

# Nurse Staffing Levels and Patient-Reported Missed Nursing Care

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A total of 729 inpatients were surveyed using the *MISSCARE Survey-Patient*. Missed timeliness, patient reports of the time it took for them to receive care from nursing staff, was negatively associated with total nursing staff hours of care per patient-day ( $r = -0.09$ ,  $P = .015$ ), registered nurse (RN) hours per patient-day ( $r = -0.14$ ,  $P = .0002$ ), and RN skill mix ( $r = -0.13$ ,  $P = .0004$ ). RN skill mix was also a predictor of missed timeliness ( $P = .01$ ). **Key words:** *missed care, nursing care, nurse staffing, patient reports, quality care*

**O**MISSIONS of nursing care are often unrecognized errors affecting patient safety. These errors pose serious risks such as failure to rescue, inadequate nutritional intake, and decreased mobility.<sup>1-3</sup> Errors of *omission* have been described as failure to do the right thing, whereas errors of *commission* are doing something wrong. Both types of errors have the potential to result in undesirable outcomes.<sup>4</sup> Until recently, errors of omission in nursing, such as failure to reposition patients, missing medications, and not respond-

ing to call lights, have received little attention in the patient safety and quality literature, which has mainly focused on errors of commission such as administering the wrong medication to a patient. According to the Agency for Healthcare Research and Quality, errors of omission are more difficult to recognize and likely represent a larger problem than errors of commission.<sup>4</sup>

The concept of *missed nursing care* addresses nursing care omissions in the process of delivering nursing care. Kalisch<sup>5</sup> coined the term “missed nursing care,” defined as any aspect of required patient care that is omitted or significantly delayed. Kalisch et al<sup>6</sup> later reported a concept analysis of the phenomenon. Missed nursing care was operationalized with the development of the *MISSCARE Survey*. This tool measures staff reports of elements of missed nursing care and the reasons for missed nursing care.<sup>7</sup> The *MISSCARE Survey* is a reliable and valid measure of nursing care that is not completed.

Studies of missed nursing care have revealed a large amount of missed care.<sup>8,9</sup> In a study of 3 hospitals with a sample of 459 nurses, the 6 most frequently reported elements of missed nursing care were the ambulation of patients (84%), assessment of the effectiveness of medications (83%), patients being turned every 2 hours (82%), mouth care

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(82%), patient teaching (80%), and the timeliness of medication administration (80%).<sup>8</sup> A second study of 10 hospitals and more than 4000 nursing staff members revealed similar results. The most frequent elements of missed care were ambulation (76.1%), attendance of interdisciplinary rounds (65.5%), mouth care (64.5%), administration of medications within 30 minutes of their scheduled time (59.8%), and turning patients every 2 hours (59.4%).<sup>9</sup> Gravlin and Bittner<sup>10</sup> obtained similar results in a study of nurse and nursing assistant reports of missed nursing care.

Missed nursing care leads to diminished quality of care and poor patient outcomes.<sup>11</sup> Kalisch et al<sup>12</sup> found that missed nursing care mediates the relationship between staffing levels and inpatient falls. Examination of patient reports of missed care revealed that significantly more overall missed nursing care was reported by patients who also reported experiencing skin breakdown, medication errors, new infections, intravenous tubes running dry, intravenous infiltration, and other adverse events during their hospitalization.<sup>13</sup>

Significant relationships have been found between nurse staffing levels and missed nursing care. In a study of 4288 nursing staff members on 110 patient care units, higher levels of registered nurse hours per patient-day (RNHPPD) correlated with lower levels of missed nursing care ( $r = -0.27, P < .01$ ).<sup>12</sup> The researchers also found a negative correlation between missed nursing care and all nursing hours of care per patient-day (HPPD) ( $r = -0.32, P < .01$ ), with higher HPPD associated with lower levels of missed nursing care. HPPD was also found to be a significant predictor of missed nursing care ( $\beta = -.45, P = .002$ ). Ball et al<sup>14</sup> studied the reports of 2917 RNs working in 401 general medical-surgical units in 46 acute care hospitals in England and found that the number of patients per RN was significantly associated with the incidence of missed nursing care, with significantly lower odds of missing care as the number of patients per RN decreased ( $P < .001$ ).

