

The effect of nurse staffing on patient outcomes is expressed in part through its effect on the process of nursing care. Kalisch, Tschannen, & Lee (2011) found that nurse staffing levels (a structure variable) predict the amount and type of missed nursing care (a process measure). Additionally, missed nursing care has been found to mediate the relationship between nursing hours per patient day, a structural component, and inpatient fall rates, a patient outcome (Kalisch, Tschannen, & Lee (2012).

### **Definitions of Terms**

The following terms are conceptually and operationally defined within the context of this study.

#### **Patient Reported Missed Communication**

**Conceptual definition.** Patient reported missed communication is a type of Missed Nursing Care defined as any aspect of required patient care that is omitted (either in part or in whole) or delayed (Kalisch, Landstrom, & Hinshaw, 2009). It represents patient reports of the amount of communication received from nursing staff.

**Operational definition.** Patient reported missed communication was operationalized using the *MISSCARE Survey – Patient* (see Appendix A). This quantitative survey tool represents the self-report of patients on the communication scale representing five questions measured on a 5-point Likert scale of “never,” “rarely,” “sometimes,” “usually,” and “always.”

## **Patient Reported Missed Basic Care**

**Conceptual definition.** Patient reported missed basic care is a type of *Missed Nursing Care* defined as any aspect of required patient care that is omitted (either in part or in whole) or delayed (Kalisch, Landstrom, & Hinshaw, 2009). It represents patient reports of the amount of basic care received from nursing staff.

**Operational definition.** Patient reported missed basic care was operationalized using the *MISSCARE Survey – Patient*. This quantitative survey tool represents the self-report of patients on the basic care scale representing four questions measured on a 5-point Likert scale of “never”, “rarely”, “sometimes”, “usually”, and “always”.

## **Patient Reported Missed Timeliness**

**Conceptual definition.** Patient reported missed timeliness is a type of *Missed Nursing Care* defined as any aspect of required patient care that is omitted (either in part or in whole) or delayed (Kalisch, Landstrom, & Hinshaw, 2009). It represents patient reports of the time it took for them to receive care from nursing staff.

**Operational definition.** Patient reported missed timeliness was operationalized using the *MISSCARE Survey – Patient*. This quantitative survey tool represents patient self-reports of the timeliness scale representing four questions Measured on a 5-point Likert scale of “< 5 minutes,” “5-10 minutes,” “11-20 minutes,” “21-30 minutes,” and “> 30 minutes.”

## **Nurse Staffing**

The nurse staffing variables used in this study are: registered nurse hours of care per patient day (RNHPPD), all nursing staff hours of care per patient day (NHPPD), and registered nurse (RN) skill mix.

**Conceptual definitions.** *RNHPPD* reflects the overall time expended by registered nurses on the inpatient unit per patient day excluding vacation, sick time, orientation, education leave, or committee time. It is defined as “the number of productive hours worked by RNs with direct patient care responsibilities per patient day for each in-patient unit in a calendar month” (NQF, 2012, p. 1).

*NHPPD* reflects the overall time expended by all nursing staff:

- Registered nurses (RNs),
- Licensed practical nurses / licensed vocational nurses (LPN/LVNs), and
- Unlicensed assistive personnel (UAPs)

on the inpatient unit per patient day excluding vacation, sick time, orientation, education leave, or committee time. It is defined as “the number of productive hours worked by nursing staff (RN, LPN/LVN, and UAP) with direct patient care responsibilities per patient day for each in-patient unit in a calendar month” (NQF, 2012, p. 1).

*RN Skill Mix* represents the proportion of nursing care provided by registered nurses on a unit relative to care provided by all nursing staff including RNs, LPN/LVNs and UAPs (NQF, 2012).

**Operational definitions.** *RNHPPD* is the sum of total RN hours per patient day divided by inpatient days.

*NHPPD* the sum of total nursing hours worked by nursing staff (RN, LPN, UAP) with direct patient care responsibilities divided by the number of inpatient days.

*RN Skill Mix* the sum of productive hours worked by registered nurses divided by the total number of productive hours worked by all nursing staff (RN, LPN/LVN, UAP).

### **Study Aims and Research Questions**

The aims of this study and research questions were as follows.

Aim 1: To determine the amount and types of missed nursing care occurring on inpatient units as reported by hospitalized adults.

Research question:

1a. Which elements of nurse communication, basic care, and timeliness do patients report as being missed and to what degree?

Aim 2: To determine the inpatient unit nurse staffing variables, unit characteristics, and patient characteristics contributing to patient reports of missed nursing care.

Research questions:

2a. What is the relationship between inpatient unit nurse staffing variables (RNHPPD, NHPPD, RN Skill Mix) and patient reported missed nursing care?

2b. What is the relationship between selected unit characteristics (unit type, CMI) and patient reported missed nursing care?

2c. What is the relationship between selected patient characteristics (age, gender, education, health status, diagnosis) and patient reported missed nursing care?

- 2d. Is nurse staffing, measured by RNHPPD, NHPPD, and RN Skill Mix, associated with patient reported missed nursing care in acute care hospital units after controlling for significant inpatient unit and patient characteristics?
- 2e. What are the unit and patient characteristics that associate with patient reported missed nursing care?

### **Summary**

This study explores patient reports of missed nursing care and the relationships between nurse staffing and patient reported missed nursing care controlling for unit and patient characteristics. The study addresses two gaps. The first is the lack of empirical evidence on patient reports of routinely provided inpatient nursing care. The second gap is the exploration of the relationship between inpatient unit staffing and missed nursing care when the patient is the reporter of nursing care provided. Filling these two gaps allows for more complete exploration of the concept of missed nursing care, offers additional clarification into the process of nursing care delivered in the inpatient unit setting, and provides additional evidence on the impact of nursing staffing on nursing care process. This information may be especially helpful in guiding future studies related to inpatient nursing care quality.

## **CHAPTER 2**

### **REVIEW OF THE LITERATURE**

#### **Patient Reports of Inpatient Care**

Patient reports of the nursing care they receive while in the inpatient setting provide valuable information about the process of inpatient nursing care, as they shed light onto what is happening at the point of care delivery. Fitzpatrick and Hopkins (1983) found, however, a lack of fit between patients' accounts of their experiences and the assumptions obtained by satisfaction research, which poses the question whether patients lack the expertise to evaluate hospital care. Nonetheless, Rosenthal and Shannon (1997) note that several practical, empirical, and theoretical arguments have provided a strong rationale for assessing patient reports. These include:

1. Patient perceptions are more sensitive to differences across health-care delivery systems than many traditional measures of quality.
2. Patient perceptions are not an adversity based measure, thus promoting the ability to capture positive effects of health care which better complement newer models of quality improvement.
3. Using the principle of autonomy, competent patients have the right to decide what is best for them.
4. There is empirical evidence suggesting that patients' perceptions may be directly related to other indicators of quality and may be reliable.

5. Patients' perceptions of and satisfaction with health care are directly related to patients' decisions to seek medical care, to change providers, and to comply with recommended treatment.

It is important to distinguish between patient reports of nursing care they receive and patient satisfaction. Assessing patient satisfaction requires comparison between what the patient expected and what actually happened (Dozier, 2001). Crow (2002) conducted a comprehensive literature review of patient satisfaction and noted that satisfaction is a relative concept that does not imply superior service, only adequate or acceptable service. Patients' satisfaction with nursing services may not provide the specificity needed to fully assess particular aspects of nursing care, such as how long patients wait for a response to a beeping monitor. Notably, patients' reports of their health care experiences illustrate their perceptions of the health care received and are in response to their experiences (Sofaer & Firminger, 2005). McDonald (2012) conducted a concept analysis on perception. The resultant operational definition was "an individual's or group's unique way of viewing a phenomenon that involves the processing of stimuli and incorporates memories and experiences in the process of understanding" (p. 8).

Two widely used surveys measuring patients' reports of their inpatient care include the Picker Institute Patient Satisfaction Survey and the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey. The Picker Institute promotes a patient-centered approach to healthcare and their survey has a focus on specific dimensions of the patient experience (Picker Institute, 2012). The Picker adult inpatient questionnaire, though not targeted to nursing, contains dimensions applicable to nursing including the provision of information and education, respect for patient

preferences, and the provision of emotional support (Jenkinson, Coulter, & Bruster, 2002). Specific questions related to nurses include:

- “When you had important questions to ask a nurse, did you get answers that you could understand?
- Did you have confidence and trust in the nurses treating you? and
- Did nurses talk in front of you as if you weren’t there?” (Sizmur & Redding, 2009, p. 2).

Other dimensions of the Picker adult inpatient questionnaire included in the survey are not specific to care provided by nurses; however nurses do play a significant role in them including: coordination of care, physical comfort, involvement of family and friends, continuity and transition, and overall impression (Jenkinson, Coulter, & Bruster, 2002). Unfortunately, one cannot parse out the impact of nurses, specifically, on these measures as the patients’ response may indicate care delivered by another health care provider such as a physician. The institute chose not to ask patients to provide simple satisfaction ratings, but instead the researchers asked patients whether or not certain processes and events had occurred during their episode of care.

The Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey contains four questions about inpatient care received specifically from nurses. These questions measure patient reports of how often the nurses:

- treated them with courtesy and respect,
- listened carefully to them,
- explained things in a way they could understand, and

- provided help as soon as the patient wanted it after pressing their call button (HCAHPS, 2012).

Additionally, there are other questions in the survey that could relate to nursing staff; however, they are phrased as hospital experiences which could be attributable to nurses, doctors, or other hospital staff. Those questions ask how often nurses or other hospital staff:

- provided help to the bathroom or in using a bed pan as soon as the patient wanted,
- controlled their pain well,
- did everything they could to help with the patients' pain,
- told the patient what their medication was for, and
- described possible side effects of medications.

The HCAHPS questions are on a 4-point Likert scale ranging from never to always. Additionally, there is a yes/no question related to whether doctors, nurses, or other hospital staff talked to the patient about discharge planning (HCAHPS, 2012). Although the Picker Institute Patient Satisfaction Survey and the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey are routinely referred to as patient satisfaction surveys, it is important to note that in addition to rating overall satisfaction, they elicit patient reports of their inpatient nursing care, but on a limited scale.

### **Previous Studies**

Several qualitative studies have evaluated patient reports of their inpatient nursing care. Kalisch, McLaughlin and Dabney (2012) interviewed 38 adults on seven acute care

hospital units to explore their experiences of inpatient nursing care. The patients were found to be able to fully report on certain aspects of nursing care including mouth care, listening, being kept informed, nursing staff response to call lights and alarms, meal assistance, pain medication administration and follow-up and bathing. They were partially able to report on ambulation, discharge planning, patient education, medication administration, repositioning, vital signs, and nursing staff hand washing. However, due to their inability to determine what is involved in the nursing process of observation, patients were unable to report on nursing surveillance and patient assessment. Additionally, most patients were unable to report on intravenous site care due to their lack of clinical knowledge in this area (Kalisch, McLaughlin, & Dabney, 2012).

Schmidt (2003), using a grounded theory method, interviewed eight medical surgical patients who were recently discharged from the hospital. Four categories of what patients reported regarding their nursing care emerged including: seeing the individual patient, explaining, responding, and watching over. Seeing the individual patient encompassed the concept of patient-centeredness and demonstrated the patients' value of being seen as unique individuals. Explaining referred to communication and the patient's need for information. Responding referred to both the character and the timeliness of the nurses' response to patient requests or symptoms. "Watching over" referred to surveillance activities. Schmidt (2003) also found that patients described nurse competence as watching over them and responding as needed. Patients wanted to know that their nurses knew what was going on with them and that they were able to respond to their clinical situation when required. The interviewed patients also reported feeling a sense of caring when they perceived that their nurses were seeing them as individuals and

not just another patient. This personalization brought about feelings of comfort and security. The timeliness of nurse response to patient requests or to a symptom was also a main concern for these patients.

