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Employing Nurse Practitioners and Physician Assistants in Nursing Homes: Role of Market Factors

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Abstract

Nursing homes are increasingly using nurse practitioners (NPs) and physician assistants (PAs), with approximately 37.1% of them employing NPs/PAs in 2010. This study examines the role of market factors in the nursing homes' decision to employNPs/PAs. The data (2000-2010) was derived from LTCFocus. The binary dependent variable represented nursing homes' decision to employ NPs/PAsand the market characteristics constituted the independent variables. A panel logistic regression with facility random effects and state and year fixed effects was used for analysis. Results show that nursing homes operating in more competitive markets and those with higher Medicare managed care penetration are more likely to have NPs/PAs. Moreover, larger, multi-facility, and for-profit facilities and those with higher occupancy rate are more likely to have NPs/PAs. In contrast, nursing homes in counties with higher proportion of residents whose primary support is Medicaid and greater number of hospital-based facilities are less likely to have them. Nursing homes with greater resources employ NPs/PAsas a differentiation strategy in more competitive markets. Policymakers should explore strategies to incentivize use of NPs/PAs in resource-constrained nursing homes, as a potential mechanism to reduce disparities in care.

Keywords: Nurse Practitioners; Physician Assistants; Nursing homes; Market factors; Competition; and Porter's five forces model

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1. Introduction

Nursing homes have traditionally been the providers of various types of care needed by the elderly. Since, the Institute of Medicines' (IOM) report in 1986, the quality of care in nursing homes (IOM, 1986) has increasingly come under focus. Previous research has also found that physician staffing patterns can significantly affect the quality of care delivered in nursing homes (Karuza, & Katz, 1994). Physician involvement and / or the lack thereof might be one of the reasons for this poor quality of care (Caprio, 2006). As the demand for health care services increases with the aging of baby boomers, the pressure on the physician workforce engaged in delivering care in nursing homes willfurther increase (Caprio, 2006; University of California, 2006).

One of the potential strategies to meet the increasing demand for physician care could be employment of *nurse practitioners (NPs) and physician assistants (PAs)*. Other terms such as *mid-level providers* or *mid-level practitioners* are also used to describe this category of the health care workforce (Caprio, 2006). These terms primarily are indicative of the licensure requirements to practice and are used for role definition by healthcare organizations. These terms are used interchangeably for the purpose of this study. According to the National Sample Survey of Registered Nurses (NSSRN), approximately158,348 nurses prepared for the role of nurse practitioners in 2008 (U.S. Department of Health and Human Services, Health Resources and Services Administration, 2010). Similarly, the American Academy of Physician Assistants census from 2005 reported more than 66,000 physician assistants were eligible to practice in the U.S., out of which approximately 10% were engaged in long-term care provision (American Association of Physician Assistant (AAPA), 2005).

The purpose of this study is to examine the various market-level characteristics of nursing homes that employ nurse practitioners to deliver care to their residents. Since NPs/PAsmay potentially become significantly involved in the delivery of healthcare services in nursing homes, it might be useful to understand the role market factors play in nursing homes' decision to employ NPs/PAs.This would allow policy makers to formulate strategies incentivizing the use of NPs/PAsin nursing homes as an alternative to the increasing need for physician engagement in nursing homes.

2. Conceptual Framework

This study utilizes Porter's five forces model to analyze the different factors that could influence nursing homes' behavior related to the employment of NPs/PAs. Porter's five forces model provides a framework to analyze the industry environment and its competitive structure (Porter, 1980b) that could influence the nursing homes' hiring decision.

2.1 Porter's Five Forces Model

According to Porter (1980a), firms within an industry compete to achieve sustained competitive advantage. Five forces, namely threat of new entrants, threat of substitute products or services, bargaining power of the buyers, bargaining power of the suppliers and rivalry among existing firms, act in synergy to determine the competitive interactions within an industry. Thereby, affecting the competitive advantage the firms in that industry enjoy (Porter, 1985). Similarly, nursing homes compete with each other for hospital referrals and patients. So, they need to acquire resources that would allow them to achieve sustained competitive advantage. Staffing patterns in nursing homes as well as physician involvement have been shown to be associated with their quality of care (Everhart, Neff, Al-Amin, Nogle, & Weech-Maldonado, 2013; Hyer et al., 2011; Weech-Maldonado, Meret-Hanke, Neff, & Mor, 2004). Literature has also shown that NPs/PAs can deliver care of the quality equivalent to that of the physician (Kane, Flood, Bershadsky, & Keckhafer, 2004). The decision to employ NPs/PAs may offer nursing homes an alternative to physician-supervised care. It would allow them to deliver higher quality of care and achieve competitive advantage.

