



Linking Unit Collaboration and Nursing Leadership to Nurse Outcomes and Quality of Care

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OBJECTIVE: The objective of this study is to identify the effects of unit collaboration and nursing leadership on nurse outcomes and quality of care.

BACKGROUND: Along with the current healthcare reform, collaboration of care providers and nursing leadership has been underscored; however, empirical evidence of the impact on outcomes and quality of care has been limited.

METHODS: Data from 29 742 nurses in 1228 units of 200 acute care hospitals in 41 states were analyzed using multilevel linear regressions. Collaboration (nurse-nurse collaboration and nurse-physician collaboration) and nursing leadership were measured at the unit level. Outcomes included nurse job satisfaction, intent to leave, and nurse-reported quality of care.

RESULTS: Nurses reported lower intent to leave, higher job satisfaction, and better quality of care in units with better collaboration and stronger nursing leadership.

CONCLUSION: Creating a care environment of strong collaboration among care providers and nursing leadership can help hospitals maintain a competitive nursing workforce supporting high quality of care.

Improving the nurse work environments has been recommended as a system-level intervention to im-

prove quality of care and patient safety.¹⁻³ It also is a key factor for retaining a competent nursing workforce.⁴ The nurse work environment is multifaceted and consists of a set of organizational characteristics that can facilitate or constrain professional nursing practice.⁵ Among these attributes, collaboration among healthcare professionals and nursing leadership are 2 essential elements.^{6,7} In the Institute of Medicine's report of *The Future of Nursing: Leading Change, Advancing Health*,³ interdisciplinary partnership between nurses and other healthcare professionals and nursing leadership were underscored as challenges as well as opportunities to advance nursing and improve quality of healthcare.

Review of the Literature

A literature review revealed that a body of research has described the status quo of collaboration (mainly nurse-physician [NP] collaboration) and nursing leadership and emphasized their importance in patient care.⁸⁻¹⁰ However, only a few studies have empirically linked NP collaboration and nursing leadership to nurse outcomes and quality of care.^{11,12} In 1 study, the researcher found that NP communication, an approach to enhancing collaboration, had a direct effect on nurses' job satisfaction and mediated the relationship between structural factors (eg, practice environment) and nurse outcomes (eg, nurse job satisfaction).¹³ In another study, Boyle and colleagues reported that unit managers' leadership style was significantly associated with critical care nurses' intent to leave.¹⁴ While acknowledging the contributions of these studies, it should be noted that the majority of them were limited by small samples, and they rarely operationalized

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collaboration and leadership as an organizational factor (eg, unit- or hospital-level factors) in analysis. In addition, teamwork among nurses—the largest health-care workforce—was rarely examined.

We had a unique opportunity to fill this knowledge gap by using nationwide registered nurse (RN) survey data from the National Database of Nursing Quality Indicators (NDNQI). NDNQI was founded in 1998 by the American Nursing Association with the mission of aiding nurses in efforts of improving care quality and patient safety.¹⁵ NDNQI is the only national nursing quality measurement data repository in the United States that enables researchers to compare quality of hospital nursing and nursing-sensitive patient outcomes at the unit level. The hospital nursing unit is the micro-organization where interactions actually happen between healthcare providers and patients and between healthcare providers of different disciplines. Units of different types vary in social milieu and team relations.¹⁶ In the NDNQI data, units from different hospitals were consistently and systematically classified into a unit type based on the patient population, type of care provided, and acuity level. This enables comparative analysis of units across hospitals.

The purpose of this study was 2-fold: to examine the collaboration (both NP collaboration and nurse-nurse [NN] collaboration) and nursing leadership at the unit level in US acute care hospitals and to identify the extent to which unit-level collaboration and nursing leadership were associated with nurse outcomes and nurse-reported quality of care. We hypothesized that units with better collaboration (NP collaboration and/or NN collaboration) and stronger supportive nursing leadership would have superior nurse outcomes and quality of care.

Methods

This study is a secondary analysis of cross-sectional data from the 2012 NDNQI RN survey, the most recent data available when we initiated the project. The study protocol was approved by the institutional review board at a Midwestern academic medical center.

