Deficiency Citations for Physical Restraint Use in Nursing Homes

Nicholas G. Castle

Institute for Health, Health Care Policy, and Aging Research, New Brunswick, New Jersey.

Objectives. The average percentage of residents restrained in nursing homes is approximately 20%. Facilities that do not meet Health Care Financing Administration standards for restraint use may be issued a deficiency citation. This article investigates which structure and process factors of nursing homes are associated with a deficiency citation for restraint use.

Methods. Nationally representative data from the 1997 On-line Survey Certification of Automated Records are used, first, to provide descriptive analyses, and second, for logistic regression analyses of structure and process factors associated with a deficiency citation for restraint use.

Results. A total of 2,321 facilities were found to have at least one restraint deficiency citation, and 14,703 had none. After controlling for seven other key variables, five structural factors and six process factors are significant. The structural factors—larger bed size, for-profit ownership, and hospital-based—were significantly associated with a higher likelihood of a deficiency citation for restraint use; whereas higher numbers of full-time equivalent specialists per resident and nurse aide training were significantly associated with a lower likelihood. The process factors—suctioning therapy, pain management, and bladder training—were significantly associated with a lower likelihood of a deficiency citation for restraint use; whereas intravenous therapy, higher use of catheters, and physical restraints were significantly associated with a higher likelihood of a deficiency citation.

Discussion. This analysis establishes linkages between structures and processes and the outcome of a deficiency citation for restraint use. The structural results may have some utility for regulators. They could be used to develop a specific program to target facilities most commonly found to have inappropriate restraint use. The process results may have some utility for providers who could use the information to target residents for review of inappropriate restraint use.

VARIOUS forms of physical restraint have been used in nursing homes for many decades (Evans & Strumpf, 1989). These include vests, belts, mittens, and wrist and ankle restraints (often called Posey restraints because of their brand name). Their use was especially prevalent for violent residents and those with mental illnesses (Soloff, 1984). However, at some point the use of restraints for nonviolent and non-mentally ill nursing home residents became widespread. Why this happened and exactly when it began is unclear (Evans & Strumpf, 1989), but as a result we saw rates of restraint use reported to be as high as 84% of residents in some facilities (Evans & Strumpf, 1989).

During the 1980s there was an outcry against these now endemic restraint practices in nursing homes. Both the lay press (Coleman, 1991) and academic press (Elwell, 1984; Moos & Igra, 1980; Riportella-Muller & Slesinger, 1982) condemned their use. Moreover, empirical evidence came to light showing that physical restraints were associated with an increased risk of morbidity and mortality in nursing home residents, further fueling the antipathy toward their use (Dube & Mitchell, 1986; McHutchion & Morse, 1989; Phillips, Hawes, & Fries, 1993; Rovner, Edelman, Cox, & Shmuel, 1992; Tinetti, Wen-Liang, Marottoli, & Ginter, 1991; Werner, Cohen-Mansfield, Braun, & Marx, 1989).

These concerns came to fruition in 1987 in the form of the Nursing Home Reform Act (NHRA) (Coleman, 1991). This act mandated that nursing homes reduce their use of physical restraints and that residents have the right to be free from any physical restraint imposed for purposes of discipline or convenience and not required to treat their medical symptoms (Omnibus Budget Reconciliation Act [OBRA], 1987). Specifically, regulations stipulated that restraints could only be used under the following circumstances: (a) with a physician’s order; (b) with informed consent from the resident (or proxy); (c) in a nursing care plan with the goal of restraint removal; (d) documentation that alternatives to restraints were tried; or (e) to enable the resident to maintain their highest practicable level of functioning.

The Health Care Financing Administration (HCFA) is responsible for ensuring that nursing homes meet these standards. As part of the Medicare and/or Medicaid certification process, HCFA certifies approximately 18,000 nursing homes per year. State and federal surveyors conduct inspections every 9 to 15 months. When a facility does not meet a standard (or code), a deficiency citation is issued.

Despite this increased attention on physical restraints, the examination of deficiency citations for their use remains undeveloped. Graber and Sloane (1995) examined deficiency citations in North Carolina nursing homes; however, their study was limited to 195 facilities and 1991 data. No other studies could be identified that addressed this issue. Thus, we know very little regarding which facilities receive these citations. Yet this question is important. In particular, identifying subpopulations of types of facilities, or facilities using specific processes of care, that are at higher risk of receiving a deficiency citation for restraint use could benefit from targeted interventions. These
nursing homes may benefit from educational initiatives in restraint use. Clearly, potentially important quality improvement in the health and satisfaction of both residents and staff may be achieved. Thus, the purpose of this article is to examine characteristics of nursing homes associated with citations for restraint use.

