Patient Safety Culture and the Association with Safe Resident Care in Nursing Homes

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Purpose of the Study: Studies have shown that patient safety culture (PSC) is poorly developed in nursing homes (NHs), and, therefore, residents of NHs may be at risk of harm. Using Donabedian’s Structure–Process–Outcome (SPO) model, we examined the relationships among top management’s ratings of NH PSC, a process of care, and safety outcomes. Design and Methods: Using top management’s responses from a nationally representative sample of 3,557 NHs on the 2008 Nursing Home Survey on PSC, the Online Survey, Certification, and Reporting Database, and the Minimum Data Set, we examined the relationships among the three components of Donabedian’s SPO model: structure (PSC), a process of care (physical restraints), and patient safety outcomes (residents who fell). Results: Results from generalized estimating equations indicated that higher ratings of PSC were significantly related to lower prevalence of physical restraints (odds ratio [OR] = 0.997, 95% confidence interval [CI] = 0.995–0.999) and residents who fell (OR = 0.999, 95% CI = 0.998–0.999). Physical restraint use was related to falls after controlling for structural characteristics and PSC (OR = 1.698, 95% CI = 1.619–1.781). Implications: These findings can contribute to the development of PSC in NHs and promote improvements in health care that can be measured by process of care and resident outcomes.

Key Words: Patient safety culture, Nursing homes, Falls

More than a decade ago, To Err is Human: Building a Safer Health System (Institute of Medicine, 1999) posited that most medical errors could be traced to problems at the systems level. Since then, there has been a national push for a “culture of safety” that deemphasizes blame and punishment (Scott-Cawiezell & Vogelsmeier, 2006) and shifts the focus to changing process and structures to prevent future errors. Hospitals have led the culture of safety movement. The hospital literature suggests associations between patient safety culture (PSC) and positive safety outcomes (Donnelly, Dickerson, Goodfriend, & Muething, 2009; Feng, Bobay, & Weiss, 2008) and shifts the focus to changing process and structures to prevent future errors. Hospitals have led the culture of safety movement. The hospital literature suggests associations between patient safety culture (PSC) and positive safety outcomes (Donnelly, Dickerson, Goodfriend, & Muething, 2009; Feng, Bobay, & Weiss, 2008), including lower mortality rates, lower rates of failure to rescue, decreased chances of medical errors, and more days between serious safety events (Boyle, 2004; Havens & Aiken, 1999; Hoffman & Mark, 2006; Seago, Williamson, & Atwood, 2006; Singer, Lin, Falwell, Gaba, & Baker, 2009; Sokol, 2004).
Although the IOM report suggested that approximately 98,000 deaths in hospitals each year are attributable to errors, no such numbers are reported for nursing home (NH) residents. The study presented here is among the first to examine the relationships among ratings of PSC, process of care, and resident outcomes in NHs. Previous studies of NHs suggest (a) that they lag behind hospitals in their awareness and adoption of PSC (Castle, 2006; Castle, Wagner, Ferguson, & Handler, 2011a; Handler et al., 2006) and (b) NHs generally report poor perceptions of NH facilities’ PSC (Bonner, Castle, Men, & Handler, 2009; Castle & Sonon, 2006; Handler et al., 2006; Hughes & Lapane, 2006; Wagner, Capezuti, & Rice, 2009; Wisniewski et al., 2007).

Some assume that NH residents are even more prone to the harmful consequences of errors because NH residents represent a vulnerable population in terms of age, mental capacity, compromised immune systems, financial circumstances, and low rates of family involvement and that they require 24-hr nursing specialized care and assistance with the basic activities of daily living (Kapp, 2007). In relation to resident outcomes and PSC in NHs, poor PSC as rated by certified nursing assistants (CNAs) was associated with the use of physical restraints and higher PSC was associated with increased reporting of the falls that occur (Bonner et al., 2009).

Theoretical Framework

Donabedian’s Structure, Process, and Outcome (SPO) framework has frequently been used in examining health services, patient outcomes, and NH quality (Donabedian, 1966). Structure is defined as the environment where care is being provided, process is the method by which it is provided, and outcomes are the consequence of the two. SPO has been used in hospital research to understand the structure–process connection and adverse events (El-Jardali & Lagace, 2005). Donabedian’s model provides a patient safety framework that allows for an examination into how risks and hazards within the structure and process of care have the potential to cause injury or harm to residents.

