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Original Research Article

# Impact of the CMS No-Pay Policy on Hospital-Acquired Fall Prevention Related Practice Patterns

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## Abstract

**Background and Objectives:** In October 2008, the Centers for Medicare & Medicaid Services (CMS) stopped reimbursing hospitals for costs related to patient falls. This study aimed to examine whether the CMS no-pay policy influenced four fall prevention practices: bed alarms, sitters, room changes, and physical restraints.

**Research Design and Methods:** Using electronic medical record data collected from four hospitals between 2005 and 2010, this secondary observational analysis examined the associations between the CMS no-pay policy and nursing interventions and medical orders related to fall prevention. Multivariable generalized linear mixed models with logit link function and accommodation for matching was used to assess the associations between the CMS no-pay policy and nursing interventions and medical orders.

**Results:** After the CMS policy change, nurses were more likely to perform one or more fall-related interventions (adjusted odds ratio (aOR): 1.667; 95% confidence interval (CI): 1.097–2.534). Of the four prevention practices, the use of bed alarms (aOR: 2.343; 95% CI: 1.409–3.897) increased significantly after the CMS policy change.

**Discussion and Implications:** The CMS no-pay policy increased utilization of fall prevention strategies despite little evidence that these measures prevent falls.

**Translational Significance:** The CMS no-pay policy may have influenced nursing fall prevention practice. Specifically, it appears that nurses may have increased their use of bed alarms.

**Keywords:** Healthcare policy, nursing, falls, hospital, CMS

Falls are expensive and detrimental adverse events that occur in United States (US) hospitals. It has been estimated that up to 1,000,000 inpatient falls occur annually in the US with associated direct medical costs greater than $30 billion (Centers for Disease Control and Prevention, 2015; Ganz, Huang, Saliba, & Shier, 2013). Patient safety in US hospitals was introduced as a major issue in To Err is Human, a publication by the Institute of Medicine (Institute of Medicine, 2000). In 2005, in an effort to align financial incentives with improvement in health care quality, Congress began the process of identifying "preventable" hospital-acquired conditions for which the Centers for Medicare & Medicaid Services (CMS) would no longer pay (Medicare Program, 2007; Rosenthal, 2007). The Secretary of Health and Human Services was instructed to select at least two conditions that (a) are high cost and/or high volume, (b) result in assignment to a diagnosis-related group that has a higher payment when present as a secondary diagnosis, and (c) could be reasonably prevented using evidence-based care (Inouye, Brown, & Tinetti, 2009; Rosenthal, 2007). After collaborative work with public health and infectious disease experts from the Centers for Disease Control and Prevention, 13 candidate conditions, including hospital-acquired falls, were selected for further consideration.

The inclusion of fall injuries was questioned because the evidence supporting preventability was weak, and there are technical difficulties related to identifying falls in health care claims (Inouye et al., 2009; Medicare Program, 2007). It was ultimately decided that falls would be included with the hope that inclusion of these events would stimulate more rigorous research into their prevention: "… we believe these types of injuries and trauma should not occur in the hospital, and we look forward to …identifying research… that will assist hospitals in following the appropriate steps to prevent these conditions from occurring after admission," (Medicare Program, 2007, p. 357). In October 2008, CMS stopped reimbursing hospitals for costs related to eight hospital-acquired conditions viewed as reasonably preventable, including injuries due to patient falls (Centers for Medicare and Medicaid Services, 2008a; Humphreys, 2009; Inouye et al., 2009). Some of the hospital-acquired conditions (e.g., central line-associated bloodstream infections, catheter-associated urinary tract infections) have decreased following the implementation of CMS payment changes; however, there have been no short-term effects of this regulation on fall events (Waters et al., 2015; Agency for Healthcare Research and Quality, 2015). After the implementation of the CMS no-pay policy, clinician adherence increased significantly for the practices of using chlorhexidine for line insertion and using barrier precautions to prevent central line-associated bloodstream infections (Stone et al., 2011).

