Nursing Home Registered Nurses' and Licensed Practical Nurses' Knowledge of Causes of Falls

Deanna Gray-Miceli, PhD, RN, GNP-BC, FGSA, FAANP, FAAN; Pamela B. de Cordova, PhD, RN; Giles L. Crane, MPH, ASA; Patricia Quigley, PhD, MPH, ARNP, CRRN, FAANP, FAAN; Sarah J. Ratcliffe, PhD

Reducing falls in nursing homes requires a knowledgeable nursing workforce. To test knowledge, 8 validated vignettes representing multifactorial fall causes were administered to 47 nurses from 3 nursing homes. Although licensed practical nurses scored higher than registered nurses in individual categories of falls, when we computed the average score of all 8 categories between groups of registered nurses and licensed practical nurses, registered nurses scored higher ($F =$ 4.106; $P < .05$) in identifying 8 causal reasons for older adults to fall. **Key words:** *fall prevention, licensed practice nurses, nurses' knowledge, nursing homes, registered nurses*

PROTECTING PATIENTS from harm due to falls is a public health priority and the responsibility of the health care workforce, especially when delivering care to older adults residing in nursing homes (NHs). Between one-half and three-fourths of the 1.4 million NH residents fall yearly.[1] The patient population residing in NHs possesses multiple chronic illnesses and functional limitations[2] and frequently incurs recurrent falls, evidenced by a summary of long-term care studies that calculated a mean fall rate of 1.7 falls per person year.[3] Equally important as preventing falls is protecting patients from associated injury, a leading cause of mortality in the older adult population.[4]

Compared with other populations of patients who fall, patients who fall in NHs incur more serious complications, with 10% to 25% of falls resulting in fracture injuries and lacerations.[3,5] Serious injuries reported in the NH include hip and pelvic fractures, found

1

to have an increased mortality,[6,7] and head injury.[8] The aftermath of an injurious fall for older adults in NHs often includes hospitalization with long lengths of stay, reduced function and mobility, among other adversities.[9] This overall economic burden of the direct and indirect costs for fall care is projected to skyrocket to $59.6 billion by 2020.[9]

Falls are not a normal or inevitable part of the aging process; rather, falls are considered a preventable geriatric syndrome.[10] Patient falls result from the interaction between patient-specific risk factors, the physical environment, and process of care delivery.[11] The epidemiology of falls in older adults is rooted in personal risk factors of mutlifactorial origin.[11,12] Evidence substantiates multifactorial fall risk to include lower extremity muscle weakness; cognitive, visual, gait, and balance impairments; orthostatic hypotension[13,14]; use of high-risk medications[15]; footwear[16]; and environmental risks external to the person. Because of the multifactorial etiological basis of a fall, not all falls are the same. Prior nursing research has generated a broad nomenclature of causal event factors contributing to falls among older adults in acute and long-term care settings.[17,18] In prior research in the NH environment, registered nurses (RNs) have diagnosed 8 types of falls among their patients, which include falls due to (1) an acute medical reason, (2) a chronic medical reason, (3) environmental reasons, (4) adverse medication effects, (5) behavioral reasons, (6) poor safety awareness or poor judgment of the patient, (7) unknown reasons, and (8) multifactorial reasons.[18] Varied types of falls mean interventions will differ, for example, fall prevention interventions for accidental falls are different from falls due to acute physiological or medical reasons.[17-19]

Evidence suggests that approximately 30% of patient falls in NHs are preventable[3]; however, their prevention hinges on accurate scientific knowledge and the correct assessment and diagnosis by RNs. Few studies have been conducted in NHs to determine nurses' knowledge of underlying causes of falls in older adults and whether RNs can decipher from a range of common fall scenarios the likely underlying reason for the fall and corresponding intervention.[18] The potential influence of RNs on reducing falls in NHs is important, given the harms associated with fall-related injuries. Moreover, according to licensure, nursing scope of practice supports only RNs performing patient evaluations to determine underlying causes of a patient fall.[20] Yet, in some NH practice environments, it is commonplace for licensed practical nurses (LPNs) to deliver care interchangeably with RNs.[21] If we are to improve practice and patient outcomes, it is essential to know more about nurses' knowledge and role in the processes of care for fall and injury prevention.