Data and Sample

Aiming to better understand the characteristics of the nursing workforce, in 2004, NDNQI initiated an annual Web-based RN survey to collect data on nurse work conditions, work attitudes, work content, and demographic information from staff nurses in NDNQI member hospitals. In this study, we used data from hospitals with nurses who completed the RN survey with the Job Satisfaction Scale in the long form. In 2012, 73 808 RNs in 3,746 units from 237 hospitals completed this survey form.

To be eligible for the survey, nurses had to meet the following criteria at the time of survey: (1) spend at least 50% of their time providing direct patient care, (2) have a minimum of 3-month employment in the current unit, and (3) not agency or contract nurses. To ensure the reliability of the aggregated unit measures from individual nurse reports, we excluded units that had less than 5 RN respondents and a response rate of less than 50%. A 50% response rate is a generally accepted criterion for supporting the accuracy of inferences made from aggregated data.¹⁷ We included 5 adult unit types: critical care, step-down, medical, surgical, and medical-surgical combined units. Based on these inclusion criteria, our analytic sample for this study included 29 742 RNs in 1 228 units from 200 acute care hospitals in 41 states.

Measures

Collaboration

Collaboration was measured by two 6-item scales: NN interaction scale and NP interaction scale. These 2 scales were adapted from the Index of Work Satisfaction,¹⁸ a widely used scale for measuring nurses' attitudes toward specific aspects of their job. The scales have been tested in pilot studies for feasibility and reliability.¹⁹ The NN scale measures nurses' experience of interactions among nurses on their units. Sample items include the following: "Nursing staff pitch in and help each other when things get in a rush" and "There is a good deal of teamwork among nursing staff." The NP scale measures nurses' perception of interactions between nurses and physicians. Sample items include the following: "In general, physicians cooperate with nursing staff" and "There is a lot of teamwork between nurses and doctors on our units."

Nursing Leadership

Nursing leadership was measured by the supportive nursing management scale (5 items), a scale adapted from the Practice Environment Scales of Nursing Work Index (PES-NWI).⁵ The PES-NWI is a nursing-sensitive instrument endorsed by the National Quality Forum.²⁰ This nursing management scale asks nurses about their perception regarding nurse manager's ability, skills, and styles, for example, "Their nurse manager (NM) is supportive of nurses" and "Their NM consults with staff on daily problems."

We operationalized collaboration and nursing leadership as unit-level organizational factors by aggregating individual nurse responses to unit level. For all the items in the 3 scales (NN scale, NP scale, and NM scale), response options were provided on a 6-point Likert-type scale from "strongly disagree" to "strongly agree." First, each scale score was calculated for each RN

respondent as the mean of the items comprising the respective scale; the unit-level scale scores then were calculated as the mean of scale scores across all the RNs on a unit. Higher scores represent better collaboration and/or more supportive nursing leadership. In the regression models, we categorized scale scores into quartiles for interpretive purpose. Our preliminary analysis suggested that the aggregated unit measures were reliable. Each scale's internal consistency reliability among RN respondents was high (NN scale, $\alpha = .87$; NP scale, $\alpha = .91$; NM scale, $\alpha = .92$). The unit-level reliability, measured by the intraclass correlation coefficient (ICC [1,2]) from 1-way analysis of variance (ANOVA), ranged from 0.79 (NP scale) to 0.88 (NM scale). Researchers have suggested that aggregated measures with an ICC of 0.6 or higher are considered sufficiently reliable.²¹

Nurse Outcomes

Two nurse outcomes were measured: intent to leave and job satisfaction. In the RN survey, nurses were asked to indicate their job plans for the next year. We considered RNs who reported plans of leaving the current position in the next year as having the intent to leave. Those RNs who planned to leave their current position because of retirement were not considered having intent to leave.

RN's job satisfaction was measured in an untraditional way. RNs were asked to indicate the extent to which they would recommend their hospital to a friend as a place for employment using a 6-point Likert-type scale from "strongly agree" to "strongly disagree." RNs who reported that they "strongly agreed" or "agreed" were considered as being satisfied with their jobs. This method has been used in measuring patient satisfaction with healthcare service from hospitals and has been endorsed as a metric for public report on quality of care.²²

Nurse-Reported Quality of Care

Nurse-reported quality of care was measured in 2 ways: overall quality of care and improved quality of care. In the RN survey, nurses were asked to assess the overall quality of care on their units using a 4-point scale ranging from "poor" to "excellent"; this variable was denoted as nurse-reported overall quality of care. Nurses also were asked to indicate whether they perceived that the quality of care in their units had improved, remained the same, or deteriorated over the past year; this variable represented nurse-reported improvement in quality of care.