Numerous individual nursing fall prevention interventions have been tested with mixed results. Research has been conducted on the effectiveness of communication interventions such as placing wristbands on patients to identify them as high fall risk and utilizing bed alarms to alert nursing staff when a patient is getting out of bed. These investigations resulted in nonsignificant reductions in hospital-acquired falls (Mayo, Gloutney, & Levy, 1994; Shorr et al., 2012; Tideiksaar, Feiner, & Maby, 1993). Additionally, evidence on the effectiveness of utilizing sitters to prevent falls has been mixed and is inconclusive overall (Lang, 2014). Physical restraints have been used by clinicians to prevent falls, however physical restraints have been associated with increased odds of falling and increased injury severity (Mion, Minnick, & Palmer, 1996; Tan et al., 2005; Shorr et al., 2002). Investigators have reported a significant decrease in the risk of falling when a registered nurse conducts risk-factor specific patient education (Ang, Mordiffi, & Wong, 2011). In addition to individual interventions, multifactorial interventions have also been tested. However, a recent, well-executed, cluster randomized trial of multifactorial fall prevention interventions found no change in fall rates compared to controls (Barker et al., 2016). Although hospital fall prevention guidelines have been published, few controlled trials of specific interventions have been carried out, with little evidence supporting these recommendations (Hempel et al., 2013; Miake-Lye, Hempel, Ganz, & Shekelle, 2013). A quantitative review found no evidence of benefit in published hospital fall prevention studies using concurrent controls (Hempel et al., 2013).

To the best of our knowledge, there has not been quantitative research on whether the CMS no-pay policy influenced fall prevention practices. The aim of this study was to empirically examine whether the CMS no-pay policy influenced nursing care and medical ordering practices related to fall prevention. We studied four fall prevention practices, which could be identified through medical record review: bed alarms, room changes, sitters, and physical restraints. We hypothesize that hospital-acquired fall rates have not decreased significantly since the CMS no-pay policy because there have not been significant changes in fall prevention practice patterns since policy implementation.

## Methods

### Theoretical Framework

This study was informed by Donabedian's Structure-Process-Outcome model, which was created to evaluate the quality of care (Donabedian, 1966; Donabedian & Bashshur, 2003). Structure factors, including payment changes, are believed to influence process factors, such as activities intended to prevent hospital-acquired conditions, which ultimately influences outcomes, including patient falls. This study examined the influence of the CMS no-pay policy (i.e., structure) on practice patterns (i.e., process) by examining whether the frequency of nursing interventions and medical orders related to fall prevention changed significantly after implementation of the policy.

### Setting and Sample

This secondary observational analysis was conducted using data collected from 2005 through 2010 in four hospitals located in the southeastern United States. These hospitals were part of the same hospital system and included a 635-bed tertiary hospital associated with a university and three 200- to 260-bed community hospitals. The original study used a matched case-control design with the intent of examining patient-level risk factors for hospital-acquired falls. Cases were defined as patients that fell on medical-surgical units and were identified using the hospital incident reporting system. Up to two controls (i.e., nonfallers) were matched to cases (i.e., fallers) based on potential environmental confounders. Specifically, controls were on the same unit, at the same time, for a similar length of stay as cases. A fall index time was created for each control to indicate the date and time that the corresponding matched case fell. The University of Tennessee Health Science Center Institutional Review Board approved the original data collection and the University of Florida Institutional Review Board approved this secondary analysis.

### Outcomes of Interest

Outcome, exposure, and covariate data were obtained by data collectors blinded to patient fall status. Data from the time period 24 hr prior to the fall index time were extracted from the medical record. The primary outcomes for this study included nursing interventions and medical orders related to fall prevention that are typically documented in the medical record. There were three nursing interventions related to fall prevention that were identified in nursing documentation, and are intended for monitoring or increasing surveillance: bed alarms, sitters (i.e., presence of one-on-one nursing personnel), and room changes (i.e., moving a patient to a room closer to the nurses' station). The one medical order in this study was the request to apply physical restraints to keep a patient in bed or in a chair. Physical restraints require an order from a licensed independent practitioner (e.g., medical doctor or advanced practice registered nurse). Additionally, a binary variable, "any fall-related nursing intervention," was created based on the three nursing interventions listed above. This outcome measure represented whether any fall-related nursing intervention was documented regardless of the type or number (i.e., if the patient was provided with a bed alarm, sitter, and/or room change).

### Exposure of Interest

The primary exposure of interest in this study was the implementation of CMS's policy to no longer reimburse hospitals for costs related to hospital-acquired falls. Specifically, the implementation date of the CMS policy was used to create a binary variable to indicate whether the data abstracted from the medical record was recorded before or after October 1, 2008.

### Covariates

Demographic covariates included patient age, race, and gender. Other covariates included admission hospital and whether a patient was at high risk of experiencing a hospital-acquired fall. High fall risk status was determined using a standardized assessment tool used by all four hospitals in this study. Comorbidities included diagnoses of dementia, hypertension, congestive heart failure (CHF), diabetes, and stroke.

