

Missed Nursing Care, Staffing, and Patient Falls

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Patient falls in hospitals continue to be a major and costly problem. This study tested the mediating effect of missed nursing care on the relationship of staffing levels (hours per patient day [HPPD]) and patient falls. The sample was 124 patient units in 11 hospitals. The HPPD was negatively associated with patient falls ($r = -0.36, P < .01$), and missed nursing care was found to mediate the relationship between HPPD and patient falls. **Key words:** falls, missed nursing care, staffing

UP to 12% of hospitalized patients experience at least 1 fall during their hospital stay.¹ A fall is defined as any event in which patients are found on the floor (observed or unobserved) or an unplanned lowering of the patient to the floor by staff or visitors.² In 2008, and 2010, falls were identified as one of the top 10 sentinel event categories by the Joint Commission.³ Fall rates in hospitals range from 4 to 14 falls per 1000 patient days.⁴ With the adoption of the Centers of Medicare and Medicaid rule, which no longer reimburses hospitals at the higher diagnosis related group for the care and treatment associated with patient falls that occur during hospitalization, a clearer understanding of what factors

influence fall rates among hospitalized patients is even more critical.⁵

The causes of patient falls and interventions to prevent them have received considerable attention.^{6,7} Yauk and colleagues⁷ identified ambulation assistance, disorientation, bowel control problems, and fall history as predictors of falls among hospitalized medical-surgical patients. Ferrari and colleagues⁶ also found inattention and mobility to contribute to falls. Additional studies have examined the effectiveness of several fall prevention strategies. Results of 2 meta-analyses found a pooled effect reduction of 4% and 25% in falls for patients in the experimental groups after the implementation of a variety of fall-prevention strategies.^{4,8} Strategies aimed at prevention of falls have included identification wrist bands or stickers, greater vigilance through hourly or scheduled rounds, camera monitoring, use of alarms, and in some cases physical restraints. In a review of the literature, we found only 1 study that investigated the link between the extent to which standard nursing care is completed and patient falls. That study used nurse reported perceptions of patient falls as the measure.⁹

The aim of this study was to determine whether the omission of elements of nursing care (ie, missed nursing care) leads to a greater number of patient falls, using actual fall rates gathered from our study hospitals and controlling for nurse staffing (hours per patient day [HPPD]) levels. The related research

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questions were as follows: (1) Do nurse staffing levels (HPPD) predict patient falls? and (2) Does missed nursing care mediate the effect of staffing levels on patient falls?

LITERATURE REVIEW

Falls have adverse consequences for patients (eg, mortality, fractures, functional dependence, and fear of reoccurrence) and staff providing direct patient care (eg, feelings of guilt, apprehension). Although several national and professional organizations have developed evidence-based guidelines that set forth strategies for reducing falls,^{10,11} consistency in implementation of these strategies has been limited. Findings from 188 medical-surgical units in 48 hospitals across the United States found that risk-specific interventions (such as ambulation and medication management) are not being implemented consistently.¹²

This finding is in line with our research where we have identified that elements of nursing care are being regularly missed in acute care hospitals. We have conducted 3 studies of missed nursing care, the first being a qualitative focus group study on 5 patient units,¹³ the second a quantitative study in 3 hospitals,¹⁴ and the third, an expansion of the 3-hospital study in 10 hospitals with diverse characteristics (eg, size, teaching status).¹⁵ The results of these studies showed that a substantial amount of standard required nursing care is being left undone and that the patterns of missed care are similar across hospitals. Ambulation of patients 3 times per day (or as ordered) was the most frequently reported element of missed nursing care with 76% of nurses reporting this action being frequently or always missed. Similarly, Callen and colleagues¹⁶ found that 73% of patients did not walk during their inpatient stay on a medical-surgical unit.

Previous studies have found that nurse staffing levels are predictive of patient falls.¹⁷⁻¹⁹ Lake and colleagues¹⁸ studied 5388

units in 108 Magnet and 528 non-Magnet hospitals and found that an additional registered nurse (RN) HPPD was associated with a 3% lower fall rate in intensive care units.¹⁸ Similarly, Dunton and colleagues¹⁷ discovered that higher fall rates were associated with lower HPPD and a lower percentage of RNs. This association held true for higher staffing levels up to 15 HPPDs on step-down, medical, and combined medical-surgical units; however, no evidence was found of this relationship above the 15-hour cutoff point.