Larrabee (2001) interviewed 199 hospitalized adults and identified five themes of nursing care quality from the patient's perspective. These themes included: providing for my needs, treating me pleasantly, caring about me, being competent, and providing prompt care. Noted here is that in addition to interpersonal relationships, competence and timeliness are also of importance to patients. Izumi, Baggs, and Knafl (2010) developed of concept a quality nursing care as perceived by hospitalized patients with advanced illness. Based on interview data analysis of 16 patients in an urban acute care teaching hospital in the Pacific Northwest, 97 codes describing quality nursing care emerged and were grouped into four domains: competence, caring, professionalism, and demeanor. According to the patients, competent nursing care was care that met their everyday needs. Caring was described as genuine concern and compassion by the nurse. Professionalism was described by patients as the nurse being responsible, autonomous, and committed. Finally, nurse demeanor reflected how the nurses appeared and presented themselves to the patients. The researchers noted that the caring domain obtained increased importance for patients with advanced illness who perceived themselves as vulnerable. Nakano, Mainz, and Lomborg (2008) interviewed 30 acute cardiac syndrome patients and found that pain management was of high importance to them. Patients viewed the timely provision of pain management as a sign of clinical competence.

McMurray and colleagues (2011) interviewed ten hospitalized adult patients in one hospital about their perspectives of the bedside handover practice, a practice where

nurses conducted shift-to-shift handoff report at the patients' bedsides. The researchers concluded that the communication of information was of high importance to patients. Most patients appreciated being 'in the loop' of what was going on with them clinically and having the opportunity to be a part of this type of communication. Additionally, patients were able to add comments or correct statements made in the report that they felt were incorrect. The patients valued being acknowledged as a partner in the health care process. Likewise, patients appreciated being provided with knowledge and included in the decision process. Being included as a partner in their health care provided a sense of control and increased feelings of dignity. Larsson, Sahlsten, Sjostrom, Lindencrona and Plos (2007) conducted focus groups with 26 patients who were either currently inpatient or who had discharged from the inpatient setting to explore their perceptions of participation in their hospital nursing care. They found that patients desire for their nurses to initiate and build relationships, listen to them, give feedback, supply information in a way that the patient could understand, and possess a willingness to spend the time necessary for this type of interaction.

These qualitative studies illuminate the patients' desire for individuality, respect, communication, timely responses, clinical competence, caring, and professionalism. Hospitalized persons are in a vulnerable state. Patients need to know that their nurses are capable of providing the care they need in a timely manner and in a professional way.

The quantitative literature on patient reports of inpatient nursing care address many of the concepts uncovered in the qualitative studies however, evaluation of many routine elements of nursing care are missing. Jenkinson, Coulter, and Bruster (2002) developed the *Picker Patient Experience Questionnaire (PPE-15)* comprised of 15

questions selected from the bank of items used in inpatient surveys by the Picker Institute. Based on the survey results of patients ( $N = 62,925$ ) who had attended acute care hospitals in five countries, including the United Kingdom, Germany, Sweden, Switzerland, and the USA, the researchers concluded that the fifteen-item questionnaire provided a meaningful picture of patient experiences of health care. However, of the fifteen questions, fourteen addressed communication and one question addressed pain control. The researchers noted that further modules could be added to this small set of questions.

Lynn, McMillen, and Sidani (2007) developed the *Patient's Assessment of Quality Scale – Acute Care Version* to provide a mechanism through which patients could meaningfully evaluate their nursing care. The 45-item tool revealed five factors (individualization, nurse characteristics, caring, environment, and nurse responsiveness). They concluded that the tool was useful for assessing quality. However, specific nursing tasks such as ambulation, mouth care, and pain medication administration follow-up were not addressed. Bolton et al. (2003) used the standardized Picker Institute inpatient questionnaire to elicit patient reports of their care. The nurse-sensitive questions within the questionnaire addressed patient-centeredness, communication, physical comfort, emotional support, continuity including transition to home, and overall impression of nursing care. It is noted that several aspects of routine inpatient nursing care were also not addressed in this questionnaire.

Dozier and colleagues (2001) developed the *Patient Perception of Hospital Experience with Nursing (PPHEN)* questionnaire, a 15-item instrument. This instrument measures patient perceptions of feeling cared for. Psychometric evaluation of the tool

indicated that, despite positive skewing, the fifteen-item PPHEN was able to detect changes in patients' perceptions of the quality of nursing care received when provided in different institutions and when care delivery changes within the same institution, supporting the ability of the PPHEN to distinguish between patient care units. The authors noted that because the instrument represents only one general factor, it cannot be used to diagnose specific nursing care deficiencies.

### **Gaps**

The research on patient reports of inpatient nursing care tends to focus on interpersonal aspects of nursing care and patient comfort. The body of evidence reviewed suggests that the way nurses make patients feel is of high importance to patients. There is, however, limited research exploring what nursing care is actually being delivered at the point of care as reported by patients. Reports of several aspects of nursing care routinely provided to inpatients, such as wait time in minutes or the mobilization of patients, are not addressed. Further research is needed eliciting patient reports of routinely provided inpatient nursing care. These reports can be useful in identifying areas for improvement and the identification of care omissions.

### **Missed Nursing Care**

The concept of missed nursing care was first reported in 2006 in a qualitative study measuring the types of and reasons for omitted or delayed nursing care as reported by inpatient nursing staff (Kalisch, 2006). Missed nursing care is defined as any aspect of required patient care that is omitted (either in part or in whole) or delayed (Kalisch, Landstrom, & Hinshaw, 2009). In a qualitative study, Kalisch conducted 25 focus group

interviews consisting of nurses and nursing assistants working on medical and surgical inpatient units to identify the scope of nursing care missed in the acute care setting and found that important elements of nursing care are being missed on a regular basis. The findings of this study revealed nine areas of missed nursing care: ambulation, turning, delayed or missed feedings, patient teaching, discharge planning, emotional support, hygiene, intake and output documentation, and surveillance. Seven reasons for missed nursing care reported by nursing staff were also discovered, including: too few staff, poor use of existing staff resources, time required for the nursing intervention, poor teamwork, ineffective delegation, habit, and denial (Kalisch, 2006).

This study revealed that nurses were aware of what care is missed and could readily identify it. However, unless they were specifically asked about it they did not tend to openly acknowledge or discuss it. Feelings of guilt or powerlessness to correct the situation likely contributed to the lack of open acknowledgment. Additionally, the feelings of guilt and powerlessness led to the use of coping mechanisms such as denial and placing higher priorities on care that was ordered by a physician or regularly asked about by the physicians (Kalisch, 2006). The negative consequences of this action are that routine basic nursing care not systematically asked about or ordered by physicians (such as patient ambulation and turning) is given a lower priority and has a higher risk of not being completed. Additionally, care resulting in immediate impact was more likely to be completed, leaving care which may not have readily apparent immediate impact to a lesser priority in the list of things to do and therefore at higher risk of not being completed (Kalisch, 2006).

Selected aspects of missed nursing care have been investigated previously. For example, nursing care omissions have been documented in studies examining inpatient ambulation. Callen, Mahoney, Grieves, Wells, and Enloe (2004) found inpatient ambulation to be a missed component of nursing care during an observational study of patient ambulation on three medical units. Results showed that only 19% of patients walked once, 5% walked twice, 3% walked more than twice, and 73% did not walk at all during the study observational period. The fact that lack of mobilization can lead to functional decline is an example of how missed nursing care may impact patient outcomes. Functional decline is a common complication of hospitalization of elderly patients. In a qualitative study, Boltz, Capezuti, Shabbat, and Hall (2010) found that patients expected to go home better, not worse, and a patient reported barrier to independence was insufficient staffing for activities such as walking. The need for strong basic nursing care and an enabling environment which made sure that people did not lose their abilities were also strong themes that emerged from the study.

Studies have also explored the presence of inadequate nutrition among hospitalized patients. In a study of 320 hospitalized patients, 8% stated that the reason for their insufficient food intake was lack of assistance from hospital staff (Rasmussen et al., 2004). Rasmussen et al. (2004) also found that a significant number of hospitalized patients were malnourished. Inadequate nutrition can be partially due to missed feedings and/or not setting up food trays for patients who require assistance or encouragement to eat for those who can feed themselves. Xia and McCutcheon (2006) conducted a descriptive study of nutritional practices on a medical ward. Using observation and semi-structured interviews, the researchers found that older patients did not receive enough

assistance during mealtimes and that nutrition issues appeared to receive less priority than other nursing activities.

Other examples of studies of care omissions include omissions of inpatient oral hygiene, catheter care, skin care, patient and family education, discharge planning, and adequate documentation of nursing care (Al-Kandari & Thomas, 2009; Lucero, Lake, & Aiken, 2009). The research literature indicates that missed nursing care is a significant problem encompassing several aspects of inpatient nursing care.

Researchers have also explored the reasons for care omissions. Using the *MISSCARE Survey*, a sample of 459 nurses from three hospitals indicated that the reasons for missed care were related to labor resources (85%), material resources (56%), and communication (38%) (Kalisch, Landstrom, & Williams, 2009). An expanded study of ten hospitals found inadequate labor resources (93.1%) to be the most frequently cited reason for missed nursing care followed by material resources (89.6%) and communication (81.7%) (Kalisch, Tschannen, Lee, & Friese, 2011). Bittner & Gravlin (2009) noted that ineffective task delegation from registered nurses to nursing assistants, erroneous knowledge expectations, poor relationships between nurses and the unlicensed assistive personnel, role uncertainty, communication barriers, and deficiencies in system support were factors contributing to the omission of nursing care. Unexpected rises in patient volume or patient acuity, inadequate numbers of assistive personnel, heavy admission or discharge activity, the level of staffing, and urgent patient situations were also found to be reasons for missed care (Gravlin & Bittner, 2010). These studies all found labor resources to be one of the factors in missed nursing care. In addition to nursing staffing issues, registered nurses may find it increasingly difficult to provide

necessary nursing care due to the increasing complexity of health care delivery, new technologies, regulatory constraints, and the illness severity of patients (Lucero, Lake, & Aiken, 2009). Concepts similar to missed nursing care have been studied include unfinished care and rationed care, as described next.

### **Unfinished Care**

Unfinished care is patient care that is left undone due to time constraints. Sochalski (2004) examined the quality of nursing care provided by inpatient staff nurses working in acute care hospitals in Pennsylvania using nurse-reported rates of unfinished care. In this study, unfinished care was defined as the number of nursing tasks left undone during the nurse's last shift due to lack of time to undertake the task. In a study of 8,670 nurses, 40% reported leaving three or more tasks undone at the end of their last shift. The tasks examined included patient teaching and counseling, skin and oral care, documenting patient problems and interventions, and discharge planning. Sochalski (2004) found that the quality of nursing care (as rated by the nurses) was significantly associated with the number of patients nurses cared for (patient workload) and the rates of unfinished care for those patients. The number of tasks left undone was associated with 40% of the variation in nursing care quality ratings. In a study of registered nurses working in acute care hospitals, one out of five indicated that the quality of nursing care on their unit was fair or poor. These quality ratings were due in part to reports of care left undone at the end of their shift due to time constraints (Sochalski, 2001).

Using an exploratory survey design, Al-Kandari and Thomas (2009) conducted a study of 780 registered nurses working on general medical and surgical wards in five government hospitals in Kuwait to assess the workloads of nurses and elements of

nursing care left unfinished by nurses during a shift. They found that only 44.8% of the nurses stated that they could complete all of the required procedures for patients during their shift. The most common nursing activities left unfinished were comfort talk with the patient and family, consisting of listening to patient needs and providing support (26.8%), adequate documentation of nursing care (23.3%), and oral hygiene (17.7%). For medical units, the next ranked items left unfinished were routine catheter care and the development or updating of nursing care plans. For surgical units, they were starting or changing IV fluid and performing routine catheter care. Al-Kandari and Thomas (2009) also found that there was less unfinished care when the nurses' patient load was less than five patients.

Lucero et al. (2009) referred to unfinished care as unmet nursing care needs. Unmet nursing care needs were nursing care activities that are considered necessary by registered nurses but are left undone during the nurses' shift. Unmet nursing care needs were measured using a single questionnaire item that contained seven nursing activities: teaching patients or family, preparing patients and families for discharge, comfort/talk with patients, adequately documenting nursing care, back rubs and skin care, oral hygiene, and developing or updating nursing care plans. The nurses were asked to indicate which among the list were necessary but left undone because they lacked the time to complete them. The researchers found that, on average, development or updating of nursing care plans was unmet 41% of the time, comfort/talk to patients 40%, backrubs and skin care 30%, patient and family teaching 29%, adequate documentation of nursing care 22%, and oral hygiene was unmet 20% of the time.

## **Rationed Care**

Rationed care is another concept similar to missed nursing care. Rationed nursing care is defined as “the withholding or failure to carry out necessary nursing tasks due to inadequate time, staffing level, and/or skill mix” (Schubert et al., 2008, p. 228).