### Statistical Analysis

All statistical analyses were performed using Version 9.4 of the SAS System for Windows (SAS Institute, Inc., Cary, NC). Descriptive statistics were calculated for both before and after CMS policy change time periods. Counts and percentages were calculated for categorical data and the means and standard deviations were calculated for continuous data. For each of the outcomes of interest (i.e., bed alarms, sitters, room changes, any fall-related nursing intervention, and order for physical restraints), adjusted and unadjusted odds ratios were determined using generalized linear mixed models (GLMM) with a logit link function. Since the cases and controls were matched based on environmental factors, it was necessary to use GLMM analyses because these analyses can accommodate matched observations.

An exposure by high fall risk interaction term (i.e., pre-/post-CMS policy change * high fall risk / not high fall risk) was tested with each outcome of interest. The purpose of testing this interaction was to determine whether the association between fall risk and outcome probability (i.e., the odds that a nursing intervention or medical order occurred) differed before versus after the CMS policy change. If the interaction terms were found to be significant after adjusting for multiple testing, then the term would be included in the corresponding model. Unadjusted models were estimated for each outcome of interest. These unadjusted models included the exposure of interest variable. Then, a set of adjusted models was estimated for each outcome of interest. Because room changes occurred infrequently, unadjusted and adjusted models were not estimated for this outcome ($n$ = 10 room changes).

## Results

The characteristics of the study sample were similar before and after the CMS policy change (Table 1). The mean age and proportion of males was approximately 63 years and 43% before and after the policy change. The frequencies of fall prevention related nursing interventions and medical orders before and after the policy change are presented in Table 2. After adjusting for multiple testing, none of the time by fall risk interactions were statistically significant. Therefore, no time by fall risk interaction effects were included in the models.

**Table 1.** Characteristics of Sample Before and After CMS Policy Change (*N* = 1,888)

| | Before CMS policy (*n* = 1108) | | | After CMS policy (*n* = 780) | | |
|---|---|---|---|---|---|---|
| Factor | *N* | Frequency (%) | Mean (SD) | *N* | Frequency (%) | Mean (SD) |
| Fall status | 1,108 | | | 780 | | |
| Faller | | 411 (37.1) | | | 288 (36.9) | |
| Nonfaller | | 697 (62.9) | | | 492 (63.1) | |
| High fall risk | 1,090 | 542 (49.7) | | 763 | 258 (33.8) | |
| Age | 1,108 | | 63.1 (17.1) | 780 | | 62.4 (17.5) |
| Race | 1,107 | | | 780 | | |
| White | | 578 (52.2) | | | 352 (45.1) | |
| Not White | | 529 (47.8) | | | 428 (54.9) | |
| Gender | 1,108 | | | 779 | | |
| Male | | 480 (43.3) | | | 342 (43.9) | |
| Female | | 628 (56.7) | | | 437 (56.1) | |
| Medical conditions | | | | | | |
| Dementia | 1,107 | 149 (13.5) | | 776 | 96 (12.4) | |
| Hypertension | 1,108 | 773 (69.8) | | 779 | 568 (72.9) | |
| CHF | 1,104 | 248 (22.5) | | 776 | 164 (21.1) | |
| Diabetes | 1,106 | 372 (33.6) | | 776 | 283 (36.5) | |
| Stroke | 1,103 | 134 (12.1) | | 777 | 117 (15.1) | |
| Admission hospital | 1,108 | | | 780 | | |
| University | | 455 (41.1) | | | 395 (50.6) | |
| Community 1 | | 299 (27.0) | | | 150 (19.2) | |
| Community 2 | | 79 (7.1) | | | 75 (9.6) | |
| Community 3 | | 275 (24.8) | | | 160 (20.5) | |

*Note.* CHF = Congestive heart failure.

**Table 2.** Nursing Interventions and Medical Orders Related to Fall Prevention Before and After CMS Policy Change (*N* = 1,888)

| | Before CMS (*n* = 1,108) | | After CMS (*n* = 780) | |
|---|---|---|---|---|
| Factor | *N* | Frequency (%) | *N* | Frequency (%) |
| Bed alarm | 1099 | 31 (2.8) | 765 | 40 (5.2) |
| Sitter | 1102 | 25 (2.3) | 771 | 10 (1.3) |
| Room change | 1102 | 4 (0.4) | 777 | 6 (0.8) |
| Any fall-related nursing intervention[a] | 1090 | 56 (5.1) | 756 | 53 (7.0) |
| Order for physical restraints | 1102 | 64 (5.8) | 775 | 39 (5.0) |

[a]Any fall-related nursing intervention includes if patient received a bed alarm, sitter, and/or room change.

