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THE USE OF PHYSICAL RESTRAINTS AMONG NURSING HOME
RESIDENTS: DO DISPARITIES EXIST?

by

SHEKINAH A. FASHAW

A thesis submitted in partial fulfillment of the requirements
for the Honors in the Major Program in Interdisciplinary Studies
in the Undergraduate Studies
and in The Burnett Honors College
at the University of Central Florida
Orlando, Florida

Fall Term 2014

Thesis Chair: Dr. Latarsha Chisholm

Abstract

Introduction: The purpose of this study is to examine how nursing home (NH) characteristics, specifically racial composition of nursing homes residents, influences the use of physical restraints. As the population ages and becomes more diverse, it is essential to mitigate/eliminate racial/ethnic disparities in quality care.

Methods: This is cross-sectional study using a 2010 national data set from Brown University Center for Gerontology and Healthcare Research. This study employs Donabedian's Structure-Process-Outcome (SPO) conceptual framework. Statistical analysis includes univariate, bivariate, and a logistic regression model. It is hypothesized that nursing homes with higher proportions of black residents, more Medicaid residents, and for-profit ownership status will be associated with higher prevalence of physical restraint use.

Results: Findings show that nursing homes with high proportions of blacks have a lower likelihood of high physical restraint use. Nursing homes with a higher proportion of Medicaid-reliant residents have a higher likelihood of restraint use, as does for-profit nursing homes.

Discussion: The findings indicate that there are no racial/ethnic disparities present in the use of physical restraints in nursing homes. There is indication of socio-economic disparities, since nursing homes with higher Medicaid-reliant residents are associated with greater restraint. There are policy implications associated with these findings, including raising Medicaid per diem or implementing a quality performance payment incentive. Further research will be needed to determine ways to reduce racial/ethnic disparities in nursing homes. This research, adds to the nursing home literature focused on socio-economic disparities.

Acknowledgements

I would like to express my deepest gratitude to those who have made this thesis possible. First, unto him who can do exceedingly abundantly far more than I could ever ask, think, or imagine, thank you for being my guiding light. Thank you to my family and my pastors Gregory & Stephanie Fashaw for always believing in me and instilling in me the spirit of faith, I could not have completed this without you. To my peers in the McNair Scholars program, thank you 1000 times over for being next to me those late nights and stressful afternoons always reminding me that after this we were going to grad school! Thank you to the Health Management & Informatics Department faculty and staff for always encouraging and being there to support me along this journey providing laughter in between each chapter and rewrite. To my thesis committee members, Dr. Liu and Dr. Gammonley, you both took this project on with no questions asked and were supportive throughout the entire process and I can't thank you enough. Last, but never least, Dr. Chisholm you have definitely been an awesome mentor, pushing me to go above and beyond what I saw possible for myself, because of you I understand what it means to be a researcher and I look forward to the day I become a "real researcher."

Table of Contents

Introduction.....	1
Restraint Use in Nursing Homes.....	2
Significance.....	3
Racial/Ethnic Health Disparities.....	3
Racial/Ethnic Health Care Disparities.....	4
Contributors of Racial/Ethnic Disparities and Nursing Homes.....	5
Racial/Ethnic Disparities and Physical Restraint Use.....	6
Literature Review.....	8
Characteristics and Physical Restraint.....	8
Conceptual Framework and Hypotheses.....	9
Structure-Process-Outcomes Framework (The Donabedian Model).....	9
Racial/Ethnic Composition.....	10
Payer Mix.....	11
Ownership.....	11
Study Design and Methods.....	13
Study Design.....	13
Study Sample.....	13
Study Data.....	13
Dependent Variable.....	14
Primary Independent Variable.....	14
Independent Variables.....	15
Payer Mix.....	15
Ownership.....	15
Control Variables.....	15
Statistical Analysis.....	18
Results.....	19
Descriptive Statistics.....	19
Multivariate Analysis.....	20

Discussion	22
Control Variables	23
Policy Implications	25
Limitations	26
Conclusion	27
Appendix A - (Figure 1)	28
Appendix B - (Tables 1-3)	30
References	35

Introduction

Currently, there are approximately 43.1 million individuals age 65 and older and by 2060 it is estimated that 92 million individuals will be 65 and older (Administration on Aging [AoA], 2013). The United States Census Bureau (2012) projected that in 2056 individuals over the age of 65 will outnumber the young, stating that the population under the age of 18 will actually decrease by 2% by 2060. In addition to the aging population increasing, our society is also becoming more diverse over time. In 2030, approximately 28% (20.2 million) of the elderly population will be composed of racial/ethnic minorities, this is an estimated 11% increase from the year of 2002 (AoA, 2013). The AoA indicates older adults have a longer life expectancy and majority of them have one or more chronic diseases, increasing their need for long-term care. Consequently, with a population that is aging and living longer it is expected that nursing home use will increase over time as this particular population increases. Additionally, the AoA (2013) indicates an increase in long-term care facility use since 2012, with a correlation between higher age and increased long-term care use.

In 2011, approximately 16,000 nursing homes provided care to an estimated 1.5 million elderly residents who typically consist of vulnerable populations, such as individuals with cognitive and physical impairment (Nursing Home Care, 2014). While nursing homes provide care to some of the most vulnerable populations defined by age, gender, race, geography, disabilities and more, poor quality of care continues to be a concern for residents, families, and policy makers. In addition to poor quality of care being documented in nursing homes, studies also report racial/ethnic disparities in resident health outcomes (Cai, Mukamel, Temkin-Greener, 2010; Konetzka & Werner, 2009; Cassie & Cassie, 2013; Boyington et al., 2007). The growth of

an aging diverse population makes racial/ethnic disparities in nursing homes a pertinent issue for policy makers, families and residents. Consequently, it is essential to understand factors that contribute to inequalities in care for minority residents. Racial/ethnic minorities have also been identified by the government as one of the most vulnerable, at risk, populations (Other At Risk Populations, 2014). As such, this study will simultaneously take into account two subsets of vulnerable populations, minorities and the elderly, in order to examine how nursing home residents' racial composition is associated with the use of physical restraints.