Glickman and colleagues updated the SPO framework to include organizational attributes, which could serve as primary determinants of process and outcome quality improvement, such as culture (Glickman, Baggett, Krubert, Peterson, & Schulman, 2007). Although organizational culture has been shown to be related to quality (Shortell et al., 2000), conclusive evidence, which links organizational culture with performance, is lacking. However, health care facilities have been able to maintain noteworthy quality outcomes by their adherence to a high-quality culture (Glickman et al., 2007). For this reason, PSC is included as an organizational/structural attribute that may drive quality and safety improvement in long-term care facilities (see Figure 1).

Physical restraint use is a care process that can influence patient safety outcomes in NHs. Physical restraints, while controversial (Mukamel, 1997), have been used to prevent and decrease the number of falls and injuries (Weech-Maldonado, Mereth-Hanke, Neff, & Mor, 2004) and are most common among individuals with difficulties transferring and with behavioral disorders (Mukamel, 1997). However, physical restraints have been shown to increase the likelihood of death, injuries, and functional decline making physical restraints an indicator for quality and safety (Morris et al., 2003; Rantz et al., 2004; Schnelle, Bates-Jensen, Chu, & Simmons, 2004; Sullivan-Marx, Strumpf, Evans, Baumgarten, & Maislin, 1999a; Weech-Maldonado et al., 2004).

Although there are numerous patient safety issues in NHs, falls are among the most common events (Gruneir & Mor, 2008), with an average of 1.5 falls per bed per year occur in NHs (Rubenstein, 1997). Falls are detrimental, particularly to older adults, in that they can result in fractures (Binder, 2002), hospitalization (Roudsari, Ebel, Corso, Molinari, & Koepsell, 2005), decreased quality of life (Rubenstein, Josephson, & Robbins, 1994), and ultimately death (Rubenstein, 1997). Every year, more than 10,000 adults over the age of 65 in the United States die as a result of an unintentional fall (Centers for Disease Control and Prevention, 2002). Falls are considered the consequence of multiple potentially modifiable risk factors (Rubenstein, 1997), and NH staff play a major role in preventing falls and implementing fall prevention practices.

Figure 1. Conceptual model of the updated structure, process, outcome framework for nursing home patient safety.
The Present Study

Building on previous literature and using the SPO theoretical model as a framework, this study examined the relationships among the structural attribute PSC, process of care, and a common patient safety outcome, residents who fall.

Hypothesis 1: Higher PSC scores are associated with a better process of care (lower prevalence rates of restraint use) after controlling for other structural variables.

Hypothesis 2: A poor process of care (physical restraint use) are associated with a poor patient safety outcome (residents who fell) in NHs independent of the structural characteristics.

Hypothesis 3: Higher PSC scores are associated with favorable patient safety outcomes (fewer falls) independent of physical restraint use in NHs.

Design and Methods

Data

This study used the Agency for Healthcare Research and Quality (AHRQ) Nursing Home Survey on Patient Safety Culture (NHSPSC), a survey created specifically for NH settings to measure PSC in a large nationally representative sample of NHs (Castle et al., 2011a). The instrument was modeled after the Hospital Survey on Patient Safety Culture (HSOPSC) and consisted of 42 five-point Likert scale items that measured 12 areas of organizational culture pertaining to NH resident safety: supervisor expectations and actions promoting resident safety, training and skills, management support for resident safety, overall perceptions of resident safety, teamwork, feedback and communication about incidents, handoffs, communication openness, compliance with procedures, nonpunitive response to mistakes, organizational learning, and staffing. Extensive details of the development and psychometric analyses of this instrument can be found in a web-based technical report at http://www.ahrq.gov/qual/patientsafetyculture/nhsurvindex.htm.

