Factors Predicting Adoption of the Nurses Improving Care of Healthsystem Elders Program

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Background: Registered nurses are often underprepared with the knowledge and skills to care for hospitalized older adult patients. One strategy to bridge this gap is for hospitals to adopt the Nurses Improving Care for Healthsystem Elders (NICHE) program: A nurse-led interdisciplinary organizational intervention to improve care of hospitalized older adults.

Objectives: This study aimed to identify the market, organizational and managerial, and sociotechnical factors associated with the adoption of NICHE among U.S. hospitals in order to understand factors that promote and inhibit the adoption of models to improve care for elders and to provide a basis for future studies that evaluate the effects of NICHE participation on patient outcomes.

Methods: We used an observational, retrospective design, linking three national administrative data sources, in a secondary analysis. Data included the 2012–2013 American Hospital Association Annual Survey, NICHE database, and the American Nurses Credentialing Center Magnet database. Multivariate logistic regression models were completed at the hospital level ($n = 3,506$).

Results: Statistically significant variables associated with hospital adoption of the NICHE program include using a medical home model, being in a network, having a pain services program, being in an urban location, and having over 100 beds.

Discussion: Understanding factors that promote the adoption of organizational interventions like NICHE holds promise for accelerating the use of evidence-based clinical practices to promote health, function, and well-being for older hospitalized adults. Our results provide a foundation for assessing the effects of NICHE participation on patient outcomes by identifying factors that account for membership in NICHE.

Key Words: adoption of innovation ● education and training ● nursing ● selection bias ● workforce issues

The 78-million-member American baby boom generation born between 1946 and 1964 began turning 65 in 2011. The number of people age 65 and older in the United States is projected to be 88.5 million—more than double its projected population of 40.2 million in 2010 (Vincent & Velkoff, 2014). Furthermore, globally, the proportion of older people is rising along with the average life span (National Institutes of Health, 2011). This explosive rate of aging will place greater demands on healthcare systems. In turn, improving the nursing care of hospitalized older adults is particularly needed given the high utilization rates, complications, and costs associated with healthcare services for older adults.

The care of older adults is complex, and high-quality services for this vulnerable population requires a holistic and coordinated approach (Davis et al., 2015; Malone, Capezuti, & Palmer, 2015; McCarthy, Ryan, & Klein, 2015). Several promising patient-centered care models for older adults exist across the continuum of care—home, primary care, hospital, long term, and palliative care—that demonstrate improvements in important outcomes including clinical quality; costs; and client, family, and provider satisfaction (Capezuti & Brush, 2009; Malone et al., 2015).

Despite the promise of these care models to meet the needs of an aging population, hospitals and other provider organizations have not widely adopted them (Malone et al., 2015). To promote the uptake of evidence-based nursing care for older adults, we seek to understand the adoption of a well-established geriatric care model: The Nurses Improving Care for Healthsystem Elders (NICHE) program. Extending previous studies examining NICHE implementation (Boltz, Capezuti, & Shabbat, 2010; Boltz et al., 2013; Mezey et al., 2004), we seek to answer the research question: What hospital and community characteristics predict the adoption of an evidence-based program to promote the quality of nursing care for older adults in U.S. hospitals?

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By focusing on the factors associated with NICHE adoption, we make two important contributions to the literature. First, we identify the organizational and community characteristics of U.S. acute care hospitals that joined the NICHE program in 2012–2013. Identifying the characteristics of NICHE hospitals provides managers and policymakers with information to promote the adoption of this and similar programs.

Second, identifying factors associated with NICHE adoption provides information needed for valid evaluations of the relationship between program adoption and patient outcomes. In other words, we need to account for possible selection bias in evaluations of the effects of NICHE on hospital and nurse performance. Controlling for factors that promote membership in the NICHE program will create a more "apples to apples" comparison of NICHE versus non-NICHE hospitals, disentangling the NICHE effect from other potential confounding variables.