Restraint Use in Nursing Homes

Physical restraint, as defined by the Centers for Medicare & Medicaid Services (CMS), is “any manual method or physical or mechanical device, material, or equipment attached or adjacent to the resident’s body that the individual cannot remove easily which restricts freedom of movement or normal access to one’s body” (42 CFR 483.13(a)). The Nursing Home Compendium 2013 report issued by the Center of Medicare and Medicaid Services (CMS) indicates that restraint use citations decreased from 11.5% in 2007 to 6% of facilities in 2011. In 1987 the Nursing Home Reform Act (Omnibus Reconciliation Act of 1987), was created to ensure that quality care was being provided to nursing home residents, it specifically limited restraint use in nursing homes to the treatment of medical symptoms only [42 CFR 483.13 (a)]. Although restraint use has decreased since the implementation of the Act, restraint use remains a key quality of care and quality of life concern due to the adverse psychological and physical health effects. In addition, prior research suggests physical restraint use has been associated with increased depression and less social engagement among nursing home residents (Lane & Harrington, 2010; Wagner, McDonald, & Castle, 2013; Castle, 2006).

Falls, physical agitation, and verbal agitation have been identified as resident predictors of restraint use and have shown to worsen with extended restraint use among residents (Hofmann & Hahn, 2013; Meyer, Kopke, Haastert, & Muhlhauser, 2008; Chaves, Cooper, Collins, Karmarkar, & Cooper, 2007). Lane and Harrington (2010) also suggest a decrease in muscle strength due to persistent restraint use among residents. While restraints may be used to control behavior problems, studies have also cited increases in behavior problems when restraints are used on residents (Castle, 2006; Feng et al., 2009). In addition restraint use has been associated with pressure ulcers (Feng et al., 2009; Lane & Harrington, 2010; Wagner et al., 2013; Hofmann & Hahn, 2013), incontinence (Hofmann & Hahn, 2013; Lane & Harrington, 2010), injuries (Hofmann & Hahn, 2013), and deaths (Chaves et al., 2007; Feng et al., 2009; Lane & Harrington, 2010; Wagner et al., 2013; Castle, 2002). The use of physical restraints may be useful to protect patients from falling or from tampering with life-sustaining devices (Wagner et al., 2013; Castle, 2006; Hofmann & Hahn, 2013; Lane & Harrington, 2010; Chaves et al., 2007), however the adverse quality of life and quality of care issues may outweigh the benefits of using restraints to prevent falls.

Significance

Racial/Ethnic Health Disparities.

With an aging U.S. population, it is expected that the demand for nursing home services will increase over time. Additionally, it was reported by the U.S. Census Bureau in 2012 that the minority population in the U.S. will increase substantially, suggesting that more minority residents will be utilizing long-term care services more often (Belgrave, Wykle, & Choi, 1993, Pandya, 2005). Unfortunately, racial/ethnic disparities have been continuously documented

throughout nursing home settings. Racial/ethnic disparities exist in several health outcomes including: end-of-life care, use of antipsychotics, presence of urinary incontinence, pressure ulcers, and immunizations (Cai et al., 2010; Konetzka & Werner, 2009; Boyington, et al. 2007). Boyington et al. (2007) found that African-Americans were more likely to have urinary incontinence compared to Caucasian residents, after controlling for resident-level factors. Their study used the 1999-2002 Minimum Data Set (MDS) to examine nursing home residents in the Southeastern states. However, this study failed to account for facility-level characteristics that may influence incontinence of care. Cai et al. (2010) examined racial/ethnic disparities in the prevalence of pressure ulcers among nursing home residents. Investigators found blacks were more likely to have pressure ulcers present than whites, after controlling for resident- and facility-level factors. The sample for their study consisted of 619 nursing homes in New York State. Both studies postulated that the difference between races was not due to differential treatment but because of differential access to quality care.

Racial/Ethnic Health Care Disparities.

Konetzka and Werner (2009) conducted an extensive systematic review that provides evidence that racial/ethnic health disparities are a result of unequal access to care for minorities and individuals in of lower socioeconomic status. Konetzka and Werner's review (2009) also provides evidence of studies illustrating racial/ethnic disparities in the quality of care and care outcomes. Furthermore, prior studies indicate black residents are more likely to be admitted to high-deficiency nursing homes than their white counterparts (Mor, Zinn, Angelelli, Teno, & Miller, 2004; Feng, Fennell, Tyler, Clark, & Mor, 2011; Grabowski, 2004). Grabowski (2004) specifically examines a 1996 nationally representative sample of 2,690 nursing homes to find

that blacks were more likely to be admitted to nursing homes that had been federally evaluated as having poor quality of care, after controlling for individual-, facility-, and market-level variables such as ownership type, chain affiliation, and number of beds.

Contributors of Racial/Ethnic Disparities and Nursing Homes.

Racial/ethnic disparities are documented throughout the healthcare system, and the nursing home industry has not been immune to these disparities. Factors contributing to racial/ethnic disparities have been documented in prior research. Two primary contributors of racial/ethnic disparities in nursing homes that have been documented include: nursing home segregation and overrepresentation of minority residents in Medicaid-reliant nursing homes (Mor, et al., 2004; Smith, Feng, Fennell, Zinn, & Mor, 2007; Feng, et al., 2011; Kontezka & Werner, 2009; Davis, Weech-Maldonado, Lapane, & Laberge, 2014).