In general, the use of these nursing home code citations is known to vary from state to state (Day & Klein, 1987). For example, some states (e.g., New York) are more likely to use nursing home code citations, whereas other states (e.g., South Carolina) are less likely to do so (Day & Klein, 1987). Thus, the total number of code citations received by a facility in one state is probably not comparable with those received by a facility in another state. However, physical restraints are visible measures of quality. In a visit to a facility, the use of vests, belts, mittens, and wrist and ankle restraints can be readily identified. Consumer groups such as the National Citizens Coalition for Nursing Home Reform (NCCNHR) have also been particularly successful in sensitizing the public about the indiscriminate use of restraints in nursing homes (Kane, Williams, Williams, & Kane, 1993). Moreover, in view of the widespread consequences of extensive use of physical restraints, implementation of the NHRA provisions became a major goal of HCFA officials and state inspection agencies. Possibly as a result of this uniform oversight and concern, the variance in deficiencies for restraint use across states is less than that for other deficiencies found in the OSCAR. In this analysis, we also take into consideration this potential geopolitical limitation by including a control variable for the percentage of nursing homes within each state that had a deficiency citation.

Structural and process characteristics were examined. Structural measures are the organizational and professional properties associated with the provision of care. These include size, ownership, chain membership, and staffing levels (Davis, 1991). Process measures are things done to and for the resident (Gustafson, Sainfort, Van Konigsveld, & Zimmerman, 1990). In a nursing home, these include giving medications and therapies. This approach follows the work of Donabedian, who hypothesized that good (bad) structure promotes good (bad) process, and good (bad) process in turn promotes good (bad) outcomes (Donabedian, 1988). In this article, a citation for restraint use is considered to be a bad outcome (Mukamel, 1997).

The prevalence of restraint use in nursing homes has decreased since the passage of the NHRA (Kane et al., 1993; Rovner et al., 1992; Werner et al., 1989). For example, national data show the average percentage of residents restrained in nursing homes was 44% during 1989 (On-line Survey and Certification of Automated Records [OSCAR], 1989) and 20% during 1997 (OSCAR, 1997). However, these aggregate data hide a disconcerting trend; that is, during the same period some nursing homes have actually increased their use of physical restraints. Additionally, data such as these do not provide any information regarding the appropriateness of restraint use. Examining deficiency citations for restraints adds the dimension of appropriateness to our understanding of their use in nursing homes.

Based on our review of the literature, we hypothesized that the likelihood that a nursing home would receive a deficiency citation for restraint use would be positively related to bed size and quality measures and negatively related to not-for-profit ownership, chain membership, hospital affiliation, staffing levels of caregivers, occupancy rate, provision of medical/rehabilitation services, and training of nurse aides. In the following paragraphs the rationales for these expectations are presented.

Modalties of care in nursing homes often vary according to the size of the facility. For example, previous studies have shown higher levels of restraint use to be more common in larger facilities than in smaller facilities, despite case-mix adjustment (Castle, Fogel, & Mor, 1997). In general, it is thought that some of these differences may be attributable to the fact that larger facilities tend to provide standardized regimens of care, whereas smaller facilities may be more likely to provide individualized resident care. Facilities providing care tailored to the individual needs of residents are less likely to receive a deficiency citation for restraint use.

The organizational goals and resultant behavior of for-profit and not-for-profit providers may be dissimilar (Holmes, 1996). For-profit nursing homes are often seen as profit oriented and as a result may be less aggressive in implementing costly resident care services (Davis, 1991). Not-for-profit nursing homes are often seen as more altruistic and as a result may be more aggressive in implementing resident care services, irrespective of costs (Davis, 1991). Appropriate restraint use is an important resident care activity but is often viewed as expensive (Phillips et al., 1993).

Facilities that are part of a chain may have access to capital, along with other resources that may help facilitate appropriate restraint use. Benefits of chain membership have been identified in other studies. For example, chain membership was associated with a greater likelihood a nursing home would adopt a computerized information system (Castle & Banaszak-Holl, 1997). In general, the availability of resources throughout a chain may help members in decreasing deficiency citations.