For example, perhaps hospitals that specialize in services for elders are more likely to join NICHE; this specialization, as opposed to NICHE training, could account for superior patient outcomes compared to non-NICHE hospitals.

Nurses Improving Care for Health System Elders (NICHE)

The NICHE is an evidence-based organizational change and practice development program that seeks to enhance the care of hospitalized older adults by developing nurses' clinical competence in the specialized needs of older adults and positioning nurses as leaders to institutionalize clinical processes that address the complexity of care associated with aging. The NICHE program comprises three interrelated components:

1. nursing care models to support specialized geriatric care delivered by nurses, nursing assistants, and other frontline clinical staff;
2. research-based clinical practice protocols for common nursing problems and syndromes experienced by hospitalized elders; and
3. staff development, quality improvement, and care coordination models to identify barriers and promote effective geriatric care within and across hospital nursing units.

Currently, there are 643 acute care NICHE hospital members in the United States, Singapore, Canada, Mexico, and Bermuda. Hospitals join the NICHE program by purchasing an annual membership. The annual membership includes leadership development programs for advanced practice nurses and unit-level clinical leaders, continuing professional education modules and webinars on common nursing problems affecting older adults for frontline nurses and nursing assistants, and practice change consultation to accelerate program implementation. Member organizations receive feedback on changes in nurses' knowledge, attitudes, and perceptions of the practice environment through a survey research benchmarking service. Lastly, NICHE hosts an annual conference to cultivate a community of geriatric nursing practice to identify, promote, and spread best practices in the care of older adults across member sites. Nurses at member hospitals gain access to the education programs and practice development materials via an online learning management platform and receive American Nurse Credentialing Center (ANCC) continuing education contact hours for completing the courses (Capezuti, Briccoli, & Boltz, 2013).

To date, studies about NICHE adoption have focused on identifying organizational processes and structures to support the implementation of nurse-led geriatric care once a hospital has joined the program (Boltz et al., 2008, 2010, 2013; Mezey et al., 2004). Preliminary evidence suggests that implementation of the NICHE program does improve nurses' clinical knowledge and changes their perceptions of the practice environment to value and support age-sensitive care (Boltz et al., 2008, 2010, 2013). In this article, we extend knowledge about the adoption of NICHE by focusing on the market, organizational and managerial, and sociotechnical characteristics that distinguish hospitals that joined the program in 2012–2013 from others.

Conceptual Framework

We use three distinct conceptual models from organization and management theory to guide our variable selection and identify hospital and community characteristic to account for the adoption of NICHE (Figure 1). The first conceptual model is the *market model* that focuses on the dynamics of local competition and social networks in the adoption of innovations. The market model focuses on the resources available to managers to offer services to consumers and the relationships among organizations that shape the competitive environment. We expect that hospitals with high daily census and those certified to receive Medicare reimbursement are likely to offer specialized services for older adults and therefore are more likely to adopt NICHE. Private insurance coverage, such as Blue Cross/Blue Shield, for hospital and physician services, provides a potential revenue source for hospitals to develop specialized services for older adults and is likely to be an enabling condition for hospitals to develop age-friendly programs and services for older adults.