Seminal work by Mor et al. (2004) illustrated minority residents are disproportionately housed in lower-tier nursing homes, with lower-tier nursing homes consisting of facilities that rely heavily on Medicaid and upper-tier facilities consisting of nursing homes with a mixture of private and government reimbursement. In addition, Medicaid-reliant nursing homes have a lower availability of resources, lower staffing, and lower quality of care. In addition, Chisholm et al. (2013) found nursing homes with higher proportions of Black residents had lower financial performance and lower quality of care.

Aforementioned, nursing home segregation has been identified as a possible contributor of racial/ethnic disparities. Research indicates poor communities are more likely to contain low-tier nursing homes and have nursing homes with more health related quality deficiencies. Feng et al. (2011) found resource-deprived nursing homes are located in communities with a higher

number of minorities, which increases the likelihood for minorities residing in these facilities. Minority residents' desires to live in nursing home located in their community may contribute to differences in the racial composition of nursing home residents. However, minorities' decisions to reside in nursing homes located in their community should not affect the quality of care provided to residents.

Prior research indicates other nursing home characteristics may also facilitate racial/ethnic disparities in nursing homes. Studies indicate for-profit and chain affiliated nursing homes are more diversified and have a poorer quality of care, whereas not-for-profit nursing homes are more segregated with a higher quality of care (Davis et al., 2014; Smith et al., 2007). Diversity in for-profit nursing homes refers to a greater mix of whites and blacks, however, segregation in not-for-profit nursing homes is due to their higher percentage of whites only. For-profit nursing home diversity may be associated with overrepresentation of Medicaid-reliant residents, which tends to be related to diversity of residents' racial composition.

Racial/Ethnic Disparities and Physical Restraint Use.

To our knowledge only one study has examined the relationship between physical restraint and racial/ethnic disparities. Cassie and Cassie (2013) used the 2004 National Nursing Home Survey data, which is a national representative sample of nursing home residents in the United States, to examine the racial/ethnic disparities in the use of physical restraints among nursing home residents. The investigators found that black residents are more likely to be restrained compared to white residents, after controlling for resident-level factors. Black residents were more likely to be restrained by bed rails, side rails and trunk restraints. While, Cassie and Cassie used a national sample to examine racial/ethnic disparities in restraint use,

their study only controls for resident-level factors. Aforementioned, prior literature indicates racial/ethnic disparities are more likely to occur due to across facility differences instead of within facility differences (Cassie & Cassie, 2013; Cai et al., 2010; Mor et al., 2004; Smith et al., 2007), which indicates the need to understand how nursing home characteristics influence disparities in restraint use for nursing home residents. The purpose of our study is to examine how nursing home characteristics, particularly residents' racial composition, may influence the use of physical restraint among nursing homes. Findings from this study will have practical and policy implications.

Our study will add to the current literature on racial/ethnic disparities in nursing homes by examining how residents' racial composition is associated with restraint use, while controlling for facility-level factors. As the minority population increases there is a growing need to understand nursing home factors that enable or hinder racial/ethnic disparities in long-term care. Additionally, this project is significant because of its use of a national dataset to study the relationship between restraint use and residents' racial/ethnic composition in nursing homes. Although literature examining racial/ethnic disparities in nursing home care is expanding, to our knowledge only one study has examined physical restraint use and race of nursing home residents, and no work to date has examined this at the facility-level.

Literature Review

Characteristics and Physical Restraint

Prior studies have identified average age, gender, and activities of daily living (ADL) dependency as resident characteristics associated with increased physical restraint use (Heinze, Dassen, & Gritner, 2011; Castle, 2002; Hoffmann & Hahn, 2013; Feng et al., 2009; Phillips et al., 1996). The literature on age and physical restraint is mixed, with more recent studies indicated younger residents are more likely to be restrained and older studies suggest opposite findings. Recent studies indicate that restraint use occurs among younger residents compared to older residents (Heinze et al. 2011; Feng et al. 2009; & Hofmann & Hahn, 2013). Wagner et al. (2013) found similar findings in regards to age, as nursing homes with higher numbers of the oldest elderly had a lower likelihood of improper restraint use; however the data on age has been mixed. Tinetti, Liu, Marottoli, and Ginter (1991) found that older age correlated with a higher prevalence of restraint use and as residents aged the incidence rate also increased.

Previous research also demonstrates an association between higher restraint use for nursing home residents with lower activities of daily living (ADL) (Hofmann & Hahn, 2013 & Castle, 2002, Burton, German, Rovner, & Brant, 1992) and higher care dependency, or need for assistance and daily care (Heinze et al., 2011). Additionally, Castle et al. (2002) found nursing homes with more ADL dependent residents were more likely to have residents that are restrained. While low ADL may be a precipitating factor that leads to restraint use, studies have also shown that using physical restraints causes a further decrease in ADL and increase walking dependency (Feng et al. 2009; Hofmann & Hahn, 2013). An extensive literature review conducted by Castle and Mor (1998) further reveals resident-level and mentions possible facility-

level characteristics associated with physical restraint use. Castle and Mor (1998) identify cognitive impairment, physical functions, gender, staffing ratios, dementia, ADL dependence, incontinence, and falls as risk factors and predictors of restraint use.

Since Castle and Mor's suggestions for further research in 1998, studies have examined nursing home facility-level characteristics associated with physical restraint use. Wagner et al. (2012) and Castle (2002) studied characteristics associated with deficiency citations for physical restraints. Wagner et al. (2012) found that majority of nursing homes receiving citations were for-profit, had majority Medicaid residents, and had an average of 114 beds in the facility. His study found that higher levels of RNs and LPNs were associated with fewer deficiency citations for physical restraint. As for chain affiliation, their study found that chain membership decreased the likelihood of deficiency citations. Castle (2002) had similar findings to Wagner et al. (2012), concerning RN staffing, additionally she found that a higher Medicaid census correlated with greater deficiency citations.

Conceptual Framework and Hypotheses

Structure-Process-Outcomes Framework (The Donabedian Model).