2.1.1 Threat of New Entrants

New entrants into the market introduce new pressures in the market by competing with incumbent firms for market share as well as resources. The increase in competition due to new entrants depends on the ease of market entry and the amount and strength of barriers to entry (Porter, 1980a). In the context of healthcare,government policies such as a certificate of need (CON) can facilitate or hinder new entry into the market by "amplifying or nullifying other entry barriers" (Starkey, Weech-Maldonado, & Mor, 2005).

In states with active CON laws, nursing homes are required to demonstrate that a clinically legitimate need for care could not be met by current providers and there is a need for new entrants into the market (Starkey et al., 2005). Therefore, government policies such as the certificate-of-need laws lower the threat of new entrants and reduce market competition. Consequently, the nursing homes located in the states with active CON laws face less competition and may not want to invest in employing NPs/PAs. Therefore, we hypothesize that,

Hypothesis 1: Facilities located in states with certificate-of-need are less likely to employ nurse practitioners and physician assistants.

2.1.2 Bargaining Power of the Buyers

Managed care penetration in the nursing homes' markets could be considered an expression of buyer power (Starkey et al., 2005). With increasing numbers of Medicare beneficiaries choosing to enroll in managed care plans, these plans represent animportant source of referrals for nursing homes. Approximately, 15.4 % of Medicare beneficiaries were enrolled in managed care plans in 2011 (MCOL, 2011). Managed care plans have greater bargaining power in the markets where there is greater managed care penetration. In such markets, managed care plans could potentially influence nursing homes' behavior by seeking improvement in their quality of care (Starkey et al., 2005). Nursing homes operating in such markets would then need to find ways such as employing NPs/PAs to enhance the quality of their care. Therefore,

Hypothesis 2a: Facilities located in markets with higher Medicare managed care penetration are more likely to employ nurse practitioners and physician assistants.

Proportion of residents with Medicaid as their primary support would also represent the bargaining power of the buyers. Medicaid, being the largest buyer of nursing home services, could significantly affect the competition in the market (Starkey et al., 2005). However, Medicaid reimbursement traditionally has been very low. Therefore, nursing homes prefer private-pay patients whom they could charge higher prices (Scanlon, 1980). Higher number of residents with Medicaid would imply fewer private-pay patients. Consequently, nursing homes operating in such markets may use their financial resources conservatively. They may continue to have physicians on call rather than incurring additional expense as wages by employing NPs/PAs. Therefore,

Hypothesis 2b: Facilities located in markets that have a higher proportion of residents with Medicaid as their primary support are less likely to employ nurse practitioners and physician assistants.

2.1.3 Threat of Substitutes

A product or service is referred to as a substitute if it can perform the same or a similar function as another product or service (Porter, 1980). Hospital-based skilled nursing facilities form one of the substitutes for skilled nursing care and compete with nursing homes for patients. The threat of substitution for nursing homes is high as the switching cost for the patients is small. Research has shown that skilled nursing patients tend to be sicker and need greater supervision (Thomas et al., 2012). Hospital-based facilities could satisfy these needs through better availability of physician time and resources. In order to compete with hospital-based skilled nursing facilities and maintain their competitive advantage, nursing homes would need to focus on ways of providing superior quality of care to cater to these patients. Employment of NPs/PAscould allow nursing homes to address the need for greater supervision for skilled nursing patients and ensure delivery of high quality of care. Therefore, we hypothesize that:

Hypothesis 3: Facilities located in markets with a higher percentage of hospital-based skilled nursing facilities are more likely to employ nurse practitioners and physician assistants.

2.1.4 Bargaining Power of the Suppliers

Another component of Porter's five forces model is the suppliers. Nursing homes' competitive position in the market is influenced by the availability of essential inputs or resources such as registered nurses. Supply of registered nurses to nursing homes could be measured in terms of number of RNs with active licenses per 1000 elderly. Greater supply of RNs per thousand elderly in the market would imply that more of them could train as NPs/PAs. With greateravailability of NPs/PAs in the market, nursing homes can employ NPs/PAsmore easily and at wages lower than physician's costs. Therefore, we hypothesize that

Hypothesis 4: Facilities located in markets with a higher number of registered nurses per thousand elderly are more likely to employ nurse practitionersand physician assistants.

