Association of Nurse Engagement and Nurse Staffing on Patient Safety

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ABSTRACT

Background: Nurse engagement is a modifiable element of the work environment and has shown promise as a potential safety intervention.

Purpose: Our study examined the relationship between the level of engagement, staffing, and assessments of patient safety among nurses working in hospital settings.

Methods: A secondary analysis of linked cross-sectional data was conducted using survey data of 26 960 nurses across 599 hospitals in 4 states. Logistic regression models were used to examine the association between nurse engagement, staffing, and nurse assessments of patient safety.

Results: Thirty-two percent of nurses gave their hospital a poor or failing patient safety grade. In 25% of hospitals, nurses fell in the least or only somewhat engaged categories. A 1-unit increase in engagement lowered the odds of an unfavorable safety grade by 29% ($P < .001$). Hospitals where nurses reported higher levels of engagement were 19% ($P < .001$) less likely to report that mistakes were held against them. Nurses in poorly staffed hospitals were 6% more likely to report that important information about patients "fell through the cracks" when transferring patients across units ($P < .001$).

Conclusions: Interventions to improve nurse engagement and adequate staffing serve as strategies to improve patient safety.

Key words: nurse engagement, nurse staffing, nurses, patient safety

Nearly 20 years have passed since the release of the Institute of Medicine (IOM) report, *To Err Is Human: Building a Safer Health System.* Although initiatives to reduce patient harm have proliferated over this period, safety concerns persist.[1] A major recommendation of the IOM was the promising strategy of transforming nurse work environments to keep patients safe.[2] Yet, in large part, patient safety initiatives have focused on specific interventions, such as checklists, care bundles, and improved electronic health records, rather than on simultaneously improving nurse work environments.[3] Thus, after almost 2 decades of substantial investments in patient safety improvement, it is important to reevaluate whether nurse work environments remain important in achieving safer care.

The nurse work environment, defined as characteristics of a practice setting that facilitate or constrain professional nursing practice, has been linked to patient outcomes.[4-6] Good nurse work environments are characterized by safe nurse staffing levels, good communication and

teamwork with physicians, competent nurse managers, and support from hospital management to enable nurses to provide effective and efficient patient care.[7] Nurses practicing in good work environments are also highly engaged in the governance and decision making of their institutions.[8] Interestingly, few studies have examined the relationship between nurse engagement and patient safety. Our article explores this relationship.

NURSE ENGAGEMENT AND OUTCOMES: AN EVOLVING FIELD OF STUDY

The concept of engagement has emerged over the past 2 decades from disciplines such as organizational psychology, sociology of complex organizations, and business. Engagement has been defined as worker inclusion in organizational decision-making, interprofessional collaboration, and opportunities for professional development.[9-11] In health systems, nurse engagement can involve participation in advisory boards, unit councils, and a range of hospital committees. Wider clinician participation in interdisciplinary and cross-departmental activities is believed to help align institutional priorities and policies with patient care requirements by actively engaging those who have the most contact with patients and families. High levels of nurse engagement have been linked to better workforce outcomes, including lower staff turnover, lower burnout, and higher reports of job satisfaction.[12,13]

Studies have more recently begun to investigate whether greater nurse engagement in organizational decision-making is associated with improved patient outcomes. Kutney-Lee and colleagues[14] found that in hospitals with highly engaged nurses, patients reported more favorable ratings of their hospitals. Similarly, Pearson and colleagues[15] determined that nurse engagement initiatives were associated with lower pressure ulcer prevalence and improved patient satisfaction. While a growing number of studies have linked nurse engagement with patient outcomes,[14,16] a few have examined the relationship between level of nurse engagement and global assessments of patient safety and patient safety climate.