The outcomes in this study include the RNs' knowledge of underlying causative event factors for falling among older adults. Since direct patient care is provided by LPNs as delegated by RNs, we included LPNs in our sample. LPNs are expected to have an understanding of factors associated with patient safety, fall prevention, and the multifactorial nature of falls in older adults in NHs. As a result of educational preparation, however, we hypothesized that LPNs' knowledge of fall cause would be less accurate than RNs'.

BACKGROUND

Nurses who care for older patients in the health care setting need to understand why a fall has occurred before they can intervene with a plan for their prevention, thereby improving the quality of care, and potentially reducing deaths.[22] Toward this end, NH facility educators provide continuing education (CE) to staff nurses in fall prevention. Typically, however, facility-based education programs in fall prevention are directed not only at RNs but also at all licensed personnel collectively. As well, facility-based programs in fall prevention are noted to focus heavily on quality improvement or systems approaches.[23] Educational content and measures to ascertain staff knowledge within these programs are usually limited to general safety precautions and measures to prevent accidental-type falls.[24,25]

Moreover, learner outcomes related to requisite knowledge attained from these programs are measured by an isolated posttest evaluation. In short, critical gaps exist in the NH practice environment related to overall translation and use of scientific knowledge about falls among older adults in NHs, as well as knowledge sustainability.

Furthermore, while nurses could rely on clinical practice guidelines[26] for fall prevention treatment protocol in their plans of care, barriers prevent their implementation in practice. In a study of 1830 practicing nurses, the greatest barriers to the implementation of guidelines were (1) lack of knowledge, education, and motivation of staff; (2) lack of change champions to support staff; and (3) lack of access to resource facilities.[27] With no formal measures to assess nurses' knowledge of underlying causal event factors for falls, a critical gap in fall prevention exists.

Purpose

The purpose of the study was to determine the difference in knowledge among RNs versus LPNs as it relates to 8 multifactorial causes of falls among older adults residing in the NH.

METHODS

Study design

A multisite, cross-sectional study was conducted with nurses from 3 NHs, which used a randomized viewing of validated fall clinical vignettes by nurse participants. The order of viewing each of the 8 vignettes followed a predetermined randomization sequence to minimize an order effect that might have existed.

Setting

Three licensed NHs volunteered as sites for this study. Each facility provides assisted living and skilled nursing care to older adults in the northeastern region of the United States. All 3 NH sites were similar in size (ranging from 127 to 144 beds), occupancy rate (ranging from 94% to 100%), types of services provided, and quality of the facility in terms of care. The

sites encountered similar fall rates: NH site 1—calculated fall rate 3.7 falls per 1000 bed-days; NH site 2—calculated fall rate 3.75 falls per 1000 bed-days; and NH site 3—calculated fall rate of 4.3 falls per 1000 bed-days. Overall, these homes were representative of the fall epidemiology landscape across the country.[1] All sites were located in metropolitan settings and provided annual education for staff in fall prevention. University approval to conduct the study was granted by the institutional review board.

Sample

There were 47 participants who were English speaking; were employed full-time, part-time, or per diem; and provided direct hands-on care. Excluded were nurses in management roles, such as charge nurses or Director of Nursing.

Measures

Demographic survey

A demographic survey was administered to participants that included the nurses' age, gender, ethnicity, educational preparation, years in practice, and number of CE programs taken in fall prevention at the NH site.

Validated fall clinical vignettes

Because no universal fall knowledge test exits to elicit knowledge of fall causes for use in NHs, we selected 8 validated clinical vignettes of falls as a proxy measure to test RNs' and LPNs' knowledge and assessment of underlying factors contributing to falls. Clinical vignettes have been found to effectively teach nurses diagnostic skills.[28] Each of the 8 fall clinical vignettes was developed from complex case exemplars obtained in prior clinical research by Gray-Miceli et al[18] to provide realistic scenarios of the multifactorial cause of falls. Two national fall prevention experts analyzed the content of the 8 vignettes to determine their suitability for this study. To be representative of a particular type of fall, each vignette contained various representative nursing assessment findings typical of that particular type of fall. Refinements were made on

the basis of experts' responses until 80% interrater reliability was achieved. Each of the 8 clinical vignettes was then validated again with the principal investigator and 1 expert educational evaluator, using a rating tool for overall content, flow, ease of reading, consistency, and presentation. The final 8 fall clinical vignettes were refined so that they were phrased alike, consistent, and of equal length and equivalent content. These vignettes were designed to elicit nurses' assessment of various types of falls.