2.1.5 Rivalry among Existing Firms

Since, organizations within an industry and operating in the same market, compete with each other to gain competitive edge, they influence each other's action (Pfeffer, & Salancik, 1978). They employ various strategies to acquire resources which would allow them to maintain their competitive advantage. The competitive strategies employed by these firms would depend on how concentrated the market is. Since, nursing homes compete with each other for patients and hospital referrals, their strategies would also depend on their market concentration (Starkey et al., 2005). Lower market concentration would indicate highly competitive environment which would lead to greater demand on a shared pool of resources such as patients (Banaszak-Holl, Zinn, & Mor, 1996). In order to maintain their competitive advantage, nursing homes in such markets would need to find ways of providing superior quality of care to satisfy their patients' needs. Employing NPs/PAs could allow nursing homes to cater to the needs of patients that need greater supervision. It would also reduce response time to emergencies in the absence of an in-house physician leading to better quality of care. Therefore, we hypothesize that:

Hypothesis5: Facilities located in more competitive markets are more likely to employ nurse practitioners and physician assistants.

3. Methods

3.1 Data

Provider-level, as well as county-level data, derived from Long-term care focus (LtcFocus) dataset, was used in the analyses. This data set contains information on market, organizational, resident and staffing characteristics of nursing facilities. Ltcfocus includes county-level information on competition (Herfindahl index), Medicare managed care penetration, residents with Medicaid as their primary support, supply of nurses per 1000 elderly, and hospital-based facilities in the county. It also includes information about organizational characteristics such as ownership, chain affiliation, staffing intensity, staffing mix, patient acuity, utilization of services and the payer mix (Ltcfocus, 2008). The data included in Ltcfocus is compiled from a variety of sources, including OSCAR, MDS and CMS (Ltcfocus, 2008).

Data related to CON laws were obtained from the website for National Conference of State Legislatures ((NCSL) 2012).

3.2 Sample

The study sample consists of all nonfederal, U.S. nursing facilities operating between 2000 and 2010 for a total of 13,6996 observationsover the 10-year period covered by the study.

3.3 Measures

3.3.1 Dependent Variable

Table 1 provides a listing of the dependent, independent and control variables included in the analyses and their definitions. As shown in table 1, the dependent variable represents nursing homes' decision to employ NPs/PAs (1 = did employ, and 0 = did not employ).

3.3.2 Independent Variables

The primary independent variables include the market characteristics of nursing homesnamelycertificate of need, Hospital-based skilled nursing facilities in the county, Medicare mamaged care penetration, Percent of residents in the county with Medicaid as primary support, nurses per 1000 elderly and competition(HHI).

Table 1. Listing and Definition of Dependent, Independent and Control Variables

Hypotheses	Five forces	Variables	Variable Definition
Independent variables			
Hypothesis 1	Threat of new Entrants	CON	States with certificate of need
Hypothesis 2	Threat of Substitutes	Hospital-based nursing facilities in the county	% of nursing facilities in the county that are hospital-based
Hypothesis 3	Bargaining power of the buyers	Medicare managed care penetration	Medicare managed care organization penetration rate
		Percent of residents with Medicaid at county level	Average proportion of facility residents whose primary support is Medicaid among all facilities in the county.
Hypothesis 4	Bargaining power of the suppliers	Nurses per 1000 elderly	Number of nurses (RNs & LPNs) in the county for every 1000 persons age 65 or older
Hypothesis 5	Rivalry among existing firms	Market competition (HHI)	Each nursing facility's total beds are squared and the sum for all facilities in the county is calculated. This sum is then divided by the sum of all county beds squared.
Control variables			
		Case Mix Index	Relative intensity of care of different nursing home populations for all residents admitted to the facility during the calendar year.
		Occupancy rate	Number of occupied beds in the nursing facility divided by the total number of facility beds
		Percent white	Proportion of residents admitted to the nursing facility in the calendar year who were White
		Percent minority	Proportion of residents admitted to the nursing facility in the calendar year who were minority (black & Hispanic)
	Staffing intensity	CNA hours per resident day	Total number of CNA hours divided by the number of residents in the facility
		LPN hours per resident day	Total number of LPN hours divided by the number of residents in the facility
		RN hours per resident day	Total number of RN hours divided by the number of residents in the facility
	Staffing mix	RN to nurses ratio	Ratio of number of RN FTEs divided by number of RN FTEs plus LPN FTEs
	Organizational characteristics	Size	Total number of beds reported by the nursing facility on the annual OSCAR survey.
		Chain affiliation	Indicates whether or not the nursing facility is part of a chain (1= yes; 0 = no)
		Ownership	Indicates whether or not the nursing facility is for-profit (1= for- profit; 0 = not-for-profit)
		Payer Mix	Proportion of residents in the nursing facility whose primary support is either Medicaid or Medicare. The proportion is calculated by divinding the total number of residents in the nursing facility whose primary support is Medicaid or Medicare by the total number of facility residents

3.3.3 Control Variables

Control variables included in the analysis were case-mix index, occupancy rate, percent white, percent minority, staffing intensity, staffing mix,and organizational characteristics such as nursing home size, chainaffiliation, ownership, and payer-mix. The variables controlling for the staffing mix and staffing intensity included ratio of registered nurses (RNs) to other non-RN staff, CNA hours per resident per day, LPN hours per resident per day, RN hours per resident per day respectively.

