

Description of an Advanced Practice Nursing Consultative Model to Reduce Restrictive Siderail Use in Nursing Homes*

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Abstract: Researchers have demonstrated that the use of physical restraints in nursing homes can be reduced, particularly where advanced practice nurses (APNs) are utilized. We examined the link between APN practice, siderail reduction, and the costs of siderail alternatives in 273 residents in four Philadelphia nursing homes. The majority of participants were cognitively and physically impaired with multiple co-morbidities. APNs recommended a total of 1,275 siderail-alternative interventions aimed at reducing fall risk. The median cost of siderail alternatives to prevent falls per resident was \$135. Residents with a fall history experienced a significantly higher cost of recommendation compared to non-fallers. Findings suggest that an APN consultation model can effectively be implemented through comprehensive, individualized assessment without incurring substantial costs to the nursing home. © 2007 Wiley Periodicals, Inc. *Res Nurs Health* 30:131–140, 2007

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Advanced practice nurses (APNs), including nurse practitioners and clinical nurse specialists, provide a wide range of practice, education, and consultative services in nursing home settings (Rosenfeld, Kobayashi, Barber, & Mezey, 2004). In addition to providing direct care to nursing home residents (Ryden et al., 2000), APNs have assumed roles in staff education and administration, consulting with nursing staff to improve care processes and providing the expertise and leadership necessary to implement changes in practice (Rapp, 2003). Outcomes of their involvement include evidence of reduced hospitalization and emergency room use among nursing home residents (Intrator, Zinn, & Mor, 2004; Kane, Keckhafer, Flood, Bershady, & Siadat, 2003); improved use of care protocols among facility staff (Krichbaum, Pearson, & Hanscom, 2000; Krichbaum, Pearson, Savik, & Mueller, 2005); and enhancement of quality improvement initiatives to reduce pressure ulcers, behavioral symptoms, and falls (Rantz et al., 2001).

Advanced practice nursing interventions have been shown to be particularly effective in reducing or eliminating physical restraints in nursing home settings. One clinical trial showed that when APNs assessed restrained nursing home residents and provided individualized plans and alternatives to restraint use, the use of restraints declined significantly or could be eliminated altogether (Patterson, Strumpf, & Evans, 1995). In other studies, advanced practice nursing consultation, combined with staff education, resulted in significant reduction in physical restraint use, without increasing psychoactive drug use, the number of falls or fall-related injuries, or reduction in staffing needs, when compared to homes receiving only restraint education or no intervention (Capezuti, Evans, Strumpf, & Maislin, 1996; Capezuti, Strumpf, Evans, Grisso, & Maislin, 1998; Capezuti, Strumpf, Evans, & Maislin, 1999; Evans et al., 1997; Siegler et al., 1997). One successful component of the restraint reduction studies was that the interventions were based on the individualized care model approach. Individualized care is the process of tailoring or customizing interventions to match characteristics of each resident. This approach is often used in interventions to reduce restraints, as restraints have been viewed as a one-size-fits-all approach to care (Evans, 1996; Happ, Williams, Strumpf, & Burger, 1996).

Physical restraints are any devices placed on or near the body that limit the freedom of voluntary

movement and access to one's body, primarily vest, ankle, and waist restraints (Centers for Medicare and Medicaid Services, 2005). Siderails are adjustable metal or rigid plastic bars that attach to the bed and come in an assortment of shapes and sizes (full-, three-quarter-, half-rail, and quarter-length rail, split-rail configuration, and alternate split-rail configuration). Until recently, siderails were not typically included as physical restraints and were, therefore, not included in criteria for restraint use. Siderails have now been redefined as restraints or restrictive devices when used to impede a resident's ability voluntarily to get out of bed (Capezuti, 2004). Restrictive siderail use is defined as two full-length or four half-length raised siderails (Capezuti, Wagner et al., in press). Siderails restrict residents' movement and have historically been linked to patient safety, namely, to the prevention of patients from falling out of bed (Brush & Capezuti, 2001). Because the use of body restraints, such as vest and waist restraints, has been drastically reduced in nursing homes, restrictive siderails have become the most frequently used restraint to prevent older adults from bed-related falls (Capezuti, Maislin, Strumpf, & Evans, 2002). Nursing home residents who are cognitively impaired, or have conditions such as impaired mobility, increased risk for injury, nocturia or incontinence, and sleep disturbances, are at greatest risk for restrictive siderail use (Capezuti, Talerico, et al., 1999).