Covariates

Given that our data set had a 3-level structure, various variables at the hospital, unit, and individual levels

were included as covariates. Hospital-level covariates included ownership, bed size, teaching status, Magnet® status, and geographic location. Hospital ownership was categorized as not-profit, profit, or government owned. Hospital size was measured by the number of staffed beds and grouped into 2 categories (small, ≤ 299 beds; large, ≥ 300 beds). Teaching status was classified as teaching or nonteaching. Hospitals also were identified whether it was a Magnet-recognized hospital. Using the national standards, hospitals were grouped into 4 census regions: Northeast, Midwest, South, and West.

Unit-level covariates included unit type and unit staffing levels. In the survey, nurses were asked to report the number of patients assigned to them on their last shift. Unit staffing levels were calculated as the mean number of patients per nurse on a unit. This measure has shown to have greater predictive validity than administratively reported nurse staffing, which often includes nurses without direct inpatient care assignments.^{23,24}

To adjust for differences in nurse mix across units and hospitals, nurse demographics also were controlled in the regression models. These demographics included age, gender, race/ethnicity, education (having BSN or higher degrees or not), unit tenure (years on the current unit), specialty certification (having specialty nursing certification awarded by a national nursing association or not), and employment status (full time vs not full time).

Statistical Analysis

Descriptive statistics were used to characterize nurses, units, and hospitals in our sample. Differences in unit collaboration (NN interaction and NP interaction) and nursing leadership across unit types were tested using 1-way ANOVA with Tukey-Kramer (TK) post hoc tests. Three-level hierarchical logistic regression models were conducted to estimate the odds of nurses: (1) expressing intent to leave, (2) being satisfied with their current job, (3) reporting excellent overall quality of care on their units, and (4) perceiving improved quality of care on their units over the past year, when working in units with a work environment of different levels of NN collaboration, NP collaboration, or nursing leadership. All the models controlled for nurse and hospital characteristics and unit type and staffing levels. To account for the clustering of nurses within a unit and units within a hospital, we included a unit-level random intercept and a hospital-level random intercept in all regression models. All analyses were conducted using Stata version 12.0 (StataCorp LP, College Station, Texas) with statistical significance set at $P < .05$.

Results

Table 1 summarizes the characteristics of nurse respondents and nurse-reported outcomes. Nurses had a mean age of 38 (SD, 11) years. On average, nurses had worked as an RN for 10 (SD, 9.8) years and been on the current unit for about 6 (SD, 6.4) years. The majority of nurses were female (90%), white (68%), and full time (84%). Roughly 64% had a bachelor's degree or higher, and 62% had specialty nursing certification(s) awarded by a national association. About 1 in 4 nurses was in critical care units, which had the lowest percentage of female nurses (86%) and had the highest percentage of white (75%), BSN-prepared (72%) nurses and nurses with specialty certification (96%), compared with units of other types (not shown in Table 1). Nurses in critical care units also were most experienced with an average RN tenure of 12 (SD, 10.1) years and unit tenure of 7 (SD, 7.3) years, not shown in Table 1).

Of the 29 742 nurses, 56% of nurses expressed satisfaction with their jobs, approximately 43% of nurses reported excellent quality of care to patient, and 39% perceived improvement in quality of care

Table 1. Nurse Characteristics and Reported Outcomes (n = 29 742)