According to Schubert et al. (2008), implicit rationing of nursing care takes place when nurses lack sufficient time to provide all of the care they perceive is needed by their patients.

Rocheffort and Clarke (2010) explored the relationship between neonatal nurse perceptions of rationed care, work environment characteristics, job outcomes, and the quality of care. They found that the nursing care activities most frequently rationed due to insufficient time were discharge planning, parental support and teaching, and comfort care. As staffing and resource adequacy was rated one point higher, the rationing of parental teaching, support, infant comfort care, discharge planning and care coordination decreased by approximately 11%. Lawless, Wan, and Zeng (2010) surveyed nurses and found that more than a quarter ranked the eleven common patient care activities studied as being rationed often or very often. Respondents indicated workload and work intensification as contributing to rationed care, with 61% reporting an increase in patient complexity in the last six months. The survey results also found that compensatory methods used by nurses included increasing work pace, missing breaks, and working past the end of their shifts (Lawless et al., 2010).

Schubert et al. (2008) found higher levels of rationing of care to be significantly related to poor patient outcomes, both alone and after controlling for staffing and work environment measures, with higher levels of rationed care significantly related to higher

frequency of adverse patient outcomes including medication errors, patient falls, infections and pressure ulcers. Given the seriousness of the potential consequences of nursing care omissions, a fuller understanding of their impact on health care quality is needed.

### **Gaps**

The previous studies of missed nursing care, unfinished care, and rationed care all expose the problem of nursing care omissions and some attributable factors. However, these reports of care omissions were all elicited from the nursing staff. While obtaining nursing staff reports is essential and provides the observations of those providing the actual care, it may not provide a complete picture. Including the reports of those receiving the care is needed to fully assess the phenomenon of nursing care omissions.

### **Nurse Staffing**

The studies of nursing care omission repeatedly cite staffing as a contributor to care omissions. Hospital nurse staffing has also been linked to healthcare quality. Needleman, Buerhaus, Mattke, Stewart, and Zelevinsky (2002a) using administrative data from 799 hospitals found that having a higher registered nurse skill mix and a greater number of hours of care per day provided by registered nurses to be associated with shorter lengths of stay and lower rates of pneumonia, urinary tract infections, shock or cardiac arrest, and failure to rescue.

Cho, Ketefian, Barkauskas, and Smith (2003) using a sample of 124,204 patients from 232 acute care hospitals also found statistically significant relationships between nurse staffing and adverse events. For every increase of one hour worked by registered

nurses per patient day, there was an 8.9% decrease in the odds of pneumonia. For a 10% increase in the proportion of RNs to other nursing staff there was a 9.5% decrease in the odds of pneumonia. However the researchers also obtained an inconsistent result indicating that a greater number of nursing hours per patient day was associated with a higher probability of pressure ulcers.

Frith et al. (2010) wished to strengthen the growing evidence of the relationship between nurse staffing and patient outcomes using standardized databases and multilevel modeling. In a cross sectional study of 35,000 patients from eleven units in four hospitals, their findings indicated that higher registered nurse and licensed practical nurse hours per equivalent patient day and a higher percentage of registered nurses in the skill mix predicted a lower number of adverse events. These studies indicate the impact of nurse staffing variables on patient outcomes. However they do not address the question of how this relationship occurs.

Kane, Shamliyan, Mueller, Duval, and Wilt (2007) conducted a systematic literature review and meta-analysis of the association between registered nurse staffing levels and patient outcomes. They concluded that studies using different designs showed associations between higher registered nurse staffing and a lower odds of hospital related mortality and adverse patient events. The evidence supports the use of unit nurse staffing variables as predictors of patient outcomes. In particular, the staffing of registered nurses is of importance.

Bolton et al. (2003) examined the relationship between nurse staffing and patient perceptions of nursing care. The researchers surveyed patients who had received inpatient care from 40 California hospitals using the six dimensions of care identified as critical to

hospital patients by the Picker Institute: (1) hospital personnel respect patient's values, preferences, and expressed needs; (2) information, communication, and education; (3) physical comfort and pain management; (4) emotional support and alleviation of fear and anxiety; (5) involvement of family and friends; and (6) transition and continuity to home and community. A statistically significant relationship was found between nursing hours per patient day and the dimension of respect for patient's values, preferences, and expressed needs suggesting that having a lower number of all nursing staff hours of care per patient day may be associated with higher reports of problems in that area. No significant relationships were found between nurse staffing variables and the other dimensions of care studied. It is noted however that the data were collected and analyzed at the hospital level; therefore unit variability could not be captured. Additionally, several aspects of basic nursing care were not captured using the survey, such as ambulation, mouth care, the response time to call lights, etc.

### **Gaps**

Numerous studies have shown links between the level and type of inpatient nurse staffing and patient outcomes (Santon & Rutherford, 2004). While these studies add understanding to the relationships between structure and outcomes, they provide little information about the actual nursing care that does or does not occur within the process of nursing care delivery. Further research is needed to determine whether there is a relationship between nurse staffing and patient reports of nursing care omissions. This information will add to the examination of the relationship between nurse staffing and missed nursing care by providing the reports of missed nursing care as experienced by the persons receiving the care.

## **CHAPTER 3**

### **METHODS**

The purpose of this study was to examine patient reports of inpatient nursing care received and to explore relationships among patient reported missed nursing care and inpatient unit nurse staffing variables. Additionally, patient and inpatient unit characteristics contributing to patient reported missed nursing care were explored. In this chapter, the study methodology is presented including: study design; sample and setting; data collection; instruments and measures; and data analysis plan.

#### **Design**

This study utilized a secondary data analysis research design. Data from the Patient Perceptions of Missed Nursing Care study was used (Kalisch & Rochman, in press). The Patient Perceptions of Missed Nursing Care study used a prospective survey design and its database is comprised of patient reports of nursing care received, patient demographic data, and inpatient unit level data consisting of unit nurse staffing variables, unit type, and unit level case mix index. Patient demographics and reports of nursing care received were collected using the *MISSCARE Survey – Patient* (Appendix A). Inpatient unit nurse staffing measures and unit level case mix index were collected using hospital administrative data.

## **Sample and Setting**

The Patient Perceptions of Missed Nursing Care study was conducted in two acute care hospitals in the Midwestern region of the United States. The study population consisted of a convenience sample of 750 adults who were inpatients on 22 different patient care units within the two hospitals.

### **Inclusion and Exclusion Criteria**

The inclusion criteria for sample selection of the original study were: (1) being an inpatient on a medical, surgical, intensive care, or rehabilitation unit; (2) adults eighteen years of age or older; (3) inpatient for three or more days; (4) English speaking; (5) cognitively able to participate in the survey or had a family member at the bedside able to participate on their behalf; (6) consenting to participate in the study. The exclusion criteria were: (1) patients who were on units other than those listed in the inclusion criteria, such as the emergency department, labor and delivery, psychiatric care, etc.; (2) patients who were deemed by the unit charge nurse to be unable to participate in the study due to their clinical status.

For this study, the inclusion/exclusion criteria remained the same with the exception of the exclusion of data from patients in the intensive care units.

### **Study Sample**

Patients in medical, surgical, and rehabilitation units were selected from the Patient Perceptions of Missed Nursing Care study database. Data collected from patients in the intensive care units was not included for this project because of the low number of respondents, and because patients in intensive care units were only surveyed at one of the

two participating hospitals. This step was done to ensure that the study included similar samples in both hospitals and that adequate sample sizes were obtained from each unit. Based on these criteria, there were a total of 20 inpatient units comprising 729 inpatients included in this study. Two subsets of data (patient survey and administrative data) corresponding to particular inpatient care units were utilized to answer the research questions.

### **Data Collection**

Trained research assistants administered the *MISSCARE Survey – Patient* to hospitalized patients meeting inclusion criteria. The surveys were administered at the bedside after obtaining consent from the patient. The surveys were conducted from January 2011 to June 2012. In addition to the patient survey data, both participating hospitals provided raw administrative data for calculation of the nurse staffing variables. The designated finance and quality staff in each hospital were provided specific definitions and data requirements for each study variable. Subsequently, the research team computed the nurse staffing variables of registered nurse hours per patient day, total nursing staff hours per patient day, and registered nurse skill mix to ensure consistency in calculation across hospitals. The hospital finance departments also provided the unit-level case mix index value for each unit in which patient surveys were collected for the months in which they were collected.

### **Privacy/Confidentiality/Security**

Institutional Review Board approval was obtained from the University of Michigan and from both participating hospitals prior to data collection. The data

collected were kept in an encrypted laptop of the investigator, locked with a password. All identifiers had been removed from the data, thus privacy was ensured.

## **Measures**

### **Missed Nursing Care**

The selection of variables for this study was guided by the conceptual model and the review of existing literature on contextual factors related to missed nursing care (see Chapter Two). Three dependent variables measuring patient reports of missed nursing care are studied including: patient reported communication, patient reported basic care, and patient reported timeliness. These measures are scale scores that were calculated from patient responses to the *MISSCARE Survey – Patient*. The questions and scoring are presented in Table 1.

Patient reported communication is a total scale score comprised of patient responses to five questions regarding nurse communication with patients including: providing information about tests/procedures, listening to them, discussing their treatment, and considering patient opinions. Patient reported basic care is a total scale score comprised of patient responses to four questions regarding the basic care of patient activities including: bathing, mouth care, sitting in a chair, and ambulating. Patient reported timeliness is a total scale score comprised of patient responses to four questions asking how long it took in minutes for the patient to receive various items of nursing care including: response to call lights, time to provision of need requests, response to beeping machines, and time to assistance to the bathroom.

Table 1. *Dependent Variable Scale Questions and Scoring*

Variable	Questions	Range of Scores
Communication	1. How often are you clear about which specific nurse was assigned to take care of you for the shift?	1-5
	2. How often did your nursing staff discuss your treatment with you?	1-5
	3. How often did your nursing staff give you information about tests (e.g., x-ray, MRI, CT scan) and/or procedures you received during this hospitalization (timing, what would be involved, etc.)?	1-5
	4. When you had a question or concern about your care or illness, did your nursing staff listen to you?	1-5
	5. When you had an opinion about what needed to be done relative to your care, did the nursing staff consider your opinions and ideas?	1-5
Total Scale Score		5-25
Basic care	1. How often did the nursing staff check with you to make sure your teeth were brushed and mouth rinsed (or provide the care if you could not do it yourself)?	1-5
	2. How often did the nursing staff check with you to make sure you had a bath or were kept clean throughout your hospitalization?	1-5
	3. On average, how often did the nursing staff help you or monitor that you got out of bed and sat in a chair?	1-5
	4. On average, how often did the nursing staff help you or monitor that you walked?	1-5
Total Scale Score		4-20
Timeliness	1. When a monitor or other machine beeped, how long did it usually take the nursing staff to respond?	1-5
	2. When you pushed your call light, how long on average did it take the nursing staff to answer?	1-5
	3. Once your call light was answered, how long on average did it take for you to receive the help you requested?	1-5
	4. If you needed help to go to the bathroom, how long did it take the nursing staff to get into your room to help you?	1-5
Total Scale Score		4-20

### **Instrument – *MISSCARE Survey - Patient***

Patients' reports of nursing care received were collected using the *MISSCARE Survey – Patient* (Kalisch & Rochman, in press) (see Appendix A). The *MISSCARE Survey – Patient* tool was designed to elicit patient reports of the extent to which nursing care was provided or not. This tool consists of twenty one questions and describes: (1) how often elements of nursing care were received on a 5-point Likert scale from never to always, (2) how long it took the patient to receive elements of nursing care on a 5-point Likert scale from less than five minutes to more than thirty minutes, (3) patient's overall rating of nursing care on a 5-point Likert scale from poor to excellent, (4) reports of adverse outcomes such as falls or medication errors reported as yes or no, (5) and patient demographic information (Kalisch & Rochman, in press).

Results from exploratory factor analysis revealed a three-factor solution explaining 59.62 % of variance in patient perceived missed nursing care: (1) Communication, (2) Time-to-respond, and (3) Basic Care. Communication was composed of five items, Time-to-respond consisted of four items, and Basic Care included four items. Internal consistency was tested for the 13 items, resulting in a Cronbach's alpha coefficient of .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), Time to respond ( $\alpha = .834$ , 4 items), and Basic Care ( $\alpha = .708$ , 4 items)] (Kalisch & Rochman, in press).

