Received: 19 October 2021 | Revised: 19 January 2022 | Accepted: 1 February 2022

DOI: 10.1111/jonm.13555

ORIGINAL ARTICLE

WILEY

The impact of nurse staffing on falls performance within a health care system: A descriptive study

Melissa Cooke DNP, RN, CNML[1] | Margarita de la Fuente DNP, RN, NE-BC[2] | Candice Stringfield DNP, RN[3] | Kelly Sullivan DNP, RN, NE-BC[4] | Robert Brassil MMCi[2] | Julie Thompson PhD[5] | Deborah H. Allen PhD, FNP-BC, AOCNP[2] | Bradi B. Granger PhD, RN, FAAN[5] | Staci S. Reynolds PhD, RN, ACNS-BC[5]

[1]Department of Nursing, Duke Regional Hospital, Durham, North Carolina, USA

[2]Department of Nursing, Duke University Health System, Durham, North Carolina, USA

[3]Department of Nursing, Duke Raleigh Hospital, Raleigh, North Carolina, USA

[4]Department of Nursing, Duke Primary Care, Durham, North Carolina, USA

[5]Division of Adult Health Nursing, Duke University School of Nursing, Durham, North Carolina, USA

Correspondence
Staci S. Reynolds, Division of Adult Health Nursing, Duke University School of Nursing, 307 Trent Drive, Durham, NC, USA.
Email: staci.reynolds@duke.edu

Abstract

Aim: The purpose of this study was to examine the impact of nurse staffing on inpatient falls performance across a multi-hospital system.

Background: Evidence to support which staffing variables influence fall performance so that health care organizations can better allocate resources is lacking.

Method: A descriptive study design was used to analyse the impact of nurse staffing and falls performance, with units dichotomized as either high or low performing based on national benchmarking data. The impact was evaluated using 10 nurse staffing variables.

Results: A total of nine units were included (five high and four low performing). Higher performing units showed less use of sitters and travellers, had fewer overtime hours worked by nurses, and employed more expert-level clinical nurses and combined nursing assistant/health unit coordinator positions, than lower performing units.

Conclusion: Findings provide evidence of how staffing variables affect a unit's falls performance. While significant relationships were found, further evaluation is needed to explore the relationship of staffing variables and quality outcomes.

Implications for Nursing Management: Nursing managers may consider trying to reduce use of sitters and travellers, and utilize innovative staffing models, such as using combined nursing assistant/health unit coordinator positions, to help improve their falls performance.

KEYWORDS
falls, nursing, skill mix, staffing, staffing ratios

1 | BACKGROUND

Adequate nurse staffing is linked to positive patient outcomes (Kouatly et al., 2018). However, there is a lack of evidence as to which staffing model or nursing skill mix proves most effective at optimizing patient outcomes. Nurse leaders must provide adequate staffing ratios while concurrently ensuring an effective nursing skill mix to safely care for patients. The definition of appropriate nurse staffing varies between health care organizations, leaders, and nurses. The American Nurses Association (ANA) defines appropriate nurse staffing as "a match of registered nurse expertise with the needs of the recipient of nursing care services in the context of

the practice setting and situation" (ANA, 2020, p. 6). And yet, no operational definition or universal data collection procedure has been established (ANA, 2020; Institute for Healthcare Improvement, 2019).

Inadequate staffing can have a significant effect on quality patient outcomes. Researchers have frequently used hours per patient day (HPPD) as a measure of appropriate staffing and have found that higher HPPD is associated with fewer infections, falls and pressure injuries (He et al., 2016; Kouatly et al., 2018; Min & Scott, 2016). An alternate but related measure of appropriate nurse staffing is total nursing HPPD (TNHPPD). The National Database for Nursing Quality Indicator's (NDNQI) definition of TNHPPD, also endorsed by National Quality Forum (NQF), is the overall time spent by nurses and nursing assistants on the unit per patient day excluding vacation, sick time, orientation, education, leave or committee time (Choi et al., 2014; Kalisch et al., 2011). Though not as consistently used, several other staffing variables can contribute to the quality of patient outcomes, including staffing ratios, years of experience, skill mix, overtime hours, nursing turnover and nursing position (e.g., registered nurse, nursing assistant, etc.) (Bowden et al., 2019; Cho et al., 2020; Ferguson et al., 2020; Kim et al., 2019; Kouatly et al., 2018).