Hospitals may overuse restraints (Castle & Mor, 1998). Instances are cited whereby previously unrestrained nursing home residents are restrained when hospitalized (Castle & Mor, 1998). This indiscriminate use of restraints in hospitals has recently been addressed by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). This JCAHO initiative includes the requirements of extensive documentation for restraint use, training of clinical staff, and reporting of restraint use (HAS, 1999). Nursing homes affiliated with hospitals may also be subject to some of these requirements; as a result, staff may be increasingly aware of restraint use as an area of concern. These nursing homes may also have greater economies of scope because of their partnership and, as for nursing homes that are part of a chain, they may have greater access to capital, along with other resources, that may help facilitate appropriate restraint use.

A high nurse-to-patient ratio was previously shown to be associated with reductions in restraint use (Sloane et al., 1991) and with citations for restraint use (Graber & Sloane, 1995). Other caregivers, such as physical therapists, may also have an impact on care processes, including the use of restraints (Castle & Mor, 1998). Clearly, staffing patterns of caregivers in nursing homes have an impact on resident care, especially in the area of restraint use.

Some research has shown that higher occupancy rates are associated with lower quality (Spector & Takada, 1991). It has been suggested that nursing homes operating with high occu-
pency rates have less incentive to provide quality care (Nyman, 1987). This lower quality may also be operationalized as deficiencies for restraint use.

Many nursing homes do not provide comprehensive medical services. When a resident becomes sick, external medical help is often sought. However, the provision of medical services, such as pain management, intravenous (IV) therapy, and suctioning therapy, implies that the nursing home is more clinically sophisticated. Clinical sophistication is also considered important for appropriate restraint use (Castle & Mor, 1998). Likewise, restraints are generally regarded as counterproductive to the rehabilitation of residents (Castle & Mor, 1998). Thus, facilities providing these medical and rehabilitation services may also be more sophisticated in their use of restraints and be less likely to receive a deficiency for restraint use.

The provision of training programs for caregivers may be potential indicators of the sophistication of the nursing home. In addition, appropriate restraint use is a common training topic (Castle & Mor, 1998). Training and education of staff are often viewed as necessary to implement individualized care alternatives to restraints (Kane et al., 1993). The primary caregivers in nursing homes are nurse aides; as such their training may be especially relevant. Therefore, we believe facilities providing training to nurse aides may be less likely to receive a deficiency for restraint use.

When resident acuity is controlled for, high levels of catheter, psychoactive drug, and physical restraint use are each considered to be indicators of poor quality (Davis, 1991; Mukamel, 1997). The relationships between quality measures are not always apparent (Gustafson et al., 1990). However, given the current sensitization about the use of restraints, facilities that perform poorly in the area of restraint use are unlikely to be sensitized about other areas of care. Therefore, we hypothesize that facilities with higher use of these factors will also be more likely to receive a deficiency citation for restraint use.

Methods

Data

This study used data from the OSCAR (1997). The OSCAR is conducted by state licensure and certification agencies as part of the Medicare and/or Medicaid certification process and includes approximately 18,000 facilities per year. Those facilities that are neither Medicare nor Medicaid certified are not included (approximately 1,000).

The OSCAR contains information on the number and types of deficiency citations received from the most recent certification in addition to numerous facility and aggregated resident data elements. Structural data relevant to this study include facility ownership, chain membership, number of beds, number of nursing personnel by job category and full-time equivalent (FTE) status, the number of residents by payer category, and training of nurse aides. Process data relevant to this study include the number of residents receiving psychotropic drugs and the number of residents restrained as well as the presence of pain management programs, behavior management programs, and bladder training.

Much of the OSCAR data is self-reported by the nursing home administrator and director of nursing (DON). Clearly, this is a limitation of this secondary data source. However, the structural factors used in this investigation, such as size, chain membership, hospital affiliation, and ownership, are unlikely to be subject to reporting bias. In addition, most data elements pertaining to process factors and resident characteristics are verified by the surveyors, such as the provision of medical services and staff training; however, this is a limitation for some of the process and resident variables we used because 24-hr observation was not possible. The information that the surveyors report is pertinent only for the time they make rounds in the facility, which usually occurs during the day shift. The use of psychotropic drugs and physical restraints may be biased because other shifts may not follow day shift practices. We have no reason to believe that other variables such as census, service, or training factors are biased in this way. However, the fact still remains that interrater reliability testing has not been performed for these data and such biases are unknown.