The conceptual framework that will be used for this study is Donabedian's (1988) structure-process-outcome (SPO). This framework is readily used in health services research for evaluating the quality of care. Typically in this framework, "structure" focuses on facility characteristics: professional and organizational resources; "process" refers to the care being delivered to the patient by the provider; finally, "outcome" denotes the overall effect and states that result (Chisholm et al., 2013). SPO posits that structure influences processes which can

influence outcomes. In addition, structure can directly influence outcomes (See Figure 1 IN Appendix A).

In this study structure focuses on nursing home characteristics such as size, ownership, payer mix, staffing, residents' racial composition, and chain affiliation; and outcomes refer to the use of restraints in the facility. Other studies have used the SPO model to examine how structure influences outcomes (Chisholm et al., 2013). This study will also focus on the effect of structure on the outcome, raising the question of how structure impacts the use of restraints.

Racial/Ethnic Composition.

According to the study by Cassie & Cassie (2013) blacks were more likely than whites to be restrained in nursing homes. Additionally, Boyington et al. (2007) found a similar disparity in health between African-Americans and whites, where blacks were more likely to have urinary incontinence indicating a subpar quality of care. Cai et al. (2010) also found that blacks were more likely to suffer from a higher prevalence of pressure ulcers among nursing home residents and that nursing homes with more blacks had a greater prevalence of pressure ulcers. In addition, Chisholm et al., (2013) found nursing homes with no Black residents had greater pressure ulcer prevention, greater restorative walking, and lower total catheter use compared to nursing homes with high Black residents. Overall, African-American residents are reported to have a lower quality of care in health outcomes (Belgrave et al., 1993). With these studies as evidence of the presence of racial/ethnic health disparities the first hypothesis was formulated.

Hypothesis 1: Nursing homes with high proportions of black residents will be associated with high physical restraint use.

Payer Mix.

Another facility characteristic that has been associated with racial/ethnic disparities in the quality of care is payer mix. Mor et al. (2004) indicated that Medicaid-reliant nursing homes have poorer quality of care and black residents are over represented in these facilities. In addition, Cai et al. (2010) found that blacks are more likely to have Medicaid as a primary source of payment and/or reside in nursing homes with a higher proportion of Medicaid residents. A study by Mitchell, Kiely, and Gillick (2003) also indicated quality of care disparities in nursing homes with a higher proportion of Medicaid beds when examining feeding-tube use, an indicator of poor quality of care. Furthermore, previous studies found higher restraint use is associated with higher Medicaid payer mix and chain affiliation (Castle, 2002; Wagner et al., 2013; Miller et al., 2006). We examine the possible association between higher Medicaid proportions and restraint use in our second hypothesis.

Hypothesis 2: Nursing homes with a higher proportion of Medicaid residents will be associated with high physical restraint use.

Ownership.

Not-for-profit facilities have historically been associated with a higher quality of care (Centre for Reviews and Dissemination, 2009) and more segregation (Davis et al., 2014; Smith et al., 2007) than for-profit facilities because not-for-profit nursing homes were implemented by churches and other organizations as a way to care for their members specifically. For-profit facilities are typically more diversified, with a greater number of blacks, and have a higher percentage of Medicaid residents (Davis et al., 2014; Smith et al., 2007; Chisholm et al., 2013). Considering the lower reimbursement rate of Medicaid, for-profit nursing homes may have lower

quality of care and need more residents as a result to compensate. Not-for-profit homes have higher private-pay residents, private-pay residents typically have a higher reimbursement allowing for higher quality of care (Christensen & Arnold, 2005). In the study by Mitchell et al. (2003) there is also an indication of increased feeding-tube use, illustrating poor quality of care, in for-profit nursing homes. Additionally, Miller et al. (2006) found that residents in for-profit nursing homes were more likely to be restrained. We explore this possible dynamic in our second hypothesis to analyze any congruence with previous studies.

Hypothesis 3: Nursing homes with a for-profit ownership status will be associated with high physical restraint use.

Study Design and Methods

Study Design

This is a cross-sectional study that will examine the relationship between the use of physical restraints and nursing home characteristics, specifically residents' racial composition.

Study Sample

The original sample consists of 15,726 Medicare and Medicaid certified nursing homes in the United States. Hospital-based nursing homes were excluded (n=1003) due to their focus on post-acute care. Hospital-based nursing homes often fail to represent other nursing homes similarly in terms of organizational characteristics, residents, and providers (Castle, 2002). Additionally, nursing homes that had missing data for all the variables were excluded from this study (approximately 240 nursing homes). The final sample size consisted of 14,483 nursing homes.

Study Data

This study uses 2010 data obtained from Brown University's Long-Term Care Focus project, "Shaping Long Term Care in America Project". This publically available data can be found at LTCFocUS.org website and used by researchers to assess various outcomes for nursing home residents. The LTCFocUS data uses the following data sources: Online-Survey Certification and Reporting (OSCAR), Minimum Data Set (MDS), State Policy data, Area Resource File, and Residential History File. This dataset has aggregated resident-level variables to the facility level. The variables used for this study are derived either from OSCAR or MDS. OSCAR data includes information about nursing home characteristics and demographics such as,

facility size, staffing hours, proportion of Medicare/Medicaid residents, chain affiliation, profit status, presence of an Alzheimer SCU and proportion of residents physically restrained. The MDS is a federally mandated clinical assessment of residents in Medicare or Medicaid certified nursing homes that helps nursing home staff identify each resident's health status and functional capabilities. MDS data contains resident-level information, such as age, race/ethnicity, and the cognitive performance scale (CPS) score.