Of the 6,000 facilities randomly selected to be included in the sample, 4,000 returned responses from both the NHA and the Director of Nursing (DON), giving an analytic response rate of 67%. No significant differences on facility characteristics (i.e., bed size, ownership, chain membership, and private-pay census) existed for respondent compared with nonrespondent facilities. Of this sample, we were unable to merge 103 facilities with the 2008 Online Survey, Certification, and Reporting (OSCAR) because these facilities did not have a survey during that calendar year. Hospital-based NHs were excluded because they tend to staff differently from free-standing NHs and it may be more appropriate for these settings to consider using the HSOPSC; this exclusion left a total of 3,613 NHs. In order to minimize bias by any potential data entry errors, standard procedures were used to remove outliers from the data set (Harrington, Swan, & Carrillo, 2007). Facilities with 15 or fewer beds and/or residents (45 facilities), facilities reporting less than 1 hr per resident day (HPRD) of total staffing (seven facilities), and facilities reporting no licensed nurse staffing (four facilities) were excluded from the data set. The final sample consisted of 3,557 facilities.

Structure data came from the Centers for Medicare and Medicaid Services’ (CMS) 2008 OSCAR data. OSCAR is a national data set of all NH data elements collected by state survey agencies during the required annual onsite Medicare and Medicaid Certification inspection. OSCAR provides information on facility characteristics, resident census, conditions of residents, and deficiency measurements.

Data on the process of care and patient safety outcome came from the 2008 Minimum Data Set (MDS). The MDS is used to collect uniform resident information on all NH residents admitted to any Medicare- or Medicaid-certified facility. The MDS includes data on more than 400 assessment items that measure clinical, functional, behavioral, and social needs of residents. All Medicare- and Medicaid-certified facilities are mandated to gather and report MDS data on admission, every 3 months, or when a resident has a change in health status. Because short-stay residents are often funded by Medicare, have unique care needs, and may be served in separate areas of the facility with different care staff, they were excluded from this analysis. Data for these analyses include long-stay residents defined as those with any assessment recorded in calendar year 2008 who had a minimum of two prior assessments to establish a continuous residence in a NH of at least 90 days (this excludes long-stay resident assessments of individuals who were admitted to a hospital and had a readmission assessment before 90 days). If multiple assessments satisfying these criteria were identified for the same resident, the one dated closest to year-end (2008) was retained for analysis. Therefore, all initial assessments, readmissions, and discharge assessments are excluded leaving a sample...
of 375,770 long-stay resident assessments from 3,557 NHs.

**Measures**

Various measures of structure were included in these models. The primary independent variable in the SPO models was upper management’s overall PSC score. For each domain score, the percentage of positive responses was calculated—that is, the percentage of positively worded items with the answer *strongly agree*, *agree*, *always*, or *most of the time*. In a similar way, for each negatively worded item, the percentage of negative responses was calculated because a negative response to a negative item is equivalent to a positive response to a positive item. Confirmatory factor analyses, model fit statistics, reliability analyses, and validity analysis of the safety culture domains of the NHSPSC all met the criterion for good conformance. The overall PSC score is the overall mean percent positive scores for each of the 12 domains. Because using information from both NHAs and DONs provides a more complete view of PSC than from either top managers alone (Castle, Wagner, Ferguson, & Handler, 2011b), their two scores were then averaged to create the upper management’s overall PSC score. The possible range of scores is from 0% to 100%, with higher scores indicating a more positive response.

Structural components that are linked to the nursing care process (physical restraint use) as well as resident outcomes were also included in the models so that the influence of PSC on physical restraint use and residents who fell could be interpreted independent of their effect (Unruh & Wan, 2004). We include ownership (for profit/not), chain membership (member of a chain/not), resident payer source (percent Medicare, percent Medicaid), nurse staffing levels (CNA HPRD, licensed practical nurse [LPN] HPRD, and proportion of registered nurse [RN] HPRD to total licensed nurse HPRD), and facility size (total number of beds) as control variables. Additionally, we included the facility occupancy rate and proportion of RN agency staff (greater than 5%) because lower occupancy (Unruh & Wan, 2004; Zhang & Wan, 2007) and higher RN agency staff have been associated with lower quality in NHs (Bourbonnieres et al., 2006). A summary of the operational definitions of these variables is presented in Table 1.
Physical restraint use was selected as a measure of process of care because it has high levels of reliability and validity and has been used frequently in the literature as a measure for quality and safety (Morris et al., 2003; Rantz et al., 2004; Schnelle et al., 2004; Sullivan-Marx et al., 1999a; Weech-Maldonado et al., 2004). Physical restraint use was defined as residents who were physically restrained (chair, trunk, or limb) on a daily basis during the past 7 days of the target MDS 2.0 assessment (items P4c, P4d, or P4e = 2). Although some researchers have risk adjusted this measure (Arling, Lewis, Kane, Mueller, & Flood, 2007), we follow CMS’ standard for risk adjusting publicly reported quality measures and therefore do not risk adjust for physical restraints (Abt Associates Inc., 2004).