Measures

A resident is defined in the OSCAR as restrained when vests, belts, mittens, or wrist and ankle restraints are used. Chairs with locking trays (gerichairs) are also included, whereas bed rails are not (OSCAR, 1997). The use of restraints is verified by surveyors conducting the OSCAR survey. A deficiency citation for restraint use is issued when a restraint is used without (a) a physician’s order; (b) informed consent from the resident (or proxy); (c) a nursing care plan with the goal of restraint removal; (d) documentation that alternatives to restraints were tried; and (e) when restraint does not enable the resident to maintain their highest practicable level of functioning. This citation is listed in the OSCAR as deficiency #221.

In this analysis the structural variables were divided into organizational, staffing, and training factors. These divisions followed the work of others (Spector & Takada, 1991) and merely organized the variables. The number of beds in each facility was used as a measure of organizational size. A dichotomous (e.g., 0, 1) ownership category (for-profit and not-for-profit) was used to represent ownership. If a nursing home was a member of a nursing home system, it was categorized as a member of a chain. Likewise, if the nursing home was owned by a hospital, it was categorized as hospital-owned. The FTE hours of registered nurses (RNs), licensed practical nurses (LPNs), and nurse aides per resident were included as nurse staffing variables. FTE hours of speech, occupational, and physical therapists per resident were combined in the specialists variable. In addition, the surveyors asked questions regarding the use of approved nurse aide training programs. A dichotomous variable representing whether or not a facility provided this training was used in the analysis.

Overall occupancy rate of the facility, Medicaid census, and the private-pay census were included as a separate group of census variables. These variables are commonly used in long-term care studies (Davis, 1991; Mukamel, 1997; Phillips et al., 1996; Spector & Takada, 1991) but do not readily fit into the structure-process-outcome paradigm. Census is not necessarily a choice of the facility or a physical characteristic, as is the case with most structural factors, nor is it a health care practice, as is the case with process factors. This blurred distinction between structure and process is not uncommon (Spector & Takada, 1991). The occupancy rate variable was created by dividing the average census rate by the total bed size. Similarly, the numbers...
of Medicaid and private-pay residents were divided by the total bed size to create the Medicaid and private-pay occupancy variables, respectively.

Process variables were divided into medical—rehabilitation factors and quality factors. The process variables—providing rehabilitation services, IV therapy, and suctioning therapy—were verified by surveyors conducting the OSCAR survey. The number of residents receiving these services was divided by the total number of residents, to create variables representing the percentage of each. The use of pain management, bladder, or behavior management programs was not verified by surveyors conducting the OSCAR survey. These variables represent a response by nursing home management to the question “Do you currently provide these programs?”

Quality factors included as process variables were characterizing residents, use of psychoactive drugs, and physical restraint use (Spector & Takada, 1991). In general, raw rates of these variables that are not risk adjusted are a function of both quality and case mix (Mukamel, 1997). In this analysis, raw rate variables were used, but risk factors were also included as controls in the estimating equation. Thus, the coefficients estimated for these raw variables would equal the coefficient of the variables if risk adjusted.

The use of catheters, psychoactive drugs, and physical restraints was verified by surveyors. The number of residents for each factor was divided by the total number of residents, to create variables representing the percentage of each. Psychoactive drugs are defined as medications “that affect psychic function, behavior, or experience” (Harrington, Tompkins, Curtis, & Grant, 1992, p. 823). They are generally classified as one of four types of medication: antianxiety, sedative/hypnotic, an-tipsychotic, or antidepressant. The general concern with these psychoactive drugs is that the rates of use may be excessive and/or clinically unjustified. Concomitantly, there is also a concern that antidepressants may in some cases be underutilized in nursing homes (Harrington et al., 1992). Thus, antidepressants were not included in this investigation, and the remaining psychoactive drugs were grouped together.

In addition to structure and process factors, resident factors were included as controls. Aggregate resident factors known to be important in the investigation of restraints were included; these were the percentage of residents bed bound, dressing dependent, urinary incontinent, bowel incontinent, with pressure ulcers, and with dementia (Graber & Sloane, 1995; Mion, Frengley, Jakovec, & Marino, 1989; Tinetti et al., 1991). Inclusion of these factors enabled us to evaluate the structure and process variables while controlling for the resident acuity of each nursing home (Grabber & Sloane, 1995). The number of residents with each of these conditions were divided by the total number of residents, to create variables indicating the percentage of residents with each. In addition, to take into consideration the potential geopolitical differences in the use of citations for restraints, we included a variable for the percentage of nursing homes within each state that had a deficiency citation for restraint use.