These findings provide evidence that inpatient unit nurse staffing affects the amount of

missed nursing care as reported by nursing staff. However, the relationship between inpatient nurse staffing and patient reports of missed nursing care has not been tested. To determine what patients can reliably report about the care they receive, we conducted a qualitative study of 39 patients asking them their perceptions on various aspects of inpatient nursing care experienced during their hospitalization.<sup>15</sup> The aim of the study was to determine elements of nursing care that patients were able to report on accurately. The responses revealed that patients and/or their family members were able to fully report on how often they received mouth care, listening, being kept informed, response to call lights, response to alarms, meal assistance, pain medication and follow-up, and bathing. They were partially able to report on ambulation, discharge planning, patient education, medication administration, repositioning, vital signs, and hand washing, and they were not able to accurately report on patient assessment, surveillance, and intravenous site care. The items of nursing care found to be most frequently missed were mouth care, ambulation, discharge planning, patient education, being listened to, and being kept informed.<sup>15</sup> On the basis of the findings from this qualitative study, a quantitative survey of patient reports of nursing care, *MISSCARE Survey-Patient*, was developed and tested.

Previous studies of missed nursing care and the relationship between nurse staffing and missed nursing care were based on the reports from nurses and nursing assistants. The aim of this study was to extend this research by exploring patient reports of missed nursing care and determine the relationship between patient reports of missed care and unit nurse staffing levels.

## METHODS

### Design and sample

The data obtained in the cross-sectional study of patient reports of missed nursing care were used to conduct a secondary analysis of

the relationship between patient reports of missed care and level of nurse staffing.<sup>13</sup> A total of 729 patients on 20 units in 2 hospitals made up the sample. Of the 20 inpatient units, 12 were medical units (420 participants, 57.6% of the sample), 6 were surgical units (255 participants, 35.0% of the sample), and 2 were rehabilitation units (54 participants, 7.4% of the sample). The inclusion criteria for sample selection were adults 18 years or older, hospitalized for 3 or more days, English speaking, and cognitively able to participate in the survey themselves or have a family member at the bedside able to participate on their behalf who had spent at least 5 hours a day with the patient.<sup>13</sup>

### Measures

The missed nursing care variables measured were subscale scores calculated from patient responses to the *MISSCARE Survey-Patient*. That tool was designed to elicit patient reports of the extent to which nursing care was or was not provided. Results from exploratory factor analysis revealed a 3-factor solution explaining 59.62% of variance in patient perceived missed nursing care. These factors included (1) communication, (2) timeliness, and (3) basic care. The tool consisted of 13 questions describing how often elements of nursing care were provided and how long it took for patients to receive care. The subscale communication was composed of 5 items on a 5-point Likert scale ranging from 1 (never) to 5 (always). This subscale included being listened to, having opinions considered, and receiving information regarding who their nurse was, their treatment plan, and scheduled tests. The subscale timeliness consisted of 4 items on a 5-point Likert scale ranging from 1 (less than 5 minutes) to 5 (more than 30 minutes). *Missed timeliness* refers to patient reports of the time it took for them to receive care from nursing staff, including assistance to the bathroom, addressing a beeping monitor or machine, answering a call light, and responding to the call light needs. The subscale basic care (eg, bathing, mouth care, getting out of bed into a chair, and ambulation) included 4 items on a

5-point Likert scale ranging from 1 (never) to 5 (always).