Several quality patient outcomes are impacted by staffing. Out of all patient quality outcomes, current literature provides the most evidence correlating a relationship between falls and staffing, mainly HPPD (Bowden et al., 2019; Kim et al., 2019). Falls are tracked by NDNQI, which was established by the ANA in 1998 to facilitate their Patient Safety and Nursing Quality initiative (Montalvo, 2007). Falls continue to be a problem across hospitals in the United States, with approximately 700,000 to one million patients falling each year while in the hospital, 25% of which results in injury (Agency for Healthcare Research and Quality, 2021). Inpatient falls result in physical and economic burdens to patients, as well as financial burdens to health care organizations due to increased length of hospital stays and medical costs (LeLaurin & Shorr, 2019). In 2015, upwards of $50 billion in health care expenses were contributed to patient falls in the United States (Daley et al., 2021). Although patient falls continue to be a common issue in health care organizations, the Centers for Disease Control and Prevention considers falls as a preventable event (Centers for Disease Control and Prevention, 2020).

As health care transitions to a value-based payment system, it will be imperative for health care organizations to provide adequate nurse staffing, reduce patient harms and improve provision of quality care. Within a large academic health system in the Southeastern United States, patient falls continue to be an area for improvement. Despite implementation of various interventions such as falls swarms, falls bundles and alarm devices to prevent falls, several inpatient units perform worse than benchmarked peer units per NDNQI data. The purpose of this study was to examine the relationship between nurse staffing variables and unit fall performance across a large, multi-hospital system.

2 | METHODS

2.1 | Design

A descriptive design was used for this study to analyse the relationship between staffing variables and unit-based fall performance. Nine quarters (October 2018 to December 2020) of staffing variables and falls performance data were collected and analysed. This study was approved by the health system's Institutional Review Board.

2.2 | Sample/setting

This study was conducted at a multi-hospital system in the Southeastern United States. Over 7,500 nursing and ancillary staff are employed at the health system to support patient care (81% registered nurses, 18% nursing assistants). As previously mentioned, NDNQI was developed by ANA to monitor nursing quality outcome indicators. Hospitals that participate in the NDNQI voluntarily submit nursing quality data on a quarterly basis. Data are summarized and published by the NDNQI in a quarterly report, allowing hospitals and units to compare, or benchmark, their results with others across the United States that have similar characteristics. For example, fall rates for inpatient neuroscience units are compared with those of other neuroscience units to allow for appropriate and accurate benchmarking. These reports identify units that are above or below the national average based on confidence intervals. To maintain ANCC Magnet™ status, units should strive to 'outperform the mean'; for patient fall rate (number of falls per 1,000 patient days), this refers to having a fall rate lower the national average (American Nurses Credentialing Center, 2021). This NDNQI data can then be used to identify opportunities for improvement and set performance goals for units (Gajewski et al., 2007).

For our study, individual units were dichotomized as 'high' performing or 'low' performing based on NDNQI benchmarking data. Units were included in the 'high' performing group if they outperformed (were below) the national average nine times over the course of nine quarters (Quarter 4 2018–Quarter 4 2020); five units were designated as 'high' performers. Units were included in the 'low' performing group if they outperformed (were below) the national average only one or two times out of nine quarters; four units were designated as 'low' performers. See Table 1 for an overview of the units included in the analysis. Units were included if they were inpatient step-down or floor units; areas were excluded if they were intensive care units or ambulatory settings.

2.3 | Procedures

After a review of the literature, the research team, which consisted of four post-doctor of nursing practice scholars and three PhD-prepared researchers, developed a comprehensive list of staffing variables that could influence unit-based falls performance. Additionally, the research team met with health system experts in quality and falls and

TABLE 1 Overview of included nursing units and median total NHPPD/median total registered nursing (RN) HPPD

Unit type	Number of beds	Performance category	Median total NHPPD	Median total RNHPPD
Adult orthopaedic/spine	41	High	11.53	7.73
Adult medical/surgical/oncology	39	High	11.33	7.76
Adult cardiology step-down	32	High	10.90	8.90
Paediatric bone marrow transplant	16	High	17.70	15.83
Adult haematology/oncology	32	High	10.21	7.96
Adult neuroscience step-down	32	Low	11.66	9.50
Adult neuroscience/spine	32	Low	10.58	8.29
Adult cardiothoracic step-down	24	Low	11.80	9.30
Adult general medicine	32	Low	9.40	7.28

Note: Nursing hours per patient day (NHPPD) is the overall time spent by nurses and nursing assistants on the unit per patient day excluding vacation, sick time, orientation, education, leave or committee time; RNHPPD is the overall time spent by registered nurses on the unit per patient day.

brainstormed additional staffing variables that may affect falls performance. Through this process, we identified 17 potential staffing variables. This list was narrowed to 10 variables based on data availability.

