Research Article

Nurses as Agents of Safety: Identifying unique contributors to falls in hospitalized Adult Hematology Patients: A Retrospective Study

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ABSTRACT

Falls continue to be a major safety concern in acute care settings and are the second cause of unintentional injury deaths globally [1].The World Health Organization defines a fall as an event that results in a person coming to a rest inadvertently on the ground or floor or other lower level. Prevention of a fall is a safety measure, which is significantly affected by nursing care according to the National Database of Nursing Quality Indicators (NDNQI) [2].This retrospective review of one hundred medical records was conducted to assess if there are unique contributors to falls in hospitalized adult hematology patients. The study sample was drawn from the parent study that examined the impact of video-based educational intervention on the occurrence of falls among hematology patients hospitalized for the management of cancer treatment and complications. Patients with cancer are at an increased risk of sustaining a fall related injury due to impaired functional status, low blood counts, treatment related fatigue, frailty, and poor nutritional status [3,4]. Simple logistic regression between continuous variables and dependent variable, and cross-tabulation between categorical variables and the dependent variable was used to analyze study results.The study revealed that there was a significant relationship between fall incident and fall risk assessment scores on admission; X^2 (1) = 6.153, p = .013, Cramer's V = .256.

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Introduction

Fall prevention is a concept associated with hindering a fall from happening through advance care planning or action.The body of knowledge on falls, risk factors, consequences, and prevention originates from studies of older persons who have experienced a fall. The medical community has made several efforts toward fall risk assessment with an emphasis on prevention of the reoccurrence of falls, but this approach could potentially skew attention away from initial fall prevention efforts [5]. The purpose of this retrospective case-control study was to identify unique contributors to falls in hospitalized adult cancer patients with a hematologic diagnosis. Patients with hematologic disorders are at an increased risk of sustaining an injury due to their low platelet counts resulting from chemotherapy and radiation treatments. The Centers for Medicare and Medicaid Services no longer reimburses hospitals for in-hospital falls with injury [6], therefore, placing a greater burden on nursing staff to ensure patient safety through the development of nurse-driven fall prevention strategies, and the implementation of risk reduction plans of care. Four acute care hematology inpatient units at a renowned hospital in the Texas medical center continued to report falls at a high rate on a consistent basis.These fall rates were higher than the institutionally set goals. Standard fall prevention measures including fall prevention education had been implemented on these units.

Methodology

This case-control retrospective study aims to analyze the unique contributors to falls in hospitalized adult hematology patients.To achieve this goal, secondary analysis of data from a prior study was conducted. The prior study period was September 1, 2012 through August 31, 2013.This parent study was done to examine the impact of a video-based educational intervention on the occurrence of falls among hematology patients. This randomized controlled intervention study consisted of a population of 2,472 individuals who were hospitalized for care associated with leukemia, lymphoma, multiple myeloma or stem cell transplantation. Study participants comprised of 1,236 enrolled in the intervention group and 1,236 in the control group.

Study participants in the control group received standard of care fall prevention education while participants enrolled in the intervention group received standard of care in combination with the fall prevention video-based educational intervention. For this study, demographic data were collected from participant medical records and study variables such as fall risk assessment was collected from the Hester Davis Scale for fall risk assessment scoring tool which identifies patients as either medium (defined as a score of eight or less) or high (defined as a score of nine or greater) fall risk[6]. Data related to the events surrounding a fall was collected from a Patient Safety Network (PSN) electronic database, which is an incident-reporting tool that stores various data points such as causative factors to a fall. A reliable and validated instrument for analyzing medical record data abstraction

methodology was not located in the electronic literature search, and therefore the cancer center's hospital-based incident reporting database data points were utilized to extract pertinent data. The outcome in this study was a total of 47 falls; 23 from the control group and 24 from the intervention group. This fifty percent fall rate therefore demonstrated that the video-based educational intervention was not effective in reducing the occurrence of falls in the intervention group.

Sample and Setting

An administrative Institution Review Board (IRB) protocol amendment approval to the parent study was granted by the cancer center. The principle investigator did not collect additional data. A waiver of informed consent was obtained for the parent study as the data collected was consistent with the standard of care procedures, and the consent for treatment included consent for data to be evaluated and tracked for quality and care purposes. The population and inclusion criteria for the parent study were adult (18 years and older) patients on the first admission to the designated hematology inpatient setting of lymphoma, myeloma, leukemia, and stem cell transplantation units. Participants were expected to be able to read and understand English and this criterion was evaluated through self-reporting. Exclusion criteria included patients with non-hematologic diagnoses admitted to the study units. The setting for this study was a major cancer center located in the medical center of a large south-central city located in the United States.