Prior research points to the role of market structure, in the form of organizational networks, and monopoly power, in the form of sole provider organizations, as factors that promote or inhibit the adoption of innovation by healthcare delivery organizations (Damanpour, 1991; Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004; Rye & Kimberly, 2007). Connections among organizations shape the social environment that leads the manager to learn about potentially useful innovations and evidence-based practices used by their colleagues and peers that, in turn, influence adoption decisions (Rye & Kimberly, 2007). Hospitals that are part of network arrangements or serve as a regional referral centers may be more likely to adopt NICHE because they are likely to distribute patients and services to meet the demand for specialized healthcare services across the organizations participating in these collaborative strategic arrangements (Beckham, 2014).
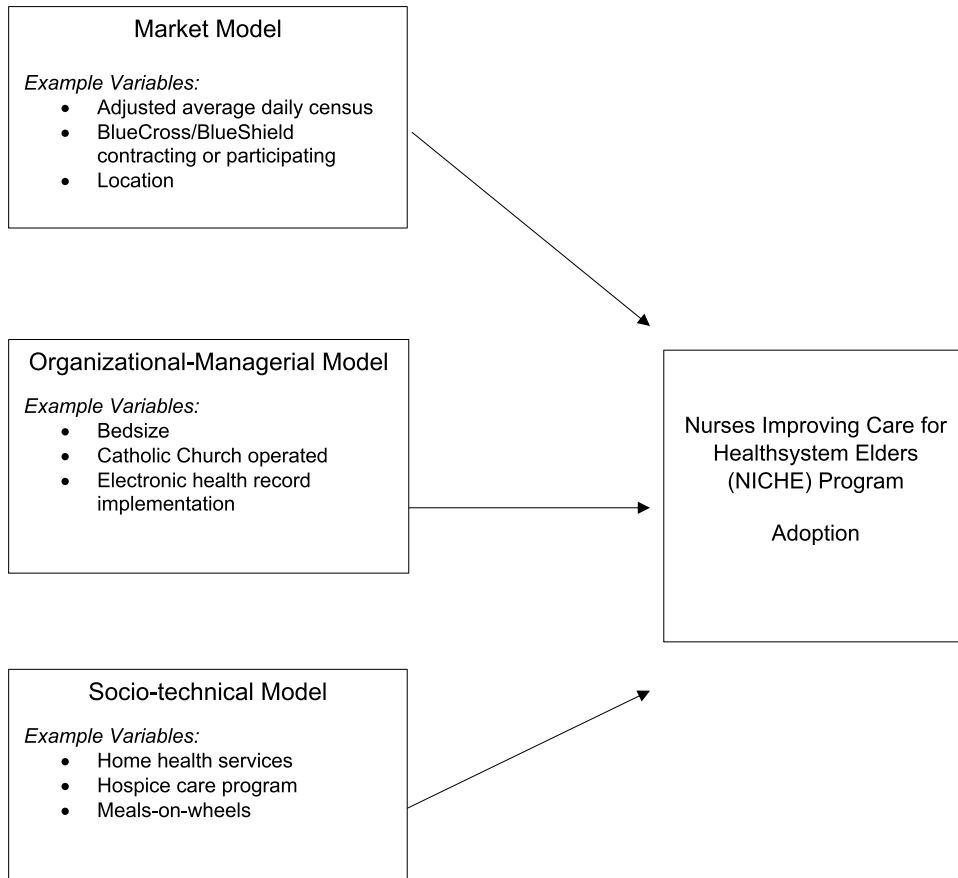
FIGURE 1. Conceptual framework and variables.

In a similar fashion, sole provider organizations, by virtue of their monopoly power, may elect to adopt NICHE to meet the demand for specialized services for older adults in the geographic markets in which they operate. Location is the last market factor in our conceptual model. We expect that hospitals in urban locations are likely to adopt NICHE due to the concentration of older adults living in metropolitan areas that drive the demand for services (Vincent & Velkoff, 2014).

Second, we draw on the *organizational–managerial* model that emphasizes key organizational characteristics of a potential host organization, including support for an innovation among managers and clinicians. This model considers the role of internal organizational environments that are conducive to either promoting or inhibiting the adoption of innovations (Klein & Sorra, 1996; Rye & Kimberly, 2007). Prior research establishes that hospital ownership, religious affiliation, teaching status, and bed size are important organizational characteristics that promote the adoption of large-scale evidence-based nursing practice improvement programs in acute care settings (Abraham, Jerome-D'Emilia, & Begun, 2011; Lasater, Richards, Burns, & McHugh, 2017). Thus, we expect that hospitals that are organized as not-for-profit enterprises and affiliated with the Catholic church are more likely to

join NICHE. Similarly, organizational capacity, as measured by hospital bed size, is likely a necessary organizational support necessary to adopt specialized services for older adults. We hypothesize that hospitals with better nurse staffing ratios and those with medical residents are likely to join NICHE because there are enough staff members to attend to the complex care needs of older adults.

