A Model of Care Delivery to Reduce Falls in a Major Cancer Center

Nancy E. Kline, PhD, RN, CPNP, FAAN; Bridgette Thom, MS; Wayne Quashie, MPH, RN; Patricia Brosnan, MPH, RN; Mary Dowling, MSN, RN

Abstract

Falls are a leading cause of injuries sustained by hospitalized patients. Injuries sustained as result of patient falls in a cancer hospital are often severe, due to the nature of the underlying medical condition. A case-control study was conducted within a major cancer center to determine risk factors for falls, and a new falls risk assessment instrument was developed. A demonstration project was initiated and consisted of implementing a new model of care delivery to reduce patient falls. For the quarter (Q) following program implementation (Q2 2007), unassisted falls decreased from 4.90 falls to 2.96 falls/1,000 patient days compared to the previous quarter. Unassisted falls were reported at a rate of 3.73 falls/1,000 patient days in Q3 2007. Educational training is being conducted for new staff and float pool companion staff so that every provider on the unit has been exposed to the program.

Introduction

Patient falls are the most frequently reported adverse event in hospitals and the leading cause of injury deaths in adults aged 65 years and older.[1, 2] Injuries sustained as result of patient falls in a cancer hospital are often severe because of the nature of the underlying medical condition. These conditions can include a predisposition for fractures due to bony metastases or uncontrollable bleeding from thrombocytopenia or medications used to prevent deep vein thrombosis. Unfortunately, when serious injury (e.g., hip fracture) occurs, surgical repair is necessary, the patient's hospital stay is extended, and the patient may be discharged to a rehabilitation facility instead of home. Not only does this mean a financial cost to the institution, the insurance carrier, and/or patient, but associated quality of life issues affect the patient and family as well.

In 2005, our institution prioritized patient falls as one of the most important safety threats to our patients and initiated a performance improvement falls prevention project with two goals: decreasing patient falls and decreasing fall-related injuries. After development of a new falls risk assessment instrument, we undertook a demonstration project in 2007 to test and evaluate interventions targeted at reducing patient falls.

Instrument Development and Testing

The vast majority of falls risk-assessment instruments have been developed for use in long-term care facilities, and we determined that they are not useful for our acute care population. To facilitate the development of a falls risk-assessment instrument within a major cancer center, we

conducted a case-control study to determine risk factors. Each of the 73 patients who fell in the first quarter of 2005 was matched with two patients of a similar age from his/her unit (indicating a similar diagnosis). In total, the charts of 219 patients (73 cases, 146 controls) were reviewed. The initial list of variables was developed from factors commonly named in the literature, as well as those identified in clinical practice. These variables included:

- Sex (M/F).
- Number of secondary diagnoses (0/1-2/3+).
- Hearing loss (Y/N).
- Cognitive impairment (Y/N).
- Cognitive impairment within 48 hours of fall (Y/N).
- Motor deficits (Y/N).
- Procedure within 48 hours of fall (Y/N).
- Use of assistive devices (Y/N).
- History of falls (Y/N).
- Intravenous fluid (Y/N).
- High volume hydration with 48 hours of fall (Y/N).
- Patient-controlled analgesic (Y/N).
- Number of pieces of patient equipment (IV pole, chest tube, etc.; 0/1-2/3+).
- Number of medications (0/1-3/4-6/7+).
- Presence of psychotropic, antihypertensive, anticonvulsant, diuretic/cathartic, and/or analgesic medication (Y/N for each).

Significant results from this initial case-control study were used to formulate the pilot instrument. Not only were the patients screened according to these variables, they also were screened with an additional assessment using the Katz Index of Independence in Activities of Daily Living. On the Katz Index, six activities of daily living (bathing, dressing, toileting, transferring, continence, and feeding) are assessed by assigning one point for independent completion.[3] Patients with higher Katz scores are considered to be more independent and thus, it is hypothesized, less likely to fall.