Communication and basic care items were reverse coded so that higher scores indicated more missed nursing care. The overall missed care score comprised the mean of all 13 items. Internal consistency was tested for the 13 items, resulting in a Cronbach  $\alpha$  coefficient of 0.838. Alpha coefficients for each factor ranged from .708 to .834, indicating that the tool was acceptable for the 3 factors: communication ( $\alpha = .797$ , 5 items), timeliness ( $\alpha = .834$ , 4 items), and basic care ( $\alpha = .708$ , 4 items).

Test-retest reliability of the tool was conducted using 30 patients who completed the survey while hospitalized and then again 2 weeks later; the reliability was 0.818, indicating a reliable measure. Content validity of the tool was established using nursing staff and patients, with index results of 0.89 for nursing staff and 0.88 for patients. Convergent validity was established through the comparison of the *MISSCARE Survey-Patient* with a satisfaction question imbedded in the survey. As predicted, higher levels of satisfaction were correlated with less missed care ( $r = 0.25$ ,  $P < .001$ ).<sup>13</sup>

Nurse staffing was measured using 3 variables: RNHPPD, total nursing staff hours of care per patient-day (NHPPD), and RN skill mix. These data were collected from administrative databases for the dates that corresponded to when the surveys were collected on each unit. RNHPPD is the total number of productive hours worked by RNs on a designated inpatient unit during a specific calendar month, divided by the total number of patient-days for the corresponding unit and month. NHPPD is the total number of productive hours worked by all nursing staff members (including RNs, licensed practical/vocational nurses, and unlicensed assistive personnel [UAP]) on an inpatient unit during a designated calendar month, divided by the total number of patient-days for the corresponding unit and month. Finally, RN skill mix is the proportion of RNs in the total number of nursing staff members. It is calculated by

determining the number of productive nursing care hours worked by RNs with direct patient care responsibilities on an inpatient unit during a particular calendar month, divided by the total number of productive hours worked by all nursing staff members (RNs, licensed practical/vocational nurses, and UAP) for the corresponding unit and month.<sup>16</sup>

**Procedures**

Institutional review board approval was obtained at both study institutions. Subsequently, trained research assistants administered the *MISSCARE Survey-Patient* to hospitalized patients meeting inclusion criteria.

**Data analysis**

Data were analyzed using SPSS (version 19.0; IBM SPSS, Chicago, Illinois). To evaluate relationships among the nurse staffing measures and patient reports of missed nursing care, bivariate correlation analyses were used to calculate correlations among RNHPPD, NHPPD, RN skill mix, and the 3 dependent variables of missed communication, timeliness, and basic care. Each staffing variable and each missed care variable were assessed individually using Pearson correlations. Because the patient reports of missed nursing care data were reported by patients nested within inpatient units, the analysis of variable predictability was conducted using hierarchical linear modeling, a multilevel multiple regression technique useful in analyzing nested data.<sup>17</sup>

**FINDINGS**

**Description of sample and setting**

The sample of 729 patients had an age range from 18 to 98 years ( $M = 59.8$ ,  $SD = 16.42$ ). The majority of the sample was White (81.4%) and had some college education (63.4%). The sample was relatively equal in terms of gender: males (51.1%) and females (48.9%). The marital status of participants was also relatively equal, with 52.3% married and 47.7% not married (including divorced, widowed, separated, or never married). The

patient-reported health status was categorized as 49.5% good, very good, or excellent and 50.6% fair or poor. The number of days hospitalized at the time of the survey ranged from 3 to 93 days ( $M = 7.9$ ,  $SD = 8.83$ ).

**Missed nursing care**

Descriptive statistics of the missed nursing care variables and nurse staffing variables are presented in Table 1. Patients reported the *overall* missed care to be 1.82 ( $SD = 0.62$ ) on a 5-point scale ranging from 1 (care never missed) to 5 (care always missed). Of the 3 subscales, basic care was missed the most at 2.29 ( $SD = 1.06$ ), followed by communication at 1.69 ( $SD = 0.71$ ). Timeliness scored the lowest of the 3 subscales at 1.52 ( $SD = 0.64$ ).