Management commitment to service excellence, reflected by participation in national accreditation and voluntary designation programs, is a likely organizational characteristic predicting NICHE program adoption. We anticipate that hospitals with accredited rehabilitation programs are likely to join NICHE because they are both skilled at providing services to reduce functional decline—a common hazard for older adults during episodes of acute hospitalization—and have established units to address the nursing needs of older adults across levels of service intensity (Naylor, Kurtzman, & Pauly, 2009; Shay & Ozcan, 2013). Consistent with prior research, we anticipate that hospitals with Magnet recognition from the ANCC, a voluntary designation reflecting nursing excellence, are more likely to adopt NICHE because the professional practice environment in these organizations is conducive to developing nurse-led services and the use of evidence-based clinical practices (Stimpfel,

Sloane, McHugh, & Aiken, 2016). Finally, we anticipate that hospitals with electronic health records are likely to adopt NICHE because computerized records support care coordination and serve as a repository for clinical quality and performance data, which enable the adoption of large-scale organizational quality improvement interventions (Alexander, Weiner, Shortell, Baker, & Becker, 2006).

The third conceptual framework is the *sociotechnical* model that emphasizes how well an innovation matches the work needs and characteristics of its intended users. The sociotechnical model examines the interrelationships between and among workers, the work environment, and the characteristics of the technology to be adopted (Appelbaum, 1997). In this model, organizations are more likely to adopt innovations that fit existing work routines and complement the capabilities of the clinical staff. Thus, we expect that hospitals with established services for older adults are more likely to adopt NICHE to ensure that the nursing workforce has the knowledge, skills, and abilities to support and scale geriatric services. We hypothesize that hospitals with established geriatric medicine programs, Meals on Wheels, palliative care programs, hospice services, home healthcare services, pain management services, skilled nursing services, and primary care medical home programs are more likely to adopt NICHE than others that do not.

METHODS

Design

We used an observational, retrospective design with three sources of data. A secondary analysis was conducted with the 2012–2013 American Hospital Association (AHA) Annual Survey, NICHE database of member hospitals, and ANCC Magnet hospital recognition program database. The AHA Annual Survey is a widely used national survey, achieving a response rate over 80%, and includes a variety of hospital structural characteristics. It the gold standard for research on the structure and organization of the U.S. hospital sector. The NICHE database includes the indicator variable for membership in the NICHE program and is linked to the AHA using the identifier variable. Finally, the ANCC Magnet database was constructed using the ANCC website, which includes a listing of all Magnet hospitals and year of credentialing. The Magnet data base hospitals were also linked with common identifiers (i.e., hospital name, address) to the AHA and NICHE data sets.

We began by merging our three data sources, which resulted in 6,282 hospitals. Then we restricted the data to include only new NICHE hospitals during our study period (2012–2013), resulting in a sample of 5,798 hospitals. Because NICHE focuses on the care of older adults, we further restricted the sample to general, adult acute care hospitals, excluding specialty or children's hospitals. This resulted in our final analytic sample of 3,506 hospitals, of which 115 were

NICHE members. We selected 2012–2013 for our analysis because it was the first year that the clinical leadership and continuing nursing education courses were offered exclusively in an online format, thus representing a fundamental shift in the NICHE program design. A diagram illustrating the data sources, merging, and inclusion numbers is found in Figure 2.