The pilot instrument was tested from February to June 2006 on four units (neurology/ orthopedics, leukemia/lymphoma, gastrointestinal surgery, head and neck). Inter-rater reliability of the pilot instrument was 87 percent. If a patient fell anywhere in the hospital during the pilot period, a team responded to review the patient's risk score, if applicable, and additional variables present at the time of the fall, such as environmental (e.g., spills, furniture), equipment (e.g., IV tubing, IV poles), and patient (e.g., dizziness, confusion) variables.

The visit by the falls team was not punitive in nature; the intent was to investigate the circumstances leading to the fall. The time and location of the fall, patient diagnosis, age, pertinent lab results, medications received the day of the fall, falls risk score (as applicable), and Katz score (as applicable) were recorded, as were the responses to the following Yes/No questions:

- Was the fall related to toileting?
- Was the patient told to call for help prior to getting out of bed?
- Did the patient call for help prior to the fall?
- Was there a companion assigned to the patient?
- Were family members or visitors present at the time of the fall?
- Did the patient undergo a procedure during the previous shift?

The falls team was on call during normal business hours, and the night nursing supervisor recorded the data during nights and weekends.

A second prospective case control study was conducted during the pilot, and statistically significant variables from the first case control study were reconfirmed and used in the development of the final instrument (Table 1). Data were collected from 62 cases and 124 controls over a 4-month period. Using chi-square testing, fall history was significant at P <0.01 level; psychotropic and anticonvulsant medications were significant at P <0.001 level. From the Katz Index, the variables "Needs assistance with toileting" and "Needs assistance with transferring" both had P <0.05.

Table 1. Newly developed MSKCC[a] patient falls risk assessment instrument

Falls Risk Assessment *Check the box next to each factor present.* *One or more checks make a patient at high risk for falling.*	
Patient Factors	
History of falls	
Needs help transferring to commode or toilet	
Needs help moving from bed to chair, or requires a complete transfer	
Sensory Deficits	
Visual/auditory impairment affecting mobility	
Peripheral neuropathy	
Motor Deficits	
Gait imbalance	
R or L side weakness	
Lower extremity weakness	
Medications	
Psychotropics (e.g., sleep medications, hypnotics, sedatives, anxiolytics) or anticonvulsants	

a Memorial Sloan-Kettering Cancer Center

During the second case-control study, we also examined patient falls by time of day and location of the fall. The results showed that 62 percent of patient falls occurred between 8:00 p.m. and 8:00 a.m., which was not surprising, since the night shift has fewer care providers; 67 percent of patient falls occurred in relation to toileting (i.e., ambulating to and from the bathroom, or transferring to the bedside commode).

The newly developed instrument is not scored or summed. Intuitively, it did not make sense to try to assign points to each of the risk factors and calculate a cut score to determine risk for falling if the results suggested that each variable increased the patient's risk of falling.

The positive predictive value (PPV) of the new instrument is 91 percent, whereas the PPV of the previous instrument was 66 percent. The previous instrument was a home-grown tool that included the following variables: history of a previous fall, age >65 years, sensory deficits, cognitive changes, impaired mobility, generalized weakness, and medications. There was no assessment regarding the ability of the patient to actually get up and move independently or transfer from one point to another. A high risk for falling was determined by having more than one risk variable present, as in the new instrument. In contrast to the old instrument, though, where patients were assessed only at the time of admission, patients are assessed twice daily with the new instrument.

The new instrument was an improvement in identifying patients at risk for falls, but this alone was not going to help reduce falls; for that purpose, targeted interventions for specific risk variables were needed. The nursing care plan for the patient at high risk for falling was thus revised. Standard safety interventions were designated for all patients and grouped into categories: environmental safety, patient safety, and daily routines (Table 2).

Specific interventions were added for high risk patients according to the risk factors category from the new instrument (Table 3). The new risk assessment

Table 2. Standard safety interventions for all patients admitted to the hospital

Environmental safety

1. Remove excess equipment/supplies/furniture from room.
2. Secure excess electrical and telephone wires.
3. Clean all spills in patient room or hallway immediately. Place sign to indicate wet floor hazard.
4. Secure locks on beds, stretchers, and wheelchairs.
5. Keep floors clutter/obstacle free (with attention to path between bed and bathroom/commode).
6. Place call light and frequently used objects within patient reach.
7. Assure adequate lighting, especially at night.

