



Inter- and intra-disciplinary collaboration and patient safety outcomes in U.S. acute care hospital units: A cross-sectional study



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ABSTRACT

Background: Collaboration among healthcare providers has been considered a promising strategy for improving care quality and patient outcomes. Despite mounting evidence demonstrating the impact of collaboration on outcomes of healthcare providers, there is little empirical evidence on the relationship between collaboration and patient safety outcomes, particularly at the patient care unit level.

Objectives: The purpose of this study is to identify the extent to which interdisciplinary collaboration between nurses and physicians and intradisciplinary collaboration among nurses on patient care units are associated with patient safety outcomes.

Methods: This is a cross-sectional study using nurse survey data and patient safety indicators data from U.S. acute care hospital units. Collaboration at the unit level was measured by two 6-item scales: nurse-nurse interaction scale and nurse-physician interaction scale. Patient outcome measures included hospital-acquired pressure ulcers (HAPUs) and patient falls. The unit of analysis was the patient care unit, and the final sample included 900 units of 5 adult unit types in 160 hospitals in the U.S. Multilevel logistic and Poisson regressions were used to estimate the relationship between collaboration and patient outcomes. All models were controlled for hospital and unit characteristics, and clustering of units within hospitals was considered.

Results: On average, units had 26 patients with HAPUs per 1000 patients and 3 patient falls per 1000 patient days. Critical care units had the highest HAPU rate (50/1000 patients) and the lowest fall rate (1/1000 patient days). A one-unit increase in the nurse-nurse interaction scale score led to 31% decrease in the odds of having a HAPU (OR, 0.69; 95% CI, 0.56–0.82) and 8% lower patient fall rate (IRR, 0.92; 95% CI, 0.87–0.98) on a nursing unit. A one-unit increase in the nurse-physician interaction scale score was associated with 19% decrease in the odds of having a HAPU (OR, 0.81; 95% CI, 0.68–0.97) and 13% lower fall rates (IRR, 0.87; 95% CI, 0.82–0.93) on a unit.

Conclusions: Both nurse-physician collaboration and nurse-nurse collaboration were significantly associated with patient safety outcomes. Findings from this study suggest that improving collaboration among healthcare providers should be considered as an important strategy for promoting patient safety and both interdisciplinary and intradisciplinary collaboration are critical for achieving better patient outcomes.

What is already known about this topic?

- Collaboration among healthcare providers is considered an essential attribute of the work environment and a core component of the patient safety culture.
- Higher level of collaboration has been linked to higher quality of care and better outcomes of healthcare providers.
- Nurses play a critical role in collaborative care practice.

What this paper adds

This provides empirical evidence of the following:

- Higher levels of interdisciplinary collaboration between nurses and physicians were associated with better patient safety outcomes in U.S. acute care hospital units, including lower hospital-acquired pressure ulcer rates and patient fall rates.
- Intradisciplinary collaboration among nurses, an area that has been overlooked for long time, also played a significant in patient safety

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outcomes.

1. Introduction

Collaboration among healthcare providers is increasingly regarded as a promising means for improving care quality and patient outcomes with limited human and financial resources within healthcare systems across nations (HHS, 2010; WHO, 2013). Through collaboration, members of patient care team work together to develop and achieve patient care goals. Nurses play critical roles in patient care teams. Nurses' collaboration with other healthcare providers is essential for quality patient care. Nurses are the largest healthcare workforce in many countries (WHO, 2017).

The U.S. healthcare delivery system is undergoing a significant transformation. It is shifting away from a fee-for-service approach to value-based care solutions in order to achieve better care, better health, and lower costs (IHI, 2018). In response to this transformation, collaboration in care delivery is underscored as a critical approach to ensuring optimal quality patient care (IOM, 2011). Collaboration also has been identified as a core component of a patient safety culture (Sammer et al., 2010). Promoting interdisciplinary collaboration between nurses and other healthcare providers was highlighted as an essential strategy for improving patient-centered care in reports from the U.S. Institute of Medicine, including the milestone report of *The Future of Nursing: Leading Change, Advancing Health* (IOM, 2011, 2015).

There is a good amount of literature on interdisciplinary collaboration across healthcare professionals in the U.S. and internationally (Petri, 2010; Martin et al., 2010), particularly collaboration between nurses and physicians. However, the vast majority of those studies have focused on two areas: 1) describing the attitudes towards or perceptions of interdisciplinary collaboration by nurses and physicians and 2) examining the impact of such collaboration on outcomes of nurses and physicians (Petri, 2010; Sollami et al., 2014; Tang et al., 2013). Researchers consistently reported that both nurses and physicians demonstrated positive attitudes towards and desires for collaboration (Hughes and Fitzpatrick, 2010; Weller et al., 2011; Stein-Parbury and Liaschenko, 2007). Evidence demonstrating the impact of collaboration on outcomes of healthcare providers is mounting as well (Chang et al., 2009). In a study using reports from 29,747 nurses in 1228 patient care units, researchers found that the levels of collaboration on a unit had a significant influence on nurse job satisfaction and intent to leave, as well as quality of care; and this relationship was independent of the nurse staffing levels and organizational characteristics (Ma et al., 2015a).