Data Collection

Data from the parent study was deduced through an extensive systematic retrospective electronic health record (EHR) review. Extrapolated data were entered to an 18-item Excel spreadsheet, consistent with the 23-item institutional incident reporting form standards. Information which includes the date of fall incident, discovery and time of fall incident, assisted versus unassisted falls, fall prevention protocol (e.g., utilization of bed alarm, bedside commode, non-skid footwear), and activity before the fall. Event exact location (room, bathroom), and expert opinion description of event detail (what happened during the event) was examined. Additional data points included admission and discharge dates, and length of stay. The anonymity of the participants was protected by blotting out names or study ID numbers.

Statistical Analysis

For this study, a priori power analysis was conducted using G*Power 3.1.9 to determine the minimum sample size that is required to find a difference with a desired Level of power set at .80, an alpha (α) level at .05 and a moderate effect size of 1.4 (oddsratio) with two-tailed for logistic regression. It was determined that a minimum of 93participants would ensure adequate power for the current study. No additional patient enrollment occurred. Data from the Excel spreadsheet was then entered into a Statistical Package for Social Sciences (SSPS) v.24 software for analysis. Variables of interest included age, gender, race, length of hospital stay (in days), underlying diagnosis, fall risk assessment score, complete blood count values (white blood cells, hemoglobin, hematocrit, and platelets), and fall incident.

Data were evaluated for impossible values. Abnormal white blood cell count values were identified as some values fell below the normal range of 4,000K/uL to 11,000K/ul. Although abnormal, these values are possible for the patient with hematologic malignancy. Percentage and patterns of missing data were first evaluated, then assumption tests were performed to examine normality and outliers on continuous variables. No duplicate or missing data was identified. Mean and standard deviation for continuous variables and frequency and percentage for categorical variables were used to describe demographic data. Simple logistic regression between continuous variables and dependent variable, and cross-tabulation between categorical variables and the dependent variable was used to analyze study results. Demographic data of gender and diagnosis from 47 participants with hematologic malignancies who experienced a fall (fallers) was matched to 47 participants with the same diagnoses who did not experience a fall (non-fallers) to obtain a minimum sample size of 94 participants. Simple logistic regression between continuous variables and dependent variable, and cross-tabulation between categorical variables and the dependent variable was used to analyze study results. Stepwise logistic regression was utilized for the final analysis of data.

Results

From the analysis and review of fall data, a simple logistic regression of the fall incident (dependent variable) initially confirmed that 50% of the participants fell, but the predictive model demonstrated 36 fallers and 34 non-fallers resulting in a 74.5% prediction classification accuracy, which was 24.5% increase from the initial 50% classification accuracy.

Table 1: Table showing frequencies and percentages of fall incident by fall risk assessment on admission

Fall Incident	Medium Fall Risk		High Fall Risk		X2	p	Cramer's V
	n	%	n	%			
Fallers	19a	38%	28b	63.6%	6.153	.013	0.256
Non-fall	31a	62%	16b	36.4%			
* p < .013							

The relationship between fall incident and fall risk assessment score on admission was significant, $X2 (1) = 6.153$, $p = .013$, Cramer's V = .256. More than half of participants who fell were identified to be at a higher risk for falling (63.6%) than medium fall risk (38%). Cross tabulation, using Pearson's chi-square and Cramer's V tests were utilized to examine the relationship between fall incident and 10 identified variables of interest. Categorical variables for fall incidents were analyzed and reported individually.

Table 2: Table showing frequencies and percentages of fall incident by race

	Caucasian		Non-Caucasian				
Race	n	%	n	%	X2	p	Cramer's V
Fallers	33a	45.8%	14a	63.6%	2.136a	.144	0.151
Non-fall	39a	54.2%	8a	36.4%			
p < .144							

Due to the resulting small sample size of non-Caucasian races (African American= 8, Hispanic = 6, Asian = 2, and other = 6), these races were combined into the non-Caucasian category. As shown in Table 2 the relationship between fall incident and race was not significant, X2 (1) = 2.136, p =.144, Cramer's V = .151. There was an evenly distributed number of falls in both groups, although more than half of the non-Caucasian's experienced a fall (63.6%) than Caucasian (45.8%).

Table 3: Table showing frequencies and percentages of fall incident by diagnosis

Diagnoses	Non-Hodgkin's Lymphoma		Multiple Myeloma		Leukemias				
	n	%	*n*	%	*n*	%	X2	*p*	Cramer's V
Fallers	15a	50%	12a	42.9%	20a	55.6%	1.016	0.602	0.104
Non-fall	15a	50%	16a	57.1%	16a	44.4%			
p< .602									

Due to the resulting small sample size of participants with acute myelogenous leukemia (these are two words)… chronic myelogenous leukemia. As shown in Table 3 the relationship between fall incident and diagnoses was not significant, X2 (2) = 1.016, p = .602, Cramer's V =.104. There was an equal distribution of fallers (50%) and non-fallers (50%) in participants with non-Hodgkin's lymphoma. A greater proportion of participants who fell were those diagnosed with leukemia (55.6%) than those diagnosed with multiple myeloma (42.9%).