Understanding whether nurse engagement is associated with patient safety is vital to identifying actionable, affordable, and value-added strategies that hold promise for improving care outcomes. Nurses, because of their close proximity to patients, constitute the surveillance system for early identification of clinical complications and errors of commission or omission. Nurses have direct knowledge of patients and changes in conditions and are often the first to identify clinical deterioration and mobilize lifesaving interventions.[6] Yet, the hierarchical management structure of many hospitals may prevent nurses from having a "voice" in important patient safety policies and interventions.[10] The 2017 Workforce Engagement Benchmark Report of the Advisory Board, for example, found that 60% of the 76 419 nurses surveyed were disengaged from their workplace, which represents a tremendous amount of expertise not being utilized by these organizations to improve patient care.[17] Likewise, Rivera and colleagues[11] surveyed 510 registered nurses (RNs) in a single-institution study and found that only 31% of nurses were actively engaged in the workplace. Researchers have identified a number of factors preventing nurse engagement, including heavy patient workloads, inadequate managerial support, and lack of professional autonomy.[18-20] Highest levels of engagement have been found among nurses working in administrative roles or among RNs working less than 6 months.[21]

It is well established that organizational features of nursing such as better staffing ratios are related to improved patient outcomes, including lower mortality, fewer patient falls, and lower rates of infection.[22-24] The purpose of this study was to examine whether nurses' assessments of patient safety differ under varying levels of nurse engagement and staffing.

METHODS

Our study was informed by Donabedian's[25,26] conceptual model of health care quality. We examined the relationship between hospital nursing structure (represented by nurse staffing levels and level of nurse engagement in hospital affairs) and outcomes (indicators of patient safety).

Samples and setting

This was a study of patient safety ratings in 599 representative hospitals in 4 large states (California, Florida, New Jersey, and Pennsylvania). This study involved a secondary analysis of 2 linked data sources: (1) The 2007 American Hospital Association (AHA) Annual Survey of

Hospitals and (2) the 2006-2007 Penn Multi-State Nursing Care and Patient Safety Survey.[7] Virtually all hospitals in the 4 states were included in the study, thus eliminating by design nonresponse bias at the hospital level, which is the greatest threat to the study of organizational performance. The 4 states account for close to a quarter of all hospital discharges in the country; the hospitals in these states are similar in characteristics to hospitals nationally. We did not seek hospital permission for their inclusion, as denials would likely eliminate hospitals concerned about patient safety and thus bias our results. Instead, we used a combination of publically available information on hospital characteristics and primary data from nurse informants collected through a survey of nurses at their homes.

Nurses provided us with information about the hospitals where they were employed including the name of the hospital, and in the case of staffing and engagement, we aggregated nurses' responses to their hospitals of employment. Patient safety reports were examined at the nurse level. Our nurse sample was randomly selected from state boards of nursing lists of RNs and yielded responses from 26 960 inpatient staff nurses for a survey response rate of 39%. A survey of nonrespondents that achieved a 90% response rate found no nonresponse bias on the variables of interest in this study.[27] Having deleted hospitals with fewer than 10 responses, the average number of nurse respondents per hospital was 47, with a range from 10 to 276.

The AHA data set provided information on the hospitals including their size, the availability of high technology, measured by the conduct of organ transplants and/or open heart surgery, teaching status, and whether they were located in an urban or rural setting.[14] Study inclusion criteria required hospitals to be present in both data sets and have a minimum of 10 inpatient staff nurse respondents. Previous research documented acceptable reliability from nurse-reported measures for a minimum of 10 nurses per hospital.[14,28] Nurse survey data were merged with the AHA data using hospital identifiers common to both data sets. A comprehensive description of the survey methodology has been published previously.[7] This study was approved by the authors' University Human Subjects Review Committee.

Measures

The primary variables of interest for this investigation included nurse engagement in hospital affairs, patient-to-nurse staffing ratios, and nurse reports of patient safety. Staffing and engagement served as the independent variables, and patient safety grade and 7 indicators of hospital safety climate were dependent variables.