The research team met with the health system's Director of Clinical Analytics and a PhD-prepared statistician over the course of 3 months to define each staffing variable and determine the timeframe for which the data would be retrieved. In collaboration with the Director of Clinical Analytics and data source experts, these data were retrieved from four main data sources, including the human resources database, our workforce management platform, the health system's performance services department and NDNQI. The Director of Clinical Analytics retrieved, merged, organized and cleaned the data for analysis in multiple Microsoft Excel™ documents.

2.4 | Staffing variables

For this project, the following staffing variables were included: (1) registered nursing HPPD (RNHPPD), (2) TNHPPD, (3) annual terminations, (4) number of travellers, (5) number of sitters, (6) number of staff on orientation, (7) amount of overtime hours worked, (8) staff years of service, (9) position and (10) years of service by job title. The staffing variables were analysed to determine the association between high- and low-performing units.

Registered nursing HPPD has been defined as the number of productive hours worked by RNs per patient day; the *total nursing HPPD* includes productive hours worked by all nursing staff (including RNs and nursing assistants) per patient day (ANA, 2022). *Annual terminations* are those staff who have left the health system. *Travellers*, also known as contract nurses, are nurses deployed in a temporary position and are not permanent employees (Ferguson et al., 2020). *Sitters*, also called companions, are staff who provide one-to-one observation of high-risk patients (Greeley et al., 2020). The *number of staff on orientation* measures the number of new nursing staff who are being oriented to their position. *Amount of overtime worked* measures the number of overtime hours worked by nursing staff for each month. *Staff years of service* measure the staff member's number of years of service within the health system. *Position* refers to the type of job in which an individual is employed. At this institution, a nursing clinical ladder programme is available to allow advancement of staff nurses based on Benner's From Novice to Expert Theory (clinical nurse I = novice; II = competent; III = proficient; IV = expert) (Benner, 1982). Clinical nurse I staff are promoted to clinical nurse II after completion of the nurse residency programme, while an application process is required to advance to clinical nurse III and IV. Other positions included nursing assistants, advanced health unit coordinators (e.g., administrative clerks), and combined nursing assistant/health unit coordinator positions (employees trained in both positions). *Years of service by job title* measure the staff's years of service in their current role.

2.5 | Analysis plan

For the staffing variables, individual staff data and unit level data were collected based on data availability. Individual staff data were collected for years of service and position. Unit-based data were collected for RNHPPD, TNHPPD, annual terminations, number of staff on orientation, number of travellers, number of sitters and overtime. For variables extracted at an individual-level, inferential unpaired *t* tests were conducted. Unit-level variables were examined using non-parametric Mann–Whitney U tests. Statistical analysis was conducted in IBM SPSS version 27 with alpha set to .05.

3 | RESULTS

Each unit was dichotomized as either a high- or low-performing unit regarding patient falls based on their NDNQI benchmarking data. Staffing variables were analysed to determine any differences between these two groups. Out of the 10 staffing variables that were included in the analysis, there were statistically significant relationships found between unit fall performance and use of travellers and

sitters, amount of overtime hours worked, position and years of service by nursing position. The results from each staffing variable are described below.

3.1 | RN hours per patient day and total nursing hours per patient day

The median RNHPPD and TNHPPD were compared between high- and low-performing units using a Mann–Whitney U test. The median RNHPPD and TNHPPD were calculated for each individual unit based on data across nine quarters, and that value was applied in the Mann–Whitney U test. There was no difference in RNHPPD between high- (median = 7.9, interquartile range [IQR] = 7.7, 12.4) and low-performing units (median = 8.8, IQR = 7.5, 9.5), $Z = -0.25$, $p = .806$, nor TNHPPD for high- (median = 11.3, IQR = 10.6, 14.6) and low-performing (median = 11.1, IQR = 9.7, 11.8) $Z = -0.25$, $p = .806$. The range of RNHPPD for high-performing units was 7.7–15.7 and 7.3–9.5 for low-performing units; the range of TNHPPD for high-performing units was 10.2–17.7 and 9.4–10.9 for low-performing units (see Table 1).

3.2 | Terminations

The average number of terminations was compared between high- and low-performing units using an independent sample *t* test. The average terminations across nine quarters was not different among units (high: $n = 51$, mean = 3.92, $SD = 2.01$; low: $n = 36$, mean = 3.92, $SD = 1.87$), $t(85) = -.012$, $p = .991$ (see Figure 1).