Pearson correlation coefficients among the missed nursing care variables (overall, basic care, communication, and timeliness) and the unit-level nurse staffing variables (RNHPPD, NHPPD, and RN skill mix) are presented in Table 2. Communication, timeliness, and basic care were significantly and positively correlated to each other, as were the nurse staffing variables of RNHPPD, NHPPD, and RN skill mix, which were positively correlated to one another.

Significant relationships were found between the missed timeliness variable and all 3 of the nurse staffing variables. No significant correlations were found between the

**Table 1.** Missed Care and Nurse Staffing Descriptive Statistics (N = 729)

Variable	Mean (SD)
Overall missed care	1.82 (0.62)
Basic care	2.29 (1.06)
Communication	1.69 (0.71)
Timeliness	1.52 (0.64)
RNHPPD	7.03 (1.42)
NHPPD	10.08 (1.32)
RN skill mix	0.69 (0.09)

Abbreviations: NHPPD, nursing staff hours of care per patient-day; RN, registered nurse; RNHPPD, registered nurse hours per patient-day.

**Table 2.** Pearson Correlation Coefficients of Nurse Staffing and Nursing Care (N = 712)<sup>a</sup>

Measure	1	2	3	4	5	6	7
1. Overall missed care	1.00						
2. Communication	0.766 <sup>b</sup>	1.00					
3. Basic care	0.833 <sup>b</sup>	0.424 <sup>b</sup>	1.00				
4. Timeliness	0.667 <sup>b</sup>	0.406 <sup>b</sup>	0.289 <sup>b</sup>	1.00			
5. RNHPPD	−0.036	0.003	0.020	−0.141 <sup>b</sup>	1.00		
6. NHPPD	−0.062	−0.034	−0.030	−0.091 <sup>c</sup>	0.805 <sup>b</sup>	1.00	
7. RN skill mix	0.014	0.048	0.072	−0.131 <sup>b</sup>	0.793 <sup>b</sup>	0.283 <sup>b</sup>	1.00

Abbreviations: NHPPD, nursing staff hours of care per patient-day; RN, registered nurse; RNHPPD, registered nurse hours per patient-day.

<sup>a</sup>Listwise deletion.

<sup>b</sup>Significant at .01 level (2-tailed).

<sup>c</sup>Significant at .05 level (2-tailed).

nurse staffing variables and patient reports of missed communication or basic care. The missed timeliness subscale showed a significant negative correlation with RNHPPD ( $r = -0.14$ ,  $P = .0002$ ). The higher the RNHPPD, the more timely the provision of nursing care. Similarly, NHPPD was also negatively correlated to missed timeliness ( $r = -0.09$ ,  $P = .015$ ). Having more total nursing staff hours was associated with patients receiving care more promptly. Likewise, RN skill mix was negatively correlated to missed timeliness ( $r = -0.13$ ,  $P = .0004$ ). Having a higher ratio of RNs to other nursing staff was associated with patients receiving their care faster.

Hierarchical linear modeling was used to explore whether the nurse staffing variables (RNHPPD, NHPPD, and RN skill mix) predicted patient-reported missed nursing care after controlling for unit type and patient characteristics. A series of bivariate analyses and mean difference tests was conducted to determine independent variables for inclusion in the models. Only statistically significant independent variables were entered into each model.

RN skill mix was found to be a predictor of missed timeliness along with the age of the patients, patient-reported general health status, and not having a psychiatric diagnosis. Older patients, patients who reported

better health status, and patients without a psychiatric diagnosis reported receiving more timely care. Both RNHPPD and NHPPD were not significant predictors of nurse timeliness. The final model is presented in Supplemental Digital Content, Table (available at: <http://links.lww.com/JNCQ/A172>).