Measures

We used a binary variable, NICHE member or nonmember, as our dependent variable from the NICHE database. We included all new NICHE member hospitals for 2012–2013. Our independent variables were added from the 2012–2013 AHA Annual Survey based on our conceptual framework and were clustered into categories. As shown in Table 1, eight variables were included in the market category, and nine variables were included in both the organizational–managerial and sociotechnical categories.

Analysis

Analysis began with descriptive statistics for all of the major variables including means and standard deviations for continuous variables and frequencies and percentages for categorical variables, along with assessments of missing data. No variable exceeded 10% of missing data. Listwise deletion was employed in modeling. We conducted correlations among the independent variables. Next, we conducted bivariate and then multivariate logistic regression models to determine predictors of NICHE adoption. Goodness of fit and predictive indices were assessed using corrected R^2 and receiver operator curve (ROC) and Hosmer–Lemeshow test, respectively, which indicated adequate model fit (ROC curve = 0.86, adjusted R^2 = .24, Hosmer–Lemeshow p = .84). All analyses were conducted in SAS v9.4, with statistical significance considered at the $p < .05$ level. The institutional review board at the researchers' institution reviewed this research study and deemed it exempt.

RESULTS

The characteristics of the hospitals in our sample (n = 3,506) are found in Table 1. The NICHE hospitals are compared to the non-NICHE hospitals, with several notable differences between the two groups. First, the NICHE hospitals were larger than non-NICHE hospitals in terms of bed size (318 vs. 146 beds, on average). Corresponding with a greater number of beds, the staffing (nurses, physicians, and resident physicians) and average daily census were higher in the NICHE hospitals. The NICHE hospitals were also more likely to be in urban locations (91% vs. 53%) and not for profit (80% vs. 60%) than non-NICHE hospitals. Finally, aligned with NICHE's focus on older adults, many services related to care of older adults were found in greater proportions in NICHE hospitals than non-NICHE hospitals, such as specialized geriatric services, hospice program, palliative care program, and social work services.
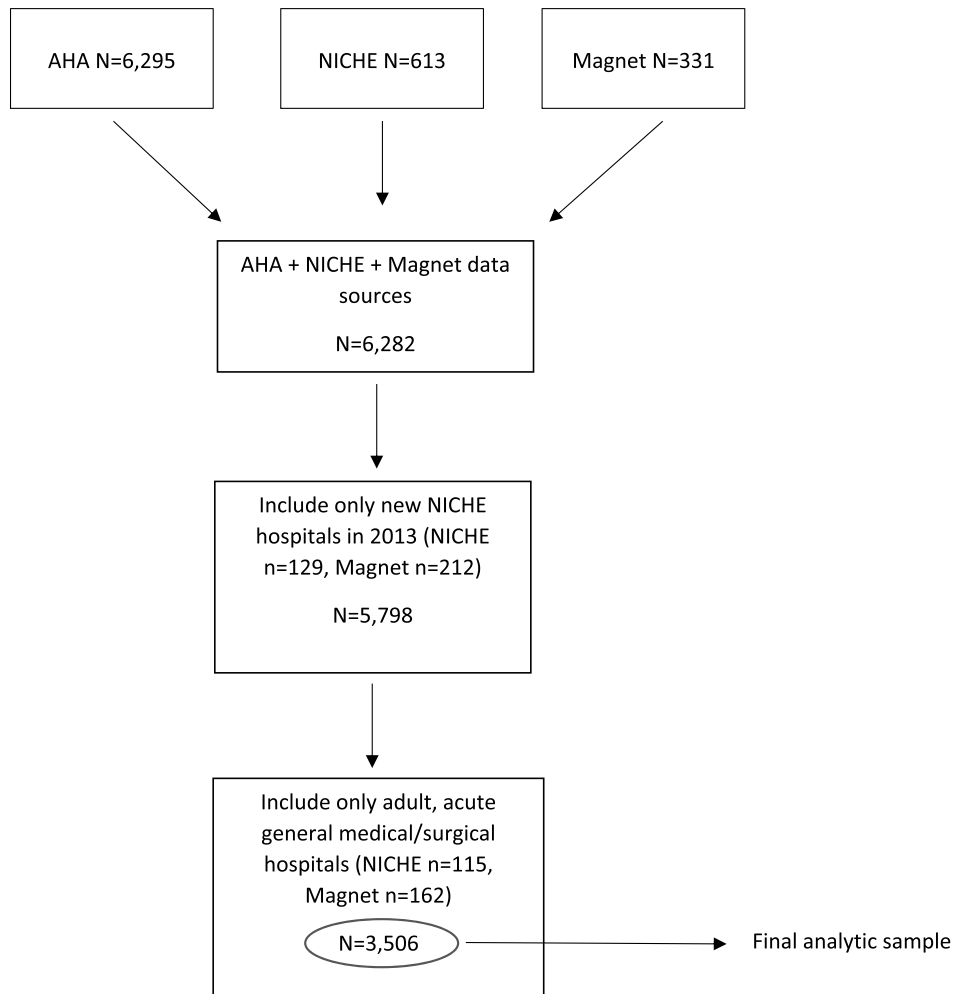
FIGURE 2. Data sources and linkages.