TABLE 2 Median travellers, sitters and those on orientation for high- and low-performing units

	High ($n = 5$)		Low ($n = 4$)		
Variable	Median	IQR	Median	IQR	*p*
Travellers	0.0	0.0, 0.10	0.20	0.10, 0.40	<.001
Sitters	0.10	0.0, 0.30	3.6	2.2, 4.1	<.001
Orientation	1.8	1.2, 2.8	2.1	1.4, 4.3	.209

Abbreviation: IQR, interquartile range.

3.3 | Number of travellers, sitters and staff on orientation

Mann–Whitney U tests showed significant differences between high- and low-performing units for the number of travellers and sitters used on units. The median number of travellers were lower for the high-performing units (median = 0, IQR = 0, 0.10) than the low-performing units (median = 0.20, IQR = 0.10. 0.40), $Z = -3.75$, $p < .001$. Similarly, the median number of sitters used were lower for the high-performing units (median = 0.10, IQR = 0, 0.30) than the low-performing units (median = 3.6, IQR = 2.2, 4.1), $Z = -6.11$, $p < .001$. The median number of staff on orientation was lower for the high-performing units (median = 1.8, IQR = 1.2, 2.8) than the low-

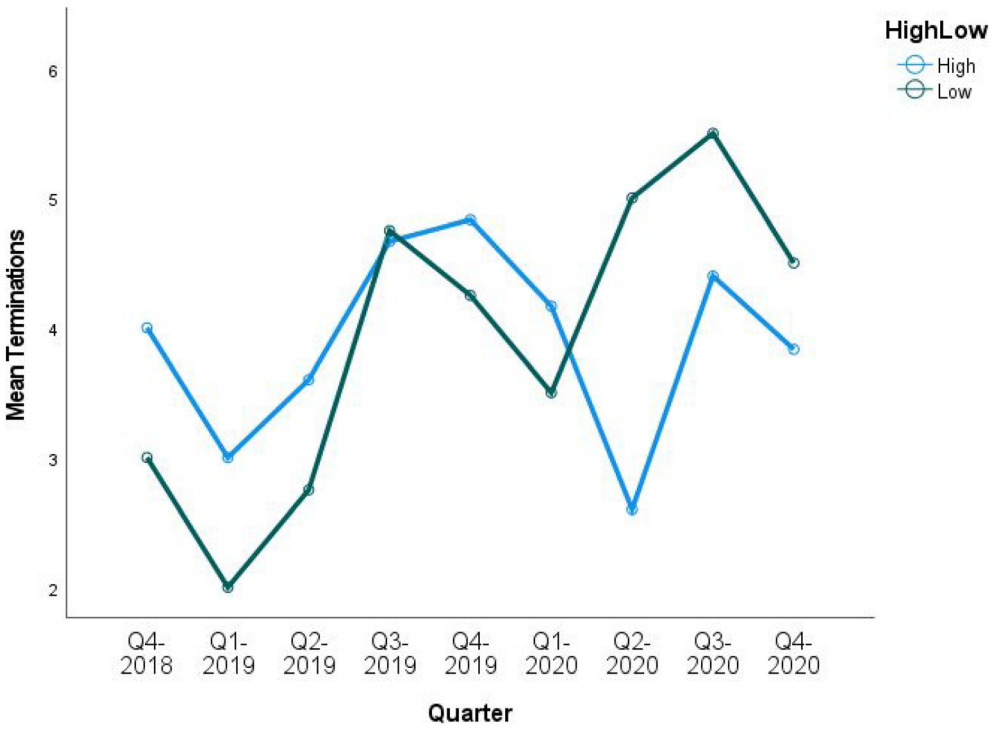

FIGURE 1 Mean terminations per quarter for high- and low-performing units

performing units (median = 2.1, IQR = 1.4, 4.3), although it was not statistically significant ($Z = -1.26$, $p = .209$; see Table 2).

3.4 | RN overtime

The average amount of overtime worked in hours was compared between low- and high-performing units using an independent samples *t* test. The results showed low-performing units have significantly higher overtime hours (mean = 58.29, $SD = 25.69$) than high-performing units (mean = 28.41, $SD = 22.40$), $t(193) = -8.69$, $p < .001$, Cohen's $d = 1.24$. Figure 2 displays the overtime hours per month for high- and low-performing units.