Procedures

Research assistants recruited nurses from NH sites. Packets were assembled to contain a demographic survey and the 8 fall clinical vignettes along with a questionnaire about the likely underlying reason for the fall and single best intervention they would institute to reduce the fall from reoccurring. The order in which the vignettes were presented in each package was determined using a randomized block design. Surveys were administered off-hours to minimize fatigue. The principal investigator blindly reviewed nurses' responses to each case as correct or incorrect, based on the prespecified correct response for each question.

Statistical analysis

Standard descriptive statistics were used to summarize the educational experience (subjectively and objectively) of the nurses in the sample. For each nurse, the number and percentage of correct answers on the 8 fall vignettes were calculated. These responses were used to generate a total score of correct answers. We examined whether the percentage of correct answers varied by order of presentation, age, and licensure or degree type of respondents via a multiple, generalized, linear model; probabilities and 95% confidence limits were computed. Logistic regression was used to test for differences on each of the vignettes separately because they were designed to test different cause domains. An analysis of variance (ANOVA) was also conducted to test the relationship between licensure type (RN or LPN), educational preparation, and NH site (1, 2, or 3) on test performance. The average category score for RNs versus the average category score for LPNs was also computed using an ANOVA. Comparisons of category effects were made within nurses. All analyses were conducted in the R statistical package (2012; Developmental Core Team, Vienna, Austria).

RESULTS

There were 23 RNs (48.9%) and 24 LPNs (52.1%) in the sample. There were 26 nurses (56.5%) from NH site 1, 14 nurses (30.4%) from site 2, and 7 nurses (14.8%) from site 3. RNs had a mean age of 51.3 years, whereas LPNs were slightly younger at 47 years of age. Most nurses were female (97.8%; n = 46) and of multiracial origin (53%; n = 25). Most nurses were associate degree prepared (44.6%; n = 21), with a median of 10 years licensed to practice (range, 2-48 years) and a median of 9 years employed in the NH. Thirty-nine percent (n = 9) were baccalaureate-prepared RNs.

More than three-fourths of nurses perceived themselves very knowledgeable (76%; n = 36), extremely knowledgeable (17%; n = 8), or somewhat knowledgeable (6.3%; n = 3) in fall prevention, having attended an average of 4 educational programs in the past year. More than 40% of nurses rated their confidence in fall prevention as very confident (42.6%; n = 20) or somewhat confident (46.8%; n = 22). None of the nurses perceived themselves as not knowledgeable or not confident in fall prevention.

Each of the 8 fall vignettes was designed to examine a different potential cause of the fall and was stratified by cause for further analysis, as presented in the Table. RNs were most accurate in identifying fall events due to underlying chronic factors (91.3% correct) or behavior (78.3% correct) but performed the worst on accidental falls—falls due to poor judgment (21.7% correct) and unsafe equipment (30.4% correct) despite perceived confidence. LPNs (n = 23) were most

Table. Nurses' Responses, Mean Confidence Score, and Probabilities of Correct Answers to 8 Fall Vignettes

Fall Due to	Responses to Vignette #					
	RN % Correct	RN M Conf. Score	Probability (Conf. Limits) for RNs	LPN % Correct	LPN M Conf. Score	Probability (Conf. Limits) for LPNs
1. Environment	60.9	4.1	0.609 (0.406-0.789)	50.0	3.9	0.500 (0.308-0.692)
2. Acute medical	65.2	4.0	0.652 (0.449-0.823)	75.0	3.8	0.750 (0.557-0.892)
3. Chronic medical	91.3	4.1	0.913 (0.755-0.985)	66.7	3.8	0.667 (0.468-0.831)
4. Behavior	78.3	4.1	0.783 (0.590-0.916)	83.3	3.8	0.833 (0.945-0.834)
5. Unsafe equipment	30.4	3.7	0.304 (0.144-0.506)	41.7	3.6	0.417 (0.235-0.615)
6. Medication	56.5	4.0	0.565 (0.364-0.753)	50.0	4.0	0.500 (0.308-0.692)
7. Environment and poor judgment	21.7	4.0	0.217 (0.084-0.410)	37.5	3.9	0.375 (0.201-0.574)
8. Multifactorial	43.5	4.0	0.435 (0.247-0.636)	54.2	3.8	0.542 (0.346-0.729)