Although there are numerous safety issues in NHs, we examined the most frequently reported adverse event in NHs: falls (Gruneir & Mor, 2008). The measure for falls was obtained from the MDS 2.0, indicating that the resident has fallen at least once in the past 30 days (J4a = 1). Further clarification from CMS instructs the NH to consider the following circumstances as falls: resident lost their balance and was lowered to the floor by staff, resident fell to the floor but there was no injury, resident was found on the floor but the means by which he/she got to the floor was witnessed, and resident rolled off a mattress that was on the floor. Following CMS’ guidelines, we do not risk adjust for falls (Abt Associates Inc., 2004).

**Analysis**

The data for the subsequent analyses arise from a clustered design in which residents are nested in facilities. Therefore, we assumed that there exists some correlation between residents within a NH. We used generalized estimating equations, an advanced regression that can both account for clustered data and handle nonnormally distributed outcomes (both outcomes in this study were dichotomous). We specified models with a binomial distribution and a logit link function, hence imposing an advanced form of binomial logistic regression on the data, and an unstructured working correlation matrix in SAS procedure GENMOD (SAS Institute Inc., 2008). Therefore, we used a hierarchical model with the outcome \( Y_{ij} \) being either falls or restraint use for resident \( i \) in facility \( j \) that is independent of the outcome \( Y_{i'}j' \) for some other resident, \( i' \), in the same facility. We report the adjusted odds ratios (AORs) and 95% confidence intervals (CIs) for each of these models.

**Results**

Descriptive characteristics of the 3,557 certified free-standing NHs are presented in Table 2. In our sample of residents, approximately 13% had fallen at least once and 4% were restrained on a daily basis during the last 7 days of their target assessment. On average, DONs and NHAs in our sample had a 63% positive rating on their overall PSC summary score. Of the NHs in the sample, 72% were for profit and 55% were members of a chain. Sixty-two percent of residents were funded by Medicaid and 14% by Medicare. The average CNA HPRD was 2.5, the average LPN HPRD was 0.9, and the average RN to nurse ratio was 0.27. Facilities in our sample had, on average, 114 beds and an occupancy rate of 84% (range 8%–100%), and approximately 7% of facilities had 5% or more of their RN hours staffed by contracted agency staff.

### Table 2. Descriptive Characteristics of Facilities in Sample

<table>
<thead>
<tr>
<th></th>
<th>M (SD) or %</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient safety culture</td>
<td>62.76 (20.50)</td>
<td>14.4–99.65</td>
</tr>
<tr>
<td>For-profit ownership</td>
<td>72.00</td>
<td></td>
</tr>
<tr>
<td>Member of a chain</td>
<td>55.12</td>
<td></td>
</tr>
<tr>
<td>Medicaid residents</td>
<td>61.73 (20.98)</td>
<td>0–100</td>
</tr>
<tr>
<td>Medicare residents</td>
<td>13.96 (11.30)</td>
<td>0–100</td>
</tr>
<tr>
<td>CNA HPRD</td>
<td>2.53 (0.98)</td>
<td>0–18.81</td>
</tr>
<tr>
<td>LPN HPRD</td>
<td>0.93 (0.50)</td>
<td>0–13.29</td>
</tr>
<tr>
<td>RN to nurse ratio</td>
<td>0.27 (0.19)</td>
<td>0–1</td>
</tr>
<tr>
<td>Total beds/10</td>
<td>11.37 (6.46)</td>
<td>1.80–88.90</td>
</tr>
<tr>
<td>Occupancy rate</td>
<td>0.84 (0.15)</td>
<td>0.08–1</td>
</tr>
<tr>
<td>RN agency staff &gt;5%</td>
<td>6.85</td>
<td></td>
</tr>
</tbody>
</table>

Note: \( N = 3,559; \) \( M = \) mean; \( SD = \) standard deviation; CNA = certified nursing assistant; HPRD = hours per resident day; LPN = licensed practical nurse; RN = registered nurse.