Test-retest reliability of the tool was conducted using 30 patients two weeks after they first completed the survey with a result of .818. Content validity of the tool was

established using nursing staff and patients with index results of 0.89 and 0.88 respectively (Kalisch & Rochman, in press).

### **Nurse Staffing**

Nurse staffing was measured using three variables: (1) registered nurse hours of care per patient day (RNHPPD), (2) total nurse staff hours of care per patient day (NHPPD), and (3) registered nurse skill mix (RN Skill Mix). The raw data were obtained from hospital administrative personnel, and the nurse staffing variables were calculated by the researchers. Table 2 provides the variable calculations.

### **Unit Case Mix Index**

The hospital finance departments of each hospital calculated an All Patient Defined, Diagnosis Related Group (APR DRG) case mix index for each inpatient unit for each month in which surveys were collected. The unit-level calculation consisted of the sum of version 25.0 APR DRG weights, based on APR DRG code and severity level, for all discharges, divided by the number of discharges per unit/per month.

### **Unit Type**

The inpatient units were categorized as medical units, surgical units or rehabilitation units. The unit classification of each study unit was designated by their hospitals. Unit type is a categorical variable. To facilitate data analysis, dummy variables were created (Unit type1: 1=Medical unit, 0=All other units; and Unit type2: 1= Surgical unit, 0=All other units; Unit type3: 1=Rehabilitation unit, 0=All other units).

Table 2

*Nurse Staffing Variable Calculations*

Variable	Calculation
Registered nurse hours per patient day (RNHPPD)	This is a continuous variable derived from: <i>Numerator:</i> The total number of productive hours worked by registered nurses with direct patient care responsibilities for a designated in-patient unit during a designated calendar month. <i>Denominator:</i> The total number of patient days for a designated in-patient unit during a designated calendar month.
Nursing care hours per patient day (NHPPD)	This is a continuous variable derived from: <i>Numerator:</i> The total number of productive hours worked by nursing staff (RN, LPN/LVN, and UAP) with direct patient care responsibilities for a designated in-patient unit during a designated calendar month. <i>Denominator:</i> The total number of patient days for a designated in-patient unit during a designated calendar month.
Registered nurse skill mix (RN Skill Mix)	This is a continuous variable derived from: <i>Numerator:</i> Productive nursing care hours worked by registered nurses with direct patient care responsibilities for a designated in-patient unit during a designated calendar month <i>Denominator:</i> The total number of productive hours worked by employee and contract nursing staff (including RN, LPN/LVN, and UAP) with direct patient care responsibilities for a designated in-patient unit during a designated calendar month (NQF, 2012).

**Patient Characteristics**

The general information section of the *MISSCARE Survey – Patient* captured patient demographic data, patient health data, and hospitalization history data. Socio-

demographic data including patient age, gender, race, education level, and marital status were used to describe the sample population. Additionally, medical information including patient reports of their overall general health status and diagnosis history was gathered. Finally, data of the hospitalization, including the number of days in the hospital at the time of the survey and type of hospitalization is included. Table 3 describes the patient demographic variables.

Table 3

*Patient Demographic Variables*

<b>Patient Characteristics</b>	<b>Description</b>	<b>Operational Definition</b>
Patient reported general health status	Patient reports of their general level health	This is a continuous variable reported on a 5-point Likert scale (poor, fair, good, very good, excellent)
Patient age	Patient reports of their age in years	The age of the patient in years
Patient gender	Patient report of being male or female	This is a categorical variable reported as 1=male, 0=female
Patient race	Patient report of race	This is a categorical variable reported as 1=white, 0=other
Patient education	Patient report of highest level of education	0=high school diploma/GED or less, 1=some college or more

(Continued)

(Table 3 continued)

<b>Patient Characteristics</b>	<b>Description</b>	<b>Operational Definition</b>
Patient marital status	Patient report of their marital status	1=married, 0=not married
Diagnoses history	Patient report of ever being diagnosed or treated for the following: cancer, lung disease, heart disease, high blood pressure, stroke, psychiatric problems, substance abuse, diabetes, and rheumatoid arthritis	1=yes, 0=no for each diagnosis

## **Data Analyses**

### **Data Set Preparation**

In order to improve interpretability of the results, the dependent variables were recoded such that higher scores represented more missed nursing care. Thus, communication and basic care were reverse recoded so that 1 equated to care always received and 5 equated to care never received.

Additionally, two of the basic care survey items contained a sixth option where the patient could indicate that they did not require the nursing services asked about. For the basic care item of sitting in a chair, the patient could indicate that they were unable to get out of bed. For the basic care item of walking, the patient could indicate that they could not walk. These responses were recoded as system-missing. All four of the questions comprising the timeliness score contained a sixth option where the patient could indicate that either, their machine never beeped, they never pushed their call light,

or they did not request or need help to the bathroom. These were also recoded as system missing.

### **Reliability Testing**

To estimate the internal consistency of the three scales measuring patient reported nursing care, the Cronbach's alpha coefficients for the three scales (communication, basic care, and timeliness) were calculated using the sample described for this project.

Cronbach alpha coefficients were calculated to report the reliability of the three scales used for this current study. Internal consistency reliability for the 5-item communication scale was  $\alpha = .78$ . The reliability coefficient for the 4-item basic care scale was  $\alpha = .77$ .

The reliability coefficient for the 4-item Missed Timeliness scale was  $\alpha = .80$ .

### **Univariate Analysis**

Prior to addressing the study aims, descriptive analyses were conducted to examine the characteristics of the sample and the patient care units. Descriptive statistics including frequency, mean, standard deviation, minimum and maximum, were computed for the patient variables of patient age, hospital days, and general health status; and for the unit variables of registered nurse hours per patient day, total nursing staff hours per patient day, registered nurse skill mix, and unit case mix index (CMI). The frequency and percentages were calculated for the categorical patient variables including patient gender, race, education, marital status, medical diagnoses, and unit variable of unit type.

Evaluation of the distribution of study variables revealed that unit-level CMI was not normally distributed; therefore the log of unit-level CMI was used for data analysis.

## **Bivariate Analysis**

In order to specify a correct structural model for this study, a series of mean different tests (independent sample t-tests, and ANOVA) and correlations were conducted to identify important patient related and inpatient unit related variables influencing the missed nursing care dependent variables.

Pearson correlations were used to examine relationships between the continuous variables and the three dependent variables (missed communication, missed basic care, and missed timeliness). The preset alpha of .05 was used to determine if statistical significance was achieved. One Way-ANOVA was used to test for differences among the means of dependent variable scores based on the type of unit (medical, surgical, or rehabilitation). Independent samples t-tests were used to test for differences among mean dependent variable scores based on patient gender, and the presences of certain medical diagnoses.

## **Analysis of Research Questions**

The following statistical analyses were conducted for each specific aim and research question:

Aim 1: To determine the amount and types of missed nursing care occurring on inpatient units as reported by hospitalized adults.

*Research Question 1:* Which elements of nurse communication, basic care, and timeliness do patients report as being missed and to what degree?

Descriptive statistics including frequency, minimum, maximum, mean score, and standard deviation for the mean communication, basic care and timeliness scores were calculated along with the descriptive statics for each answer choice comprising the three

scales. Box plots were utilized to understand the distribution by unit. In order to better evaluate the amount of most and least missed care, the patient reports of nursing care received were recoded into missed and not missed care as shown in Table 4. The frequency and percentage of missed nursing care for each nursing care item were then obtained and ranked from most missed to least missed.

Table 4

*Coding of Missed and Not Missed Nursing Care*

Item choice	Missed	Not Missed
Never	X	
Rarely	X	
Sometimes	X	
Usually		X
Always		X
< 5 minutes		X
5 to 10 minutes		X
11 to 20 minutes	X	
21 to 30 minutes	X	
> 30 minutes	X	

Aim 2: To determine the inpatient unit nurse staffing variables, unit characteristics, and patient characteristics contributing to patient reports of missed nursing care.

*Research Question 2a:* What is the relationship between inpatient unit nurse staffing variables (RNHPPD, NHPPD, RN Skill Mix) and patient reported missed nursing care?

Bivariate correlation analyses were conducted to examine correlations among RNHPPD, NHPPD, RN Skill Mix and the three dependent variables nurse communication, basic care, and timeliness. Each staffing variable and each outcome variable were assessed individually using Pearson correlations.

*Research Question 2b:* What is the relationship between selected unit characteristics (unit type, CMI) and patient reported missed nursing care?

Pearson correlation analysis was used to test for relationships between unit case mix index and patient reported nurse communication, basic care, and timeliness. One-way ANOVA was used to test for mean differences in communication, basic care, and timeliness scores related to unit type.

*Research Question 2c:* What is the relationship between selected patient characteristics (age, gender, education, health status, diagnosis) and patient reported missed nursing care?

Pearson correlation analysis was used to test for relationships between the patient related variables of patient general health, the number of hospital days, patient age, and patient education, and patient reported nurse communication, basic care, and timeliness. Independent samples t-tests were used to assess for differences in patient reports of nurse communication, basic care, and timeliness based on patient diagnosis history and gender.

*Research Question 2d:* Is nurse staffing, measured by RNHPPD, NHPPD, and RN Skill Mix, associated with patient reported missed nursing care in acute care hospital units after controlling for significant inpatient unit and patient characteristics?

Because the Patient Perceptions of Missed Nursing Care data were reported by patients nested within inpatient units, the analysis of variable predictability was conducted using hierarchical linear modeling (HLM), a multi-level multiple regression technique useful in analyzing nested data (Raudenbush & Bryk, 2002). In order to proceed with HLM, the number of levels in the data needed to be specified and models need to be constructed. The Patient Perceptions of Missed Nursing Care data was best described in two levels: patient level (level-1), and inpatient unit level (level-2). Nesting within hospitals was not accounted for in this analysis because the sample size was small ( $N = 2$ ).

### **Unconditional Means Models**

The dependent variable nurse timeliness was the only one found to be correlated with the nurse staffing variables. An unconditional means model was constructed for each dependent variable to timeliness to examine the variation in nurse timeliness scores between inpatient units and within inpatient units. The unconditional model contains no level-1 or level-2 variables. The motivation for this model is to answer the question of how much inpatient unit-level scores vary in their mean timeliness scores.

The regression equations are noted below, where  $r_{ij} \sim N(0, \sigma^2)$  and  $u_{0j} \sim N(0, \tau^2)$ . The notation used by Bryk and Raudenbush (1992) is used wherever possible.

$$\text{Timeliness}_{ij} = \beta_{0j} + r_{ij}$$

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

Combining the two equations into one by substituting the level-2 equation to level-1 equation, results in:

$$\text{Timeliness}_{ij} = \gamma_{00} + u_{0j} + r_{ij}$$

In this model,  $\text{Timeliness}_{ij}$  is the dependent variable score of patient  $i$  in inpatient unit  $j$

$\beta_{0j}$  is the regression intercept for inpatient unit  $j$

$\gamma_{00}$  is the overall average dependent variable score for all inpatient units

$u_{0j}$  is the random effect of inpatient unit  $j$

$r_{ij}$  is the random effect of patient  $i$  in inpatient unit  $j$

Model 1: 
$$\text{Timeliness}_{ij} = \gamma_{00} + u_{0j} + r_{ij}$$

Reported from the unconditional model are the Covariance Parameter Estimates with hypothesis testing which indicate whether units differ in their average patient reported nurse timeliness scores, and the intraclass correlation which indicates the portion of the total variance that can be explained by the different units.

Next, the effects of unit level (level-2) predictors and patient level (level-1) predictors were examined sequentially. Based on the results from previous bivariate analysis and mean difference tests, independent variables were determined as important for inclusion in the models. Only those statistically significant independent variables were entered into each model. After examining each type of predictor separately, both

level-1 and level-2 predictors are included into a single model for each dependent variable.