	Mean (SD)	No. (%)
Age, y	37.8 (11.3)	
RN tenure (years as an RN)	10.2 (9.8)	
Unit tenure (years on current unit)	5.9 (6.4)	
Gender		
Female		26 214 (90.2)
Male		2 852 (9.8)
Race/ethnicity		
White		20 283 (68.2)
Black		2 429 (8.2)
Asian/Pacific		3 544 (12.24)
Hispanic/Latina(o)		957 (3.31)
Other		1 739 (6.01)
BSN degree or higher		18 894 (64.0)
Specialty certification		18 227 (62.0)
Full time		24 612 (83.8)
Unit types		
Critical care unit		7 675 (25.8)
Step-down unit		4 584 (15.4)
Medical unit		6 487 (21.8)
Surgical unit		4 595 (15.5)
Medical-surgical combined unit		6 401 (21.5)
Nurse-reported outcomes		
Intent to leave		8 372 (28.2)
Job satisfaction		16 761 (56.4)
Reporting excellent quality of care		12 718 (42.8)
Reporting improved quality of care		11 471 (38.6)

Table 2. Characteristics of Hospitals and Units (n = 1228 Units From 200 Hospitals)

	No.	%
Hospital characteristics		
Ownership		
Nonprofit	159	79.5
Profit	23	11.5
Government owned	18	9.0
Bed size		
Small, ≤299 beds	138	69.0
Large, ≥300 beds	62	31.0
Teaching status		
Nonteaching	103	51.5
Teaching	97	48.5
Magnet status		
Non-Magnet	138	69.0
Magnet	62	31.0
Location		
Northeast	52	26.0
Midwest	63	31.5
South	68	34.0
West	17	8.5
Unit characteristics		
Unit types		
Critical care	262	21.3
Step-down	185	15.1
Medical	276	22.5
Surgical	213	17.4
Medical-surgical combined	292	23.8
Unit nurse staffing, mean/SD	5.02	1.71

over the past year. There were 28% of nurses reporting intent to leave their current position in the next year. Compared with nurses in other unit types, nurses in critical care units were most likely to report excellent quality of care (50%), but least likely to report intent to leave (25%), job satisfaction (55%), and improved quality of (33%) (not presented in Table 1).

Table 2 describes the characteristics of hospitals and units. Of the 200 hospitals, the majority were non-profit (80%) and non-Magnet hospitals (70%) and had less than 300 beds (70%). Roughly half of the hospitals were teaching hospitals (49%). About 34% of the hospitals were located in the Northeast, 32% in the Midwest, 34% in the South, and 9% in the West. Of the 1228 units, approximately 1 in 4 (24%) were medical-surgical combined units, followed by medical units (23%), critical care units (21%), surgical units (17%), and step-down units (15%). Units had an average nurse staffing level of 5 patients per nurse, with the critical care units having the lowest patient-to-nurse ratio (2.52) and the medical-surgical combined units having the highest (6.02) patient-to-nurse ratio.

Table 3 depicts unit-level descriptive statistics for collaboration (NN and NP) and nursing leadership. The overall mean scores on NN scale (measuring collaboration among nurses), NP scale (measuring collaboration between nurses and physicians), and NM

Table 3. Distribution of Unit-Level Collaboration and Nursing Leadership (*n* = 1,228 Units)

	NN Collaboration, ^a Mean (SD)	NP Collaboration, ^b Mean (SD)	Nursing Leadership, ^c Mean (SD)
Overall	4.53 (0.37)	4.12 (0.38)	4.28 (0.65)
Critical care	4.56 (0.36)	4.15 (0.41)	4.21 (0.81)
Step-down	4.55 (0.39)	4.09 (0.38)	4.30 (0.68)
Medical	4.51 (0.37)	4.12 (0.34)	4.32 (0.64)
Surgical	4.56 (0.35)	4.15 (0.38)	4.34 (0.63)
Medical-surgical combined	4.49 (0.38)	4.10 (0.38)	4.24 (0.60)

^aMeasured by NN interaction scale.^bMeasured by NP interaction scale.^cMeasured by the supportive NM scale.

scale (measuring nursing leadership) were 4.53 (SD, 0.37), 4.12 (SD, 0.38), and 4.28 (SD, 0.65), respectively. Although there were slight unit-type differences in scores of each scale, ANOVAs with TK post hoc tests indicated that none of these observed unit-type differences were statistically significant.