Based on a recent literature review of restraint use (Castle & Mor, 1998), we are not aware of any covariates in the use of restraints that were excluded as controls. Because of data limitations, we were only able to examine a limited number of control variables, which could have affected the results because of unmeasured differences in case mix. In addition, there are known problems of inaccurate measurement with mental health variables, including dementia data, taken from the OSCAR (Castle & Fogel, 1998).

**Analytic Approach**

To estimate the probability of a facility receiving a citation for restraint use, this study used a multivariate logistic regression function with structure, process, census, and control factors as independent variables. The general logistic regression model can be represented by the equation:

$$\log \left( \frac{\text{Probability of citation for restraint use}}{\text{prob of no citation for restraint use}} \right) = f(\text{Structure + Process + Census + Controls})$$

Multivariate logistic regression estimates the probability of mutually exclusive events (e.g., citation or no citation) and is often used with dichotomous dependent variables (Demaris, 1992). In evaluating the effects of the independent variables included in the analysis, odds ratios were calculated by taking the exponent of the parameter estimates (Demaris, 1992).

An analytic concern was the likelihood that a citation for restraint use might increase with the number of residents restrained in a nursing facility. We tried alternative analytic approaches in sensitivity analyses to determine this effect. By using the rate of citations for restraint use as a fraction of restraint use as the dependent variable, this association was found in some states and was strongest in states that utilized citations for restraint use most frequently. In general, many of the findings we report in the Results section were robust when compared with these additional analyses. Chain membership and staffing variables were exceptions, both of which were significant in these additional analyses as compared with the nonsignificant findings we report. Presenting both the dichotomous and the rate findings proved unwieldy. Therefore we present findings addressing the question of which facilities received citations for restraint use and leave the more complex question of the rate of citations for restraint use for future analyses.

In addition, we examined the correlations between the variables to identify whether the data had any problems of collinearity (not reported). Most of the correlations were small. As one would intuitively expect, facility size and staffing levels showed the highest correlations, although the variables showed no problems of collinearity on the basis of a threshold of .8 (Kennedy, 1992). Likewise, values for regression tolerance statistics (not reported) showed no problems of multicollinearity (SAS, 1990).

There was very little missing data on any of the variables. Insufficient data were present in 116 cases for the dependent variable, resulting in an analytic sample of 17,024 facilities. Missing cases for the independent variables represented between 0–5% of these variables. All missing independent variables for continuous or ordinal variables were imputed using mean substitution. Dichotomous variables were randomly assigned values of 0 or 1, according to the binomial distribution with a probability as observed for the complete cases (Maddala, 1977). Clearly, we were unable to determine the number of missing data points for the independent variable, but if we assume the same frequency of missing cases found for the dependent variables, this is unlikely to be problematic.
Common errors in the OSCAR data included approximately 2% of duplicate facilities and between 0–4% of data with entry errors. Duplicate facilities were eliminated using the federal identification number (the primary source of facility identification) and the survey date. When an identification number appeared more than once in the data, the information associated with the most recent survey date was used. If the survey dates were identical, one of the duplicate facility records was chosen randomly to be used in the analysis. Following the approach outlined by other researchers using these data, frequency distribution plots were used to identify obvious outliers (Castle & Fogel, 1998). Imputation, as described earlier, was used to replace these data entry errors.

RESULTS

Table 1 presents descriptive statistics of the variables used in the analysis. In the analytic sample, we found that 2,321 facilities had at least one deficiency citation for restraint use in 1997, and 14,703 had none. With regard to structural factors, facilities with restraint citations were significantly larger, with 116 beds compared with those with 105 beds without restraint deficiencies. Facilities with restraint citations were less likely to be hospital based (11% vs 13%). We found lower RN, LPN, and nurse aide staffing levels in nursing homes with restraint citations. The overall occupancy rate of facilities with restraint citations was 85%, whereas for those without restraint citations it was 82%. Facilities with restraint citations had higher Medicaid occupancy rates (63%) than those without citations (60%). For the process variables, facilities with restraint citations were significantly less likely to provide rehabilitation services (17% vs 20%) and bladder training (5% vs 6%) than nursing homes without restraint citations; however, they were significantly more likely to have a higher rate of restraint use (22% vs 14%). In addition, nursing homes with restraint citations had significantly lower rates of residents who were bladder dependent but significantly higher rates of residents who were bladder incontinent, bowel incontinent, and had dementia.