### **Addition of Unit Level (Level-2) Predictors**

Models were next created to include the effects of unit level (level 2) predictors on the dependent variables. One level-2 variable is included in each model. The motivation of these models is to answer the question of how much the variable explains variability between units. In other words, we want to understand why there is a unit difference in timeliness scores. In terms of regression equations,  $r_{ij} \sim N(0, \sigma^2)$  represents variation in intercepts within inpatient units, and  $u_{0j} \sim N(0, \tau^2)$  represents variation in intercepts between inpatient units. In these equations the dependent variables are expressed as a function of the level-2 variables. All level-2 models include random errors.

$$\text{Timeliness}_{ij} = \beta_{0j} + r_{ij}$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(X) + u_{0j}$$

$X = \text{a level-2 variable}$

Combining the two equations into one by substituting the level-2 equation to level-1 equation, we have

$$\text{Timeliness}_{ij} = \gamma_{00} + \gamma_{01}(X) + u_{0j} + r_{ij}$$

The first conditional model, in which the dependent variable  $\text{Timeliness}_{ij}$  is expressed as a function of RNHPPD is written as follows:

$$\text{Model 2: } \text{Timeliness}_{ij} = \gamma_{00} + \gamma_{01}(\text{RNHPPD}) + u_{0j} + r_{ij}$$

The next conditional model, in which the dependent variable  $\text{Timeliness}_{ij}$  is expressed as a function of NHPPD is written as follows:

$$\text{Model 3: } \quad \text{Timeliness}_{ij} = \gamma_{00} + \gamma_{01}(\text{NHPPD}) + u_{0j} + r_{ij}$$

The next conditional model, in which the dependent variable  $\text{Timeliness}_{ij}$  is expressed as a function of RN Skill Mix is written as follows:

$$\text{Model 4: } \quad \text{Timeliness}_{ij} = \gamma_{00} + \gamma_{01}(\text{RN Skill Mix}) + u_{0j} + r_{ij}$$

The next conditional model, in which the dependent variable  $\text{Timeliness}_{ij}$  is expressed as a function of CMI is written as follows:

$$\text{Model 5: } \quad \text{Timeliness}_{ij} = \gamma_{00} + \gamma_{01}(\text{CMI}) + u_{0j} + r_{ij}$$

The next conditional model in which the dependent variable  $\text{Timeliness}_{ij}$  is expressed as a function of Unit Type is written as follows:

$$\text{Model 6: } \quad \text{Timeliness}_{ij} = \gamma_{00} + \gamma_{01}(\text{Unit Type}) + u_{0j} + r_{ij}$$

### **Addition of Patient Level (Level-1) Variables**

Including effects of patient-level (level-1) predictors began by initially examining a model with only one patient-level predictor at a time. This was to ease interpretation, and to focus on those features unique to the inclusion of level-1 predictors. Level-2 predictors were excluded in this formulation.

$$\text{Timeliness}_{ij} = \beta_{0j} + \beta_{1j} (X) + r_{ij} \quad X = \text{level 1 variable}$$

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + u_{1j}$$

The regression equations for the level-1 models are as follows:

$$\text{Model 7:} \quad \text{Timeliness}_{ij} = \beta_{0j} + \beta_{1j} (\text{Pt Health}) + r_{ij}$$

$$\text{Model 8:} \quad \text{Timeliness}_{ij} = \beta_{0j} + \beta_{1j} (\text{Psych}) + r_{ij}$$

$$\text{Model 9:} \quad \text{Timeliness}_{ij} = \beta_{0j} + \beta_{1j} (\text{Pt gender}) + r_{ij}$$

$$\text{Model 10:} \quad \text{Timeliness}_{ij} = \beta_{0j} + \beta_{1j} (\text{Pt Age}) + r_{ij}$$

### **Combined Models**

The final combined models include both level-1 and level-2 predictors. These models account for the variability.

$$\text{Model 11:} \quad Y_{ij} = \gamma_{00} + \gamma_{01}(\text{cen\_RN\_HPPD}) + \gamma_{02}(\text{cen\_HPPD}) + \gamma_{03}(\text{cen\_RN\_SKILL\_MIX}) + u_{0j} + \beta_{1j} (\text{cen\_health}) + \beta_{2j} (\text{PSYCH1}) + r_{ij}$$

All analyses were conducted with SAS 9.13 (SAS Institute Inc, Cary, NC), which uses the Taylor expansion approximation technique for calculating the estimates of variance for multiple regression analysis. Hierarchical linear models were built using the SAS PROC MIXED routine.

*Research Question 2e:* What are the unit and patient characteristics that associate with patient reported missed nursing care?

Hierarchical linear modeling was used when statistically appropriate. Otherwise, regression analysis accounting for unit clustering was used to discover the unit related and patient related predictors of reported missed nursing care.

## **CHAPTER 4**

### **RESULTS**

This chapter presents the results of data analyses conducted to meet the study aims. The chapter consists of three sections. The first section of this chapter describes the sample and inpatient unit characteristics using univariate statistical analysis to (a) explore the sociodemographic and medical characteristics of the respondents and (b) describe the characteristics of the inpatient units, including their nurse staffing levels. The second section presents the patient reports of nurse communication, basic care, and timeliness to determine the prevalence of missed nursing care. Finally, the last section presents the relationships among the nurse staffing variables, patient reported nurse communication, basic care and timeliness, selected unit characteristics, and patient characteristics.

#### **Description of Study Population**

##### **Inpatient Unit Distribution**

A total of 729 patients from 20 inpatient units in two acute care hospitals are represented in the sample (see Table 5). Patients participated from 11 units in Hospital A and from 9 units in Hospital B. The number of respondents from each nursing unit ranged from 20 to 74. Among the 20 inpatient units, 12 were medical units (containing 420 participants, 57.6% of the sample), 6 were surgical units (containing 255 participants,

35.0% of the sample), and 2 where rehabilitation units (containing 54 participants, 7.4% of the sample population).

Table 5

*Frequency and Percentage of Participants per Inpatient Unit (N = 729)*

Hospital	Unit	Frequency	%
A	A1	38	5.21
	A2	42	5.76
	A3	48	6.58
	A4	25	3.43
	A5	20	2.74
	A6	44	6.04
	A7	39	5.35
	A8	25	3.43
	A9	67	9.19
	A10	27	3.70
	A11	74	10.15
B	B1	20	2.74
	B2	34	4.66
	B3	28	3.84
	B4	39	5.35
	B5	34	4.66
	B6	30	4.12
	B7	28	3.84
	B8	33	4.53
	B9	34	4.66
Total		729	100

The unit-level mean case mix index scores were calculated, and the distribution of unit-level case mix index scores by inpatient unit is illustrated in Figure 2. The average unit case mix index score was 1.52 ( $SD = .678$ ,  $N = 729$ ). Inpatient unit A10 had a notably higher case mix index than the other units. Closer evaluation reveals that this was a unit that cared for bone marrow transplant patients and has a very high acuity patient population.

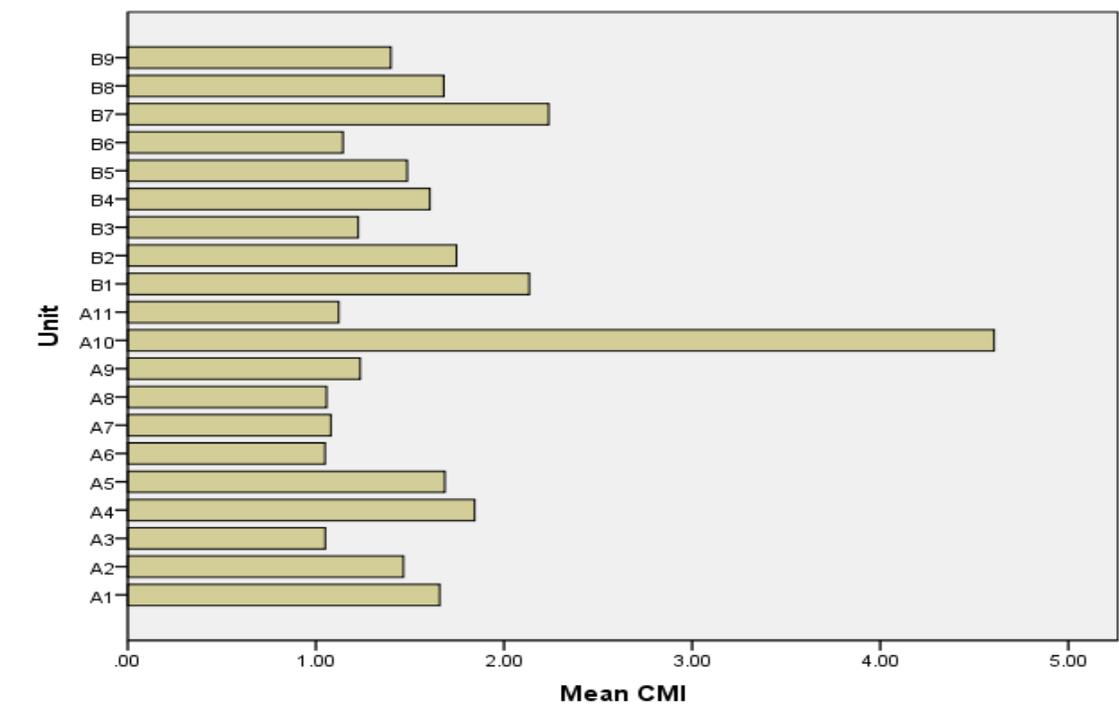


Figure 2. Distribution of mean CMI scores by inpatient unit

As is illustrated in Figure 3, the unit case mix index scores were not normally distributed. Therefore the Log of the mean case mix index was calculated for analysis. Figure 4 illustrates the distribution of the Log of the unit mean case mix index scores.

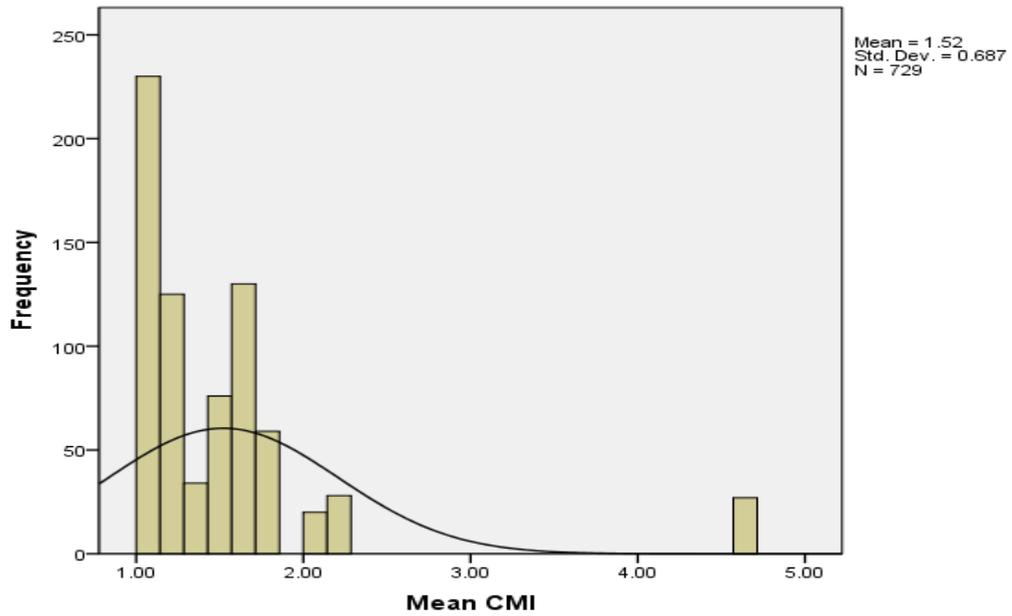


Figure 3. Distribution of mean CMI

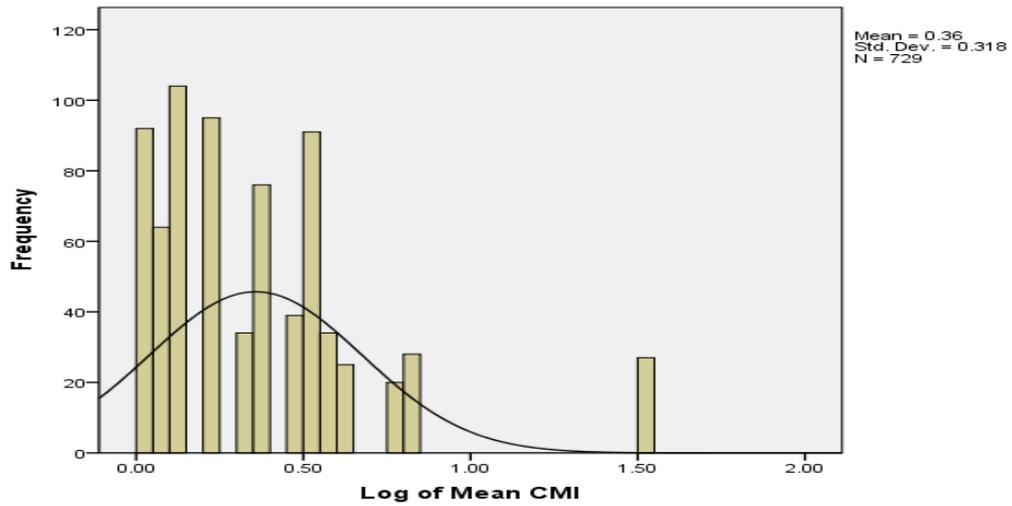


Figure 4. Distribution of the Log of mean CMI

## Patient Demographics

Table 6 presents the demographic information of the patients participating in the survey, including their age, gender, race, education level, and marital status.