Although restrictive siderail use is rationalized as a mean to prevent falls from bed, no evidence exists that siderail use decreases the risk or rate of fall occurrence (Capezuti, et al., 2002; Frengley, 1999). Indeed, contrary to their intended purpose as safety devices, numerous reports and studies have documented the negative effects of restrictive siderail use. For example, the Joint Commission on the Accreditation of Healthcare Organizations (2002) issued a sentinel event alert highlighting documented injuries associated with siderails. Entrapment deaths and injuries occur when residents slip through the siderail bars or the space between split siderails; between the siderail and mattress; or between the head or footboard, siderail, and mattress (Hignett & Griffiths, 2005; Miles, 2002; Parker & Miles, 1997). Between 1985 and 2004, more than 575 incidents of siderail entrapment were reported to the United States Food and Drug Administration; 358 cases of siderail-attributed deaths were also registered (US Food and Drug Administration, 2004).

The Centers for Medicare and Medicaid Services (CMS, 2005) responded to these reports with revised guidelines aimed at preventing accidents such as siderail entrapment injuries in nursing homes. CMS guidelines now require nursing homes to conduct individualized assessments of residents deemed in need of restrictive siderails, to provide clear documentation of the alternatives considered or used in lieu of restrictive siderails, and, if all else fails, to develop a clear plan justifying restrictive siderail use. Restrictive siderail use reduction, therefore, requires an individualized assessment and careful selection of tailored interventions that target modifiable risk factors for bed-related falls and others incidents.

Any time a modification to the current care routine is considered or implemented, the costs related to this change must be considered. This is especially true in the long-term care setting, as nursing homes are reluctant to implement new programs without reimbursement from governmental or insurance company sources. For example, following the 1997 Balanced Budget Act implementation of the Prospective Payment System, fewer nursing home residents received physical therapy and related rehabilitation services as a result of drastic reimbursement cuts to nursing facilities (Yip Y.B., Wilber, & Myrtle, 2002). With respect to restraint use and costs, Phillips, Hawes, and Fries (1993) reported that, when differences in impairment and care needs are controlled, residents who are physically restrained require less staff time and care than those who are not restrained. If a similar conclusion could be drawn from studying restrictive siderail uses, it could provide a strong financial incentive for nursing homes both to reduce siderails and implement cost-effective and safe alternatives to their use.

Therefore, the purpose of this article is to describe the delivery of an individualized care advanced practice nursing intervention and the protocol used to implement the intervention. We report the facility out-of-pocket costs associated with specific advanced practice nursing recommendations.

METHODS

We conducted a secondary analysis of data collected in a study, the purpose of which was to examine the effectiveness of an APNs consultation intervention on the reduction of restrictive siderails (Capezuti, Wagner et al., in press). In the parent study, we explored the associations between APNs' intervention, restrictive siderail reduction, and bed-related falls. This article

focuses on the intervention protocol used in the parent study, frequency and type of recommendations provided by APNs, and the associated costs of these recommendations.

SETTING AND PARTICIPANTS

Using convenience sampling, we selected four medium-sized (120–235 beds) nursing homes in the metropolitan Philadelphia area: two religion-affiliated non-profit homes, one proprietary home, and one private, university health system-affiliated nursing home.

Prior to the APN intervention, observation methods were used to evaluate restrictive siderail usage in each nursing home. All residents identified with restrictive siderails at baseline were eligible to participate and were contacted regarding their willingness to be evaluated by an APN. If they were able, residents provided their own consent to participate; if unable, the resident's surrogate decision-maker provided consent. The study and written informed consent procedure were approved by the University of Pennsylvania Institutional Review Board. A total of 276 consenting residents were evaluated by APNs. Three evaluations were not fully completed because of residents' cognitive impairments and unwillingness to co-operate. The final sample, therefore, included evaluations from 273 residents. The advanced practice nursing intervention protocol took approximately 3–6 months to complete in each nursing home.