Dependent Variable

The dependent variable in this study is physical restraint use. For this study, physical restraints are defined leg or arm restraints, mitts, ties, vests, trays or cushions that are difficult to remove, or practices such as side rails, tightly tucked sheets, or bed and chair placement. This variable has been recoded from a percentage into a dichotomous variable, 0=no/low and 1=high. The average percent of residents restrained in nursing homes is about 3% (Cassie & Cassie, 2013). Categories for the restraint variables were developed from analysis on the proportion of restraint variables. As such the restraint variable was categorized with no/low restraint use, including nursing homes with lower than 3% restraint average and high restraint included nursing homes with more than 3% (approximately 32% of sampled nursing homes).

Primary Independent Variable

The primary independent variable for this study is the proportion of black nursing home residents. This variable has been recoded from its original percentage into a dichotomous, nursing homes no/medium black residents=0 and high proportion of black residents=1. Nursing homes with 36% or more Black residents were coded as high proportion of black variables

(approximately 10% of nursing homes). While nursing homes with less than 36% blacks were coded as no/medium proportion of Black variables (an estimated 90% of nursing homes). The high proportion of black residents are similar to those used by Chisholm et al. (2014) where 10% of the nursing homes were considered to have a high proportion of blacks.

Independent Variables

Payer Mix.

Additional independent variables used in this study are proportion Medicaid and proportion Medicare. The proportion Medicaid variable represents the percent of facility residents whose primary support is Medicaid; while the proportion Medicare is the number of facility residents whose primary support is Medicare.

Ownership.

The final independent variable is the ownership variable, which indicates whether a facility is for-profit or not-for-profit organization. It is a binary variable coded as 0= not-for-profit and 1= for-profit.

Control Variables

Additional control factors for this study included: total beds, chain-affiliation, and staffing hours per resident day (hrprd), cognitive impairment of residents, ADL, special care units and average age. These factors were incorporated into the study because prior literature indicates they are associated with physical restraint use in nursing homes. Total bed refers directly to the total number of beds reported in the facility during the annual survey. The chain-affiliation variable indicates if the facility is affiliated with a multi-facility chain organization of

nursing homes or not. Other studies have identified chain affiliation, and total beds (facility size) as being associated with physical restraint use (Abrahamson, Lewis, Perkins, Clark, Nazir, & Arling, 2013; Miller, Papandonatos, Fennell, & Mor, 2006). Abrahamson et al. (2013)

Staffing variables are defined as hours per resident hour per day (hrprd), LPN hrprd, and CNA hrprd. Wagner et al. (2013) examined staffing, illustrating that nursing homes with a higher percentage of RNs and LPNs were associated with a lower likelihood of improper physical restraint use, whereas a higher percent of CNAs was associated with increased restraint use.

Cognitive impairment has been identified as a factor associated with restraint and have been shown to worsen with extended use of restraint (Hofmann & Hahn, 2013; Castle, 2006). For this study cognitive impairment was aggregated to the facility-level and is assess as the proportion of residents with a specific score on the Cognitive Performance Scale (CPS) score (Morris et al., 1994). Low CPS scores of 0-2 represent no to low cognitive impairment, specifically 0 = intact cognition; 1 = borderline intact; 2 = mild impairment; medium CPS scores include 3 = moderate impairments, and 4 = moderate severe impairment; and lastly high CPS sores represent severely cognitively impaired residents with scores of 5 = severe impairment and 6 = very severe impairment.

Additionally, the Activities of daily living (ADL) variable measures the proportion of residents whom have declining or low independence for 7 ADLs: bed mobility, transfer, locomotion on unit, dressing, eating, toilet use, and personal hygiene. Each ADL was scored from 0 to 4, 0 representing total independence and 4 representing total dependence. The average ADL score for the facility is on a scale of 0-28, it averages together the scores for each of the 7 ADLs for each resident in the facility; 0=independent and 28=total dependence.

Several studies have found that the quality of care and quality of life on SCUs appear to be different and many times superior to care in other units (Lai, Yeung, Mok, Chi, 2012; Gruneir, Lapane, Miller, Mor, 2008a). Abrahamson et al. (2013) specifically illustrated a positive relationship between the presence of an SCU and quality of life, while indicating a decrease in physical restraint use. This can be attributed to staff training, staff ratios and work hours, special programming, and family involvement (Lai et al., 2012; Gruneir et al, 2008a). It is also shown through research that facilities with SCUs may have overall better care of their residents, both on and off of the SCU, reflecting the facilities overarching culture and approach to care (Lai et al, 2012; Arling & Williams, 2003; Gruneir, Lapane, Miller, Mor, 2008b). On these units nurses are trained to provide special care for those suffering from all types of dementia, and the culture of care is centered on the patient. Sloane et al. (1991), a study also cited by Castle (1998) discusses the effect of special care units in decreasing physical restraint use; however, this literature is also mixed since in a prior study by Castle and Fogel (1998) it was found that Alzheimer SCUs were associated with higher restraint levels. The presence of an SCU is operationalized in this study as a categorical “yes/no” variable; 0=no SCU present and 1= yes SCU present.

For this study, average age is the average of all ages of every individual in the facility. As mentioned prior, literature has been mixed on age, some studies finding that increased age increases restraint use and others indicating a lower average age is associated with an increase in restraint use (Tinetti et al., 1991; Heinze et al. 2011; Feng et al. 2009; Hofmann & Hahn, 2013; Wagner et al., 2013).

Statistical Analysis

Statistical analysis for this study was conducted using SAS 9.4 statistical software package. Univariate and bivariate analysis was used to provide descriptive statistics for recoding and determining significant variables. Due to the dichotomous nature of the outcome variable, the final model is a binary descending logistic regression. The model uses the various continuous and categorical explanatory variables above to predict the outcome of physical restraint. Theoretically and statistically significant variables were retained in this final model.