Patient safety

1. Orient patients to surroundings, including bathroom, use of bed, and location of call light.
2. Encourage patients/families to call for assistance when needed.
3. Use properly fitting nonskid footwear.
4. Assure ambulation as ordered.
5. Evaluate patient's ability to interpret information.
6. Evaluate potential medication side effects.
7. Keep assistive devices at bedside within reach.

Assess and assist patient in the following daily routine *(*schedule)

1. Assess mobility and gait as necessary.
2. Assess mental status, cognition, ability to perform ADLs.
3. Assess medications daily.

instrument and falls prevention interventions were adopted across all inpatient units in January 2007. Subsequently, a demonstration project targeting the neurology/orthopedics unit was initiated in March 2007. The aim of this project was to provide intensive training regarding patient safety. Program content included the design and implementation of a new model of care delivery to reduce patient falls and falls with injury.

Project Development

The neurology/orthopedic unit was chosen as the demonstration unit, since it consistently had the highest quarterly falls rate of all inpatient areas, due to the high-risk nature of the patient population. Prevalence of the risk factors on the new falls instrument supported choosing this unit (Table 4).

Departmental nursing leadership identified six individuals from the unit—including registered nurses, nursing assistive personnel and unit assistants—with an interest in patient safety to compose a team to lead the initiative. The unit-based nurse leader, nurse

Table 3. Interventions for patients assessed as high risk for falling

Standard interventions for high fall-risk patients

1. Implement standard interventions and any specific interventions indicated by assessment.
2. Assess the need to move patient to room with best visual access to nursing station.
3. Institute flagging system: red arm band, red star on primary board, red dot on patient floor card outside patient room.
4. Remain with patient while toileting; do not turn lights off at night.
5. Assist with bedside sitting, personal hygiene, and toileting.
6. Observe/round every hour.
7. Reorient confused patients as necessary.
8. Establish elimination schedule, including use of bedside commode, if appropriate.
9. Notify receiving areas of high fall risk, e.g., radiology.
10. Collaborate with nurse leader, clinical nurse specialist, or nursing supervisor to determine the need for a companion, e.g., sitter.
11. Reinforce activity limits/safety precautions with patient/family.

Additional interventions

Physical limitations or motor deficits

1. Assist with transfer or ambulation PRN.
2. Assess for nocturia, urgency, and implement toileting schedule.
3. Supervise and/or assist with toileting.
4. Obtain and use bedside commode PRN.
5. Reorient confused patients as necessary.
6. Consider PT evaluation if new deficits arise.
7. Instruct patient to use assistive devices, as appropriate, e.g., cane, walker.
8. Use assistive devices as necessary, e.g., cane, walker.

Medications

1. Assess for medication side effects and consult pharmacist/physician when appropriate.
2. Educate patient/family about possible side effects, e.g., sleep aids, diuretics, narcotics, anticonvulsants.
3. Evaluate schedule/type of medication, e.g., diuretics/laxatives.
4. If taking anticoagulants, educate patient/family regarding increased risk of bleeding with injury.

Sensory deficits

1. Ensure the patient wears personal glasses and/or hearing aids.
2. Assess for numbness and decreased sensation in extremities.
3. Assist with ambulation as needed.

educator, and clinical nurse specialist were also involved. The Director of Evidence-Based Practice and Research and the Director of Acute Care Services served as mentors and facilitators for development and rollout of the project.

Table 4. Prevalence of falls risk factors on neurology/orthopedic unit

Risk Factor	Prevalence (%)
History of falls	24
Needs help transferring to commode or toilet	68
Needs help moving from bed to chair or requires a complete transfer	72
Visual or auditory impairment	0
Peripheral neuropathy	16
Imbalance	68
Right or left side weakness	60
Lower extremity weakness	68
Psychotropics or anticonvulsants	36

The group met weekly, starting 2 months prior to project rollout. They immediately realized that if they wanted a realistic chance of reducing falls and injuries associated with falls, they needed to start to change the unit safety culture from one of "The patient fell; it happens" to one of "Why did the patient fall, and what could have been done to prevent it?" Instead of a strictly lecture-driven format for the training, a didactic and interactive teaching format was proposed. The consensus was that this project was of such importance that a day-long training program, not just a brief inservice, was needed to educate the entire staff. With a total of 88 staff members, the unit leadership devised a work schedule so that the training could be conducted on 3 different days within 1 week in order to include all staff members.