Odds ratios and 95% confidence intervals for the multivariate logistic regression model examining nursing homes with and without deficiencies for restraint use are presented in Table 2. Several structural factors are significant. We found that larger facilities (adjusted odds ratio [AOR] = 1.002; p < .001) and for-profit facilities (AOR = 1.081; p < .05) were significantly associated with a higher likelihood of a deficiency citation for restraint use. We also found that hospital-based facilities (AOR = 1.205; p < .05) were significantly associated with a higher likelihood of a deficiency citation for restraint use. This result had a particularly strong effect with an AOR of 1.205, but was in a direction contrary to what we had hypothesized. Higher numbers of FTE specialists per resident (AOR = 0.340; p < .001) and nurse aide training (AOR = 0.947; p < .05) were associated with a lower likelihood of a deficiency citation for restraint use, and higher occupancy rates (AOR = 1.003; p < .05) were associated with a higher likelihood of a deficiency citation for restraint use.

Six of the process factors examined were significant. Contrary to the direction proposed, IV therapy (AOR = 1.006; p < .05) was found to be significantly associated with a higher likelihood of a deficiency citation for restraint use. The results for suctioning therapy (AOR = 0.992; p < .05), pain management (AOR = 0.995; p < .01), and bladder training (AOR = 0.991; p < .001) did, however, support our hypothesis. For the quality factors, higher use of catheters (AOR = 1.014; p < .001) and physical restraints (AOR = 1.018; p < .001) were found to be significantly associated with a higher likelihood of a deficiency citation for restraint use.

Three of the seven control factors included were significant. These were bladder incontinence (AOR = 1.005; p < .01), dementia (AOR = 1.113; p < .01), and state citations (AOR = 1.006; p < .001).
### DISCUSSION

The results of this investigation indicate that structure and process factors of nursing homes were associated with the outcome of a deficiency citation for restraint use. Five structural factors (bed size, ownership, hospital based, FTE specialists per resident, and nurse aide training) and six process factors (IV therapy, suctioning therapy, pain management, bladder training, catheterization, and physical restraint use) were significant.

In support of our first hypothesis, we found that larger facilities were more likely to receive a deficiency citation for restraint use. This result is not unusual; the provision of services in nursing homes often varies according to facility size. Why these differentials exist is not always clear, however. We propose the result of this analysis is consistent with the belief that large nursing homes provide a standardized approach to resident care, but it also suggests that this standardized approach can be inappropriate in some cases.

The organizational goals and resultant behavior of for-profit and not-for-profit providers are often proposed as being dissimilar (Holmes, 1996). For-profit nursing homes are assumed to be less likely to reduce restraints because of the expense involved and are therefore more likely to receive a deficiency citation for inappropriate restraint use. It is worth noting, however, that the assumption that restraint reduction is expensive may be askew. A recent study has shown that reducing restraints may in fact be cost-effective (Phillips et al., 1993). Assuming that this study is correct, it would be counterproductive (from the standpoint of profitability) for for-profit facilities not to decrease restraint use. In turn, the likelihood of for-profit nursing homes receiving deficiency citations for restraint use may decrease.

With an odds ratio of 1.205, we identified quite large effects for the hospital-based variable; that is, nursing homes associated with hospitals were more likely to receive a deficiency citation for restraint use. We proposed that these nursing homes may have greater economies of scope because of their hospital partners. Furthermore, hospitals are under increasing scrutiny from organizations such as the JCAHO to decrease restraint use. Thus, we hypothesized that nursing homes associated with hospitals would be less likely to receive a deficiency citation for restraint use. Our result is therefore counter to that expected. There are several possible explanations for this unexpected result. For example, it may be that economies of scope are not realized in these facilities. Because of the specific nature of chronic resident care activities in nursing homes, acute care providers such as hospitals may be unable to help nursing homes achieve significant economies of scope. Alternatively, greater economies of scope may not transpose into more appropriate resident care services. The recent restraint reduction initiatives of the JCAHO may not have spilled over into nursing homes associated with hospitals. More research is needed to understand this result.