Table 6

*Demographic Characteristics of the Patient Respondents (N = 729)*

Characteristic	N	Mean	SD
Age (years)	716	59.8	16.42
	<b>Frequency</b>	<b>%</b>	
Gender <sup>a</sup>			
Male	370	51.1	
Female	354	48.9	
Race <sup>b</sup>			
White	581	81.4	
Black/African American	101	13.9	
Hispanic/Latino	8	1.1	
Asian	6	.8	
Native Hawaiian/Pacific Islander	1	.1	
American Indian/Eskimo/Aleutian	5	.7	
Other	12	1.6	
Education Level <sup>c</sup>			
< High School	46	6.4	
HS diploma/GED	217	30.2	
Some College	254	35.3	
4 year college degree	95	13.2	
> 4 year college degree	107	14.9	
Marital Status <sup>d</sup>			
Not married	337	47.7	
Married	370	52.3	

Note: <sup>a</sup>Frequency Missing = 5, <sup>b</sup>Frequency Missing =15, <sup>c</sup>Frequency Missing = 10, <sup>d</sup>Frequency Missing = 22.

The patient ages ranged from 18 to 98 years. Figure 5 illustrates the distribution of patient ages. The majority of the sample were White [81.4%] and had some college

education [63.4%]. The sample was relatively equal in terms of gender: males were 51.1% of the sample, 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).

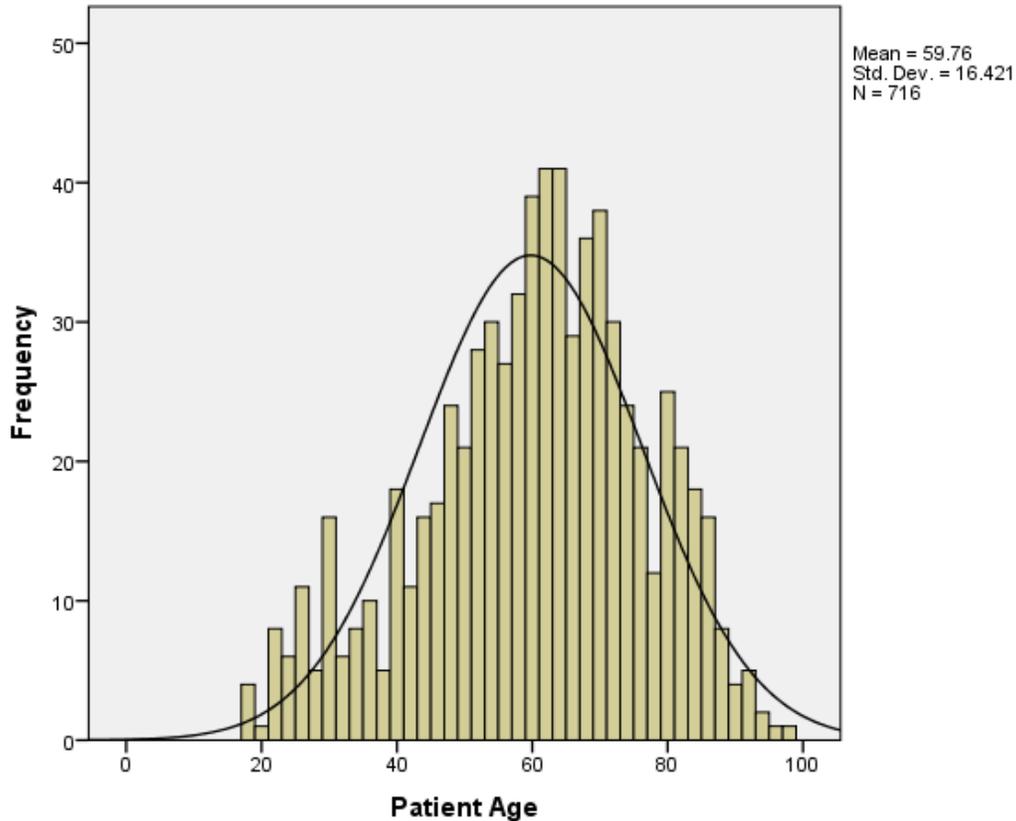


Figure 5. Distribution of patient age

### Health and Hospitalization Status

Table 7 presents the health and hospitalization related information for the patient participants including the number of days they were in the hospital at the time of the survey, their rating of their general health status, and their reported medical diagnosis history.

Table 7

*Hospital Days, Health Status, and Medical History of Study Population (N = 729)*

<b>Characteristic</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>
Hospital Days	709	7.9	8.83
	<b>Frequency</b>	<b>%</b>	
Health			
1:Poor	125	17.5	
2:Fair	236	33.1	
3:Good	234	32.8	
4:Very good	99	13.9	
5:Excellent	20	2.8	
Medical History			
Cancer	233	32.9	
Lung Disease	142	20.3	
Heart Disease	239	43.5	
High Blood Pressure	410	58.4	
Stroke	65	9.3	
Psychiatric Problems	111	15.9	
Substance Abuse	27	3.8	
Diabetes	207	29.5	
Rheumatoid Arthritis	93	13.5	

The number of days hospitalized at the time of the survey ranged from 3 to 93 days. As is illustrated in Figure 6, the majority of participants were at the lower end of the scale, with a few patients reporting very long lengths of stay; 20(2.5%) patients having stays greater than thirty days.

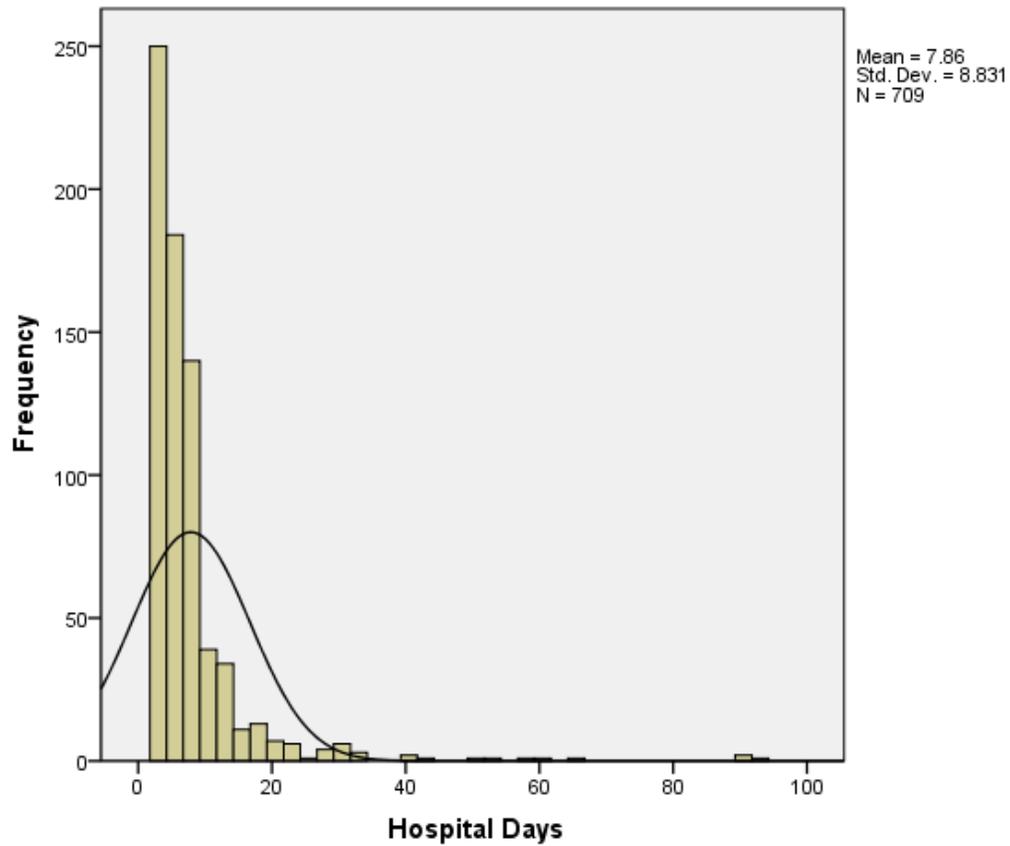
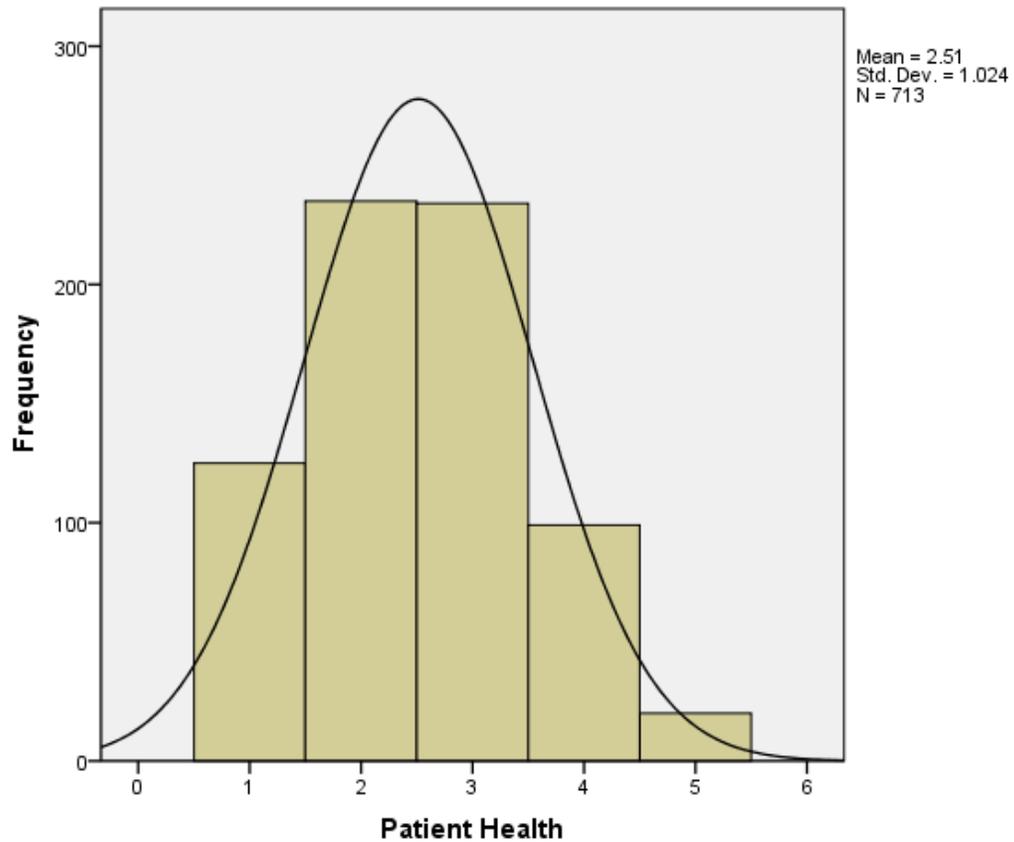


Figure 6. Number of hospital days at time of survey

The distribution of patient reported general health is illustrated in Figure 7. The majority of patients rated their health as either fair (33.1%) or good (32.8%).



*Figure 7.* Distribution of patient reported general health status

Note: 1=poor, 2=fair, 3=good, 4=very good, 5= excellent

Patients were also asked to report on their medical diagnosis history. As revealed in Table 7, the most frequently reported medical diagnosis was high blood pressure (58.4%), followed by heart disease (43.5%), and then cancer (32.9%).

## Nurse Staffing

The descriptive statistics of the nurse staffing variables used in this study are presented in Table 8. These variables include registered nurse hours of care per patient day (RNHPPD), total nursing staff hours of care per patient day (NHPPD), and registered nurse skill mix (RN Skill Mix).

Table 8

*Nurse Staffing Mean Descriptive Statistics (N = 729)*

Variable	Mean	SD	Min	Max
RNHPPD	7.03	1.42	4.93	9.77
NHPPD	10.08	1.32	8.59	13.88
RN Skill Mix	0.69	0.09	0.55	0.82

The distributions of mean RNHPPD, NHPPD, and RN Skill Mix scores by inpatient unit are illustrated in Figures 8 through 10.