Structure and Process (Hypothesis 1)

Higher overall PSC ratings from upper management were associated with decreased odds of use of physical restraints (AOR = 0.997, 95% CI = 0.995–0.999; see Table 3). In addition, a number of other structural characteristics were associated with restraint use. Being a resident in a facility that was for profit, independently owned, and had a higher proportion of Medicaid-funded residents was associated with higher rates of physical restraint use. Furthermore, residents in facilities with higher CNA staffing levels, a lower RN to nurse ratio,
and with RN agency staffing less than 5% were more likely to be physically restrained.

**Process of Care and Outcomes (Hypothesis 2)**

Process of care was significantly associated with falls independent of structural characteristics (Table 4). Residents who were physically restrained had almost 70% greater likelihood of falling than individuals who were not restrained (AOR = 1.698, 95% CI = 1.619–1.781).

**Structure and Outcomes (Hypothesis 3)**

Independent of physical restraint use, higher scores on upper management’s ratings of overall PSC were associated with decreased odds of residents who fell (AOR = 0.999, 95% CI = 0.998–0.999; see Table 4). Furthermore, residents in not for profit, chain facilities with a lower proportion of Medicaid and Medicare residents were more likely to have fallen. In addition, lower CNA HPRD, fewer beds, and a lower occupancy rate increased the likelihood of a resident fall. To facilitate results interpretation, we also converted the PSC score into quartiles. In the same covariate-adjusted regression model, we found that a PSC score in each consecutively higher quartile was associated with about a 1.7% lower odds of falling (AOR = 0.983, 95% CI = 0.968–0.997). Therefore, residents in a facility with a PSC in the highest quartile were at about a 5.1% lower risk of falling compared with residents in a facility with a PSC score in the lowest quartile.

**Discussion**

Results from our study indicate that PSC and physical restraint use are important to resident outcomes as measured by falls. Supporting Hypothesis 1 and Hypothesis 3, higher ratings for PSC were related to lower prevalence of physical restraints and residents who fell. Furthermore, results from this study also support Hypothesis 2: a poorer process of care (physical restraint use) was related to negative patient safety outcomes after controlling for structural characteristics and PSC. Higher PSC summary scores were related to lower use of physical restraints. In practical terms, the findings from this study indicate that a 10% increase in the PSC score in an average 110-bed facility translates to 3–4 fewer residents who are physically restrained. Facilities with higher PSC scores appear to be conforming to the national priorities to reduce restraint use. Perhaps, these facilities are more aware of the various alternatives to physical restraints, and therefore, low levels of restraint use suggest that these staff may be practicing newer methods for achieving safety. These findings suggest that investing time and energy

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**Table 3. Logistic Generalized Estimating Equations Modeling the Relationship Between Upper Management’s Overall Patient Safety Culture Rating (Structure) and Use of Physical Restraints (Process)**

<table>
<thead>
<tr>
<th>Structure</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient safety culture summary score</td>
<td>0.997</td>
<td>0.995–0.999</td>
</tr>
<tr>
<td>For-profit ownership</td>
<td>1.296</td>
<td>1.143–1.469</td>
</tr>
<tr>
<td>Member of a chain</td>
<td>0.815</td>
<td>0.742–0.896</td>
</tr>
<tr>
<td>Medicaid residents</td>
<td>1.007</td>
<td>1.003–1.010</td>
</tr>
<tr>
<td>Medicare residents</td>
<td>1.000</td>
<td>0.994–1.006</td>
</tr>
<tr>
<td>CNA HPRD</td>
<td>1.090</td>
<td>1.042–1.140</td>
</tr>
<tr>
<td>LPN HPRD</td>
<td>0.948</td>
<td>0.860–1.045</td>
</tr>
<tr>
<td>RN to nurse ratio</td>
<td>0.430</td>
<td>0.313–0.591</td>
</tr>
<tr>
<td>Total beds/10</td>
<td>1.006</td>
<td>0.999–1.012</td>
</tr>
<tr>
<td>Occupancy rate</td>
<td>0.823</td>
<td>0.606–1.119</td>
</tr>
<tr>
<td>RN agency staff &gt;5%</td>
<td>0.752</td>
<td>0.621–0.911</td>
</tr>
</tbody>
</table>