Results

Descriptive Statistics

Descriptive statistics are presented in Table 1. On average the percent of black residents in nursing homes in the U.S, is 9.17 and restraints were used on about 3.12% of all residents within a nursing home. An estimated 10% of nursing homes had high proportions of blacks and 32.2% had high proportions of restraint use. Approximately 62% of nursing homes have Medicaid-reliant residents, while 14% of residents in nursing homes pay using Medicare. An estimated 73% of the nursing homes were for-profit and about 56% were chain affiliated. The average total beds in nursing homes was 109. In addition, approximately 17% of nursing homes had an Alzheimer SCU. The mean average ADL score was 16.07, on a scale of 0 to 28 where 0 is independent and 28 is completely dependent. 68% of residents in nursing homes were female, and the average age among the facilities was 79 years of age. Most nursing homes had residents with low (CPS scores=0, 1, 2) to medium (CPS scores=3,4) cognitive impairment, 49.91% and 36.56% respectively, and on average 11.41% of nursing homes residents had high cognitive impairment (CPS scores=5,6).

Table 2a displays descriptive associations between restraint use and categorical variables. Nursing homes with a high proportion of blacks are more likely to use restraint (35%) than nursing homes with no/medium proportions of blacks (32%). For-profit nursing homes are significantly associated with higher restraint use (35%) compared to not for-profit nursing homes (26%). In addition, non-chain affiliated facilities (33%) are associated with higher restraint use compared to chain-affiliated nursing homes (32%). Alzheimer special care units were not statistically significant with physical restraint use in nursing homes.

Table 2b provides descriptive association between restraint use and continuous variables. Nursing homes with a higher percentage of Medicaid residents (66.48) and fewer Medicare-reliant residents (12.75) are associated with increased restraint use. Additionally, nursing homes with lower RN hrprd (.35) and higher LPN hrprd (.85) are associated with increased restraint use. Nursing homes with high restraint use had higher average ADL scores (16.4) compared to nursing homes with no restraint use average ADL score (15.8). On average, nursing homes with high restraint use had greater proportions of residents with high CPS scores (13%) than did nursing homes with no restraint use whom had an average of 11% of residents with high CPS scores. The opposite was observed in terms of low CPS scores, there were more low cognitively impaired residents in nursing homes with no restraint than there were in nursing homes with high restraint. In addition, nursing homes with a younger average age for residents are significantly associated with increased restraint use in nursing homes. Lastly, larger nursing homes (112 beds) are associated with high restraint use compared to smaller nursing homes (108 beds). While the percentage of females is found to be insignificant.

Multivariate Analysis

Table 3 describes the association between physical restraint and independent and control variables, after controlling for facility-level factors. Results show that nursing homes with no/medium blacks had 13% greater odds of restraint use than nursing homes with high proportions of blacks. A higher proportion of Medicaid residents is associated with a greater likelihood of restraint use (OR=1.013), while nursing homes with higher proportions of Medicare (OR=0.993) residents are associated with lower odds of restraint use. Additionally, not-for-profit nursing homes had a 14% lower odds of restraint use compared to for-profit

nursing homes. Facilities without an Alzheimer SCU had lower odds of high restraint use (OR=0.942). Furthermore, non-chain affiliated nursing homes (OR=1.077) were associated with greater odds of restraint use compared to chain-affiliated nursing homes.

Other significant structure variables included staffing variables, RN hrprd, and LPN hrprd. RN hrprd (OR=0.535) were found to be significantly associated with 47% lower odds of restraint use. LPN hrprd (OR=1.254) were found to be significantly associated with a 25% higher odds of restraint use. As for additional control variables, average age was associated with a lower odds (OR=0.988) of high physical restraint use. The nursing homes with higher proportions of residents with medium CPS scores (OR=1.003) and high CPS scores (OR=1.004) had a greater likelihoods of high restraint use compared to nursing homes with more low CPS scores. ADL scores (OR=1.084) were also positively associated with increase restraint use, as ADL scores increased so did the odds for high restraint use. Total beds and CNA hrprd were not significant, but were associated with a greater likelihood of high restraint; while percent female, although also insignificant, was associated with a decreased odd of physical restraint use.

Discussion

This study examined the association between nursing home characteristics, specifically racial composition, and the use of physical restraints in the nursing homes.

Hypothesis 1 was not supported in this study. The findings indicate that there are no racial/ethnic disparities present in the use of physical restraints in nursing homes, results show that facilities with no/medium (<36%) proportion of black residents actually have greater odds of high restraint use. This finding is similar to the Miller et al. (2006) which found African-Americans had a lower likelihood to be physically restrained but had a higher likelihood to receive antipsychotic drugs in comparison to white residents. Findings from that study suggest nursing homes may be reducing physical restraint use but use antipsychotic drugs for residents with complex needs.

Although, our results do not show a racial/ethnic disparity, a socioeconomic disparity in restraint you can imply a racial/ethnic disparity as well since the two are so closely associated.

Hypothesis 2 was supported, for this study facilities with a higher proportion of Medicaid residents are more likely to use a higher proportion of physical restraints. Physical restraint use can be an indicator of poor quality of care. Nursing homes with higher Medicaid populations are known to have less staff and lower resources which can lead to poorer quality of care, such as physical restraint use. The payer mix variable may ultimately disguise the presence of any possible disparity due to racial/ethnic composition. Payer mix and race may be intertwined with each other in long-term care settings. Research has shown that minorities are more likely to have Medicaid, which typically reimburses lower than other insures, as their source of payment.

Consequently, nursing homes with higher proportions of minority residents may also have a higher proportion of Medicaid residents, which can limit resources to provide quality care.

Additionally, *hypothesis 3* is also supported by the model, for-profit facilities are shown to have a greater likelihood of physical restraint use, this finding is also congruent with previous studies that illustrate for-profit facilities are more likely to have poorer quality of care, a higher proportion of Medicaid residents, and more likely to house black residents (Miller et al., 2006; Cai et al., 2010; Grabowski, 2004). Once again, the racial/ethnic disparity proposed in *hypothesis 1* may be disguised by the stronger association between for-profit facilities and high restraint use. Likewise, because of the association between for-profit nursing homes and racial composition, it can be assumed that there is an underlying racial/ethnic disparity in the use of restraint, indirectly connected through facility ownership.