3.5 | Years of service

An independent samples *t* test was conducted to examine years of service in high- versus low-performing units. The results showed a lower average for years of service for the high-performing units (cohort $N = 3{,}458$, mean years of service = 5.06, $SD = 6.75$) compared with low-performing units (cohort $N = 2{,}722$, mean years of service = 5.38, $SD = 7.84$), although it was not statistically significant, $t(5379.02) = -1.65$, $p = .098$. The mean difference was 0.31 years (95% CI = 0.05–0.68 years). The median years of service for high- and low-performing units were 2.00.

3.6 | Position

A chi-square test was conducted to compare the proportion of each position type for high- and low-performing units and revealed an overall significant difference between high- and low-performing units on the proportion of staff positions, $\chi^2(24, N = 6{,}234) = 428.36$, $p < .001$; Cramer's $V = .262$). Pairwise comparisons were examined to determine which positions differed among the performance groups. The results showed differences in proportions for seven positions. The clinical nurse I position was more prevalent in low-performing units (18.1%) relative to high-performing units (13.6%), $p < .05$. Similarly, clinical nurse II and III positions were higher in low-performing units than high-performing units (clinical nurse II: 45.8% in low performing and 42.2% in high performing, $p < .05$); clinical nurse III: 10.0% in low performing and 7.8% in high performing, $p < .05$). Conversely, the clinical nurse IV staff were less represented in lower performing units (0.7%) compared with high-performing units (3.2%, $p < .05$).

Advanced health unit coordinator positions made up a larger proportion of the lower performing unit positions (3.5%) compared with higher performing units (1.3%, $p < .05$); this trend also occurred for nursing care assistant II staff (3.1% in low performing and 1.8% in high performing, $p < .05$). Finally, combined nursing care assistant/health unit coordinators made up a higher proportion of the high-performing units (1.6%) compared with lower performing units (0.4%), $p < .05$.

3.7 | Clinical nurse position and years of service

To explore these findings for nursing position and years of service, the clinical nurse II, III and IV positions were examined to determine if years of service were related to high- or low-performing units. The results showed a statistically significant difference in the years of service for clinical nurse II positions, with higher years of service reflected in higher performing units (mean = 4.55 years) than lower performing units (mean = 4.17 years) ($p = .048$), although this difference may not be clinically significant. There were no differences in years of service for clinical nurse III ($p = .582$) or clinical nurse IV positions ($p = .962$; see Table 3).

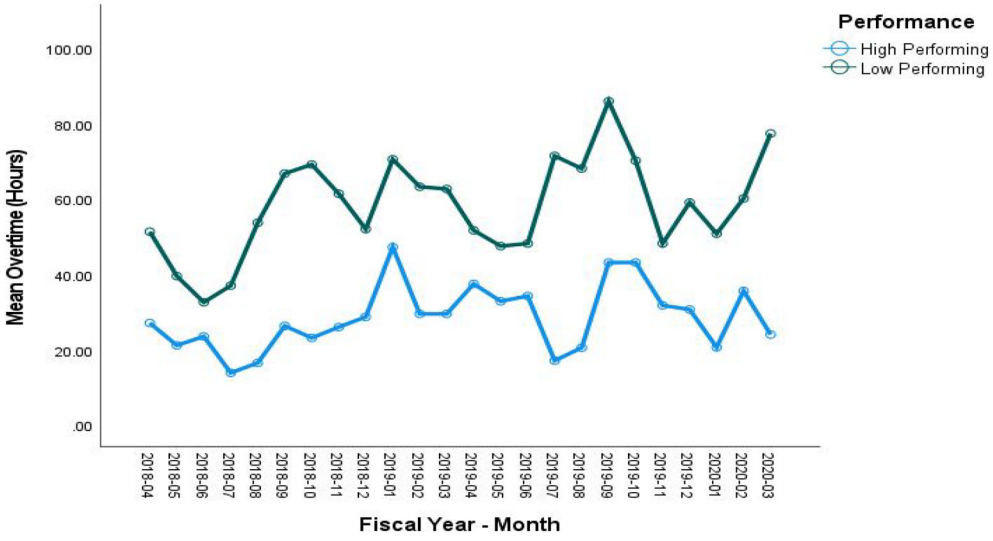

FIGURE 2 Registered nurse (RN) mean overtime hours by month

TABLE 3 Comparing high- and low-performing units on years of service for clinical RN roles

	High			Low				
Role	***n***	***M***	***SD***	***n***	***M***	***SD***	***p***	**Cohen's *d***
Clinical RN II	1,438	4.55	5.35	1,248	4.17	4.49	.048	.076
Clinical RN III	280	9.69	6.67	273	10.04	7.97	.582	.047
Clinical RN IV	108	18.31	7.20	18	18.39	3.68	.962	.012

Abbreviation: RN, registered nurse.