Clearly, staffing patterns of caregivers in nursing homes have an impact on resident care. For example, Braun (1991) found the number of FTE RNs to be positively related to resident functioning. In addition, the level of nurse staffing was also previously shown to be associated with reductions in restraint use (Sloane et al., 1991) and to citations for restraint use (Graber & Sloane, 1995). However, the results of this investigation suggest that deficiency citations for restraint use are not highly dependent on the staffing levels of nurses. Only the staffing levels of specialists show a significant negative relationship with deficiency citations.

The training factor included as a structural variable was whether a facility had an approved training program for nurse aides. These programs are potential indicators of a nursing home's sophistication. Therefore, we hypothesized that facilities providing this training would be less likely to receive a deficiency for restraint use. The results of this investigation support this hypothesis.

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#### Table 2. Multivariate Logit Estimates Examining Structure and Process Factors of Nursing Homes Associated With Deficiencies for Restraint Use

<table>
<thead>
<tr>
<th>Factor</th>
<th>Odds Ratio (95% confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.027 (0.015-0.050)***</td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td></td>
</tr>
<tr>
<td>Bed size</td>
<td>1.002 (1.001-1.003)***</td>
</tr>
<tr>
<td>Chain member</td>
<td>1.081 (1.017-1.217)*</td>
</tr>
<tr>
<td>Hospital based</td>
<td>0.907 (0.780-1.054)</td>
</tr>
<tr>
<td>Staffing</td>
<td>1.205 (1.006-1.466)*</td>
</tr>
<tr>
<td>FTE RNs/resident</td>
<td>1.002 (0.998-1.007)</td>
</tr>
<tr>
<td>FTE LPNs/resident</td>
<td>0.893 (0.748-1.065)</td>
</tr>
<tr>
<td>FTE nurse aides/resident</td>
<td>0.967 (0.769-1.226)</td>
</tr>
<tr>
<td>FTE specialists/resident</td>
<td>0.999 (0.995-1.004)</td>
</tr>
<tr>
<td>Nurse aide training</td>
<td>1.113 (1.007-1.375)**</td>
</tr>
<tr>
<td>Medicaid occupancy</td>
<td>1.000 (0.996-1.005)</td>
</tr>
<tr>
<td>Private-pay occupancy</td>
<td>1.002 (0.998-1.007)</td>
</tr>
<tr>
<td><strong>Census</strong></td>
<td></td>
</tr>
<tr>
<td>Medical/Rehabilitation services</td>
<td>1.006 (1.002-1.017)*</td>
</tr>
<tr>
<td>Intravenous therapy</td>
<td>0.992 (0.982-1.001)*</td>
</tr>
<tr>
<td>Suctioning therapy</td>
<td>1.001 (0.998-1.004)</td>
</tr>
<tr>
<td>Pain management</td>
<td>0.996 (0.991-0.999)**</td>
</tr>
<tr>
<td>Bladder training</td>
<td>0.991 (0.987-0.996)**</td>
</tr>
<tr>
<td>Catheterized</td>
<td>1.001 (1.000-1.004)</td>
</tr>
<tr>
<td>Physical restraint</td>
<td>1.002 (0.998-1.007)</td>
</tr>
<tr>
<td>Physical restraint</td>
<td>1.010 (1.006-1.012)**</td>
</tr>
<tr>
<td>Pressure ulcers</td>
<td>1.002 (0.993-1.010)</td>
</tr>
<tr>
<td>Dementia</td>
<td>1.113 (1.007-1.375)**</td>
</tr>
<tr>
<td>State citations</td>
<td>1.066 (1.059-1.073)***</td>
</tr>
</tbody>
</table>

*Note: N = 17,024 facilities (2,321 [14%] have deficiency citations for restraint use). FTE = full-time equivalent; RNs = registered nurses; LPNs = licensed practical nurses. Pseudo-$R^2$ = 0.387; Sensitivity = 69.0%; Specificity = 93.3%.

*p < .05; **p < .01; ***p < .001.
The results show that nursing homes operating with high occupancy rates are more likely to receive deficiency citations for restraint use (supporting our hypothesis). Other research has also shown that higher occupancy rates are associated with lower quality (Spector & Takada, 1991). This analysis corroborates this premise.