Program Agenda

The overriding goal of the program was to identify the staff's responsibilities in ensuring patient safety. The four objectives that drove the agenda were: (1) describing elements of a safe culture and the internal and external forces that influence patient safety; (2) discussing latent issues that contribute to unsafe patient conditions; (3) discussing the responsibilities of team members in ensuring patient safety through teamwork, communication, and delegation; and (4) describing changes in practice to improve patient safety.

The team designed a training agenda that included morning didactic presentations with small group activities in the afternoon. Didactic presentations covered the topics of safety and change theory, unit-specific falls and falls with injury data, teamwork, accountability, communication, delegation, and a unit-specific safety model. In the afternoon, the small groups spent time studying patient scenarios to identify safety hazards and developing interventions for the unit-specific patient safety model.

Developing a Culture of Safety

The "Swiss Cheese Model"[4] has been used since the 1990s in the risk analysis of accident causation, and it has recently gained popularity in aviation safety and health care systems. The Model equates human systems to multiple slices of Swiss cheese, stacked together. When the slices of cheese (representing defensive barriers within the system) shift and the holes in the slices (representing gaps in the defensive barriers) align or change size, conditions become favorable for an accident to occur.[5] Information presented to the staff equated barriers to prevent patient falls with policy and procedure (e.g., falls risk assessment, existing interventions), environmental safety barriers (e.g., side rails, grab bars in bathroom), and available staff (e.g., nurses and assistive personnel). According to the Swiss Cheese Model, gaps in defensive barriers are caused by active failures and latent conditions. Active failures were identified as high-risk patients left unassisted in the bathroom or a lapse in coverage during breaks or change of shift. Latent conditions were identified as environmental hazards, lack of toileting rounds, and lack of a safety culture on the unit.

The presentation on safety culture culminated in highlighting the requirements for safe practice, including a skilled and knowledgeable workforce, well-maintained equipment, efficient job design and scheduling, and a safe environment. From this presentation, the staff was able to understand that they were responsible for closing the gaps in the defensive barriers and reporting near misses, as well as actual events.

Change Theory

In large or complex institutions, implementing change to the culture can be difficult. For purposes of this training program, change equated to a shift in the patient safety culture on the unit. The lecture on change focused on typical reactions to change, both negative and positive, and strategies for managing change. Negative reactions to change were identified as sadness, fear, withdrawal, anger, and resistance. Positive reactions to change included being excited, motivated, and enthusiastic. Strategies for managing change in the workplace included teaching the staff to evaluate the proposed change, identifying personal gains or losses that occur due to the change, and learning to put the change into perspective. The overall message was "change is inevitable"; it may be difficult, but often it is for the best.

Unit-Specific Falls Data

Unit-specific patient falls and falls-with-injury data were presented to the staff. From the data obtained during the pilot testing of the new falls risk-assessment instrument, we knew that 67 percent of the falls on the unit were associated with toileting activities (either getting from the bed or chair to the bathroom or the commode). The distribution of falls by time of day had two distinct peaks, with the most falls occurring between 0400-0700 and 1200-1500. These periods corresponded primarily with staff breaks, resulting in fewer staff on the unit.

Specific institutional case studies—a 58-year-old woman and a 72-year-old man who fell and sustained hip fractures on the day prior to their scheduled discharge—were presented to illustrate clearly the financial and quality-of-life devastation accompanying a fall with injury. They allowed the staff to understand on a more personal level how a serious injury extends the

patient's hospital stay and negatively affects their quality of life, since both of these patients were discharged to rehabilitation facilities instead of to their homes.