Our estimates (Table 4) from multilevel regressions showed that unit-level collaboration and nursing leadership were significantly associated with nurse job satisfaction, intent to leave, and nurse-reported quality of care to patients (overall quality and quality improvement), and these associations were independent of nurse staffing. Compared with those in units with the worst collaboration among nurses (1st quartile of the NN scale score), nurses in units with the best NN collaboration (4th quartile of the NN scale score) were about 2 times more likely (odds ratio [OR], 3.06; 95% confidence interval [CI], 2.70-3.47) to recommend their hospitals for employment (denoted as job satisfaction), 3 times more likely (OR, 4.07; 95% CI, 3.57-4.63) to

report excellent overall quality of care, 1 time more likely (OR, 2.42; 95% CI, 2.10-2.79) to report improved quality of care, and approximately 57% less likely (OR, 0.43; 95% CI, 0.38-0.49) to express intent to leave. Compared with those in units with the worst collaboration between nurses and physicians (1st quartile of the NP scale score), nurses in units with the best NP collaboration (4th quartile of the NP scale score) were approximately 2 times more likely to recommend their hospitals (OR, 2.64, 95% CI, 2.31-3.01) or report excellent quality of care (OR, 2.95; 95% CI, 2.56-3.40), 1 time more likely (OR, 1.88; 95% CI, 1.62-2.18) to report improved quality of care, and 49% less likely (OR, 0.51; 95% CI, 0.45-0.58) to express intent to leave. Compared with those in units with the worst nursing leadership (1st quartile of the NM scale score), nurses in units with the best nursing leadership (4th quartile of the NM scale score) were about 2 times more likely to recommend their hospitals (OR, 2.61; 95% CI, 2.32-2.93) or report improved quality of care

Table 4. Effects of Unit-Level Collaboration (NN Interaction, NP Interaction) and Nursing Leadership on Nurse Outcomes and Quality of Care (*n* = 29 742 Nurses)

	Intent to Leave		Job Satisfaction		Overall Quality of Care		Improved Quality of Care	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
NN collaboration ^{a,b}								
2nd Quartile	0.67	0.60-0.75	1.65	1.47-1.85	1.71	1.51-1.93	1.39	1.21-1.59
3rd Quartile	0.57	0.51-0.64	1.91	1.70-2.15	2.46	2.17-2.78	1.66	1.45-1.90
4th Quartile	0.43	0.38-0.49	3.06	2.70-3.47	4.07	3.57-4.63	2.42	2.10-2.79
NP collaboration ^{a,c}								
2nd Quartile	0.73	0.65-0.82	1.45	1.29-1.63	1.46	1.28-1.66	1.28	1.11-1.46
3rd Quartile	0.66	0.59-0.74	1.80	1.60-2.04	1.99	1.74-2.27	1.53	1.33-1.76
4th Quartile	0.51	0.45-0.58	2.64	2.31-3.01	2.95	2.56-3.40	1.88	1.62-2.18
Nursing leadership ^{a,d}								
2nd Quartile	0.69	0.62-0.77	1.54	1.38-1.73	1.41	1.24-1.61	1.68	1.48-1.91
3rd Quartile	0.58	0.52-0.65	2.11	1.89-2.37	1.83	1.60-2.09	2.13	1.87-2.42
4th Quartile	0.43	0.39-0.49	2.61	2.32-2.93	2.47	2.16-2.82	2.60	2.29-2.96

^a1st Quartile is the reference group.^bMeasured by NN interaction scale.^cMeasured by NP interaction scale.^dMeasured by the supportive NM scale.

(OR, 2.60; 95% CI, 2.29-2.96), 1 time more likely (OR, 2.47; 95% CI, 2.16-2.82) to report excellent quality of care, and 57% less likely (OR, 0.43; 95% CI, 0.39-0.49) to express intent to leave.

Discussion

Our study provides empirical evidence that better collaboration (both NP collaboration and NN collaboration) and nursing leadership as unit-level organizational factors were associated with lower intent to leave, higher nurse job satisfaction, and better quality of care as reported by nurses. These findings suggest that hospital administrators can improve nurse outcomes and quality of care with 2 approaches: (1) improving collaboration among nurses and between nurses and other healthcare professionals and (2) strengthening nursing leadership.