4 | DISCUSSION

4.1 | Significant relationships

We found statistically significant relationships between unit fall performances and the staffing variables related to the use of sitters and travellers, amount of overtime hours worked, position and years of service by nursing position. Overall, higher performing units showed lower utilization of sitters and travellers and had fewer overtime hours, than the lower performing units. Additionally, higher performing units had more clinical nurse IV positions and combined nursing assistant/health unit coordinator positions, and longer years of service for clinical nurse II positions, than lower performing units.

Other studies have found similar results when analysing the relationship of quality patient outcomes to staffing variables. Sitters have often been used as a fall reduction strategy; however, their effectiveness in practice is unclear. Greeley et al. (2020) recently conducted a systematic review and found scant evidence that supports the use of sitters as an effective strategy. Indeed, our study found that units that were high performing in terms of falls used sitters *less* than low-performing units, supporting the finding that sitters may not be as effective in reducing falls. Whereas no significant relationship was identified between use of travellers and patient falls, Ferguson et al. (2020) found that higher use of travel nurses was associated with a higher rate of hospital-acquired pressure injuries. Likewise, several studies have found a positive relationship between patient safety outcomes and the amount of overtime hours worked, with higher amounts of overtime leading to higher rates of adverse events, such as falls and health care-associated infections (He et al., 2016; Son et al., 2019).

We were unable to identify previous literature that showed similar findings to ours in relation to high-performing units having more clinical nurse IV staff and combined nursing assistant/health unit coordinator positions. However, it is understandable that units with more clinical nurse IV staff would show better performance with quality patient outcomes, as these nurses have at least 4 years of experience and have demonstrated expertise in the field through progression on the clinical ladder. Additionally, clinical nurse IV staff are required to have a baccalaureate degree and a specialty certification in their clinical area. Previous research has shown a correlation between quality patient care and nurses with a baccalaureate degree and specialty certification(s) (Harrison et al., 2019; Hickey et al., 2018; Whitehead et al., 2019). Further, clinical nurse IV staff are more likely to have dedicated release time to focus on quality improvement efforts and nurse education. Likewise, individuals in combined nursing assistant/health unit coordinator positions may be more adept at meeting the needs of patients, families and nurses as they have been trained for multiple tasks.

4.2 | Non-significant relationship

We did not find a statistically significant relationship between unit fall performance and the staffing variables related to RNHPPD, TNHPPD, terminations, number of staff on orientation or years of service for specific positions. Contrary to our study, many previous researchers have found a significant inverse relationship between RNHPPD and TNHPPD and quality patient outcomes (He et al., 2016; Kouatly et al., 2018; Min & Scott, 2016). He et al. (2016) found that higher total HPPD was related to lower event rates for falls and pressure injuries. Similar, Kouatly et al. (2018) found that total falls, falls with injury, pressure injuries and central line-associated bloodstream infections were higher with lower RNHPPD. The difference in study outcomes could be due to different types of nursing care hour data, varying definitions of productive hours and differing ways to collect NHPPD. Furthermore, Min and Scott (2016) suggest that NHPPD does not account for patient characteristics, such comorbidities and language barriers, which can lead to an underestimation of nursing workload and inaccurate measurements of staffing levels.

Increased numbers of terminations, a measure for nursing turnover rates, has been shown to negatively affect quality patient outcomes (Kim & Han, 2018). However, our study did not find a significant difference in terminations between units with high and low falls performance. We did not identify any literature that analysed the relationship between the number of staff on orientation and adverse patient outcomes. Our hypothesis was that units with a higher number of staff on orientation (therefore less experienced staff and increased burden on nursing preceptors) would potentially negatively impact quality patient outcomes; however, our findings did not support this theory.

4.3 | Limitations

This study was limited by several factors. Although units were selected based on performance against national benchmarks, the analysis was limited to only nine units that met criteria as high-performing and low-

performing units in falls prevention. Most of the health system's units performed within the national mean and were not included in the data analysis. A larger sample size or longer interval of observation is needed to further validate the relationship of staffing variables with falls among peers. Further, NDNQI is a widely used national nursing database that provides quarterly and annual data on nursing process and outcome measures. Health care organizations enrol with NDNQI on a voluntary basis; therefore, these findings are generalizable only among organizations that participate in NDNQI benchmarking.

This analysis occurred during the COVID pandemic, which may have impacted staffing and quality outcomes. However, it is important to note that the high-performing and low-performing units maintained their ranking despite the pandemic, but it is unclear if, or to what degree, the pandemic had on staffing and unit outcomes.