Abbreviations: conf., confidence; LPN, licensed practical nurse; M, mean; RN, registered nurse.

accurate in identifying fall events due to behavioral causes (83.3% correct) and acute medical reasons (75% correct). Overall, RNs performed better than LPNs on risk for 2 types of falls: accidental/environmental and anticipated physiological falls, such as the falls due to chronic medical and medication reasons. However, because of the small sample size, there were no significant relationships on self-reported confidence scores and probabilities of scoring correctly. In addition, because there was not enough statistical power to compare RNs and LPNs on individual categories, we chose to compare the average category score for RNs versus the average category score for LPNs using an ANOVA test for this determination.

In models adjusted for nursing home type and educational level, there was a statistically significant relationship between licensure (RN vs LPN) and average category scores on the vignettes, with RNs achieving better results than LPNs ($F = 4.106$; $P = .049$). RNs had an estimated 5% higher score than LPNs (95% confidence interval, 0.1-4.4; $P = .049$) when average category scores were compared. Other variables were not significantly associated with the scores.

DISCUSSION

Findings from our study indicate that substantial changes are needed to properly educate nurses in fall prevention in NHs. Within facility-based CE programs in fall prevention, changes should address 2 broad areas of concern. The first would include improving the educational content addressing the various types of falls and assessment findings occurring in older adult patients in NHs. The second area of concern is to design content based on nursing scope of practice.

Current evidence-based science was used to develop the content provided in the fall vignettes. Yet, professional nurses' knowledge of these 8 causative factors for falls was unsatisfactory despite their self-rated beliefs and prior CE in fall prevention. Overall, none of the RNs or LPNs answered any of the 8 vignettes 100% correctly. The range of correct responses among all nurses was from 21.7% to 91.3%. When individual categories were analyzed, RNs, who correctly identified 3 causative factors to fall, did not perform as well as LPNs, who correctly identified 5 causative factors to fall. Because nurses lacked the knowledge to meet the practice standards

in all 8 validated fall clinical vignettes, we conclude that the current fall prevention educational programs among these 3 NHs are insufficient and limited. This raises suspicion as to the content of information provided in fall prevention in NHs nationwide. Accurate knowledge and nursing assessment of the multifactorial factors contributing to falls among older adults are practice standards for professional nurses so that they can appropriately intervene for patients at risk for falls.[10,19,26] It is especially essential for NH nurses to possess current and accurate scientific knowledge of falls and their prevention, as they provide care to older adult patients who have many complex and multiple chronic illnesses.

Findings from this study illustrate that nurse licensure was a contributing factor to the nurses' scores on the fall vignettes. Comparisons of the category effects (averages of RNs and LPNs), for example, for falls due to environmental causes versus falls due to acute care medical reasons, were made within nurse groups, providing more precision than between nurse groups. Although RNs scored lower than LPNs in some areas as reflected in the Table, when we computed the average score of all 8 categories of RNs versus LPNs, we found RNs scored higher in identifying cause of falls among older adults. These findings confirm our expectations that RNs, who have a stronger knowledge base to evaluate patients, would perform best.

In terms of nurse engagement in the work environment, it is possible that nurses in our study were unsatisfied with their job and were not engaged in completing the survey nor clinical vignettes with accuracy, although evidence suggests that NH nurses believe reasons for falls to be an important knowledge factor.[29] In a sample of 863 RNs who work in 282 skilled nursing facilities in New Jersey, researchers found that staff RNs' participation in facility affairs, supportive manager, and resource adequacy were positively associated with RNs' job satisfaction.[30] It may behoove administrators to engage nurses by using creative measures to increase NH nurses' knowledge of fall prevention. Although NHs provide in-house education programs to staff and NH nurses obtain CE on fall prevention, these sessions may not be effective if the nurses are not engaged in their work environment.