Control Variables

Findings from this study found that the absence of an Alzheimer SCU was associated with a lower likelihood of high restraint use Gruneir et al. (2008b) actually had similar findings. The investigators suggested that perhaps what had the greatest influence on quality care was not the presence of the unit but the organization philosophy and approach. Additionally, the presence of an Alzheimer SCU can be indication of residents with higher CPS scores and higher ADL scores, correlating to lower cognitive ability and lower independency respectively. Nursing homes with higher CPS and ADL scores are associated with higher restraint use, which corresponds with the presence of Alzheimer SCUs also being associated with higher restraint use in our study. Hence, nursing homes with no Alzheimer SCU may have lower restraint use due to their lower proportions of residents with high CPS and ADL scores.

In addition, this study also found that non-chain affiliated nursing homes had higher odds of high restraint use. The literature on the quality of care in association to chain affiliation has been mixed; some studies have indicated that chain-affiliated nursing homes have poorer quality (Harrington, Woolhandler, Mullan, Carrillo, & Himmelestien, 2001; Kamimura, et al., 2007; Castle & Fogel, 1998) while others have said that they have a higher quality of care in comparison to non-chain affiliated nursing homes (Kamimura, et al., 2007). The finding in our study may be due to the organizational structure of non-chain affiliated facilities. These nursing homes may lack the resources, staffing, and administrative hierarchy to emphasize and implement restraint use reduction programs in their facilities.

Policy Implications

Nursing homes with high proportions of Medicaid residents had an increased amount of restraint use. This finding suggests that nursing homes with high proportions of Medicaid residents may lack the resources to change their organization and implement better quality of care practices. One potential mechanism to reduce disparities of care in Medicaid-reliant nursing homes would be to increase Medicaid reimbursements. Studies have shown that increased Medicaid payments are associated with higher quality of care in nursing homes (Grabowski, 2004). A recent study by Davis et al. (2014) indicate that nursing homes in states with higher Medicaid per diem had greater odds of low to medium residential segregation. Other mechanisms that may serve to decrease socioeconomic disparities in poorer facilities may be pay-for-performance. Pay-for-performance nursing homes will be rewarded for improved care, fewer deficiency citations, and quality outcomes. Additionally, there are implications to be considered for staffing. The results in this study indicate that increased nursing work hours for LPNs are associated with high restraint use; legislation to limit the allowed amount of work hours can help to decrease disparities resulting from overworked LPN nurses. Additionally, substituting RNs for LPNs may result in lower odds of high physical restraint use; this reflects on the advanced training needed to be offered to LPNs. Findings show that many structural characteristics have an impact on outcomes, as suggested by our model, and by focusing on such factors such as reimbursement and staffing hours it will be possible to alleviate and mitigate some of the health disparities that are plaguing nursing homes.

Limitations

There are limitations to this study that need to be addressed. First, this is a cross-sectional study which inevitably limits the ability to imply causality and only focuses on one point in time. Additionally, the Brown Long-term Care Focus data had some observations coded as “LNEs” in the data for the proportion of Black variable, this was done due to small number of minority residents in some nursing homes which would allow residents to be identified. As such, for this study LNEs were coded as zeros because they would have represented nursing homes with no to medium proportion of Black residents. Furthermore, the OSCAR data is self-reported which can lead to misrepresentations of biases, and while the MDS data is reported by the nursing staff it can also reflect biases. However, when nurses are properly trained to complete this assessment, the MDS may resemble the “gold standard” (Mor et al., 2003). Similar issues may occur with the OSCAR data. Lastly, we were unable to control for antipsychotic/chemical restraint use which may have also effected the use of physical restraints in nursing homes with higher proportions of blacks.

Conclusion

This study has served to contribute to literature on health disparities in physical restraint. Although the study did not find a racial/ethnic disparity in restraint use, results indicate a socio-economic disparity which could indirectly indicate racial/ethnic disparities. In future studies, examining antipsychotic/chemical restraint use may be useful in examining racial/ethnic disparities and may also effect the findings of restraint use in nursing homes with higher proportions of blacks. Further research should also consider the demographics of nurses in the nursing home in comparison to the level of physical restraint use.

Appendix A

(Figure 1)

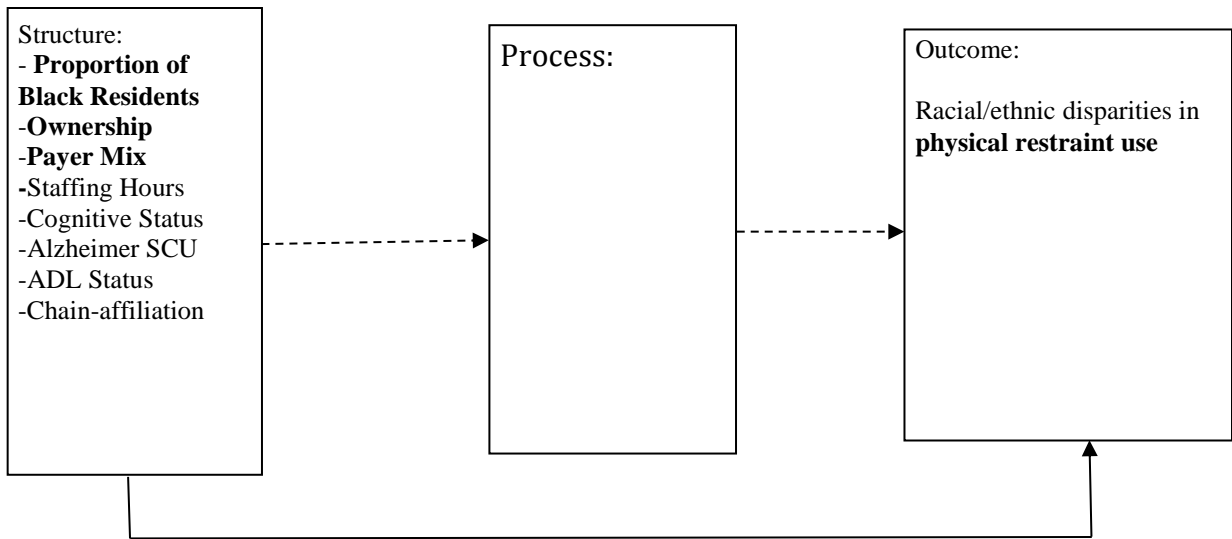


Figure 1: Depicts the Donabedian's Structure-Process-Outcomes Conceptual Framework. The dotted lines indicate the direct relationship between structure-process-outcomes. The solid line indicates the relationship between structure and process that will be examined for this study.