Meanwhile, a literature search indicated that, to date, only a small number of studies have empirically examined the relationship between interdisciplinary collaboration and patient outcomes. Findings from those studies are mixed (Martin et al., 2010). Researchers have reported that better nurse-physician collaboration was associated with shorter length of patient stay (Tschannen and Kalisch, 2009), fewer surgical site infections (Fan et al., 2015), and lower risk for 30-day readmission (Ma et al., 2015b). While findings from these studies contribute to our understanding of the relationship between collaboration and patient outcomes, many of them were limited by small sample sizes (Tschannen and Kalisch, 2009; Fan et al., 2015). In addition, other researcher reported inconsistent findings about the relationship between nurse-physician collaboration and patient outcomes (Baggs et al., 1999).

Furthermore, few types of patient outcomes have been examined thus far. Some important patient outcomes such as hospital-acquired pressure ulcers (HAPUs) and patient falls have rarely been included (Martin et al., 2010; Tang et al., 2013). Pressure ulcers and patient falls are critical patient safety issues that can cause pain, prolong hospital stays, are associated with increased risk for adverse events, and increase healthcare costs (Lyder et al., 2012; Baris et al., 2018). In the U.S., pressure ulcers and patient falls are under increasing regulatory scrutiny (CMS, 2018). Most importantly, these two patient outcomes are

often considered preventable via improving quality of care and care environments (Ma and Park, 2015).

While most attention has been paid to interdisciplinary collaboration, one area of collaboration in healthcare that has been overlooked is the intradisciplinary collaboration among nurses. Recently, Kalisch et al. conducted some studies examining the intradisciplinary collaboration among nursing staffs and its impact on outcomes. They found that intradisciplinary collaboration among nurses varied by patient care setting, and nurses who perceived intradisciplinary collaboration more positively had higher job satisfaction and were less likely to report missed nursing care (Kalisch et al., 2010; Kalisch and Lee, 2010). Similarly, Ma et al. found that nurses who reported better collaboration among nurses on their unit had lower intent to leave their current position (Ma et al., 2015a). However, there is a lack of evidence on the impact of intradisciplinary collaboration among nurses on patient outcomes.

To address the knowledge gaps, we conducted a study to identify the extent to which interdisciplinary collaboration between nurses and physicians and intradisciplinary collaboration among nurses are associated with patient safety outcomes (i.e., HAPUs and patient falls) in U.S. acute care hospital units by using unit-level data from the National Database of Nursing Quality Indicators® (NDNQI®) in the U.S.

1.1. Theoretical framework

This study was guided by the Nursing Work Environment Improvement Model (NWEIM), which was adapted from the Institute of Medicine's report "Keep Patients Safe: Transforming the Work Environment of Nurses" (IOM and Page, 2004). This model is also used by NDNQI® in developing the RN Survey and to guide its member hospitals in utilizing the RN Survey to implement improvement strategies (Dunton et al., 2013a). This model emphasizes the impact of nurse work environment on health outcomes. It considers collaboration among healthcare professionals a reflection of the culture of patient safety in care settings and an essential attribute of the nurse work environment (Dunton et al., 2013a).

2. Methods

This is a cross-sectional observational study. Data were obtained from NDNQI® and included the Registered Nurse (RN) Survey and Patient Safety Indicators data. All data was collected in 2013. This study was approved as exempt research by the Institutional Review Board (IRB) at a research university (IRB# 15-10811).

2.1. Data and sample

Data from the NDNQI® RN survey were used for measuring collaboration and other nursing factors (e.g., nurse staffing, unit type) at the patient care unit level. The NDNQI® RN survey was initiated in 2004 with the aim of assessing, understanding, and improving the nurse work environment in the U.S. The survey is web-based and conducted annually to collect data on nurse work conditions, work content, and demographics directly from staff nurses in NDNQI® member hospitals. Nurses were eligible for the RN survey if they 1) spent at least 50% of their work time providing direct patient care; 2) had a minimum of 3 months of employment on the current unit; and 3) were not agency or contract nurses. Both at NDNQI® and in this paper, collaboration is conceptualized as an organizational factor at the unit level; therefore, nurses' responses related to collaboration were aggregated to the unit level. Units were excluded from data analysis if they had fewer than 5 RN respondents or a response rate less than 50% in order to ensure the reliability of the aggregated unit measures from individual nurse reports. A 50% response rate is a generally accepted criterion for supporting the accuracy of inferences made from aggregated data (Verran et al., 1995). Based on these inclusion criteria, responses from 23,078

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