3.4 Analysis

Descriptive analysis was performed to analyze the distribution of variables. Correlation analysis of all independent variables did not show any evidence of mult-icollinearity. Bi-variate analysis was conducted to examine the differences in market characteristics of nursing facilities, which employed NPs/PAs versus those that did not employ them. Finally, a logistic regression, with facility random effects and state and year fixed effects, was used to examine the influence of market characteristics of nursing homes on their likelihood of employing NPs/PAs. SAS 9.3 and Stata 12 wereused to conduct the analyses. Statistical significance was considered at $p < 0.05$.

4. Results

4.1 Descriptive Statistics

Nursing homes that employ NPs/PAsrepresented 27.6% of the study sample. For-profit nursing homes comprised 67% of the sample, while other ownership types constituted 32.9% of it. Almost half of the nursing homes in the sample were part of a multi-facility chain (54.5%). The mean number of nursing-home beds in the sample was 105. Average acuity index of the nursing facilities in the sample was 11.1, with an average occupancy rate of 83.9%. Medicare, on average, formed 15.4% of the payer mix of the nursing homes in the study sample while Medicaid formed almost 60.5%. In terms of the staffing patterns, CNAs, on average, delivered 2.3hours of care per resident per day, LPNs delivered on average, 0.9hours of care per resident per day and the RNs, on average, delivered 0.5hours of care per resident per day. The mean RN to nurses ratio for the study sample was 0.3.

4.2 Bi-variate Analysis

Table 2 shows the comparison of organizational, patient-level and the staffing characteristics of nursing facilities that employ NPs/PAs and those that do not. Nursing homes that employed NPs/PAs are, on average, smaller (102 beds), for-profit and see fewer Medicare patients and more Medicaid patients, as compared to those that do not employ NPs/PAs.Moreover, there is a statistically significant difference between nursing facilities that employ NPs/PAsversus those who do not in terms of their average acuity index, and occupancy rate. Nursing facilities that employ NPs/PAs are characterized by higher acuity index and higher occupancy rate. Furthermore, nursing facilities that employed NPs/PAs had higher number of LPN hours per resident per day (0.8), lower number of CNA hours per resident per day (2.2), lower number of RN hours per resident per day (0.4) and lower RN to nurses ratio (0.3).

Table 2. Bi-variate Analysis of Market Factors

Variables	**Mean / Frequencies**	
	Do not Employ NPs/PAs	**Employ** NPs/PAs
Medicare managed care penetration	14.09	16.28
Percent of residents with Medicaid as primary support	64.95	64.08
Hospital-based facilities in the county	9.31	7.94
Nurses per 1000 elderly	41.23	47.545
Market competition (HHI)	0.21	0.17
Occupancy rate	84.14	85.95
Average Acuity index	11.03	11.21
Case-mix index	1.02	1.04
Percent minority	11.71	13.80
CNA hours per resident per day	2.21	2.17
LPN hours per resident per day	0.78	0.80
RN hours per resident per day	0.43	0.36
RN to nurses ratio	0.36	0.29
For-profit	71.24	26.76
%of Medicare	15.02	14.48
%of Medicaid	60.98	61.99

n: 14,863 (average number of nursing homes / year observations, 2000-2010)

4.3 Logistic Regression

Results of the logistic regression analysis, as presented in table 3, show that nursing facilities located in more competitive markets (O.R. = 0.34, p = 0.001), markets with higher Medicare managed care penetration (O.R. 1.01, P = 0.001) and those with lower proportion of residents that have Medicaid as their primary support (O.R. = 0.99, p = 0.001) have greater odds of employing NPs/PAs.

Therefore, hypotheses 2a, 2b, and hypothesis 5 are supported. Similarly, hypothesis 4 was supported since the markets with a higher number of registered nurses per 1000 elderly (O.R. = 1.01, p = 0.001) also had greater odds of employing NPs/PAs. The presence of certificate of need was not significantly associated with the likelihood of NPs/PAsemployment in nursing homes.