The results of our multivariate analyses are found in Table 2, with logistic regression model odds ratios and 95% confident intervals. Our analyses suggest that variables from each of the three conceptual models are significantly associated with NICHE adoption. Hospitals with a medical home model in place, being in a network, having a pain services program, being in an urban location, and having a bed size over 100 were predictors of NICHE adoption. The largest adjusted odds ratio was 2.7 (95% CI [1.03, 7.2]) for urban status, with hospitals in urban compared to rural locations being associated with NICHE adoption.

DISCUSSION

This study's primary aim was to develop information that future researchers could use to account for possible selection bias in evaluations of the effects of NICHE on hospital and nurse performance. Before examining patient outcomes that may be associated with hospital and nurse participation in NICHE versus non-NICHE hospitals, we need to identify factors that are associated with NICHE adoption.

Consistent with prior research on the adoption of innovations by healthcare delivery organizations, the market variable urban location and network membership, and the organizational–managerial variable bed capacity significantly predicted the adoption of the NICHE program in U.S. hospitals in 2012–2013 (Goes & Park, 1997; Rye & Kimberly, 2007). In the case of the NICHE program adoption, urban locations are likely to have a higher concentration of older adults, who, in turn, are in need of hospital care. According to the latest census figures, older adults are more likely to live in urban settings (Vincent & Velkoff, 2014). It may be that hospitals adopted the NICHE program to address the healthcare needs of older adults in these markets.

Hospitals that were members of networks and bed capacity of over 100 beds were more likely to adopt the NICHE program than others. In recent years, hospital managers have pursed merger, acquisition, and alliance strategies to concentrate market power, gain access to capital resources, and create organizational networks to support organizational learning and innovation (Beckham, 2014; Dubbs, Bazzoli, Shortell, &

TABLE 1. Hospital Characteristics

Category	NICHE hospital n (%)	Non-NICHE hospital n (%)
Market		
Adjusted average daily census, *M* (*SD*)	405 (361)	176 (212)
BlueCross/Blueshield	109 (95)	3,224 (95)
Location, urban	105 (91)	1,781 (53)
Medicare certified	113 (98)	3,319 (98)
Network	66 (59)	1,312 (40)
Regional referral center	3 (3)	253 97)
Sole community provider	5 (4)	375 (11)
Organizational–managerial		
Accredited by Commission on Accreditation of Rehabilitation Facilities	18 (16)	265 (8)
Bed size, *M* (*SD*)	318 (242)	146 (170)
Catholic Church operated	21 (18)	398 (12)
Electronic health record, full implementation	73 (75)	1,736 (60)
Full time equivalent RN, *M* (*SD*)	609 (559)	242 (353)
Medical residents, *M* (*SD*)	55 (157)	16 (27)
Member of Council of Teaching Hospitals	18 (16)	153 (5)
Magnet status	21 (18)	141 (4)
Ownership, not for profit	92 (80)	2,035 (60)
Sociotechnical		
Home health services	30 (26)	740 (22)
Hospice program	39 (34)	752 (22)
Meals on Wheels	13 (11)	347 (10)
Medical home model	51 (49)	555 (19)
Palliative care management program	75 (65)	329 (10)
Pain management program	98 (85)	1,802 (53)
Skilled nursing care	23 (20)	908 (27)
Social work services	113 (98)	2,861 (84)
Specialized geriatric services	74 (64)	1,311 (39)