DATA COLLECTION PROCEDURES

Data Collection

Data collection took place between 1999–2002. Trained research assistants obtained demographic and clinical data from the consenting residents' medical records. Once baseline data collection was completed, the APN implemented the intervention.

Intervention Protocol

The theoretical underpinnings of the advanced practice nursing consultation intervention were based on the individualized care model approach (Evans, 1996; Happ et al., 1996) and on the principles of problem-based learning using the case study approach as a teaching strategy (Shanley, 2004). The use of case studies has been shown to

facilitate nurses' ability to incorporate critical thinking and problem-solving skills in future clinical encounters (Ciesielka, 2003; Shanley).

The advanced practice nursing intervention included both resident-specific and facility-wide strategies aimed at improving the skill of nursing home staff in assessing and managing restrictive siderail reduction. Four master's prepared gerontological APNs, all with clinical expertise and experience in nursing home care, conducted individual assessments of each consenting resident in each of the nursing homes. These evaluations took about 45 minutes to complete. This model of consultation was adapted from earlier work related to physical restraint reduction (Evans et al., 1997; Patterson et al., 1995).

The APNs used the "Individualized Assessment for Evaluation of Siderail Use" tool (Capezuti, Talerico, Strumpf, & Evans, 1998) to identify factors that influenced overall siderail use in each nursing home. This tool includes obtaining a detailed history and physical examination specific to individuals' transfer and mobility, fall risk, and degree of urinary and bowel incontinence; interviewing residents, family, and nursing staff on their reasoning for siderail use; and interviewing the residents and/or staff on topics such as mental status, sleep habits, level of mobility, presence of pain, and bowel and bladder continence. The APNs also reviewed each resident's past medical history to identify diagnoses (e.g., Parkinson's disease, stroke) that could influence siderail use. Medications known to increase fall risk were also identified along with each resident's fall history. The assessment included a detailed physical examination that focused on performance-based tests in the resident's bed. An environmental assessment of the resident's bedroom and bathroom was also conducted. The entire assessment elicited resident-specific problems for which APNs could tailor individualized interventions aimed at both fall prevention and restrictive siderail reduction. These individualized recommendations focused on five key areas: compensating for memory loss (e.g., improving behavior, anticipating needs, providing visual and physical cues); improving impaired mobility; reducing injury potential; evaluating nocturia/incontinence; and reducing sleep disturbances (Capezuti, Talerico et al., 1999).

APNs collaborated as deemed appropriate with members of the nursing staff and interdisciplinary team (geriatrician, geropsychiatrist, social worker, activities assistant, and physical and occupational therapist) to develop recommendations for each resident. The individualized

advanced practice nursing evaluations of participants were used in case studies with staff to illustrate how decisions could be made regarding siderail reduction in other residents (Ciesielka, 2003). The exchanges in the meetings between the nursing staff and the APNs led to the development of an individualized decision tree aimed to help staff determine how to match interventions based on each resident's assessment information (Talerico & Capezuti, 2001). These were often completed during the resident's scheduled care plan meeting.

The APN in each nursing home also conducted in-service sessions with nursing staff on each shift twice during the study period to capture new staff. The sessions focused on restrictive siderail reduction, specifically as they pertained to fall and injury risk in bed and during bed mobility/transferring techniques. Specific nursing interventions that could reduce clinical problems associated with siderail-related injury (e.g., sleep disturbances, incontinence, pain), were also addressed (Capezuti, Talerico, et al., 1999; Capezuti, Talerico, et al., 1998). In addition, the APNs attended monthly quality improvement and restraint/falls committee meetings to participate in discussions regarding restrictive siderail reduction at the facility level. During this time, the APNs worked with the nursing home administration to develop plans to purchase siderail alternatives (e.g., bed modifications, floor mats, bed alarms) that were within the budgets of each nursing home. The APNs documented all activities and potential characteristics (e.g., of facility, staff) that could influence the study outcomes in an intervention log. The APNs also maintained a detailed file of each resident evaluation as well as a detailed log of their individual and group meeting interactions with nursing home staff and administrators during meetings and individual conversations. An APN supervisor (EC) used the files and logs to monitor the consistency of the intervention protocol among the APNs. During monthly sessions, the APN supervisor reviewed each APN's progress, provided constructive criticism regarding individual strengths and weaknesses as well as insights into the APN's interactions with the staff/administrators of each facility. Group sessions with the APNs generated potential strategies to facilitate intervention implementation (Capezuti, Taylor, Brown, Ouslander, & Strothers, in press).