Teamwork, Communication, and Delegation

Although the unit staff knew each other and often worked together on the same shifts, the project development team felt it was important to focus on improving teamwork, communication, and delegation.

Teamwork. The distinction was made between groups vs. teams. Group members work independently, and often they are not working toward the same goal. Team members work interdependently with a common goal and provide mutual support to one another. The presentations reiterated that teams succeed when the members trust each other, commit to the goal, hold themselves accountable, and focus on results.

Communication. Communication was approached from a "left-brain, right-brain" perspective, since brain dominance affects how a person processes information and communicates with others. The team felt it was necessary to emphasize this, as patient handoff and communication of specific information to staff members are critical components of patient care. Verbal cues, including how one conveys information in terms of tone of voice, inflection, and loudness, were highlighted, as well as such nonverbal cues as eye contact, facial expression, and posture. The staff was encouraged to consider their own communication patterns, along with those of their team members. Listening skills were reinforced: acknowledging the person, providing undivided attention, and repeating for clarification. If communication can be improved, whether by content or style, patient information should be more accurately conveyed.

Delegation. Delegation was a worthwhile skill to include because inexperienced nurses often find themselves having to delegate patient care to tenured assistive personnel. With the increasing complexity of cancer treatment and therapies, nursing care demands are high, and nursing assistants need to be available for specific patient needs. The registered nurse delegates tasks depending on the needs and condition of the patient, the complexity of the task, and the abilities of the staff to whom the task is delegated, all within the context of other patient needs.

Unit-Specific Safety Model

The project team developed a unit-specific safety model based on the notion that patient safety begins with each staff member. While each individual has unique responsibilities for patient care, everyone has the same responsibility for patient safety. The team developed the "ABCD Model for Patient Safety" (Figure 1). "A" corresponds to the "area" around the patient; "B" refers to the "bathroom" or toileting considerations; "C" considers the "comfort" of the patient; and "D" relates to any "desire" the patient may have at the time the nurse or assistive personnel is making rounds.

Within each of these categories, staff were instructed that four questions need to be asked each time a patient is assessed or care is planned:

1. What human factors need to be considered?
2. Is the physical environment conducive to patient safety?
3. Are any equipment or patient-related items affecting safety?
4. What system or process is in place to assure safety?