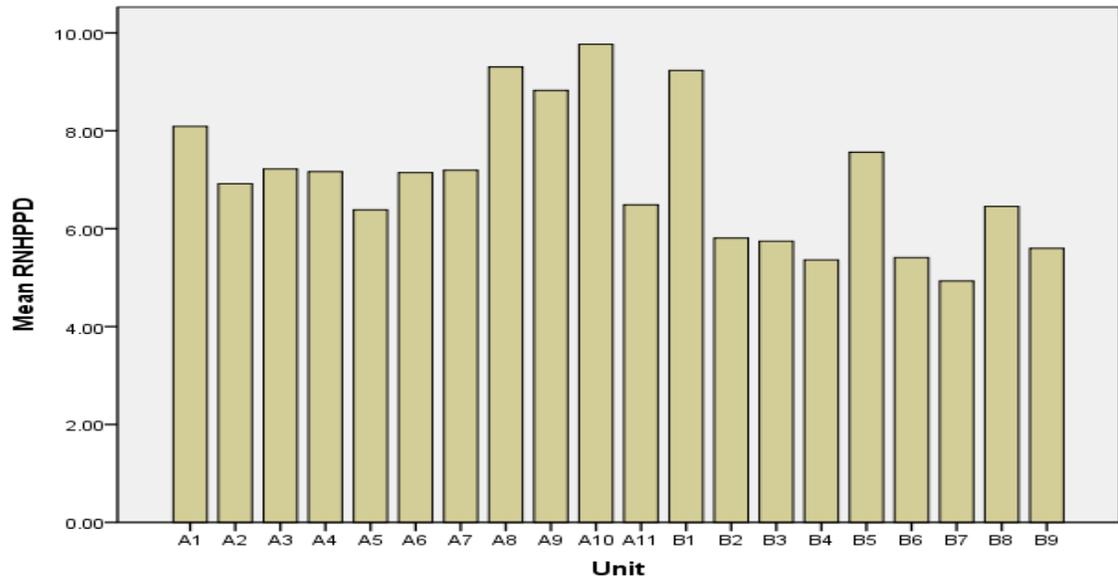


Figure 8. Mean RNHPPD by inpatient unit

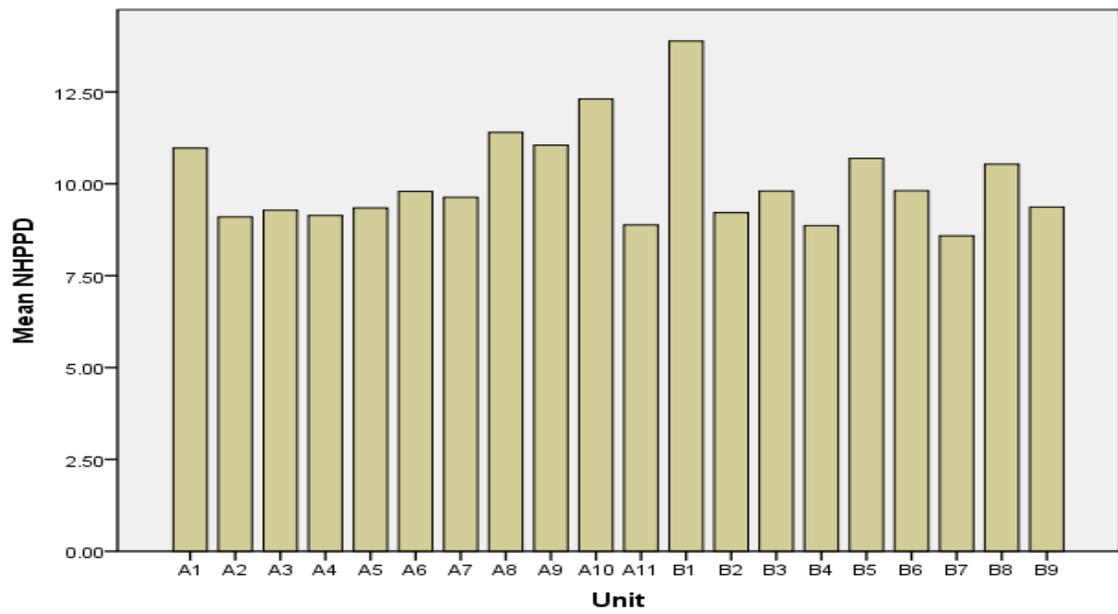


Figure 9. Mean NHPPD by inpatient unit

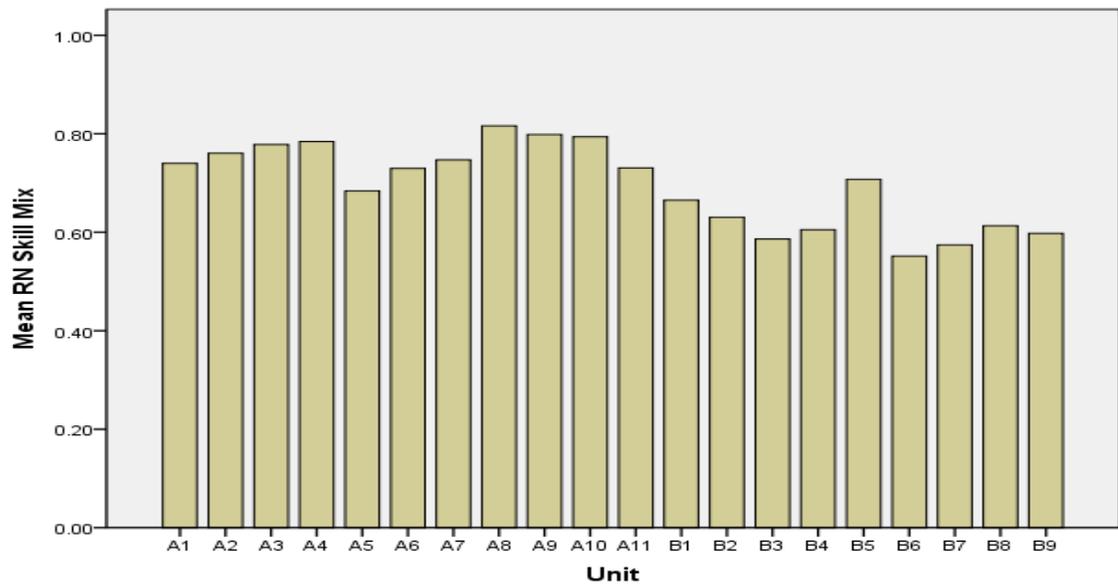


Figure 10. Mean Registered Nurse Skill Mix by Inpatient Unit

### Aim 1 Analyses

*Aim 1. To determine the amount and types of missed nursing care occurring on inpatient units as reported by hospitalized adults.*

Table 9 presents the descriptive results from the *MISSCARE Survey - Patient* questionnaire describing patient reports of nursing care. For nurse communication and basic care, the nursing care received was rated from 1 (always received) to 5 (never received), in terms of how often the element of nursing care was provided. For nurse timeliness, the time in which care was received was rated from 1 (within less than 5 minutes) to 5 (more than 30 minutes). The mean scale scores are presented in Table 9 as well as the mean scores of the individual questions comprising each scale.

Table 9

*Patient Reported Nursing Care: Descriptive Information*

Variable	N	Mean	SD
<b>Basic Care</b>	<b>727</b>	<b>2.29</b>	<b>1.06</b>
Q1: Mouth care	678	2.75	1.54
Q2: Bathing	706	1.93	1.16
Q3: Sitting	601	2.22	1.34
Q4: Walking	545	2.28	1.31
<b>Communication</b>	<b>729</b>	<b>1.69</b>	<b>0.71</b>
Q1: Know assigned nurse	728	1.52	0.88
Q2: Discuss treatment	724	1.90	1.05
Q3: Information tests/procedures	696	1.97	1.21
Q4: Listening	720	1.35	0.70
Q5: Consider opinions	678	1.72	0.96
<b>Timeliness</b>	<b>712</b>	<b>1.52</b>	<b>0.64</b>
Q1: Answer machine alarms	625	1.55	0.82
Q2: Answer call light	678	1.46	0.75
Q3: Received help	680	1.51	0.76
Q4: Help to bathroom	367	1.57	0.78

Table 10 presents the frequency and percentage of nursing care missed for each element of nursing care. These results are ordered from most missed to least missed nursing care.

Table 10

*Ordered Frequencies and Percentages of Missed Nursing Care (N = 729)*

Item	Frequency Missed	% Missed
Mouth care	341	50.29
Walking	225	41.29
Sitting in chair	233	38.77
Information about tests/procedures	188	27.01
Bathing	189	26.77
Discuss treatment	192	26.52
Consider patient opinions	138	20.35
Patient knew assigned nurse	82	11.26
Help to bathroom	40	10.90
Provide help requested	70	10.30
Answer machine alarms	55	8.80
Answer call light	58	8.55
Listen to patient	56	7.78

Figures 11 - 13 present the box plots of reported nurse communication, basic care, and timeliness by inpatient unit.

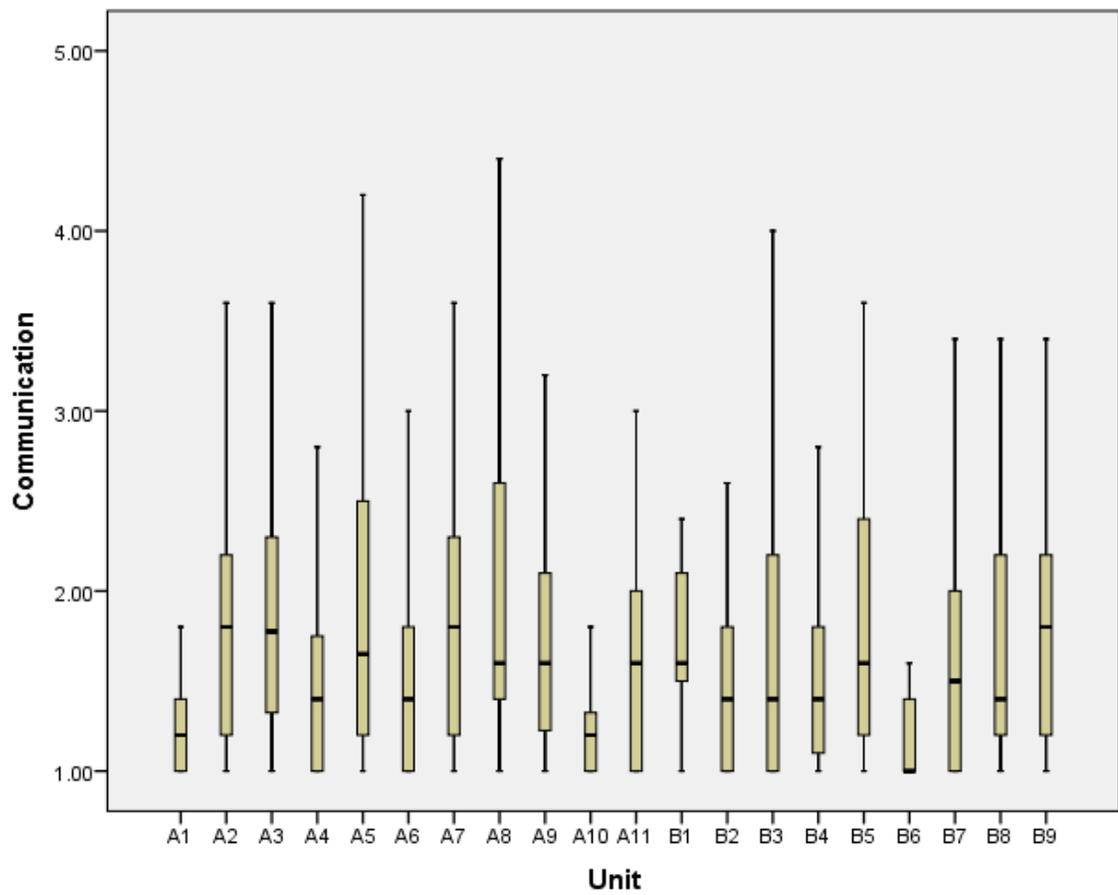


Figure 11. Box plots of patient reported nurse communication scale by inpatient unit