Data Analysis

The individualized APN recommendations were coded a priori and grouped into the following

categories: mobility, injury risk, nocturia/incontinence, sleep, consultations with other disciplines, and rail modification (e.g., change to 1/2 length-rail) (Capezuti, Talerico, et al., 1998; Capezuti, Talerico, et al., 1999). To maintain consistency, one author (EC) coded all of the recommendations to verify the correct coding designation by the APN.

A cost value was assigned to each coded material goods recommendation (e.g., bed alarm) based on prices advertised in nursing home product catalogs. Catalogs were selected that represented major vendors of equipment used by the nursing homes in the study as well as others across the nation. Because prices are negotiable and may differ depending on ordered quantities, when a range of prices existed on similar products, the lowest price was used. We deliberately focused on those recommendations that would incur additional direct, out-of-pocket costs for which nursing homes would be responsible (e.g., environmental modifications, restorative nursing assistant) rather than costs reimbursable through Medicare, Medicaid, or other forms of insurance. Costs, therefore, did not include such things such as medications or consultants

that were reimbursable under residents' health insurance.

Analyses were then conducted using SPSS for Windows version 11.5 (Chicago, IL). Descriptive statistics were used to characterize the participants in the study, the APN findings, and the frequency of recommendations. Inferential statistics (e.g., chi-square and *t*-tests) were used to compare the cost of recommendations with resident characteristics. A *p*-value of <.05 (two-tailed) was considered significant.

RESULTS

Table 1 includes selected characteristics for all of the residents regarding their fall and siderail history, sleep habits, and most common co-morbidities. The residents had a mean age of 84 years ($SD=9.39$), were primarily female (72%), White (69%), and widowed (55%). The primary payor source for nursing home care was Medicaid (65%).

Residents had an average of eight co-morbidities each ($SD=2.57$) that placed them at risk for falling. Over one-third (34%) had a history of

Table 1. Resident Characteristics ($n=273$)

	Frequency (%)
Common co-morbidities ^a	
Urinary incontinence	225 (82.4)
Diagnosed balance disorder	174 (63.7)
Confirmed diagnosis of dementia	105 (38.5)
Stroke	98 (35.9)
Fracture history	68 (24.9)
Arthritis	75 (27.5)
Fall and siderail history ^b	
Fall history	93 (34.1)
Fall history w/serious injury	13 (4.8)
Fall history from bed with siderail raised	51 (18.9)
High fall-risk medication use ^a	
Hypnotic/anxiolytic	80 (29.3)
Antidepressant	126 (46.2)
Antipsychotic	66 (24.2)
Cardiovascular	180 (65.9)
Pain (includes opioid and non-opioid)	105 (38.5)
Sleep habits ^b	
Sleep problem (e.g., insomnia)	36 (13.2)
Unable to fall asleep	18 (6.6)
Unable to stay asleep	30 (11.0)
Continent at night	51 (18.7)
Nocturia	227 (83.2)
Able to use call bell	143 (52.4)
Got out of bed with siderail raised	63 (23.1)

^aThese data were obtained by medical record review.

^bThese data were obtained from interviews with nursing staff.

falling in the past year with half of those residents falling from beds with the siderail up. Among these, nearly half (46.2%) had received antidepressant medication. Only about a fifth of the residents (19%) were continent at night, and only half (52%) were able to use a call bell. Almost a quarter (23.1%) of the subjects attempted to go over or around siderails at night, perhaps in an effort to use bathroom facilities.