Appendix B

(Tables 1-3)

Table 1: Descriptive Statistics (N=14483)	
Variable	Mean (SD)/ Frequency (%)
Structure	
Proportions of Blacks ¹	
No/Medium Blacks	12964(89.51%)
High Blacks	1519 (10.49%)
Percent Medicaid Payers	61.51 (21.58)
Percent Medicare Payers	14.48 (12.86)
Ownership [±]	
For-Profit	10539(72.77%)
Not-For-Profit	3944(27.23%)
Total Beds	109.72 (59.68)
Presence of Alzheimer SCU ¹	
Yes	2500(17.26%)
No	11983(82.74%)
Chain Affiliation ¹	
Chain Affiliated	8163(56.36%)
Non-Chain Affiliated	6320(43.64%)
Staffing	
RN Hours per Resident Day	.40 (.46)
LPN Hours per Resident Day	.84 (.59)
CNA Hours per Resident Day	2.22 (1.06)
Outcome	
Proportions of Restraint Use	
No/Low Restraint Use	9819(67.80%)
High Restraint Use	4664 (32.20%)
Controls	
Average ADL ²	16.07 (3.58)
Percent Low CPS ³	36.56 (20.03)
Percent Mid CPS ³	49.91 (19.70)
Percent High CPS ³	11.41 (14.88)
Percent Female	67.97 (16.53)
Average Age	79.11 (11.57)

1 Indicates categorical variables with frequency and percentages

2 ADL scale 0(independent) - 28(total dependency)

3 Low CPS (0,1,2); Mid CPS (3,4); High CPS (5,6)

Table 2a: Descriptive Associations Between Categorical and Restraint Variables – Chi Squares (N=14483)		
	No/Low Restraint Use (n=9819)	High Restraint Use (n=4664)
Proportion of Blacks***		
High Blacks	64.58	35.42
No/Medium Blacks	68.17	31.83
Ownership***		
For-Profit	65.43	34.57
Not-For-Profit	74.11	25.89
Chain Affiliation*		
Chain Affiliated	68.46	31.54
Non-Chain Affiliated	66.95	33.05
Alzheimer SCU		
Yes	66.60	33.40
No	68.05	31.95

*p<.05, **p<.01, ***p<.001

Table 2b: Descriptive Associations Between Continuous and Restraint Use Variables – T-test (N=14483)		
Variable	No/Low Restraint Use Mean/ (SD) (n=9819)	High Restraint Use Mean/ (SD) (n=4664)
Structure		
Percent Medicaid Payers***	59.15 (22.70)	66.48 (18.02)
Percent Medicare Payers***	15.30 (13.99)	12.75 (9.85)
Total Beds***	108.3 (60.60)	112.8 (57.59)
Staffing		
RN Hours per Resident Day***	.42 (.46)	.35 (.44)
LPN Hours per Resident Day*	.82 (.64)	.85 (.45)
CNA Hours per Resident Day	2.23 (1.10)	2.20 (.98)
Control		
Average ADL***	15.87 (3.78)	16.49 (3.09)
Percent Low CPS***	37.20 (20.57)	35.21 (18.78)
Percent Mid CPS***	40.25 (20.05)	42.30 (18.86)
Percent High CPS***	10.58 (14.34)	13.15 (15.80)
Percent Female	68.01 (17.34)	67.89 (14.67)
Average Age*	79.24 (12.60)	78.83 (9.03)

*p<.05, **p<.01, ***p<.001

Table 3: Logistic Regression Model: The Association Between Nursing Home Characteristics and High Physical Restraint Use (N=14483)				
Variable	β	OR	SE	p-value
Structure				
No/Medium Proportion Blacks ¹	0.1253	1.133	0.0310	<.0001
Percent Medicaid Payers	0.0129	1.013	0.00134	<.0001
Percent Medicare Payers	-0.00663	0.993	0.00228	0.0037
Not-For-Profit ⁴	-0.1535	0.858	0.2585	<.0001
Total Beds	-0.00029	1.000	0.000338	0.3976
No Alzheimer SCU ²	-0.0602	0.942	0.0252	0.0168
Non-Chain Affiliated ³	0.0738	1.077	0.0191	0.0001
Staffing				
RN Hours per Resident Day	-0.6249	0.535	0.0735	<.0001
LPN Hours per Resident Day	0.2265	1.254	0.0484	<.0001
CNA Hours per Resident Day	0.0341	1.035	0.0210	0.1054
Controls				
Average ADL	0.0811	1.084	0.00712	<.0001
Percent Mid CPS ⁵	0.00267	1.003	0.00105	0.0109
Percent High CPS ⁵	0.00421	1.004	0.00139	0.0024
Percent Female	-0.00162	.998	0.00172	0.3470
Average Age	-0.0121	0.988	0.00319	0.0002

1 Reference group is high proportion of Blacks

2 Reference group is the presence of an Alzheimer SCU

3 Reference group is Chain-Affiliated facilities

4 Reference group is For-Profit facilities

5 Reference group is Percent Low CPS

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