Nurse engagement

Three questions from the Practice Environment Scale of the Nursing Work Index (PES-NWI), a valid and reliable instrument, included in our nurse survey were used to create a Guttman scale to measure nurse engagement.[14,29] Nurses' responses to these 3 questions indicated 1 of 4 potential levels of engagement. Nurses who reported the opportunity to participate in policy decisions were considered most engaged. Nurses who reported the opportunity to serve on hospital internal governance committees were considered moderately engaged. Nurses who reported the opportunity to serve on nursing committees were considered somewhat engaged. Nurses who disagreed that any of these opportunities were available were considered least engaged. For hospital-level analyses, hospitals were grouped into 4 categories—most, moderately, somewhat, and least engaged—based on the median engagement score of nurses in each hospital.

Staffing

Nurse respondents reported the number of patients and nurses on their unit during their last shift. The staffing ratio was the total number of patients divided by the total number of nurses. Responses were averaged across all the nurses reporting for each hospital.

Patient safety

Our measures of patient safety were based on the Agency for Healthcare Research and Quality's (AHRQ's) Hospital Survey on Patient Safety Culture. This survey is a 51-item instrument, which is described in detail in a previous publication.[30] To reduce respondent burden, our nurse survey included 8 items from the AHRQ survey to gauge nurses' assessments of safety in their units.[30,31] Nurses were first asked to respond to a single global safety item by giving their unit an overall grade on patient safety using a 5-point Likert scale. Responses were dichotomized into favorable (a grade of

A/Excellent or B/Good) and unfavorable (a grade of C/Acceptable, D/Poor, or F/Failing). Seven additional safety climate questions asked nurses whether mistakes were held against them, whether important patient care information was often lost during handoffs, and whether things "fall between the cracks" when transferring patients. Nurses were also asked whether they felt free to question authority, whether ways to prevent errors were discussed, whether feedback was given about changes put in place based on event reports, and whether patient safety is a top priority for hospital management. Respondents were asked to answer using a 5-point scale based on level of patient safety concern (strongly agree, agree, neutral, disagree, and strongly disagree). We then dichotomized responses based on level of agreement (agree and strongly agree) or disagreement (neither, disagree, and strongly disagree). Psychometric properties of these items, including factor analysis, reliability testing, and convergent validity assessment, were detailed previously.[31]

Covariates

Characteristics collected from the nurse survey served as control variables during analysis. Prior research suggests that nurses' ratings of patient safety and quality may be influenced by nurses' age, the number of years working as a nurse, their sex, and full-time status, and hence are accounted for in our analysis.[4] Intensive care unit (ICU) nurse status was accounted for as a control due to differences in staffing between ICUs and medical-surgical units.[4] Similarly, characteristics collected from the AHA survey served as control variables. These characteristics included hospital size, urban/rural location, teaching status, technology status, and state.

Data analysis

Hospital and nursing characteristics, including frequency distributions, measures of central tendency, and bivariate correlations, were evaluated. Logistic regression models were then used to determine the association of nurse engagement and nurse staffing on our outcome of unfavorable patient safety ratings and patient safety climate before and after controlling for nurse and hospital characteristics. All analyses were completed using STATA (version 14.2; College Station, Texas). The level of significance was set at $P < .05$. All tests were 2-tailed, and the analyses also accounted for the clustering of nurses within hospitals.

RESULTS

Characteristics of hospital and nursing sample

Hospitals in the sample were distributed across the 4 study states, with the largest share of hospitals in California (39%). The majority were located in urban regions (91%) and classified as low technology status (57%), nonteaching (52%), and medium (44%) in terms of bed size. Nurse responses were aggregated by institution, and characteristics were reported at the hospital level. Approximately 31% of nurses reported caring for an average of 5 to 6 patients. Thirty-eight percent (n = 227) of the hospitals were classified as having the most engaged nurses, 37% (n = 223) had moderately engaged nurses, 21% (n = 124) had somewhat engaged nurses, and 4% (n = 25) were classified as the least engaged (Supplemental Digital Content, Table, available at: http://links.lww.com/JNCQ/A437). The majority of nurse survey respondents were female (93%) and worked full-time (69%). On average, nurses were approximately 44 years of age and had 16 years of experience as an RN.