The nursing staff described the majority of residents as either mildly (38%) or severely (26%) cognitively impaired. Among residents with restrictive siderails viewed by the APNs and nursing staff to be cognitively able to answer questions about their safety and care ($n = 144$), nearly one third (31.9%) preferred to eliminate siderail use altogether; another 24.3% preferred reduced siderail use. Most nursing staff (65.6%), however, preferred residents to have restrictive siderails, citing the need to ensure safety (39.2%) and enhance bed mobility (29.3%). Residents used siderails to enhance their ability to move around while in bed (34.7%), safety (25.7%), and to minimize fear (11.1%). Nursing staff also reported that 63 residents (23.1%) had attempted to get out of bed while the siderails were up and 8 residents (3%) had been discovered wedged between the siderail and bed.

Table 2 highlights the findings of the examinations APNs conducted. The vast majority of residents had extensive cognitive and physical

limitations and most required the assistance from staff to perform activities of daily living. Only a small percentage of residents (10.6%) were independent with toileting.

Of 1,275 advanced practice nursing recommendations across all four nursing homes, the median number of recommendations per resident was 5 (range 1–11). Recommendations focused on improving mobility (47.1%); reducing siderails (19%, e.g., from 2 to 1 full-length); minimizing siderail injury risk (13.6%; e.g., low bed or body pillow); managing incontinence or nocturia (7.2%); improving sleep (5.8%), obtaining specialist consultation (5.7%; e.g., psychiatry); and enhancing comfort (1.6%; e.g., overlay mattress). Table 3 highlights the most common recommendations. The two most prevalent recommendations were for restorative nursing therapy (62.3%), or nursing interventions that focus on restoring and/or maintaining optimal physical and psychosocial functioning (Resnick, 2004) and for implementation of siderail alternatives (51.3%), such as the use of bed bars and changes in siderail length and type.

The median cost of interventions per resident was \$135 (range \$0–\$1534). Residents with a fall history had a significantly higher mean cost of recommendations compared to those without a fall history ($t(266) = 2.69$, $p = .008$). Factors associated with the APNs recommending the single most expensive recommendation, namely, an adjustable height low bed ($n = 80$), included

Table 2. Results of APN Evaluations ($n = 273$)

APN Finding	Frequency (%)
Relevant physical exam findings	
Cognitive impairment	173 (63.4)
Requires glasses (reading and/or distance)	124 (45.4)
HEENT deficit (e.g., presbycusis)	85 (31.1)
Cardiovascular deficit (e.g., CHF)	20 (7.3)
Respiratory deficit (e.g., COPD)	27 (9.9)
Neurological deficit (e.g., stroke)	96 (35.2)
Weakness	126 (46.2)
Joint problems (kyphosis, contracture)	162 (59.3)
Foot problem (e.g., plantar fasciitis)	60 (22)
Performance-based tests	
Required human assistance to transfer from bed to chair	205 (75.1)
Required human assistance to transfer from bed to standing position	176 (64.5)
Unable to walk from bed to bathroom	106 (38.8)
Independent with transferring to the toilet	29 (10.6)
Other	
Median distance from bed to bathroom	10 feet (range 4–33)
Assistive device used (e.g., walker, wheelchair)	187 (68.5)

Note: These data were obtained by the APN who conducted a comprehensive physical examination. All values are frequency (%) unless otherwise stated. HEENT = "head, eyes, ears, nose, throat;" CHF = congestive heart failure; COPD = chronic obstructive pulmonary disorder.

Table 3. Most Common APN Recommendations With Estimated Cost-Per-Item

Recommendation	Frequency (%) Recommended	Estimated Cost-Per-Item
Care practice recommendations		
Restorative care, walk, exercise, ROM	170 (62.3)	\$432
Medication review	88 (32.2)	—
Therapy consult	76 (27.8)	—
Pain management	64 (23.4)	—
Continence program	58 (21.2)	—
Activities therapy	40 (14.7)	—
Medication review	24 (8.8)	—
Environmental recommendations		
Bed bar, 1/2, 1/4, siderail	140 (51.3)	\$60
Very low-height bed	80 (29.3)	\$1075
No rails	69 (25.3)	—
Individualize bed height	57 (20.9)	—
Floor mats	44 (16.1)	\$99
Bed bumpers	21 (7.7)	\$70
Body pillows	19 (6.9)	\$60
Any other cushion or pillow	19 (6.9)	\$25
Footwear/treaded socks	16 (5.9)	\$2
One full rail	14 (5.1)	\$145
Specialized bed size	10 (3.6)	\$1075
Electric bed with controls	8 (2.9)	\$1075
Siderails padded	7 (2.5)	\$55
Trapeze	6 (2.2)	\$75