Among the control variables, nursing facilities with higher occupancy rate (O.R = 1.01; p = 0.001) have greater odds of employing NPs/PAs. Similarly, the nursing facilities with higher number of LPN hours per resident per day (O.R. = 1.27, p = 0.001) had higher odds of employing NPs/PAs. Moreover, larger (O.R = 1.01; p = 0.001), chain affiliated (O.R. = 1.37, p = 0.001) and for-profit (O.R. = 1.15, p = 0.001) have greater odds of employing NPs/PAs.

Table 3. Logistic Regression Analysis

Dependent variable: nurse practitioners and physician assistants (1 = do employ NPs/PAs; 0 = do not employ NPs/PAs)		
Independent Variables	**Odds ratio**	**p-values**
CON	0.89	0.920
Hospital-based nursing facilities in the county	0.99***	0.001
Medicare managed care penetration	1.01***	0.001
Percent of residents with Medicaid as primary support	0.99***	0.001
Registered Nurses per 1000 elderly	1.01***	0.001
Market competition (HHI)	0.34***	0.001
Control Variables		
Case Mix Index	1.08	0.479
Occupancy rate	1.01***	0.001
Percent minority	0.99	0.318
CNA hours per resident day	0.98	0.218
LPN hours per resident day	1.27***	0.001
RN hours per resident day	0.97	0.749
RN to nurses ratio	1.16	0.311
Size	1.01***	0.001
Chain affiliation	1.37***	0.001
For-profit status	1.15***	0.001
Medicaid	1.01	0.445
Medicare	1.01	0.094
n: 14,863 (average number of nursing homes / year observations, 2000-2010) *** p-value < 0.01, **p-value <0.05		

5. Discussion

The demand for health care services in the long-term care sector is on the rise, with an increase in the number of elderly as the baby boomers age. Given the limited engagement of physicians in the nursing homes, it is essential for nursing homes to look for alternatives to physician provided care in order to fulfill this increasing demand for high-quality care. NPs/PAs may potentially be an alternative to physicians and may become significantly involved in the delivery of healthcare services in nursing homes.

Therefore, it might be useful to understand the market characteristics of the nursing facilities that already employ NPs/PAsversus those who do not. The purpose of this study was to examine the role of market factors in nursing homes' decision to employ NPs/PAs or to deliver care to their residents versus those who do not.

Findings of this study are consistent with those of other researchers (Intrator et al., 2005; Rosenfeld, Kobayashi, Barber, & Mezey, 2004). For instance, the percentage of nursing facilities employing NPs/PAswas found to be27.61%, which is close to that reported by Intrator et al. in their study (2005). According to the results, nursing homes employ NPs/PAsas a differentiation strategy in more competitive markets and those with higher managed care penetration.

Greater availability of slack resources due to chain affiliation and larger nursing home size were also significantly associated with the employment decision. Previous research has shown that use of NPs/PAscould significantly improve the quality of care provided in nursing homes since these NPs/PAscan provide care equivalent to that of physicians (Garrard et al., 1990; Kane et al., 1991; Weiland, Rubenstein, Ouslander, & Martin, 1986). Consequently, nursing homes that have more resources at their disposal by virtue of them being part of multi-facility chains or larger, would most likely try to employ NPs/PAs, to ensure delivery of high quality of care to their residents. Similarly, for-profit nursing homes would tend to employ them to provide higher quality of care to maintain a favorable position or their competitive advantage in the market.

Previous research has also shown that staffing levels are significantly associated with quality of care delivered in healthcare organizations. Therefore, if the nursing facilities have higher acuity patients, they would need to have more number of skilled personnel involved in delivery of care. Such nursing homes would be more likely to employ NPs/PAs to fulfill their patients' need for greater care. The use of NPs/PAs could help address the need for greater physician engagement in nursing homes. So, the study findings could be utilized to evaluate and design policies incentivizing the use of NPs/PAsin smaller and resource-constrained nursing homes.

6. Conclusion

This study found a significant association between market characteristics of nursing facilities and their decision to employ NPs/PAs. However,lack of availability of detailed data on NPs/PAslimited the scope of the study. Ltcfocus dataset provides this data only in terms of whether or not the facility employs NPs/PAs.Their response does not reflect the degree of care provided specifically by NPs/PAs. Availability of data such as the proportion of Nurse practitioner and Physician assistant full-time equivalents (FTEs) could allow for in-depth analysis of the impact ofemploying NPs/PAson nursing homes' quality of care as well as their financial performance. This study could also be extended, subject to availability of data, to the evaluation of the association of employing NPs/PAswith patient satisfaction, specifically among nursing homes with high acuity patients as well as disparities in quality of care.

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