Both adjusted and unadjusted odds ratios were estimated comparing pre- and post-CMS policy change of fall prevention related nursing interventions and medical orders (Table 3). Based on the unadjusted GLMM model, there was an 89.8% increased odds of nurses' use of a bed alarm as a fall prevention measure (OR = 1.898, 95% CI = 1.174–3.069) after implementation of the CMS policy change. In contrast, there were no significant differences in the odds of a patient having a sitter, any fall-related nursing intervention initiated, or an order for physical restraints after the CMS policy change in the unadjusted models. In models adjusted for covariates, the odds of nurses' use of a bed alarm increased 2.3 times (95% CI = 1.409–3.897) and the odds of any fall-related nursing intervention being performed by nurses increased 1.67 times (95% CI = 1.097–2.534) after the CMS policy change. There were no significant differences in the odds of a patient having a sitter (aOR = 0.677, 95% CI = 0.322–1.425) or an order for physical restraints (aOR = 0.994, 95% CI = 0.629–1.570) after the CMS policy change.

## Discussion

CMS stopped reimbursing health care costs related to hospital-acquired falls in 2008. This policy may have influenced changes in practice patterns among nurses in community and tertiary hospitals. Specifically, nurses may have increased the implementation of fall prevention measures. In this study, there was a significant increase in nurses' implementation of fall prevention interventions. This change

**Table 3.** Bivariate and Multivariable GLMM With Accommodation of Matched Subjects[a] Comparing Pre- to Post-CMS Policy Change on Odds for Fall Prevention Related Nursing Interventions and Medical Orders

| Outcome | Unadjusted OR (95% CI) | Adjusted OR[b] (95% CI) |
|---|---|---|
| 1. Bed alarm | 1.898 (1.174, 3.069) | 2.343 (1.409, 3.897) |
| 2. Sitter | 0.545 (0.250, 1.186) | 0.677 (0.322, 1.425) |
| 3. Any fall-related nursing intervention[c] | 1.393 (0.938, 2.068) | 1.667 (1.097, 2.534) |
| 4. Order for physical restraints | 0.856 (0.564, 1.299) | 0.994 (0.629, 1.570) |

*Note.* Reference = pre-CMS policy change and GLMM=Generalized Linear Mixed Model.
[a]The cases and controls in this study were matched based on environmental factors and GLMM analyses can accommodate for matching of study subjects. These analyses used a logit link function. [b]Adjusted for high fall risk score, admission hospital, age, race, gender, and medical conditions of dementia, hypertension, CHF, diabetes, and stroke. [c]Any fall-related nursing intervention includes if patient received a bed alarm, sitter, and/or room change.

was especially notable with nurses increasing the use of bed alarms after the implementation of the CMS policy. Notably, there was no significant change in the odds of a patient having a sitter or an order for the use of physical restraints after the CMS policy change. What remains unknown is whether these changes are based at the individual or organizational decision-making level. In other words, has the CMS policy change influenced nurses' practice patterns directly or were these patterns mediated by the organization?

Several explanations come to mind. Each of the nursing interventions related to fall prevention activities come with an effort and cost evaluation. Bed alarms are the least expensive and the easiest to implement. Room changes take the most effort because of the need to: (a) determine room availability and consider the needs of all patients on a unit, (b) coordinate the transfer and transport of patients between rooms, (c) notify the bed management office, and (d) utilize housekeeping personnel to clean and sanitize the affected rooms. A sitter is often nonlicensed nursing personnel, but not necessarily, and can be costly because their use is essentially private duty nursing.

The use of physical restraints are only considered an acceptable intervention to preserve the physical safety of patients after other less restrictive alternatives have been exhausted (Centers for Medicare & Medicaid Services, 2008b). Also, physical restraints require an order from a licensed independent practitioner and frequent safety assessments and documentation of the restrained patient. This is important given the questionable effectiveness of physical restraints in preventing falls and the known deleterious effects from immobilization (e.g., development of pressure ulcers) (Mion, Minnick, & Palmer, 1996; Shorr et al., 2002; Tan et al., 2005). Given the potential cost of a sitter and CMS restrictions on physical restraint use, hospital, and/or nursing leadership may encourage the use of bed alarms as a less costly endeavor. However, there is a weak evidence base for the benefits of bed alarms. For instance, using a cluster randomized controlled trial design, investigators found that increased bed alarm use did not significantly change fall or injurious fall rates, number of falls, or physical restraint use (Shorr et al., 2012).