Note: ROM = range of motion. Prices in U.S. Dollars. Restorative nursing (calculated as a 15 minutes treatment, 6 days/week \times 6 months (avg. hourly wage \$12.00 including benefits based on the median salary of \$9.86 per hour plus 21.7% in benefits)). Salary obtained from the Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook, 2006–07 Edition*, Nursing, Psychiatric, and Home Health Aides, retrieved March 1, 2006, from <http://www.bls.gov/oco/ocos165.htm>.

the following: fracture history ($c^2 = 4.52$; $df = 1$; $p = .034$); fall history ($c^2 = 3.01$; $df = 1$; $p = .012$); and mild to severe cognitive impairment ($c^2 = 8.81$; $df = 1$; $p = .003$).

DISCUSSION

Although the use of an advanced practice nursing consultative model has been effective in assisting nursing homes to reduce restrictive siderails and restraints (Capezuti, Wagner, et al., in press; Evans et al., 1997), our findings emphasize the complex assessment and clinical decision-making process required to address fall prevention among nursing home residents. Reducing siderail use is more complicated than simply lowering the rail in a one-size-fits-all approach. Alternatives to replace siderails must address the many clinical and environmental issues that increase an individual's fall risk. To do this successfully requires an approach that combines three critical areas: individualized resident assessment, interdisciplinary involvement, and leadership support from nursing management (Hoffman, Powell-Cope, MacClellan, & Bero, 2003).

The study residents demonstrated a high prevalence of balance disorders, incontinence, cognitive impairment, and a history of falls that both correlate with an increased risk for falling (Miceli, Waxman, Cavalieri, & Lage, 1994; Kiely, Kiel, Burrows, & Lipsitz, 1998; Yip Y.B., & Cumming, 1994) and an increased inclination among staff for restrictive siderail usage (Capezuti, Talerico et al., 1999). The arbitrary use of restrictive siderails in individuals with this array of clinical problems can be particularly dangerous. Although siderails can help remind residents to call for assistance when exiting from bed, cognitively impaired individuals, who may be fully or partially ambulatory and incontinent, may consider the siderail a barrier. Such residents may attempt to exit their beds by going over, around, or through the siderail, leading to injuries and even death (Parker & Miles, 1997).

The frequency of APNs' restorative recommendations draws attention to the prevalence of disability and frailty among the residents in our study. Their functional limitations, complicated by one-third of residents experiencing pain during the evaluation process, increased their risk for

nighttime falls and predisposed them to restrictive siderail use. Targeted restorative interventions, developed in collaboration with rehabilitation therapists, included contracture prevention, self-care activities with bathing and dressing, assisted ambulation, therapeutic exercises, individualized toileting schedules, pain management, and the use of assistive devices. The use of restorative nursing care as an intervention deserves further investigation as a means to reduce restrictive siderail use and subsequent injuries.

Because of the focus of this study, the most common environmental recommendations were for alternatives to siderails to prevent bed-related falls. As part of the Agency for Healthcare Research and Quality (AHRQ) evidence reports, Agostini, Baker, and Bogardus (2001) concluded that insufficient research existed to determine whether fall prevention interventions, such as those recommended in our study, to reduce siderail use (e.g., bed or chair alarms, signs, or tags to identify high risk residents), were effective in reducing falls or injuries. The key to successful implementation of restraint-free fall prevention interventions is conducting careful individualized assessments. What works for one resident may not necessarily be effective for another.