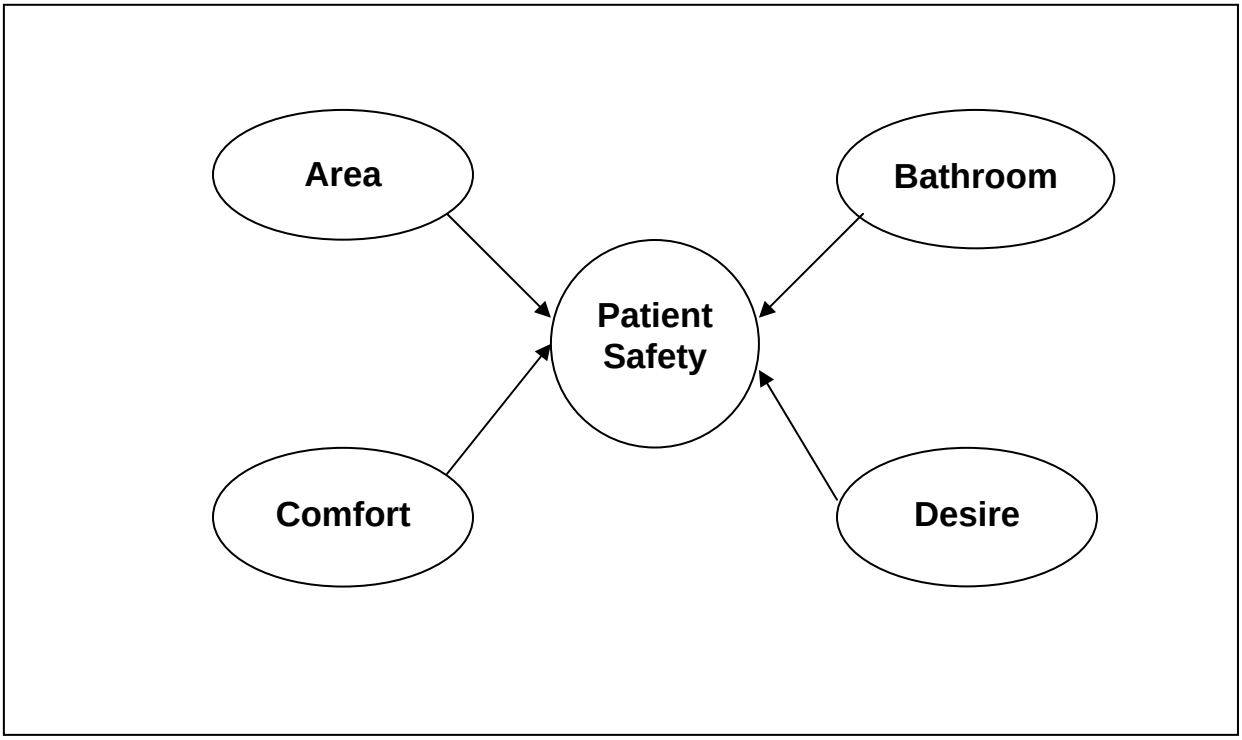

Figure 1. The ABCD model for patient safety.

During the small group sessions, multiple patient scenarios were presented, and each patient was evaluated according to the ABCD model. Emphasis was placed on the importance of maintaining the safety of the patient through careful consideration of individual risk factors that put a patient at high risk for falling.

For example, when considering the "Area" around the patient, a patient assessed with left-sided hemiparesis would be assigned to the bed positioned in the room with the night stand and nurse call system to his/her right side, thereby promoting access to personal items and call for assistance within easy reach.

The staff was instructed to carefully consider what safety measures were in place to assure patient safety in the "Bathroom." Prior to the training, the staff had traditionally defaulted to patient privacy over patient safety. The previous culture provided for complete privacy while the patient was using the toilet, so that even though a patient was assisted to the toilet or commode he/she would be left alone to toilet, despite the likelihood of tipping, slipping, or falling when left alone. Now, if the patient was assessed as being at high risk for falling, the staff was to remain with the patient during toileting.

Program Evaluation

The program was rated "5" (outstanding) by 90 percent (N = 79) of the participants and "4" (excellent) by 10 percent (N = 9). Individual comments included the following:

> "*It is obvious how important this program is since two directors were here the whole day.*"
>
> "*The falls information and case studies made me think about what a big problem this is.*"
>
> "*Safety is up to everyone.*"
>
> "*ABCD. It makes sense. It applies to every patient.*"
>
> "*Thanks for having small group sessions. It helps the teaching make sense.*"
>
> "*It is worth an entire day off the unit. It shows how important this is.*"

Results

The staff safety program was conducted during the last week of March 2007 on one unit, and the ABCD Model for care delivery went live on April 1, 2007. In the quarter following program implementation, the unassisted fall rate dropped from 4.90 falls/1,000 patient days (Q1 2007) to 2.93 falls/1,000 patient days in Q2 and remained lower than the initial level in Q3 (3.73 falls/1,000 patient days). Since program implementation, this unit no longer has the most patient falls in the hospital; at the end of Q3, it ranked third out of 11 inpatient units.

Subsequently, we have started tracking assisted falls on this unit, since assisted falls have not previously counted when calculating the falls rate. An assisted fall occurs when a patient is being accompanied by a care provider and begins to fall, typically due to an identified risk factor, and the provider lowers him/her to the floor. Assisted fall rates suggest that patients are being identified as being at high risk for falls and are being assisted during ambulation or transfer. Patients are not usually harmed because they are lowered to the floor instead of falling to the floor. For Q2, the assisted falls rate was 1.30/1,000 patient days, compared to 1.45/1,000 patient days during Q3.