Note. Data from the American Hospital Association Annual Survey of Hospitals, Nurses Improving Care for Healthsystem Elders (NICHE) program, and American Nurses Credentialing Center Magnet recognition program. *n* = 115 NICHE hospitals; *n* = 3,506 non-NICHE hospitals.

Kralovec, 2004). Prior research on the diffusion of innovation in healthcare provider organizations establishes that organizational and interpersonal networks among the managers and other leaders facilitate the adoption of innovation (Rye & Kimberly, 2007). Future work on the adoption of NICHE in acute care hospitals should examine the role of individual-level networks and connections between and among hospitals in an effort to more fully explain adoption patterns of this evidence-based, nurse-led practice model (Rye & Kimberly, 2007).

Of the variables associated with the sociotechnical model, hospital participation in the medical home model and the presence of a pain management program significantly predicted hospital adoption of the NICHE program. Drawing on the tenants of sociotechnical theory, the NICHE model philosophy of patient-centered interdisciplinary-based care aligns with the organizational culture, values, and prescribed best practices associated with the primary care medical home model (also known as patient-centered medical home). The medical home model seeks to promote primary care services that are patient centered, comprehensive, team based, coordinated, accessible, and focused on quality and safety. It has become a widely accepted model for how primary care should be organized and delivered throughout the healthcare system (Jackson et al., 2012; Patient-Centered Primary Care Collaborative, 2017). Improved care coordination across levels of care is a particular hallmark of the primary care medical home model. It is likely that hospitals developing coordinated primary care services must attend to the quality and coordination of the inpatient services to create cohesive care transitions across inpatient, outpatient, and community settings. Although the NICHE program emphasizes on staff development, quality improvement, and care coordination models to identify barriers and promote effective geriatric care within and across hospital nursing units, it is likely that hospitals adopt the NICHE program to develop the nurse workforce as part of a larger strategy to enhance the patient experience and overall quality of patient care services.

TABLE 2. Association of NICHE Adoption With Hospital Characteristics

Category	OR	95% CI
Market		
Adjusted average daily census	1.00	[1.00, 1.01]
BlueCross/Blueshield	1.32	[0.44, 3.94]
Location, urban	2.71*	[1.03, 7.12]
Medicare certified	0.49	[0.06, 4.23]
Network	1.68*	[1.07, 2.63]
Regional referral center	0.25	[0.06, 1.13]
Sole community provider	1.67	[0.57, 4.87]
Organizational–managerial		
Accreditation by Commission on Accreditation of Rehabilitation Facilities	0.81	[0.45, 1.45]
Bed size	2.62*	[1.12, 6.14]
Catholic Church operated	0.96	[0.55, 1.71]
Electronic health record, full implementation	1.42	[0.86, 2.32]
Full-time equivalent RN to bed ratio	1.27	[1.12, 6.14]
Medical resident to bed ratio	0.87	[0.35, 2.16]
Member of Council of Teaching Hospitals	0.73	[0.33, 1.60]
Magnet status	1.51	[0.8, 2.73]
Ownership, not for profit	1.66	[0.78, 3.55]
Sociotechnical		
Home health services	0.60	[0.35, 1.03]
Hospice program	1.42	[0.85, 2.36]
Meals on Wheels	1.20	[0.63, 2.3]
Medical home model	1.83*	[1.13, 2.96]
Palliative care management program	1.15	[0.64, 2.06]
Pain management program	2.05*	[1.00, 4.20]
Skilled nursing care	1.00	[0.57,1.74]
Social work services	2.57	[0.33, 19.8]
Specialized geriatric services	1.50	[0.90, 2.48]