Table 4: Table showing frequencies and percentages of fall incident by gender

	Male		Female				
Gender	*n*	%	*n*	%	X2	*p*	Cramer's V
Fallers	23a	48.9%	24a	51.1%	2.147	.143	0.151
Non-fall	16a	34%	31a	66%			
* *p < .143*							

The relationship between fall incident and gender was not significant, X2 (1) = 2.147, *p* = .143, Cramer's V = .151. More than half of participants who fell were female (51.1%) than males (48.9%).

Table 5: Table showing frequencies and percentages of fall incident for continuous variables

Variable	X²	*p*	Cramer's V
Age	26.200a	.955	0.528
Length of Say	34.467a	.674	0.614
WBC	62.143a	.542	0.813
Hgb	42.652a	.473	0.676
Hct	31.867a	.275	0.811
plts	94.000a	.172	1.000

Continuous predictors were individually analyzed but were reported together. There was no statistical significance between the fall incident and the identified continuous variables.

Discussion

This study represents a small population of adult hematology patients hospitalized in four hematology units in a cancer center. The result of this study suggests that a relationship exists between the fall assessment risk score on admission with the fall incident, p<.013. Fall risk scores were therefore the primary predictor of falls in the hospitalized adult patients with a hematologic malignancy. Further studies will be needed to understand patient perception of fall prevention education and observed increase in fall prevention measure implementation compliance by nursing staff.

Implications for Practice

A nursing practice and nursing education implication is relevant to this research. First, the study demonstrated the need for in-hospital ongoing fall risk assessment utilizing the Hester Davis Scale. Fall risk assessment scores should guide comprehensive fall prevention measures that will yield positive patient outcomes and positive patient experiences. The nurse reported data on fall prevention procedures demonstrated a lack of consistency in the implementation of required prevention measures on patients who were identified to be at a higher risk of falling. Among the 47 patients who fell, 35 (74.5%) did not have their bed alarm activated, more than 50% did not have non-slip footwear, and 57% did not have a bedside commode readily available in the room before the fall. More than half of the falls (55%) occurred between the hours of 8 am through 6.30 pm, and the majority (63.8%) of the falls occurred inside the patient's hospital room, 29.8% occurred in the bathroom during toileting, and 6.4% occurred in the hallway while the patient was ambulating.

Nursing educational implications include staff training on effective communication skills with patients and leaders. Staff training on the importance of consistent implementation of fall prevention measures for all high-fall risk patients would improve their accountability and compliance with fall prevention initiatives. Upon review of the qualitative nurse reported data, identified barriers included patient refusal of bed alarm activation because it disrupted their sleep with minor body adjustments while on the bed. Some patients who had care providers staying with them in the hospital room had refused bedside commodes inside the room because it was a barrier to privacy during toileting. One patient who fell in the hallway while ambulating had refused to wear the non-slip footwear provided by the nursing staff and opted to wear her "flipflops" which were stuck on the hardwood hospital floor resulting in a fall.

Limitations

The overarching limitation of this research was the dependence on nursing accuracy of fall incident documentation. The nurse reported data of fall incident depended on the recollection of events before and during the fall where the patient was the primary historian of the events before the fall. A second limitation is a dependence on the incident reporting system as the main tool for identifying patients who fell. Although all staff at the cancer center are expected to report patient falls in the incident reporting system, under-reporting fall events are probable due to staff time constraints and perception of blame [8]. This limits the generalizability to the target population of hospitalized adult patients with hematologic malignancy. Finally, the higher risk for falls among this population is a limitation to the generalizability of this study to other oncology patients [9]. Patients with hematologic malignancy undergo multiple chemotherapy treatments leading to a prolonged duration of severe cytopenias. The severity of their underlying disease coupled with the common use of corticosteroids places them at a higher risk for falls than the general population of patients due to steroid-induced muscular weakness or myopathy.

Conclusion and Recommendations for Further Study

This study revealed fall risk scores were the primary predictor of falls in the hospitalized adult patient population with hematologic malignancy. However, constituent implementation of fall prevention by nursing staff is imperative in preventing falls.

Recommendation

The study suggests a qualitative study to understand patient perception on nursing-led fall prevention education on safety. It is recommended that further studies include patient engagement and multidisciplinary collaboration in fall prevention efforts to ensure intentional and diligent actions are continued in a multifaceted approach.

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