Nurses' responses to patient safety questions

Thirty-two percent of nurses gave their practice settings an unfavorable patient safety grade (C, D, or F). Thirteen percent of nurse respondents agreed or strongly agreed that ways to prevent errors were not discussed, whereas 16% agreed or strongly agreed that the actions of administrators demonstrated that safety was a top priority. Twenty-seven percent of nurses reported not receiving feedback about changes put in place after an incident report. Thirty-one percent of nurses reported that information about patients was lost during shift change, whereas 36% agreed or strongly agreed that things fall through the cracks when transferring patients. Thirty-eight percent of nurses reported feeling constrained in their ability to question authority, whereas 41% believed their mistakes were held against them (Supplemental Digital Content, Figure, available at: http://links.lww.com/JNCQ/A438).

The Table presents the results of logistic regression models that jointly estimated the association of nurse engagement and nurse staffing on the odds of a hospital receiving an unfavorable

patient safety grade. After adjusting for hospital and nursing characteristics, each additional patient per nurse was associated with an increase in the odds of a hospital receiving an unfavorable patient safety grade by a factor of 1.06 (95% CI, 1.03-1.10) or an increase of 6%. Likewise, for each unit increase in nurse engagement (eg, least engaged to somewhat engaged), the odds of a hospital receiving an unfavorable patient safety grade decreased by a factor of 0.71 (95% CI, 0.68-0.75) or a decrease of 29%.

Similar patterns were found when examining our additional 7 patient safety climate questions (Table). Level of nurse engagement had a significant effect on all 7 safety climate questions, before and after controlling for potential confounding variables. Among the adjusted models, the largest effect of a 1-unit change in engagement status (eg, from moderately to most engaged) was found when nurses were asked about administrative support. In this instance, more engaged nurses were 35% less likely to report a failure of administrators to prioritize patient safety (P < .001). More engaged nurses were also more likely to report feedback about changes based on incident reports (26%; P < .001), discuss error prevention strategies (24%; P < .001), and feel free to question authority (21%; P < .001). Furthermore, higher engaged nurses were less likely to report that mistakes were held against them (19%; P < .001), important information was lost during shift change (13%; P < .001), or that things "fell through the cracks" during patient transfer (12%; P < .001).

After controlling for potential confounders, nurse staffing remained significant for 4 of the 7 safety climate questions. For instance, among the adjusted models, a 1-unit increase in staffing (ie, 1 additional patient per nurse) increased the odds that nurses would not feel free to questions authority by 7% (P < .001). Similarly, a 1-unit increase in staffing was associated with a 5% (P = .002) increase in the odds of nurses reporting that important information about patients was often lost during shift change and a 6% (P < .001) increase in the odds that information "fell through the cracks." Finally, a 1-unit increase in staffing was associated with a 5% (P = .023) increase in the odds of a nurse reporting that administrator actions do not support patient safety as a top priority.

DISCUSSION

Using nurse- and hospital-level data, the effects of nurse engagement and staffing on patient safety assessments were explored. Our results

Table. Effect of Nurse Engagement and Nurse Staffing on Patient Safety[a]

	Nurse Engagement		Nurse Staffing	
	OR (95% CI)	P	OR (95% CI)	P
Unfavorable patient safety grade	0.71 (0.68-0.75)	<.001	1.06 (1.03-1.10)	<.001
Ways to prevent errors from occurring are not discussed	0.76 (0.72-0.80)	<.001	1.02 (0.98-1.06)	.375
Actions of administrators do not show that patient safety is a top priority	0.65 (0.61-0.69)	<.001	1.05 (1.01-1.10)	.023
We are not given feedback about changes put in place based on incident reports	0.74 (0.71-0.77)	<.001	1.01 (0.97-1.04)	.646
Important information about patients is lost during shift change	0.87 (0.83-0.91)	<.001	1.05 (1.02-1.09)	.002
Things "fall through the cracks" when transferring patients	0.88 (0.85-0.92)	<.001	1.06 (1.02-1.09)	.001
Staff do not feel free to question decisions of those in authority	0.79 (0.76-0.82)	<.001	1.07 (1.04-1.10)	<.001
Staff feel mistakes are held against them	0.81 (0.78-0.85)	<.001	1.03 (0.10-1.07)	.064

Abbreviations: CI, confidence interval; OR, odds ratio.