## DISCUSSION

This study explored relationships between patient reports of missed nursing care and nursing staffing levels and found that the timeliness of nursing care was correlated to and predicted by RN skill mix, which measures the proportion of nursing care hours that are provided by RNs. Having a greater percentage of RNs in the staffing mix resulted in patient reports of more rapid responses to their needs. The other nurse staffing variables (NHPPD and RNHPPD) were also correlated to the timeliness of nursing care. Higher staffing levels correlated to less missed timeliness. The other nurse staffing variables (NHPPD and RNHPPD), however, were not associated with the subscales of communication and basic care. These findings are in contrast to previous studies of missed nursing care and staffing levels that show a more consistent relationship between staffing levels and missed care.

Why does the presence of a higher proportion of RNs lead to more timely nursing care? RNs may be more knowledgeable and accountable than assistive personnel about the need for prompt answering of call lights and to quickly respond to requests for help, for example, to the bathroom, because of their understanding of the safety implications, specifically the danger of falls. RNs, who are ultimately responsible for patient care, may also have a heightened desire to ensure that patient needs are responded to quickly.

In all likelihood, however, the reason for this discrepancy between nursing assistants and compared with RNs is due to a lack of teamwork. Effective teamwork is needed to provide timely responses to patient needs. In fact, low levels of nursing teamwork have been found to be predictive of missed nursing care: less teamwork, more missed nursing care.<sup>18</sup>

In a previous study of the working relationships between RNs and UAP, several problems were consistently uncovered.<sup>19</sup> Those problems included a lack of role clarity, lack of working together as a team, UAP's inability to deal with conflict, RNs not engaging UAP in decision making, deficient delegation, UAP having more than 1 boss, and the "it's not my job syndrome." It can be seen how those problems could lead to delayed timeliness of nursing care. The approach used by the RN, for example, commanding rather than requesting the individual to carry out a task, can also influence the response of the UAP. When a patient complains of pain and UAP seek out the RN to report it but the RN does not respond, the UAP may not let the nurse know in subsequent instances. When the patients of 2 different RNs have a need at the same time, the UAP may be unsure how to prioritize the work and become frustrated because of this. When the RN does not meet with the UAP at the beginning of the shift to jointly develop the plan of care and establish who is responsible for various aspects of care, patient care could be missed. Similarly, if the RN and the UAP do not debrief in the middle of the shift to determine what has been done

and how they are going to provide the remaining care, it is likely that elements of care will be omitted.

The significant relationships between nurse staffing and the timeliness of nursing care indicate the importance of having adequate staffing levels for the safety of inpatient care. This study found that having a higher ratio of RNs to other nursing staff was particularly important. Inpatient units that find themselves with problems providing timely care could benefit from evaluating their unit nursing models and levels of nurse staffing. One barrier to increasing the ratio of RNs to UAP on a unit is the cost. It is unrealistic to have all RN staff members in most instances. Moreover, RNs may not want to provide care that does not require their level of expertise.<sup>20</sup>

A solution to this problem is to systematically work to improve teamwork. Unit-level teamwork among nursing staff has been shown to increase through interventions such as training programs and virtual simulation.<sup>21,22</sup> Efforts made to improve the quality of nursing staff relationships could prove to be valuable in increasing unit-level performance.

### **Limitations**

This study was conducted in 2 hospitals in the Midwest region of the United States and thus cannot be generalized broadly. Furthermore, the sample was a convenience sample of inpatients willing to participate in the survey. The demographic information of patients who decided not to participate is not available. Therefore, it was not possible to test for differences between the sample and those who refused to participate. The influence of social desirability on patient self-reports of nursing care could also impact the study results. However, a comparison of patient reports with those of nursing staff showed similar results, thus lessening this concern.

### **Implications**

The results of this study provide evidence of the impact of nurse staffing levels and type on the missed nursing care. Future studies

incorporating simultaneous data collection from both nursing staff and patients should be conducted for comparison of reports of missed nursing care. All 3 nurse staffing variables studied correlated to missed timeliness; however, only RN skill mix was predictive

of missed timeliness. Thus, studies including other factors found to influence nursing care, such as nurse interruptions, multitasking, and technology, should be conducted to explore relationships to the other missed care variables.

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