The organization's data were limited in some staff specific data, particularly with years of service. The organization only collects the number of years within the organization, rather than total years of nursing experience or total years within a specific position. Without that level of data specificity, this study could not determine the impact of nursing experience on patient falls.

5 | CONCLUSION

Experiencing a fall while hospitalized can be devastating, resulting in additional injuries, prolonged hospital stays, unexpected surgeries and higher costs of care (Bowden et al., 2019). Identifying factors contributing to falls could provide preventive insight on how to reduce the prevalence of falls among patients. Nurse staffing has shown to have a direct impact on quality outcomes and specifically falls prevention. This study aimed to compare differences in staffing variables among high- and low-performing units related to falls outcomes. Findings from this study provide additional evidence of how staffing affects a falls prevention programme. Although significant relationships were found for several staffing variables, further evaluation is needed to explore the relationship of nursing workload and quality outcomes.

6 | IMPLICATIONS FOR NURSING MANAGEMENT

Falls are quality metrics nurse managers monitor as indicators of quality patient care delivery. This is essential as falls can further burden patient recovery, as well as impact hospital reimbursement. Key findings from this study can provide insight for nursing leaders as they explore and implement staffing models to positively impact patient outcomes. Our study found that decreased use of travellers, sitters and the amount of overtime hours worked by nursing staff may improve fall performance. Nurse managers should seek to identify ways to improve staffing to decrease the need for travellers and overtime. Further, they may consider using sitters in different positions, as sitters have not been shown to be effective at reducing fall rates. Additionally, nurse managers may consider supporting and encouraging staff to advance on the clinical ladder, becoming recognized experts as clinical nurse IV staff aid in quality improvement initiatives and role model/lead quality care. Lastly, developing and utilizing combined nursing assistant and health unit coordinator positions may be an innovative, versatile staffing model, as individuals are trained in multiple positions.

ACKNOWLEDGEMENTS

The authors wish to thank Duke University Health System Nursing and the Duke University School of Nursing.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

FUNDING INFORMATION

This study was not funded.

ETHICAL APPROVAL

This study was deemed exempt by the Duke University Institutional Review Board (approval number: Pro00107933).

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ORCID

Staci S. Reynolds https://orcid.org/0000-0002-0366-1328

REFERENCES

Agency for Healthcare Research and Quality. (2021). Preventing falls in hospitals. http://www.ahrq.gov/patient-safety/settings/hospital/fall-prevention/toolkit/index.html

American Nurses Association. (2020). ANA principles for nurse staffing. https://www.nursingworld.org/practice-policy/nurse-staffing/staffing-principles/

American Nurses Association. (2022). Nurse staffing measures. Retrieved January 19, 2022, from https://www.nursingworld.org/practice-policy/nurse-staffing/nurse-staffing-measures/

American Nurses Credentialing Center. (2021). Magnet recognition program. ANA. https://www.nursingworld.org/organizational-programs/magnet/

Benner, P. (1982). From novice to expert. *AJN the American Journal of Nursing*, *82*(3), 402–407.

Bowden, V., Bradas, C., & McNett, M. (2019). Impact of level of nurse experience on falls in medical surgical units. *Journal of Nursing Management*, *27*(4), 833–839. https://doi.org/10.1111/jonm.12742

Centers for Disease Control and Prevention. (2020). Keep on your feet: Preventing older adult falls. https://www.cdc.gov/injury/features/older-adult-falls/index.html

Cho, S.-H., Lee, J.-Y., You, S. J., Song, K. J., & Hong, K. J. (2020). Nurse staffing, nurses prioritization, missed care, quality of nursing care, and nurse outcomes. *International Journal of Nursing Practice*, *26*(1), e12803. https://doi.org/10.1111/ijn.12803

Choi, J., Boyle, D. K., & Dunton, N. (2014). A standardized measure: NDNQI nursing care hours indicator. *Western Journal of Nursing Research*, *36*(1), 105–116. https://doi.org/10.1177/0193945913501723

Daley, B., Fetherman, B., & Turner, J. (2021). Staffing utilization and fall prevention with an electronic surveillance video system: A

randomized controlled study. *Journal of Nursing Care Quality*, *36*(1), 57–61. https://doi.org/10.1097/NCQ.0000000000000472

Ferguson, A., Bradywood, A., Williams, B., & Blackmore, C. C. (2020). Association of use of contract nurses with hospitalized patient pressure injuries and falls. *Journal of Nursing Scholarship*, *52*(5), 527–535. https://doi.org/10.1111/jnu.12572