Linkages need to be established between processes and/or structures and outcomes. These linkages would demonstrate that outcomes are associated with something a nursing home did or failed to do. Without this linkage, outcomes have few direct implications for quality assurance or regulation (Spector & Takada, 1991). However, the linkages between survey deficiencies for restraint use as outcomes and process factors are not well developed. Therefore, in this analysis the process variables were divided into medical/rehabilitation service factors and quality factors, and hypotheses were proposed that related these factors to deficiency citations for restraint use.

We considered the medical/rehabilitation service factors used in this investigation to be potential indicators of a nursing home’s clinical sophistication. We hypothesized that facilities providing these services would be less likely to receive a deficiency for restraint use. The results for suctioning therapy, pain management, and bladder training support this notion. Contrary to our expectation, however, the results show that facilities providing IV therapy are actually more likely to receive a deficiency citation for restraint use.

Restraint use is often justified to permit the safe use of other medical devices, including IV lines (e.g., for a postoperative delirious resident; Marks, 1992). Choosing the proper type of restraint has been emphasized as important in these cases; in some cases, a mitten-type restraint may be most appropriate (MacLean et al., 1982). This association between IV therapy and restraints, and the potential for improper use, may explain the result of this analysis.

Several variables were also included as quality factors. These include catheterizing residents, giving psychoactive drugs, and physical restraint use. When resident acuity is controlled for, high levels of these factors are considered to be indicators of poor quality (Davis, 1991; Mukamel, 1997). Given the prevailing climate regarding the use of restraints, facilities that perform poorly in this area are unlikely to be sensitized about other areas of care. Therefore, we hypothesized that facilities with higher use of these factors would be more likely to receive a deficiency citation for restraint use. This was the case for catheterizing residents and physical restraint use; therefore, the results provide some support for this hypothesis. Clearly, the finding that the use of psychoactive drugs did not significantly correlate with the use of restraints does temper this result. However, poor quality in one area of care is not always correlated with poor quality in all other areas of care. Moreover, the use of restraints and psychoactive drugs may not be independent, given that psychoactive drugs may be used as pharmacological restraints. Physical restraints and pharmacological restraints may be substitutable (Kane et al., 1993). Although the NHRA mandated reductions in both, the possibility exists that facilities may reduce physical restraints by increasing their reliance on pharmacological restraints. Generally, previous analyses have not shown any substitution between the two (Kane et al., 1993).

The OSCAR data have several limitations. First, the data were collected at one point in time. This method of data collection is limited in that the prevalence of factors such as the use of psychoactive drugs or physical restraints may be overestimated or underestimated. Second, although factors associated with deficiency citations for physical restraint use were presented, it is impossible to determine whether these are causal associations. This limitation is endemic to all cross-sectional research. Third, there is no severity information relating to deficiency citations for restraint use in the OSCAR data. Thus, a facility may receive a citation for inadequate documentation rather than for inappropriate restraint use. Citations may also be overturned by the institution on appeal. Finally, because of data limitations, we were only able to examine a few structure and process measures and include a limited number of control variables; the latter could have affected the results because of unmeasured differences in case mix. Moreover, because this study relied on secondary data, it was limited in the extent to which the structure, process, and control measures were operationalized. Additional information, such as the type of restraint used, could add to the utility of the study.

The use of nursing home code citations varies from state to state (Day & Klein, 1987). Thus, the total number of code citations received by a facility in one state is probably not comparable with the number received by a facility in another state. In this analysis, we took this potential geopolitical limitation into consideration by including a control variable for the percentage of nursing homes within each state that had a deficiency citation. In future analyses, estimation of random effect models or generalized estimating equations could more appropriately take into consideration this potential geopolitical limitation.

Despite these limitations, we feel this analysis is important. These results may have some utility for regulators; for example, they could be used to develop a specific program to target inappropriate restraint use. With limited resources, surveyors may achieve the most reduction in inappropriate restraint use by focusing on the facilities identified in this analysis with the highest deficiency citation rates. The results may also have some utility for providers; for example, restraint utilization committees could use the information to target residents for review. Moreover, facilities that provide IV therapy and those with higher use of catheters or physical restraints should carefully assess the validity of restraint use in their institutions.

ACKNOWLEDGMENTS
This work was supported in part by a grant from the National Institute of Mental Health (MH58553-01).

Address correspondence to Nicholas G. Castle, Institute for Health, Health Care Policy, and Aging Research, 30 College Avenue, New Brunswick, NJ 08901.

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