Limitations

There are a few limitations of this study. First, there was a lack of empiric indicators to objectively measure the presence or degree of fatigue or stress, which may have contributed to test performance, although we controlled for fatigue by randomization of vignettes and held surveys during off-duty hours. Our sample size does not have the power to statistically test relationships. However, the design had 47 participants with 8 responses each, which was large enough of a sample to detect any substantial effects. Another limitation concerns the use of vignettes. The use of 8 written case vignettes to test nurses' cognitive knowledge and assessment of underlying causes of falls may not be the best measure to ascertain knowledge. It is possible that other methodological approaches to test knowledge and assessment might have resulted in a higher percentage of correct responses. For example, assessing nurses' knowledge in real time with actual patients they have evaluated (as opposed to reading vignettes) may yield higher percentages of correct responses to questions about underlying fall causes, because the nurses can relate to their own patients. Another limitation was the small panel of expert judges to validate the 8 clinical vignettes used in this study.

CONCLUSION

Findings from our study illustrate significant knowledge deficits of fall prevention among both RNs and LPNs. Both groups of nurses were unable to correctly distinguish between 8 different underlying factors associated with falls. These findings have implications for practice, education, and future research. In terms of practice, nurses are held accountable to the prevailing standard of care. This standard for fall prevention recognizes that

falls are potentially preventable, depending on their underlying causative factors and clearly departs from the notion that all falls are due to accidents or environmental events external to the person, as once taught. In terms of education, the standard of care for evaluating staff knowledge of falls in NHs rests on administration of knowledge tests following CE programs. Further work should be directed at developing educational content within fall prevention training programs based on underlying causative event factors contributing to falls among older adults. Developing training programs based on evidence-based content in fall prevention is one step toward ensuring nursing staff are competent to evaluate patients and provide appropriate care for older adults who fall. Finally, in terms of research, findings from our study warrant a follow-up study of intermediary explanatory factors with larger samples to determine whether what we found in these 3 NHs also occurs in other NHs. It is still unclear the degree to which nurses' knowledge in fall prevention translates to actual assessment skills for fall prevention.

Patient safety and quality care for falls and injury prevention are expectations and rights of each and every patient. All nurses working in NHs must possess accurate and current scientific knowledge about the multifactorial causes of falls among older adults. It is especially urgent, however, for professional RNs to have this knowledge so that they can be competent in providing appropriate assessments and diagnoses of their patients, which are needed to further direct interventions for fall prevention.

REFERENCES

1. Centers for Disease Control and Prevention. *Falls in Nursing Homes*. Atlanta, GA: National Center for Injury Prevention and Control; 2015. http://www.cdc.gov/HomeandRecreationalSafety/Falls/nursing.html. Accessed June 15, 2015.

2. Harris-Kojetin L, Sengupta M, Park-Lee E, Valverde R. Long-term care services in the United States: 2013 overview. *Vital Health Stat 3*. 2013;(37):1–107.

3. Becker C, Rapp K. Fall prevention in nursing homes. *Clin Geriatr Med*. 2010;26(4):693-704.

4. Centers for Disease Control and Prevention. *Web-Based Injury Statistics Query and Reporting System (WISQARS)*. Atlanta, GA: National Center for Injury Prevention and Control. www.cdc.gov/injury/wisqars/index.html. Accessed June 20, 2015.

5. Rubenstein LZ. Falls in older people: epidemiology, risk factors and strategies for prevention. *Age Ageing.* 2006;35(suppl 2):37-41.

6. Rapp K, Becker C, Lamb SE, et al. Hip fractures in institutionalized elderly people: incidence rates and excess mortality. *J Bone Miner Res*. 2008;23(11):1825-1831.

7. Rapp K, Cameron ID, Kurrie S, et al. Excess mortality after pelvic fractures in institutionalized older people. *Osteoporosis Int*. 2010;21(11):1835-1839.

8. Gray-Miceli DL, Ratcliffe SJ, Thomasson A. Ambulatory assisted living elderly fallers at greatest risk for head injury. *J Am Geriatr Soc.* 2013;61(10):1817-1819.

9. National Council on Aging. *National Falls Prevention Resource Center*. Arlington, VA: National Council on Aging; 2012.

10. Panel on Prevention of Falls in Older Persons, American Geriatrics Society and British Geriatrics Society. Summary of the updated American Geriatrics Society/British Geriatrics Society clinical practice guideline for prevention of falls in older persons. *J Am Geriatr Soc.* 2011;59(1):148-157.