Although the evidence points to several effective strategies for fall reduction, fall rates and injuries from falls remain high. Interventions implemented to reduce falls still remain vague or general in nature with limited effect size. This may be related to (1) poor dissemination of the research findings to bedside clinicians or (2) the failure of staff to effectively implement evidence-based strategies for patient-specific risk factors. It also may be due to a practice of routinely missing aspects of nursing care and not addressing these errors of omission.

CONCEPTUAL FRAMEWORK

The conceptual framework for this study is the missed nursing care model, which hypothesizes that missing or not completing standard, required aspects of nursing care leads to poor patient outcomes. The missed nursing care model is based on the structure, process, and outcome framework, as described by Donabedian.²⁰ In the missed nursing care model, *structure variables* are the characteristics of patient units and hospitals—such as staffing levels—while the *process variable* (what is in the “black box of nursing care”) is defined as missed nursing care. Finally, outcomes are both patient (eg, falls, hospital acquired infection rates) and staff-related (eg, job satisfaction, intent to leave, turnover) outcomes. For the purpose of this study, we examined the relationship between nurse staffing (structure), missed nursing care (process), and patient falls (outcome).

METHODS

Sample and setting

This study used a cross-sectional, descriptive design. The study was conducted in 11 acute care hospitals ranging in bed size from 60 to 913. The number of participating patient care units in each of the hospitals ranged from 2 to 22 units, which included a total of 124 units. Unit inclusion criteria were (1) an average patient length of stay 2 days or more and (2) a patient population older than 18 years. Exclusion criteria were (1) short stay units (≤ 23 hours) and (2) pediatric, women's health, perioperative, and psychiatric units. All patient care units in the hospitals that met the inclusion criteria agreed to participate in the study.

The total nursing staff on these units who participated in the study was 3432 nurses (RNs and licensed practical nurses) and 980 nursing assistants. The overall return rate was 57.3%, with a unit response rate ranging from 34.4% to 99.6%.

Study variables

Missed nursing care

Missed nursing care was measured by the MISSCARE survey that asks participants to identify how frequently elements of care (such as, ambulation, turning, patient assessment, teaching, discharge planning, medication administration) are missed, using a 4-point Likert scale, with anchors "rarely missed" (1) to "always missed" (4). The reliability and validity of the MISSCARE survey has been reported elsewhere.²¹

Because the missed care survey covers a wide range of nursing care interventions, we asked a panel of experts, nurses in acute care hospitals who hold quality improvement and/or risk management responsibilities, to identify which of the 24 elements of nursing care on the MISSCARE survey have the potential to impact fall rates if it is not provided. The 5 elements of nursing care on which the experts ($n = 38$) agreed were ambulation,

patient assessments each shift, focused re-assessment, response to call light, and assistance with toileting. The internal consistency measured by Cronbach α for the 5 elements of nursing care is 0.75. These elements are in line with previous literature identifying patient risk factors related to falls.^{6,7} Therefore, for the purpose of this study, missed nursing care refers to the frequency nurses reported these 5 fall-related elements as being missed.

Hours per patient day

Hour per patient day was defined in accordance with the National Database of Nursing Quality Indicator standards. The HPPD values were calculated as the number of productive hours worked by all nursing staff (RN, licensed practical nurse, nursing assistant) with direct patient care responsibilities divided by in-patient days.

Fall rate

Falls were defined as any event in which patients are found on the floor (observed or unobserved) or an unplanned lowering of the patient to the floor by staff or visitors. Fall rates were calculated as the number of falls per 1000 patient days.

Procedures

After institutional review board approval from each of the participating hospitals, study data were collected from November 2008 to August 2009. Data included (1) surveying the nursing staff on each of the study units utilizing the MISSCARE survey and (2) collecting HPPD and fall rate data by patient care unit from administrative data repositories. Packets containing a letter explaining the study, the MISSCARE survey, and a return envelope were placed in each staff member's mail box. Nursing staff were asked to place completed surveys in locked boxes located on their respective units.

For staffing data, hospitals were asked to provide the data in raw form (ie,

numerator and denominator) to ensure consistency in computation across hospitals. Administrative staff in each hospital were given a Microsoft Excel file with specific definitions and data requirements and were asked to input data into a template designed by the research team. Then, the research team computed all variables of interest. Fall rate data also were collected by administrative staff of each hospital after providing a specific definition of fall rate to the staff. The monthly fall rate was collected for each of the 2 months corresponding with survey administration in each hospital.