Note: N = 375,770 residents; residents physically restrained = 15,026; OR = odds ratio; CI = confidence interval; CNA = certified nursing assistant; HPRD = hours per resident day; LPN = licensed practical nurse; RN = registered nurse.

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**Table 4. Logistic Generalized Estimating Equations Modeling the Relationships Among Upper Management’s Overall Patient Safety Culture Rating (Structure), Use of Physical Restraints (Process), and Falls (Outcome)**

<table>
<thead>
<tr>
<th>Structure</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient safety culture summary score</td>
<td>0.999</td>
<td>0.998–0.999</td>
</tr>
<tr>
<td>For-profit ownership</td>
<td>0.870</td>
<td>0.835–0.906</td>
</tr>
<tr>
<td>Member of a chain</td>
<td>1.064</td>
<td>1.027–1.102</td>
</tr>
<tr>
<td>Medicaid residents</td>
<td>0.994</td>
<td>0.993–0.995</td>
</tr>
<tr>
<td>Medicare residents</td>
<td>0.998</td>
<td>0.996–0.999</td>
</tr>
<tr>
<td>CNA HPRD</td>
<td>0.974</td>
<td>0.953–0.994</td>
</tr>
<tr>
<td>LPN HPRD</td>
<td>0.987</td>
<td>0.950–1.025</td>
</tr>
<tr>
<td>RN to nurse ratio</td>
<td>0.996</td>
<td>0.896–1.108</td>
</tr>
<tr>
<td>Total beds/10</td>
<td>0.994</td>
<td>0.992–0.997</td>
</tr>
<tr>
<td>Occupancy rate</td>
<td>0.729</td>
<td>0.646–0.822</td>
</tr>
<tr>
<td>RN agency staff &gt;5%</td>
<td>0.952</td>
<td>0.889–1.019</td>
</tr>
<tr>
<td>Process</td>
<td>1.698</td>
<td>1.619–1.781</td>
</tr>
</tbody>
</table>

Note: N = 375,770 residents; residents with falls = 49,912; OR = odds ratio; CI = confidence interval; CNA = certified nursing assistant; HPRD = hours per resident day; LPN = licensed practical nurse; RN = registered nurse.
into promoting a safety culture could result in a better process of care by reducing the use of physical restraints in NHs. Future research should identify additional processes of care that are related to PSC.

The results of this investigation suggest that physical restraint use is related to staffing in NHs: an increased proportion of RNs to licensed nurses are found to be associated with a decreased likelihood of restraint use, whereas increased CNA HPRD and RN agency staff are associated with an increased likelihood of restraint use. These findings, although perhaps counterintuitive to some, are consistent with previous research examining predictors of restraint-free facilities (Castle & Fogel, 1998) and quality of care in NHs (Castle & Engberg, 2008). Individualized care alternatives to restraints often require professional education to observe, assess, plan, and implement attentive care from staff, and RNs may be better able to respond to these challenges than CNAs. Furthermore, CNAs may not be aware of alternatives to restraint use, and facilities with a lower proportion of RNs may not have enough time to educate nursing staff about alternatives or implement behavior modification programs. In addition, having 5% or more of a facility’s RNs staffed by agency had been shown to be related to deficiency citations (Bourbonniere et al., 2006). Agency staff are believed to interfere with continuity of care and familiarity with residents and other staff. However, our study confirms research, which suggests that RN agency staff improves quality of care (Castle & Engberg, 2008). We speculate that one possible explanation is that temporary RNs (who work for agencies) are different than those who are permanent RNs in NHs. Perhaps, their experiences and exposure to various organizations have led them to become more familiar with restraint alternatives. Alternatively, agency RNs may be highly qualified and trained and prefer the flexibility of agency work. With the national movement toward restraint reduction, it may be that the use of restraints is no longer a substitute for labor but rather an education and familiarity with alternatives issue.

