivariate analysis denoted as the time variable (dichotomous, indicating preintervention and postintervention periods) and age are regressed on the outcome variables listed in Table 1. SAS 9.1 was used for all analyses.

Results

Most patients were male (96%) Caucasians (68%) with an average age of 70 in the preintervention period. Half were married. The most common admission source was an acute care hospital (22%). **Table 2** lists the results of the regression analysis. The table lists the various domains in health outcomes and the number of residents categorized by each condition. For example, of the observed ($N = 111$) residents, one was comatose in the preintervention period, whereas two were comatose in the postintervention period. Most health outcome variables did not change significantly; that is, the statistical tests could not rule out the possibility that results occurred by chance. In the area of cognition, the only variable that was significant was long-term memory, which affected 71 residents in the postintervention period and 57 before intervention, although this change may reflect the effects of normal aging.

As expected, the domain of physical functioning improved because of the intervention. Self-performance in both bed mobility and transfer improved significantly after adjustment for age of residents. The overall improvement in this domain is evidenced by a significant drop in the number of respondents who were observed with deterioration in activities of daily living from the preintervention ($n = 23$) to the postintervention ($n = 9$) period. An equally striking finding is the statistically significant decrease in the number of falls among residents in the 6 months before the assessment, from 11 to 3. Concerning activity patterns, more residents were awake in the morning. The incidence of pressure ulcers (Stage 1 to Stage 4) showed mixed results before and after intervention, with the differences not statistically significant.

Conclusions

The findings from this study support the conclusion that implementation of a safe patient-handling program in a long-term care facility significantly improves the quality of patient care provided to residents for some quality-of-care indicators. Review of our results shows that, after implementation of a safe patient-handling program, the physical functioning of residents increased, the number of those reporting little or no activity during the day declined, the number of those reporting a deterioration in activities of daily living declined, the number of falls among residents decreased, and residents were more awake in the morning than they were before the intervention. However, we were not able to show a significant improvement in mood and behavior indicators or cognition. This is probably because of the natural downward decline in these outcome measures

Table 2. Results of Regression Analysis

Outcome	Number of Residents Before Intervention	Number of Residents After Intervention	Confidence Intervals for Time Variable		*t* Statistic (* denotes significance)
Cognitive Patterns					
Comatose	1	2	–0.66	2.10	1.02
Short-term memory problem	59	66	–0.04	0.51	1.65
Long-term memory problem	57	71	0.18	0.78	3.16*
Some impairment in daily decision making	77	79	–0.06	0.24	1.17
Deterioration in cognitive status (last 90 days/ last assessment)	2	4	–0.08	0.04	–0.58
Mood and Behavior Patterns					
Indicators present for depression, anxiety, sad mood	35	22	–0.62	0.35	–0.55
Deterioration in mood (last 90 days/last assessment)	6	3	–0.01	0.16	1.66
Wanders	3	0	–0.06	0.00	–1.76
Verbally abusive	16	14	–0.08	0.12	0.39
Physically abusive	4	6	0.00	0.06	1.76
Resists care	11	14	–0.02	0.22	1.67
Physical Functioning					
Bed mobility					
Self-performance	104	105	0.19	0.56	3.91*
Support provided	105	105	–0.10	0.13	0.31
Transfer					
Self-performance	108	110	0.01	0.23	2.17*
Support provided	108	110	–0.12	0.09	–0.31
Locomotion unit					
Self-performance	67	72	–0.23	0.25	0.05
Support provided	74	83	–0.12	0.14	0.14
Dressing					
Self-performance	111	111	–0.03	0.14	1.29
Support provided	111	111	–0.04	0.06	0.38
Toilet use					
Self-performance	81	108	–0.03	0.16	1.27
Support provided	81	108	–0.05	0.08	0.44
Personal hygiene					
Self-performance	109	106	–0.10	0.12	0.17
Support provided	109	101	–0.06	0.04	–0.38
Bathing					
Self-performance	110	111	–0.06	0.08	0.26
Support provided	110	111	–0.06	0.06	–0.03
Balance					
Standing	86	88	–0.03	0.06	0.58
Sitting	85	86	–0.23	0.23	–0.03
Limited range of motion	102	110	–0.41	0.63	0.41
Aids modes of locomotion	81	86	–0.20	0.11	–0.56
Aids mode of transfer	66	71	–0.69	0.36	–0.63
Deterioration in activities of daily living	23	9	0.04	0.23	2.68*
Incontinence (last 14 days)					
Bowel	93	110	–0.22	0.25	0.15
Bladder	82	56	–1.30	–0.58	–5.11*
Deterioration in urinary continence	101	106	–0.04	0.08	0.58
Health Conditions					
Pneumonia	10	4	–2.13	0.16	1.68
Dehydration	0	1	n/a	n/a	n/a
Fell in past 30 days	6	5	–1.35	0.96	–0.33
Fell in past 180 days	11	3	–2.61	–0.14	–2.19*
Hip fracture in past 180 days	2	0	n/a	n/a	n/a
Other fracture in past 180 days	1	3	–1.19	3.44	–0.95
Lung aspiration	6	3	–1.98	0.52	1.14

(continued)