Data analyses

Data were analyzed with the SPSS 17.0 (Chicago, Illinois). The unit of analysis was the patient care unit. Because the fall rate is positively skewed (skewness = 1.43), square root transformations were performed to adjust for this. The square root of the fall rate was used for analyses. Although missed nursing care scores were collected at the individual level ($n = 4412$), they were aggregated to the unit level (as the dependent variable falls was a unit level variable). The unit level overall mean score of missed nursing care was the average amount of missed care identified for each unit. Correlation analyses were used to address the relationship between staffing, case mix index (CMI), missed nursing care, and patient falls.

To examine the mediating effect of missed nursing care on the relationship between staffing (ie, HPPD) and patient outcomes (ie, fall rates), 3 regression equations were calculated. A variable functions as a mediator when it meets the following conditions: the independent variable must affect the mediator in the first equation; the independent variable must affect the dependent variable in the second equation; and the mediator must affect the hold in the predicted direction, and the effect of the independent variable on the dependent variable must be less in the third equation than in the second.^{22(p1177)}

RESULTS

Respondents in each of the units were primarily female (91%) and older than 35 years (54%). Most participants worked full time (81%) and 12 hours shifts (75%). In terms of education and experience, the average percentage of staff on the unit holding a BSN degree or higher was 47%, and 51% of employed staff had more than 5 years experience. Twenty-six percent of patient units were intensive care units and the others were medical-surgical, step-down, and rehabilitation units.

The mean missed nursing score for participating units was 1.50 (SD = .18), with a range of 1.07 to 2.59. Hour per patient day values ranged from 6.46 to 31.99 with the mean being 11.12 (SD = 4.55). The mean score of fall rates on the units was 3.82 (SD = 2.74), with a range from a low of 0.00 (no falls) to a high of 17.80.

Staffing, missed nursing care, and patient falls

Bivariate Pearson correlations were calculated to examine the relationships among HPPD, CMI, missed nursing care, and patient falls (Table). Hour per patient day was negatively associated with patient falls ($r = -0.36$, $P < .01$). The higher the overall missed nursing care score, the higher the patient fall rates ($r = 0.30$, $P < .01$). More patient falls were significantly related to the following missed nursing care elements: ambulation ($r = 0.22$, $P < .05$), each shift patient assessment ($r = 0.19$, $P < .05$), call light response ($r = 0.22$, $P < .05$), and toilet assistance ($r = 0.30$, $P < .01$). Focused reassessment was not significantly associated with patient falls. In addition, CMI was not significantly correlated with falls.

Missed nursing care mediation of the effect of HPPD on patient fall

Missed nursing care was hypothesized in this study as a mediating variable in the relationship between HPPD and patient falls. To

Table. Staffing, Missed Nursing Care, and Patient Falls: Correlation Matrix

Variables	1	2	3	4	5	6	7	8	9
1. Patient falls	—	−0.36 ^b	−0.19	0.30 ^b	0.22 ^a	0.19 ^a	0.16	0.22 ^a	0.30 ^b
2. HPPD		—	0.64 ^b	−0.26 ^b	0.00	−0.01	−0.15	−0.38 ^b	−0.41 ^b
3. CMI			—	−0.13	−0.00	0.05	−0.13	−0.23 ^a	−0.17
4. Missed nursing care				—	0.66 ^b	0.63 ^b	0.70 ^b	0.76 ^b	0.86 ^b
5. Ambulation					—	0.11	0.13	0.40 ^b	0.50 ^b
6. Each shift patient assessments						—	0.71 ^b	0.22 ^a	0.45 ^b
7. Focused reassessment							—	0.41 ^b	0.50 ^b
8. Call light response								—	0.65 ^b
9. Toilet assistance									—

Abbreviations: CMI, case mix index; HPPD, hours per patient day.

^a $P < .05$.

^b $P < .01$.

satisfy the requirements for mediation, 3 variables were computed. To establish mediation, the following conditions must be satisfied: (a) HPPD must affect missed nursing care in the first equation; (b) HPPD must affect patient falls in the second equation; and (c) missed nursing care must affect patient falls in the third equation. Then, if these conditions are met, the effect of HPPD on patient falls must be less in the third equation than in the second equation, thus establishing mediation.

In equation 1, missed nursing care, the mediator variable, was regressed on the predictor variable, HPPD. As noted in the Figure, results indicated that HPPD was significantly associated with missed nursing care ($F_{1,120} = 8.46$, $P = .004$). Hour per patient day explained 6.7% of the variance in missed nursing care.