Under the ongoing healthcare reform (eg, adopting a value-based purchase model and enhancing integrated and coordinated care delivery across the care continuum), interprofessional collaboration (particularly the collaboration between nurses and physicians) is drawing growing attention from various healthcare stakeholders as a potential strategy to achieve the goals of healthcare reform.²⁵ Findings from our study provided evidence that better NP collaboration led to not only positive nurse outcomes but also superior quality of patient care, which is consistent with previous studies.²⁶ In addition to interprofessional collaboration, our study suggests that NN collaboration also deserves close attention because the quality of teamwork among nurses can influence nurse outcomes and quality of care too, where empirical evidence has been rare. Improving collegial relations among healthcare providers requires strong commitment from the hospital administrators, but may be achieved at little cost.²⁷ Previous research has demonstrated that hospitals could improve team collaborations via well-designed training programs that helped nurses and physicians understand their respective practice and expertise, responsibilities, and values.^{28,29} A valid source for improving teamwork is the TeamSTEPPS program, which was developed by the Agency for Healthcare Research and Quality and the Department of Defense to improve communication and teamwork among healthcare providers.³⁰ Another suggested approach of improving collaboration across disciplines is providing interprofessional education to students of different healthcare disciplines. Lack of formal training in collaborative practice and team-based care has been considered a big barrier for effective collaboration among healthcare providers. A recent report from Robert Wood Johnson Foundation indicated that there is a trend of growth in the number of schools requiring interprofessional education; however,

the number of schools that are able to provide interprofessional education is limited, and no comprehensive data are available to quantify interprofessional activities and courses offered nationwide.³¹ Academic institutions and hospitals need to invest more in providing courses and training on interprofessional collaboration, and policymakers can help promote interprofessional education by establishing government funding.

Our study suggests that improving supportive nursing leadership is another strategy to improve nurse outcomes and quality of care. Supportive leadership can enhance nurses' abilities to perform up to their competency in meeting organizational goals.⁹ In a work environment with strong support from NMs and other leaders, nurses feel safe to speak out issues regarding patient safety such as medication errors.¹² Magnet hospitals are the best exemplars of favorable nursing leadership. Emerging research demonstrates that hospitals implementing American Nurses Credentialing Center's blueprint for Magnet recognition achieved significant improvements in their practice environments including nursing leadership.^{32,33} To build the skills and competency of nurse leaders, it requires commitment of hospitals and nursing association to investment in leadership development programs.³⁴ For instance, in addition to financial sources, hospitals should offer NMs protected time to participate in leadership training. It has documented that 1 of the biggest barriers for nurse leaders to enroll in leadership development programs is the lack of time away from the clinical settings.³⁵ Another approach of strengthening nursing leadership is to create opportunities for nurses to take leadership positions at all levels, for example, unit, hospital, state, or national level, so nurses can have voices in health policy making and be a full partner with other healthcare professionals.³

Our study is not without limitations. First, our findings are based on cross-sectional data, and therefore, we cannot establish causality. Second, we used unit-level data of a large and national sample of hospitals from the NDNQI database, and it still should be cautious when generalizing the results from this study to nonmember hospitals of NDNQI. Hospitals voluntarily chose to participate in NDNQI; therefore, certain hospital characteristics (eg, larger and Magnet hospitals) may be overpresented in the NDNQI data.^{36,37} Third, we used nurse reports to measure quality of care instead of objective quality indicators such as mortality, hospital readmission, and falls. It is desirable to include objective outcomes measures; however, researchers have suggested that, in addition to objective data, perceptions of nurses who provide direct patient care at the bedside and round-the-clock are an importance source of information when judging the quality of patient care.³⁸ McHugh and Stimpfel³⁹ compared

nurse-reported quality of care to objective indicators of quality, including mortality and failure to rescue, and concluded that quality of care reported by nurses is a valuable indicator of hospital quality.

In conclusion, this is the 1st study using unit level data from hospitals nationwide to examine the role of collaboration (both between nurse and physician and among nurses) and nursing leadership in nurse outcomes

and quality of care. Our findings of the significant influence of collaboration between healthcare providers and administrative support on nurse job satisfaction, intent to leave, and quality of care provide hospital executives and nurse administrators empirical evidence and specific directions in creating a healthy work environment for retaining a competent nursing workforce and obtaining superior quality of care.

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