The findings from this study suggest that system-level reimbursement policies (i.e., the CMS no-pay policy) could influence how nurses practice (e.g., bed alarm use, use of a patient sitter, or ordering a room change) even though there may not be evidence to support these changes. Previous research on hospital-acquired infections has shown that the CMS no-pay policy significantly influenced practices and resulted in a reduction of infection rates (Stone et al., 2011). Additionally, using National Database of Nursing Quality Indicators (NDNQI) data, another team of investigators found that the implementation of the CMS policy was associated with a significant decrease in the rates of hospital-acquired infections such as catheter-associated urinary tract infections and central line-associated bloodstream infections, however hospital-acquired falls and hospital-acquired pressure ulcers were not associated with a significant rate decrease (Waters et al., 2015). It is plausible that there has been a reduction in the prevalence rate of hospital-acquired conditions, such as hospital-acquired infections, because of established evidence-based interventions for those conditions (Hooton et al., 2010; Maki, Ringer, & Alvarado, 1991; Pronovost et al., 2006; Waters et al., 2015). In contrast, conditions such as hospital-acquired falls and hospital-acquired pressure ulcers lack a strong evidence base relative to the prevention recommendations for hospital-acquired infections (Waters et al., 2015). By including hospital-acquired falls in the 2008 CMS policy change, the assumption was made that by applying evidence-based guidelines, falls can be prevented. However, there is no evidence that indicates that falls can be consistently prevented (Inouye et al., 2009). Instead, this policy change may have led to unintended consequences.

As a nursing-sensitive quality indicator, nurses are considered partially responsible for preventing hospital-acquired falls (Montalvo, 2007; National Quality Forum, 2004). It is possible that pressure to prevent falls is creating unintended consequences among staff nurses. Investigators have reported that nurses experience: (1) guilt after their patients experience a fall, (2) major stress about the uncertainty surrounding the cause of a fall, and (3) fear of their patients falling (King, Pecanac, Krupp, Liebzeit, & Mahoney, 2016; Rush et al., 2009; Turkoski

et al., 1997). Further, it appears that nursing administration may be influencing nursing fall prevention practice by increasing pressure on nurses to prevent falls. King et al. (2016) examined whether the goal of zero falls influenced nurses' practice. In this qualitative study, the investigators reported that pressure from nursing administration to prevent falls was leading nurses to change their fall prevention practices, but not necessarily for the patient's benefit. Specifically, these investigators found that a more intense administrative message to prevent falls led to greater restriction of patient mobility. Further, these nurses acknowledged that limiting mobility has negative consequences, but the nurses felt that the need to prevent falls overrode this concern (King et al., 2016).

## Implications

Policy changes can have unintended consequences. There were fears of increased physical restraint use and complications associated with reduced mobility after implementation of the CMS no-pay policy for hospital-acquired falls (Growdon, Shorr, & Inouye, 2017; Humphreys, 2009; Inouye et al., 2009). Additionally, there were fears that this policy would result in providers implementing devices that limit mobility while bypassing traditional physical restraint regulations (i.e., implementing bed alarms) (Inouye et al., 2009). Patient immobility is a serious health concern that is associated with numerous negative outcomes such as deconditioning and institutionalization (Growdon et al., 2017). Future research should explore potential unintended consequences of the CMS no-pay policy, including examining the relationships between patient mobility, bed alarm use, and implementation of the CMS no-pay policy.

Though the findings in this study may not represent the practice patterns of nurses in all hospitals before and after implementation of the CMS no-pay policy, these results point to the impact that system-level policies can have on professional nursing practice. These findings may actually be underestimated due to underreporting of interventions in nursing documentation. Remarkably, there is a dearth of research that examines how system policy changes influence nursing care delivery. Our research suggests that the CMS no-pay policy has influenced the delivery of nursing fall prevention care. Despite this influence, the prevalence of hospital-acquired falls has not decreased compared to other hospital-acquired conditions. Future investigations could explore whether the CMS no-pay policy influenced the delivery of nursing care in other geographical settings and within other hospital systems. If our findings are validated, then future investigations could explore why fall rates have not decreased after implementation of the CMS no-pay policy. For instance, investigations could explore whether providers implement fall prevention activities reliably and if these activities are effective. Further, continued research is needed to understand whether system-level policy changes influence nursing practice at the individual and/or organizational decision-making level.

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## Conflict of Interest

One author (RIS) serves as an expert witness in cases of hospital falls. Additionally, the authors disclose receipt of financial support from US federal (e.g., NIH) and public university (e.g., university hospital) sources.

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