In equation 2, patient fall, the outcome variable, was regressed on the predictor variable, HPPD. Hour per patient day was significantly associated with patient fall ($F_{1,115} = 17.20$, $P < .001$). Hour per patient day explained 13.0% of the variance in patient falls.

In the final equation, patient fall, the outcome variable, was regressed on both the predictor variable (HPPD) and the mediator variable (missed nursing care). Missed nursing care negatively affected patient falls

($t = 2.49$, $P = .014$), explaining 9.2% of variance in patient falls. With missed nursing care present, the proportion of variance of patient falls accounted for by HPPD was reduced from 13.0% (second equation) to 8.3% (third equation), and the standardized regression coefficient was decreased from $-.36$ to $-.30$ from the second to third equation. Thus, the reduced direct association between HPPD and patient falls when missed nursing care was in the model supported the hypothesis that missed nursing care was at least 1 of the mediators in the relationship between HPPD and patient falls.

DISCUSSION

The results of this study demonstrate that the level of nurse staffing predicted patient falls. This supports the findings of previous studies which have reported that higher staffing levels lead to fewer patient falls.¹⁶⁻¹⁸ It also reinforces our earlier findings that staffing levels predict the amount and type of missed care.²³

Missed nursing care was also found to mediate the relationship between staffing levels and falls. The effect of staffing levels

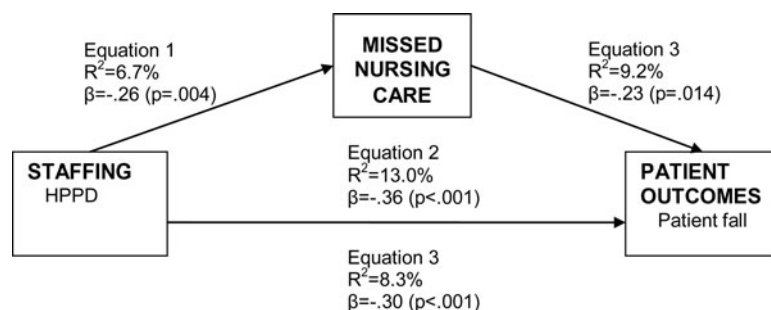


Figure. Test of the mediation model with regression analyses.

on fall rates is lessened when standard nursing care is completed (ie, no missed care, specifically ambulation, patient assessments each shift, focused reassessment, call light response, and toilet assistance). This suggests that one method of preventing patient falls is to devise methods whereby nursing staff complete standard nursing care more so than adding staff. It also could indicate that the mindfulness of the staff (ie, completing standards of care) is a critical factor for achieving improved outcomes, as opposed to specific fall-prevention strategies, such as alert signs, wristbands, and/or signage above the bed.

For example, ambulation has been found to correlate significantly with patient falls. One study by Fisher and colleagues²⁴ found that exercise (ambulation) was highly correlated with patient falls.²⁴ In addition, updated guidelines of the American Geriatrics Society and the British Geriatric Society on preventing falls in elderly patients include exercise for balance, gait, and strength training as a key recommendation.²⁵ Early ambulation also has been shown to reduce length of stay.²⁴

The fact that previous studies have identified ambulation as an element of care that is frequently missed suggests that this nursing action may be particularly critical to falls prevention.¹⁴ Further studies that examine the predictive relationship between specific elements of missed care elements and patient falls are needed to gain a better understanding of these relationships.

Limitations

This study is limited by the fact that it was confined to 11 hospitals in 2 states. This limits the generalizability of the study findings. However, this limitation is mitigated by the fact that we have found similar areas of missed care across hospitals. In addition, the measure of missed nursing care is based on perceptions of nursing staff.

IMPLICATIONS

The findings from this study underline the importance of ensuring that required care is completed (ie, limit missed care) on a daily basis, thus potentially minimizing patient falls. Although nurse staffing levels affect patient fall rates, the level of impact is reduced when care is completed in its entirety. Further work must be done to assist nurses in completing necessary tasks such as ambulation, toilet assistance, patient assessments, and call light responses, which may or may not mean additional staff members. Strategies for assisting staff to complete all aspects of nursing care include checklists, computer reminders, and patient engagement. Until we more fully understand the process of nursing care and its relationships to patient outcomes, we will not be able to develop successful strategies to prevent adverse events such as falls. Hospital nursing staff need to conduct root cause analyses to determine the reasons for missing this care and develop interventions to ensure that standard nursing care is completed.

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