Table 2. Results of Regression Analysis *(continued)*

Outcome	Number of Residents Before Intervention	Number of Residents After Intervention	Confidence Intervals for Time Variable		*t* Statistic (* denotes significance)
Pain					
Frequency (>0)	40	45	–0.11	0.20	0.56
Intensity (>0)	40	45	–0.21	5.0	0.79
			–.022	0.15	–.037
Number of ulcers (last 7 days)					
Stage 1					
1	7	3			
2	0	2			
3	2	0			
Stage 2					
1	8	10			
2	2	4			
3	2	0			
Stage 3					
1	5	4			
2	2	2			
Stage 4					
1	3	7			
2	3	1			
3	0	1			
4	2	2			
Activity Patterns					
Awake in the morning	83	97	0.28	1.44	2.89*
Awake in the afternoon	100	96	–1.07	0.35	–1.0
Awake in the evening	41	40	–0.47	0.39	–0.18
Little or no activity involvement	57	43	0.07	0.09	3.2*
Special Treatments					
Number of overnight hospital stays	31	19	–0.47	0.11	–1.21
Number of emergency room visits	14	8	–0.20	0.02	–1.56
Number of physician visits	103	104	–0.33	0.42	0.24
Number of days >0 recreational therapy administered	47	37	–0.49	0.14	–1.07
Number of patients who had therapies ordered	5	2	–2.06	1.54	–0.28
Discharge Potential					
Deterioration in overall care needs	20	13	–0.03	0.15	1.24

that normally occurs over time in a study population similar to the one in this study. This natural decline in health status may overpower any potential benefits derived from the intervention for these outcome measures and thus may mask any potential benefits. This problem can be visualized in the hypothetical data presented in **Figure 1.** Note that the number of ulcers has increased for those with a safe patient-handling program and for those without. Clearly, the safe patient-handling program was an improvement, even though there was still an increase in ulcers after implementation of the intervention. For this reason, we cannot conclude from our findings whether the intervention has any significant impacts (positive or negative) on these outcome measures. However, it is likely that the intervention lessened the natural decline that would have normally occurred without implementation of the intervention, thereby reducing the negative impact of the decline as shown in Figure 1. Additional studies, with other study populations, are needed to determine whether this intervention would improve the quality of care from a health standpoint. There are implications for geriatric rehabilitation; given the extended length of stay, it was possible to reduce adverse outcomes in this vulnerable population. The impact of these changes is not clear because, given the retrospective analysis, we did not have access to quality-of-life measures. Also, studies examining other quality-of-care indictors, such as studies evaluating the impact

of a safe patient-handling program on skin tears, joint dislocations, or perceived health status, are needed. Finally, it is possible that the positive benefits of these programs may be better demonstrated in a population that is not naturally declining, such as that of an acute care setting or a hospital environment.

Though designed to reduce the incidence, severity, and cost of injuries associated with patient handling, safe patient-handling and movement programs also can improve patient care. Findings from this study may be useful in enhancing organizational support for implementation of safe patient-handling and movement programs and could be used to build a business case for improving caregiver safety. The findings of this exploratory study justify the need for more extensive research examining the link between safe patient handling and patient outcomes.

Limitations

The limitations of the study included high mortality of subjects (a large number of preintervention subjects died before postintervention data were collected); a natural downward decline in function in survivors, making it difficult to show improvements over time; a sample size too small to detect differences in adverse events that were rare (e.g., hip fractures); and reliance on retrospective data in MDS.

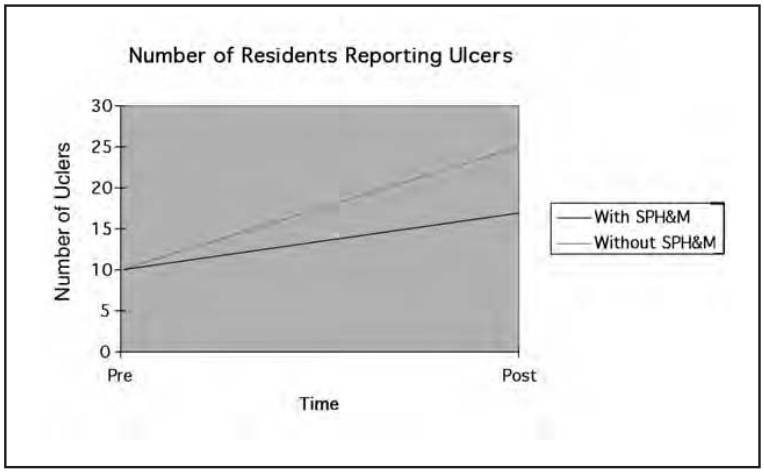
Another limitation is that we relied on secondary data to answer the research question. The MDS database was assembled for general assessment, so using the data contained therein to detect the effectiveness of any intervention is difficult. The MDS contains many confounders; a direct link between any of the variables and the intervention is questionable.

The study lacked a control group, leading to our next-best effort of a pre–post design with individuals serving as their own controls. Furthermore, several variables had small cell sizes, such as those in the health conditions category. The adverse-event outcomes are rare events (e.g., hip fractures) and hard to observe in a time frame of 5 years. Finally, with no access to comorbidity data, there was no way to control for case mix across patients or within individuals, making it difficult to show improvement in this sample of frail patients.

Acknowledgment

The authors would like to thank Elizabeth Bass, PhD, Veterans Administration Patient Safety Center of Inquiry, James A. Haley Veterans Administration Medical Center, Tampa, FL, for her thoughtful critique of the manuscript.

Figure 1. Possible Masking of Effect of Implementation of a Safe Patient-Handling and Movement (SPH&M) Program Using Hypothetical Data



Disclaimer

The research reported here was supported by the Department of Veterans Affairs, Veterans Health Administration. The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs or the National Institute for Occupational Safety and Health.

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Promoting Safe Patient Handling

continued from page 2

that undergraduate nursing students are taught unsafe manual patient-handling techniques and are rarely exposed to the newest patient-handling devices. This step is critical in educating a new generation of rehabilitation nurses about safe patient handling.

ARN can play a critical role in advocating for safer work environments for rehabilitation nurses through ongoing partnerships with the American Nurses Association (ANA), APTA, and VHA.

For Further Reading

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