Findings from this study suggest that facilities’ PSC is related to their residents’ safety. Higher ratings on overall PSC, controlling for other structural characteristics and process of care, were associated with lower rates of falls. In practical terms, a 10% increase in the PSC score in an average size facility was associated with 1–2 fewer residents who fall, independent of restraint use (which increased the odds of falling by 70%). These findings highlight the utility of developing a culture of safety: improvements in resident safety outcomes.

When examining the relationship of process to outcome (controlling for structural characteristics), physical restraint use was strongly associated with an increased likelihood of residents who fall. Our findings confirm previous research identifying a relationship between restraint use and falls (Luo, Lin, & Castle, 2011; Parker & Miles, 1997; Rubenstein, 1997; Rubenstein et al., 1994) and suggest that physical restraint use is a safety concern in NHs. Although our study does not measure outcomes of falling, research has shown that NH residents who were physically restrained were more likely to be injured during a fall than those who were not restrained (Parker & Miles, 1997) and that restraints can actually increase the risk of fall-related injuries and deaths (Miles & Irvine, 1992; Rubenstein et al., 1994).

Studies have indicated that physical restraint reduction has reduced the rate of fall-related injuries (Capezuti, Evans, Strumpf, & Maislin, 1996; Capezuti, Strumpf, Evans, Grisso, & Maislin, 1998; Ejaz, Jones, & Rose, 1994; Neufeld et al., 1999). These findings, in addition to a heightened concern with quality of life of NH residents, have led to a national effort aimed at restraint reduction in NHs. Some NH staff mistakenly believe that a resident who may be at risk for falls will be safer if physical restraints are used (Hantikainen & Kappeli, 2000), and some NHAs believe that using restraints will lower falls litigation (Kapp, 2003). Several state and quality improvement organizations (i.e., QIOs), NH associations, and medical directors have worked to educate residents, families, NHAs, and medical directors have worked to educate residents, families, NHAs, and caregivers about alternative methods for achieving safe outcomes without restraints. The findings from this study support restraint reduction in NHs in order to enhance the quality of life of NH residents while assuring safety.

These research findings have implications for providers and policy makers. Pay for performance (P4P) is a policy tool used to improve NH quality by offering financial incentives for NHs to improve the care provided to residents. Some states have begun adopting P4P through their Medicaid agencies and CMS plans to implement a P4P demonstration project (Werner, Konetzka, & Liang, 2010). Falls and physical restraints are two measures frequently included as criteria on which financial rewards are
based. Therefore, because of the linkages among the various components in this study, providers should benefit financially from enhancing their PSC as improved PSC decreases restraint use and therefore decreases likelihood of residents who fall.

Physical restraint use is a quality measure reported on Nursing Home Compare. Because this is a tool consumers use to select a NH, providers would benefit from developing a PSC as this study has demonstrated a relationship between higher PSC ratings and lower restraint use. Higher PSC scores and better processes of care should improve both their quality scores and the ability to attract residents.

A report from The National Quality Forum identifies 30 evidence-based practices, which have been shown to improve resident care and decrease adverse patient safety outcomes (National Quality Forum, 2003). Number one on this list is “create a health care culture of safety.” Because of the recognition of the importance of PSC, it is imperative that providers, policy makers, and state agencies support and promote development of a PSC in NHs. Organizational characteristics such as clear organizational goals, a focus on efficient work processes, a positive work climate, and manageable levels of stress have been suggested to be related to PSC (Arnetz et al., 2011). Therefore, changes toward a culture of safety in NHs need to have an organizational focus. In addition, poor care is expensive and falls are asserted to be a preventable (and expensive) negative health outcome (Gallagher, 2011). Because our study shows that falls are significantly related to PSC, investment in developing a PSC, reporting patient safety scores, and promoting patient safety should result in savings to Medicare and Medicaid.