Gajewski, B., Hall, M., & Dunton, N. (2007). Summarizing benchmarks in the national database of nursing quality indicators using bootstrap confidence intervals. *Research in Nursing & Health*, *30*(1), 112–119. https://doi.org/10.1002/nur.20166

Greeley, A. M., Tanner, E. P., Mak, S., Begashaw, M. M., Miake-Lye, I. M., & Shekelle, P. G. (2020). Sitters as a patient safety strategy to reduce hospital falls: A systematic review. *Annals of Internal Medicine*, *172*(5), 317–324. https://doi.org.10.7326/M19-2628

Harrison, J. M., Aiken, L. H., Sloane, D. M., Brooks Carthon, J. M., Merchant, R. M., Berg, R. A., & McHugh, M. D. (2019). In hospitals with more nurses who have baccalaureate degrees, better outcomes for patients after cardiac arrest. *Health Affairs*, *38*(7), 1087–1094. https://doi.org/10.1377/hlthaff.2018.05064

He, J., Staggs, V. S., Bergquist-Beringer, S., & Dunton, N. (2016). Nurse staffing and patient outcomes: A longitudinal study on trend and seasonality. *BMC Nursing*, *15*(1), 60. https://doi.org/10.1186/s12912-016-0181-3

Hickey, P. A., Gauvreau, K., Porter, C., & Connor, J. A. (2018). The impact of critical care nursing certification on pediatric patient outcomes*. *Pediatric Critical Care Medicine*, *19*(8), 718–724. https://doi.org/10.1097/PCC.0000000000001609

Institute for Healthcare Improvement. (2019). The IHI triple aim. http://www.ihi.org:80/Engage/Initiatives/TripleAim/Pages/default.aspx

Kalisch, B. J., Friese, C. R., Choi, S. H., & Rochman, M. (2011). Hospital nurse staffing: Choice of measure matters. *Medical Care*, *49*(8), 775–779. https://doi.org/10.1097/MLR.0b013e318222a6df

Kim, J., Kim, S., Park, J., & Lee, E. (2019). Multilevel factors influencing falls of patients in hospital: The impact of nurse staffing. *Journal of Nursing Management*, *27*(5), 1011–1019. https://doi.org/10.1111/jonm.12765

Kim, Y., & Han, K. (2018). Longitudinal associations of nursing staff turnover with patient outcomes in long-term care hospitals in Korea. *Journal of Nursing Management*, *26*(5), 518–524. https://doi.org/10.1111/jonm.12576

Kouatly, I. A., Nassar, N., Nizam, M., & Badr, L. K. (2018). Evidence on nurse staffing ratios and patient outcomes in a low-income country: Implications for future research and practice. *Worldviews on Evidence-Based Nursing*, *15*(5), 353–360. https://doi.org/10.1111/wvn.12316

LeLaurin, J. H., & Shorr, R. I. (2019). Preventing falls in hospitalized patients: State of the science. *Clinics in Geriatric Medicine*, *35*(2), 273–283. https://doi.org/10.1016/j.cger.2019.01.007

Min, A., & Scott, L. D. (2016). Evaluating nursing hours per patient day as a nurse staffing measure. *Journal of Nursing Management*, *24*(4), 439–448. https://doi.org/10.1111/jonm.12347

Montalvo, I. (2007). The National Database of nursing quality indicators (NDNQI). *OJIN: The Online Journal of Issues in Nursing*, *12*(3). https://doi.org/10.3912/OJIN.Vol12No03Man02

Son, Y.-J., Lee, E. K., & Ko, Y. (2019). Association of working hours and patient safety competencies with adverse nurse outcomes: A cross-sectional study. *International Journal of Environmental Research and Public Health*, *16*(21), 4083. https://doi.org/10.3390/ijerph16214083

Whitehead, L., Ghosh, M., Walker, D. K., Bloxsome, D., Vafeas, C., & Wilkinson, A. (2019). The relationship between specialty nurse certification and patient, nurse and organizational outcomes: A systematic review. *International Journal of Nursing Studies*, *93*, 1–11. https://doi.org/10.1016/j.ijnurstu.2019.02.001

How to cite this article: Cooke, M., de la Fuente, M., Stringfield, C., Sullivan, K., Brassil, R., Thompson, J., Allen, D. H., Granger, B. B., & Reynolds, S. S. (2022). The impact of nurse staffing on falls performance within a health care system: A descriptive study. *Journal of Nursing Management*, 1–8. https://doi.org/10.1111/jonm.13555