11. Kron M, Loy S, Sturm E, Nikolaus T, Becker C. Risk indicators for falls in institutionalized frail elderly. *Am J Epidemiol.* 2003;158(7):645-653.

12. Rubenstein LZ, Josephson K. Falls and their prevention in elderly people: what does the evidence show? *Med Clin North Am.* 2006;90(5):807-824.

13. Gray-Miceli D, Ratcliffe SJ, Liu S, Wantland D, Johnson J. Orthostatic hypotension in older nursing home residents who fall: are they dizzy? *Clin Nurs Res.* 2012;21(1):64-78.

14. Mukai S, Lipzitz LA. Orthostatic hypotension. *Clin Geriatr Med.* 2002;18(2):253-268.

15. Ray WA, Thapa PB, Gideon P. Benzodiazepines and the risk for falls in nursing home residents. *J Am Geriatr Soc.* 2000;48(6):682-685.

16. Koepsell TD, Wolf ME, Buchner DM, et al. Footwear style and risk of falls in older adults. *J Am Geriatr Soc*. 2004;52(9):1495-1501.

17. Morse J. *Preventing Patient Falls*. 2nd ed. New York, NY: Springer; 2008.

18. Gray-Miceli D, Ratcliffe SJ, Johnson J. Use of a comprehensive post fall assessment tool for fall prevention in older adults. *West J Nurs Res*. 2010;32(7):932-948.

19. Cameron ID, Murray GR, Gillespie LD, et al. Interventions for preventing falls in older people in nursing care facilities and hospitals. *Cochrane Database Syst Rev*. 2010;1:CD005465.

20. *New Jersey Administrative Code 8:39. Standards for Licensure of Long-Term Care Facilities*. Trenton, NJ: New Jersey Department of Health and Senior Services; 2012:78.

21. Corazzini KN, McConnell ES, Day LD, et al. Differentiating scopes of practice in nursing homes: collaborating for care. *J Nurs Regul*. 2015;6(1):43-48.

22. Needleman J. Is what's good for the patient good for the hospital? Aligning incentives and the business case for nursing. *Policy Polit Nurse Pract*. 2008;9(2):80-87.

23. Bonner A. Falling into place: a practical approach to interdisciplinary education on falls prevention in long term care. *Ann Long Term Care*. 2006;14(6):21-27.

24. Hartford Center for Geriatric Nursing Excellence. Fall prevention for older adults knowledge assessment test. In: *Fall Prevention for Older Adults Evidence-Based Guidelines*. Iowa City, IA: The Hartford Foundation, Center of Geriatric Nursing Excellence, the University of Iowa, College of Nursing; 2004.

25. Tool 2E: Fall Knowledge Test. January 2013. Rockville, MD: Agency for Healthcare Research and Quality. http://www.ahrq.gov/professionals/systems/hospital/fallpxtoolkit/fallpxtk-tool2e.html. Accessed September 20, 2015.

26. Gray-Miceli D, Quigley PA. Fall prevention: assessment, diagnoses, and intervention strategies. In: Boltz M, Capezuti E, Fulmer T, Zwicker D, eds. *Evidence-based Geriatric Nursing Protocols for Best Practice*. 4th ed. New York (NY): Springer Publishing Company; 2012. p. 268-97.

27. Koh SL, Manias E, Hutchinson AM, Donath S, Johnston L. Nurses' perceived barriers to the implementation of a fall prevention clinical practice guidelines in Singapore hospitals. *BMC Health Serv Res*. 2008;8(1):105.

28. Nendaz MR, Raetzo MA, Junod AF, Vu NV. Teaching diagnostic skills: clinical vignettes or chief complaints? *Adv Health Sci Educ Theory Pract*. 2000;5(1):3-10.

29. Harten-Krouwel D, Schuurmans M, Emmelot-Vnok M, Pel-Little R. Development and feasibility of falls prevention advice. *J Clin Nurs*. 2011;20(19/20):2761-2776.

30. Choi J, Flynn L, Aiken L. Nursing practice environment and registered nurses' job satisfaction in nursing homes. *Gerontologist*. 2012;52(4):484-492.