The construct of PSC has not been widely applied to the NH context. Unlike hospitals, NHs are both a setting for care and a living environment. Resident autonomy, dignity, and participation in decision making—the reported most important quality-of-life attributes—are feared to be sacrificed for safety. However, in developing a culture of safety and improving patient safety, facilities would focus on issues such as teamwork, documentation, time lines, reporting safety issues, discussion of safety issues, and collaborative learning (AHRQ resources). It is a NH's obligation to foster quality of care and quality of life but also to provide safe care. Therefore, an appropriate compromise must be negotiated to balance these different, but related, values.

This study is among the first to demonstrate the linkages among the various SPO components related to patient safety. However, it is necessary to note this study’s limitations. Because we were only able to examine 1 year of data, we are not able to identify temporal or causal relationships. Perhaps, NHSPSC respondents rated their PSC highly, especially the nursing component, because the facility was doing a good job at achieving good quality, such as minimizing restraints or avoiding falls. The possible circularity between PSC measurement (an independent variable in this study) and the care process and outcome of care (treated as dependent variables) should be noted. Future research should include a longitudinal design to track changes in culture, processes of care, and outcomes over time. In addition, an important step to establish validity would be to measure if care related to falls (fall prevention programs, communication, utilization of fall risk care items, and a risk-free environment) is actually different in NHs that score higher and lower on the PSC survey. It is only then that we can assert that these facilities that have higher ratings of safety culture are actually providing different care and decreasing the likelihood of having a resident who falls.

Our measure of process of care is but one measure and conservative at that. Because daily restraint use is a different process of care than quickly restraining an agitated resident, we chose only to include residents who were restrained daily so we do not capture incidence of restraint use. Furthermore, residents who cognitively impaired and more debilitated may be more likely to be restrained (Sullivan-Marx, Strumpf, Evans, Baumgarten, & Maislin, 1999b). Without a measure of incidence of restraints, it is difficult to address clinical issues. Future research should include not only incidence of restraint use but also additional processes of care that could be related to fall prevention and are aimed at improving safety. These might include fall assessment procedures (in addition to the MDS; Barker, Nitz, Low Choy, & Haines, 2009) and interventions to minimize fall risk (such as evaluation of medications, exercise programs, environmental modifications, and use of bed and chair alarms; Berry et al., 2011; Rapp et al., 2010; Ray et al., 2005; Rubenstein, 2006).

Although one of this study’s strengths is that it presents data on the most frequently reported adverse event, falls, it is also a limitation in that it is only one measure of resident outcomes. Future research should include additional patient safety
outcomes and the relationships among outcomes. Additionally, we did not risk adjust the fall measure. Risk factors could potentially mediate or moderate the relationship between the facility’s PSC and the likelihood that a resident will experience a fall. This issue should be addressed in future research. Also, it is important to note that from the MDS, we are not able to ascertain the total number of falls in the facility over the last 30 days, rather just the number of residents who have fallen. Thus, if one facility has five fallers who had 10 falls each, it may appear to perform better than a facility that had 10 fallers who just fell once each. As residents who are more frail may be at risk of falling more often, it is difficult, again, to address clinical issues without rates of fall occurrence.

In addition, the severity of falls is not measured in this study (as it is not well measured on the MDS 2.0). However, the new MDS 3.0 was designed to improve clinical relevance, accuracy, efficiency, and clarity, and therefore, the falls measure includes the outcomes of falling (Rahman & Applebaum, 2009). Future research should reexamine the likelihood of falling and severity of falls using MDS 3.0 as it relates to PSC.

Finally, because respondents consisted only of upper management, we are not able to ascertain if different workers would provide the same ratings of their facilities’ PSC. Future research should survey different types of staff in order to provide a more comprehensive understanding of the facility’s culture.

Findings from this study suggest that a movement toward adopting a culture of safety is related to a better process of care and a positive safety outcome. With the relationships described in this study between PSC and objective measures of safe care, this study calls for the development of a culture of safety in NHs.

Funding
This research was supported by the Agency for Healthcare Research and Quality (R36HS19671-01).

Acknowledgments
The authors would like to thank Hongdao (Daniel) Meng, PhD, and John Ferron, PhD, for their thoughtful comments during the preparation of the manuscript.

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