Discussion

Since the program launch in March 2007, multiple system and process changes have either occurred or commenced. Safety improvements are being made to patient bathrooms, including changing the bathroom fixtures to enhance illumination, strategically placing additional grab bars to allow patients safer access to the toilet, shower, and sink; and purchasing a wider mounted shower chair. Communication at change of shift between all care providers focuses on pertinent safety issues, including high risk for falls, and a plan for hourly rounding is developed as needed. The nursing assistive personnel keep track of patient risk factors and specific needs on a worksheet, and all staff must ensure that patient needs are met during shift report and staff

breaks. Communication between the patients and providers using the nurse call system is facilitated by the unit assistant, who takes the message from the patient, communicates it to the appropriate staff, and then confirms with the patient that the message has been relayed and when to expect a caregiver to respond to the call.

Four full-time equivalents designated for incremental assistive personnel were funded by hospital administration as part of this demonstration project to improve staffing ratios and make more providers available to assist patients. Their schedules cover the 1200-2000 and midnight-0800 timeframes, which correspond to the two peak times of day when fall rates were highest on the unit. Three positions have been filled, with one individual already working on the unit and two others participating in orientation. We anticipate seeing fall rates decline farther as these individuals complete orientation and are indoctrinated in the unit safety culture.

The nurse leader and clinical nurse specialist on the unit review every patient fall according to the ABCD model. The unit-based team participates as investigators to determine what happened to cause the patient to fall. The human element, physical environment, patient-related factors, and system/process issues are evaluated. This review method has produced some noteworthy results that have already led to system change. For example, three of the falls in Q2 occurred while the patient was being attended by staff who had not attended the initial safety training (per diem or travelers). All three patients had been assessed as being at high risk for falls and were left unattended in the bathroom. In Q3 we saw the same thing occur, as 10 new staff were hired and had not completed the safety program. As such, the program was to be repeated in December 2007 to ensure that all new staff received the information related to the ABCD model and the unit approach to patient safety.

The program development team did not disband after the initial training and is still meeting at regular intervals on the unit. They have assumed responsibility for training of new staff and ongoing program evaluation. Continuing data collection in the quarters ahead will show whether this intervention contributes to the downward trend in the unassisted falls rate. Currently, departmental nursing leadership provides hospital and unit-specific data to the team, and in turn, they provide continual feedback regarding information on falls and falls with injury to the staff.

Conclusion

Program rollout is scheduled for five additional nursing units in 2008. Again, interested staff from each area will be identified. Since our institution is divided into nursing units that care for specific types of cancer diagnoses, unit-specific falls data, case studies, and specific risk factors will be incorporated into each unit-based program. The nursing directors have made a commitment to mentor each team and facilitate each rollout to build capacity at the unit level. We believe that if we demonstrate through our actions that patient safety and prevention of patient falls are of paramount importance and choose staff at the unit level who are invested in achieving these goals, the success of the program will be sustainable.

Author Acknowledgements

We acknowledge the contributions of those who participated in the development of the patient safety program: Mary Ann Anderson, Karen Belford, Corine Grandison, Stacey Hammonds, Sandra James, Aileen Killen, Dora Marcial, Josephine Nappi, Kristen Puleo, Diasia Riley, Blanca Vasquez-Clarfield, and Chui Ngor Yang.

Author Affiliations

Memorial Sloan-Kettering Cancer Center, New York, NY.

Address correspondence to: Nancy E. Kline, PhD, RN, CPNP, FAAN, Memorial-Sloan Kettering Cancer Center, 1275 York Ave, Box 10, New York, NY 10021; e-mail: klinen@mskcc.org.

References

1. Eldridge C. Evidence-based falls prevention: A study guide for nurses. Marblehead, MA: HCPro; 2004.
2. Centers for Disease Control and Prevention. Falls among older adults: An overview. Available at: www.cdc.gov/ncipc/factsheets/adultfalls.htm. Accessed March 3, 2008.
3. Katz S, Ford AB, Moskowitz RW, et al. Studies of illness in the aged. The index of ADL: A standardized measure of biological and psychosocial function. JAMA 1963; 185: 914-919.
4. Reason J. Human error. Cambridge, UK: Cambridge University Press; 1990.
5. Reason J. Human error: Models and management. Brit Med J 2000; 320: 768-770.