[a]Odds ratios are from logistic regression models that estimate the net effects of a 1-unit increase in nurse staffing (1 additional patient per nurse) or a 1-category shift in nurse engagement (eg, from least to somewhat or somewhat to moderate, on engagement) on the odds of unfavorable nurse responses to patient safety questions. All models adjust (or control) for nurse characteristics and hospital characteristics.

revealed that higher levels of nurse engagement and more favorable nurse-to-patient staffing ratios were consistently associated with positive ratings of patient safety. Our findings of a relationship between nurse staffing and patient safety are consistent with the work of others who have noted increased medical errors and threats to patient safety when staffing is inadequate.[6,7] In our sample, nurses consistently reported patient safety concerns, including patient information "falling through the cracks" when nurses assumed high patient workloads, suggesting that further investments in nurse staffing may increase nurses' ability to detect patient safety threats and intervene when they occur.

While increased staffing appears to be closely tied to efforts to improve patient safety, doing so may not be immediately feasible for all institutions due to financial constraints. Our findings of a relationship between engagement and reports of patient safety, even after accounting for staffing, suggest that an additional opportunity to improve assessments of patient safety may lie in increasing the opportunities for nurses to engage in decision-making bodies in hospital settings. A number of health care systems have now initiated efforts to increase nurse engagement in patient safety initiatives.

Wadsworth and colleagues,[16] for example, described their health system's effort to increase nurse engagement by revising the system's professional practice model and aligning council goals around a vision of enhanced authentic leadership and shared decision-making. This effort is in line with recent initiatives including the IOM report, which advocates for the inclusion of nurses on boards and committees.[32] Recommendations from the report prompted the creation of the Nurses on Boards Coalition, which strives for 10 000 nurses on boards by 2020.[33] The report is further aligned with the Exemplary Professional Practice domain of the Magnet Recognition Program, which emphasizes the importance of nurse autonomy, supporting and promoting the organization's shared governance decision-making structure to influence policy and patient care.[14,34,35]

Our measurement of engagement involves nurses' levels of participation in decision making within health care systems. Evidence suggests that increasing pathways for nurses to lead and participate in committees, unit-based and hospital-wide councils, and governing boards are an effective way to increase patient safety.[10,14] Improving nurse engagement and staffing also has important benefits for the workforce since nurses working in exemplary professional practice environments report less burnout, turnover, and intent to leave.[14] Our research represents an important addition to the growing body of literature linking investments in nursing as a means to increase safety. Future research might more explicitly examine the relationship between nurse engagement and patient outcomes.

Limitations

Because of the cross-sectional nature of our study, we were unable to determine causality between our measure of engagement, staffing, and assessments of patient safety. Our sample of hospitals included only nurses and hospitals from 4 states. We do not regard this as a major drawback, however, as these are populous states where approximately 20% of all hospitalizations occur.[36] Finally, we note that the date of our survey, which was collected in 2006-2007, may raise concerns about the applicability of findings today. Prior analyses of similar data from Pennsylvania hospitals in 1999 and 2006, however, showed that while there were modest changes in nursing characteristics (eg, nurse staffing and nurse work environments) and sizable decreases in adverse patient events over the period, the relationship between nursing and patient outcomes was very similar at both time points.[35] Our prior research, in addition to the work of others, supports the persistent relationship between nurse engagement and patient outcomes.[14,16]

CONCLUSION

This study examined the survey responses of thousands of nurses across hundreds of hospital settings. Our findings suggest an association between level of nurse engagement, nurse staffing, and assessments of patient safety. Future investments in patient safety must promote adequate nursing resources and full engagement of nurses providing direct patient care.

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