Our study provides useful data regarding the costs associated with a siderail reduction program, that is, a descriptive analysis of both capital costs (e.g., beds that can be reused) and supply costs (e.g., single user items). We did not evaluate the amount of time it would take nursing staff to implement these interventions (other the restorative care), or the number of hours necessary for APNs to facilitate changing the practice of siderail use in nursing homes. We did not calculate these costs because the parent study was concerned with the processes and outcomes associated with reducing siderails. In addition, our analysis did not include the cost of implementing the APN intervention protocol.

Another limitation to our study was that we are unable to report the adherence of the nursing homes to the APNs recommendations, as the parent study focused on limiting the post-intervention rounds to observation of siderail use and did not include observing the intervention recommendations. Intervention studies using outside consultants do not typically result in high compliance with consultants' recommendations (Capezuti, Taylor, et al., in press; Ray et al., 1997). We, therefore, recommend testing this intervention with expanded outcome measures (e.g., cost-related data) and assessment of facility and staff compliance.

The adoption of any new intervention or change in care practice in nursing homes depends largely on administrative support and on evidence that the interventions are cost effective (Schnelle, Cruise, Rahman, & Ouslander, 1998). Interventions to reduce restrictive siderail use may require significant upfront spending; some equipment, such as beds, may be a capital investment for the nursing home. Further research is needed to evaluate the cost effectiveness of items that can be reused versus items restricted to one user or time-delimited. This analysis should include the financial costs of staff time in implementing these care practice changes.

Another important consideration is how the resident equipment affects staff injuries. The most expensive of the interventions the APNs recommended was an electric adjustable low-height bed. Although the lifetime of a bed will vary by product, manufacturer, use, and care setting, the average lifespan is approximately 10–15 years (Powell-Cope, Baptiste, & Nelson, 2005). Nursing homes with limited financial resources are likely using beds well beyond their lifespan. Using outdated manual hand-crank beds and manually lifting residents during bed transfers subjects staff to a higher incidence of shoulder and back injuries and subsequent worker's compensation expenses as safer ergonomically friendly alternatives are now readily available (Nelson et al., 2004; Siddharthan, Nelson, & Weisenborn, 2005). Furthermore, retrofitting old beds with new equipment (e.g., mattresses, siderails) raises concerns about siderail-related liability (Braun & Capezuti, 2000). The US Food and Drug Administration (2004) issued hospital bed design guidance aimed at reducing siderail entrapment. All nursing homes will need to consider these guidelines as they purchase new and safer beds in the years ahead.

Alternative interventions purchased for the entire facility may also be offset by the costs associated with state surveyor penalties or lawsuits (including related insurance premiums) resulting from siderail, bed, or other equipment-related injuries to residents. Bradham et al. (2003) concluded that one Veterans Health Administration network would save an estimated \$2,083 per long-term care admission and \$2,505 per hospital admission, by completely eliminating bed-related injuries. Further research on the cost-benefit ratio of siderail-alternative products needs to occur after their effectiveness has been empirically supported.

APNs can assist nursing homes to reduce restrictive devices in their roles as staff educators

and clinical nursing consultants. Their contribution to improving resident safety in nursing homes requires further exploration. Despite providing evidence of siderail-related injuries and deaths, APNs found that both staff and residents preferred siderail use to siderail elimination to ensure safety and minimize fear of falling out of bed. This perception is deeply ingrained and rooted in tradition; successful efforts to change this staff and resident perceptions must address these historic roots (Strumpf, Robinson, Wagner, & Evans, 1998). APNs have been found to be effective in influencing staff behavior changes (Evans et al., 1997; Rantz et al., 2001; Ryden et al., 2000). Although residents and staff also reported using siderails to improve bed mobility, safer siderail alternatives (e.g., bed bar, trapeze) are readily available. Slowly introducing these alternatives and reminding staff of successes is essential to altering embedded behaviors. APNs included these success stories when reviewing individual cases with staff.

Restrictive siderail use can be reduced through comprehensive and individualized assessment (Capezuti, Wagner, et al., in press). With the expertise of APNs, nursing homes can improve the safety and quality of care provided to frail nursing home residents. As legislative and practice efforts converge to identify best practices and improve resident safety, nursing homes will need to consider models such as this now and in the future.

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