Note. Data from the American Hospital Association Annual Survey of Hospitals, Nurses Improving Care for Healthsystem Elders (NICHE) program, and American Nurses Credentialing Center Magnet recognition program. n = 3,391 non-NICHE hospitals.
*p < .05. Model fit: ROC curve = 0.86, adjusted R^2 = .24.

Lastly, hospitals with dedicated pain management programs were more likely to adopt NICHE than others. Chronic pain is a common problem among older adults stemming from chronic diseases such as arthritis and other musculoskeletal conditions, neuropathy, or cancer (Gold & Roberto, 2000; Molton & Terrill, 2014), and nurses play a role in identifying and managing acute and chronic pain in older adults (Arnstein, Herr, & Butcher, 2017; Gatchel, McGeary, McGeary, & Lippe, 2014). Increasingly, hospitals are developing interdisciplinary chronic pain management programs to address this growing care need (Gatchel et al., 2014). It is likely that hospitals with pain management programs are developing interdisciplinary approaches to meet the complex physical, social, and psychological needs of people living with both acute and persistent pain. The NICHE model emphasizes nurses' roles in providing evidence-based assessment and intervention strategies for a range of common geriatric syndromes, among which is persistent pain. From the perspective of sociotechnical theory, the NICHE program characteristics are likely to align with the systems, structures, and the associated work processes required

to provide holistic and patient-centered pain management services designed for the unique needs of an aging population and thus account for the program adoption by these hospitals.

Future work on the adoption of the NICHE program by acute care hospitals should consider the interrelationships among specialized senior care services and the ways that the nursing workforce under the auspices of the NICHE practice development model not only supports age-friendly care but also influences organizational design and professional roles to meet these strategic organizational goals. Next steps of this work should include longitudinal analyses to further refine and confirm the characteristics associated with NICHE adoption so that rigorous patient outcomes analyses can be conducted.

The limitations of this study should be taken into account when interpreting the results. As a starting point for understanding organizational, technical, and market characteristics that promote or hinder the adoption of the NICHE program in acute care hospitals, we used cross-sectional data. We identified five variables that differentiate hospitals that adopted the NICHE program as compared to the population of general

acute care hospitals in the United States. Longitudinal studies examining the adoption of the NICHE program in acute care hospitals are warranted to more fully understand causal relationships among the variables and NICHE adoption. Using newer data to confirm this study's findings is also warranted, particularly given the changing market dynamics associated with healthcare reform efforts over the last 5 years. Finally, as with any secondary analysis, not all variables that may be related to NICHE adoption were able to be included in the study, given the administrative data sets, such as individual characteristics of the nurses or the unit's organizational culture.

Conclusion

The global aging phenomenon is projected to affect all aspects of healthcare services. Achieving high-quality care for older adults requires specialized skills and training that many healthcare providers lack. One strategy nurse managers may consider to improve care for older adults is adopting evidence-based geriatric models, like the NICHE program, which seek to provide education, training, and leadership development for nurses providing care to older adults. We develop information that future research could use to account for possible selection bias in evaluations of the effects of NICHE on hospital and nurse performance. The results of our study point to a number of important organizational, technical, and market variables that nurse managers and clinical leaders can use to assess organizational capacity to adopt programs such as NICHE. Moreover, researchers interested in understanding a range of outcomes attributable to age-friendly care initiatives can use our findings to develop regression models that account for selection bias associated with managers' decision to adopt organizational and workforce development programs such as NICHE.

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