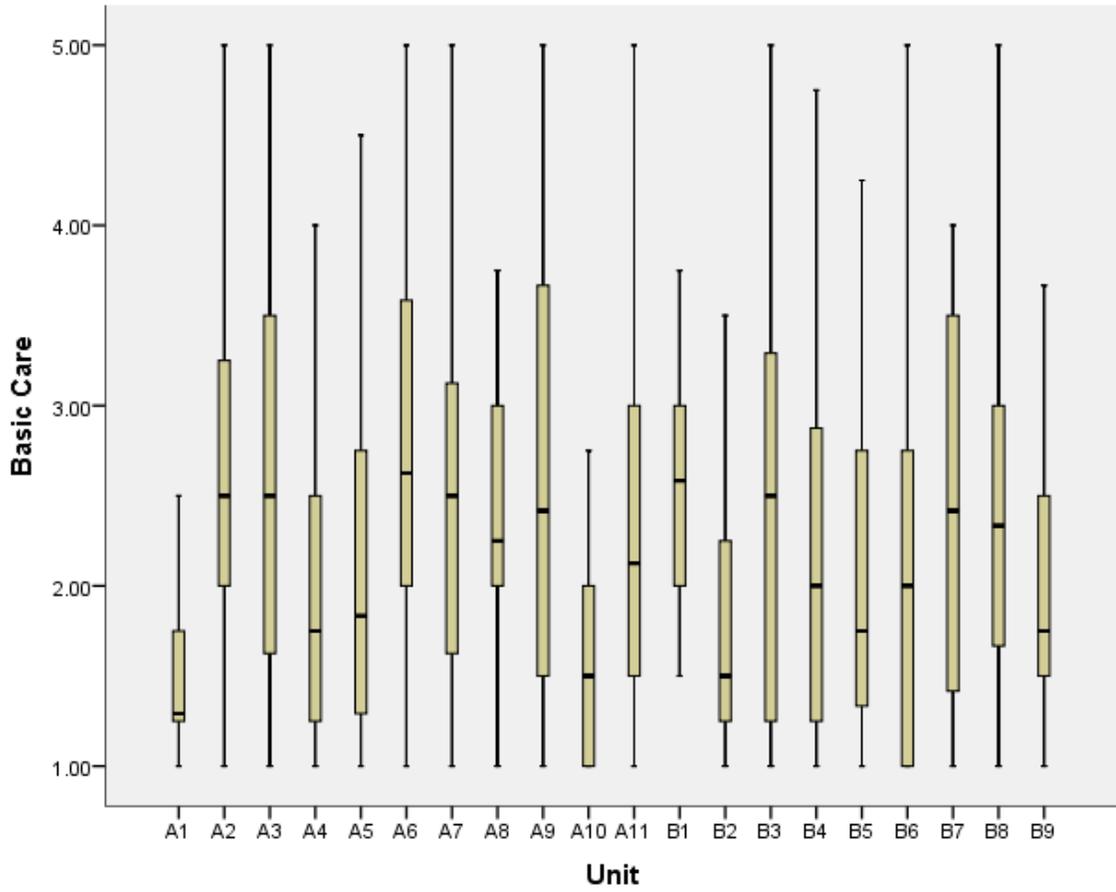


Figure 12. Box plots of patient reported basic care scale by inpatient unit

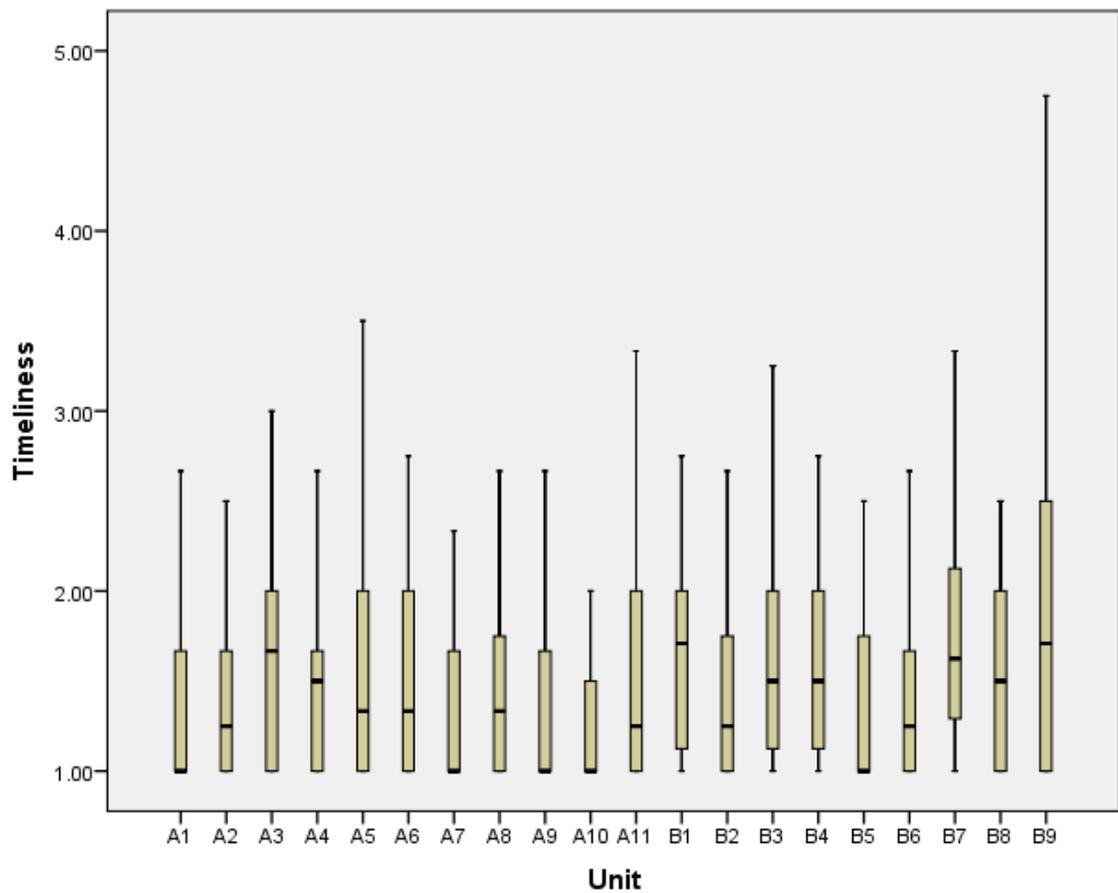


Figure 13. Box plots of patient reported nurse timeliness scale by inpatient unit

### Aim 2 Analyses

*Aim 2. To determine the inpatient unit nurse staffing variables, unit characteristics, and patient characteristics contributing to patient reports of missed nursing care.*

#### Research question 2a:

*What is the relationship between inpatient unit nurse staffing variables (RNHPPD, NHPPD, RN Skill Mix) and patient reported missed nursing care?*

Bivariate correlation analysis was used to explore relationships between the nurse staffing variables (RNHPPD, NHPPD, RN Skill Mix) and patient reported nurse communication, basic care, and timeliness. The bivariate correlation analysis was not only used to explore the relationships, but also as a preliminary to model fitting to help understand the data. Table 11 reports the Pearson correlation coefficients among the nursing care variables and the unit-level nurse staffing variables (RNHPPD, NHPPD, and RN Skill Mix). Several significant correlations were found among these variables. Nurse communication, basic care, and timeliness were significantly and positively correlated to each other, as was expected. The nurse staffing variables of RNHPPD, NHPPD, and RN Skill Mix were also positively correlated to each other and were found to be correlated only to the nursing care variable of timeliness. A negative correlation was found between RNHPPD and nurse timeliness ( $N = 712, r = -.14, p = .0002$ ). Having more registered nurse hours of patient care per patient day was correlated with patients receiving their care quicker. Similarly, NHPPD was also negatively related to nurse timeliness ( $N = 712, r = -.09, p = .015$ ). Having more total nursing staff hours of patient care per patient day was associated with patients receiving their care quicker. Likewise, RN Skill Mix was negatively correlated to timeliness ( $N = 712, r = -.13, p = .0004$ ). In other words, having a higher ratio of registered nurses to other nursing staff (including LPNs, LVNs, & UAPs) was associated with patients receiving their care quicker. The nurse staffing variables (RNHPPD, NHPPD, and RN Skill Mix) were not found to be correlated to nurse communication or basic care in this study.

Table 11

*Pearson Correlation Coefficients of Nurse Staffing and Nursing Care (N = 711)*

Measure	1	2	3	4	5	6
1. Communication	1.00					
2. Basic Care	<b>.424**</b>	1.00				
3. Timeliness	<b>.406**</b>	<b>.289**</b>	1.00			
4. RNHPPD	.003	.020	<b>-.141**</b>	1.00		
5. NHPPD	-.034	-.030	<b>-.091*</b>	<b>.805**</b>	1.00	
6. RN Skill Mix	.048	.072	<b>-.131**</b>	<b>.793**</b>	<b>.283**</b>	1.00

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

Note: Listwise deletion

### **Research question 2b:**

*What is the relationship between selected unit characteristics (unit type, CMI) and patient reported missed nursing care?*

This section reports the significant results of relationship testing between the inpatient unit characteristics of unit level case mix index (CMI) and unit type with patient reports of nurse communication, basic care, and timeliness. Using Pearson correlations, the unit-level case mix index (CMI) was found to be negatively correlated to communication ( $N = 711, r = -.13, p = <.001$ ) and basic care ( $N = 711, r = -.18, p = <.001$ ). Higher unit CMI, indicating higher acuity patients, was related to less missed communication and basic care. There was no significant correlation between unit CMI and nurse timeliness. As expected, the unit-level case mix index was also positively correlated to RNHPPD ( $N = 711, r = .289, p < .001$ ) and NHPPD ( $N = 711, r = .41, p =$

<.001). Higher unit CMI was related to higher RN hours of care per patient day and total nursing staff hours of care per patient day.

One-Way ANOVA tests revealed statistically significant differences in the mean basic care and timeliness reports among patients on different types of inpatient units, including medical, surgical, and rehabilitation units. These results are presented in Table 12.

Table 12

*Unit Type Differences in Reports of Missed Nursing Care*

Unit Type	Communication		Basic care		Timeliness	
	Mean±SD	F	Mean±SD	F	Mean±SD	F
Medical	4.29±0.74	2.68	3.61±1.10 <sup>ab</sup>	4.97*	4.52±0.61 <sup>a</sup>	6.62*
Surgical	4.39±0.65		3.82±1.00 <sup>a</sup>		4.49±0.63 <sup>b</sup>	
Rehabilitation	4.17±0.72		3.97±0.90 <sup>b</sup>		4.18±0.85 <sup>ab</sup>	

Note: \*  $p < 0.05$ . <sup>a-b</sup> Means with the same superscript were statistically different based on Tukey post hoc tests.

A one-way between-groups analysis of variance found a statistically significant difference at the  $p < .05$  level in basic care scores for the three unit types:  $F(2, 724) = 4.968, p = .007$ . Post-hoc comparison using the Tukey HSD test indicated that the mean score for medical patients ( $M = 2.39, SD = 1.10$ ), was significantly different from that of surgical patients ( $M = 2.18, SD = 1.00$ ) and rehabilitation patients ( $M = 2.03, SD = .90$ ). Patients on medical units reported the most missed basic care. Scores of patients on surgical units did not differ significantly from those of patients on rehabilitation units. The effect size of the difference, calculated using eta squared, was small at .014.

For the dependent variable nurse timeliness, a statistically significant difference between the unit types was also found:  $F(2, 709) = 6.622, p = .001$ . Post-hoc analysis indicated that the mean timeliness scores from patients on rehabilitation units ( $M = 1.82, SD = .85$ ) differed significantly from patients on medical units ( $M = 1.48, SD = .61$ ) and surgical units ( $M = 1.51, SD = .63$ ). Patients on rehabilitation units reported the most missed timeliness. However the effect size, calculated using eta squared, was also small at .018.

**Research question 2c:**

*What is the relationship between selected patient characteristics (age, gender, education, health status, diagnosis) and patient reported missed nursing care?*

Pearson correlation testing was conducted to test for relationships among nurse communication, basic care, and timeliness and the patient characteristic variables of patient reported general health, the number of hospital days, patient age, and patient education. The results are presented in Table 13.

Table 13

*Pearson Correlation Coefficients of Patient Characteristics and Nursing Care (N = 672)*

	1	2	3	4	5	6	7
1. Communication	1.00						
2. Basic care	<b>.414**</b>	1.00					
3. Timeliness	<b>.399**</b>	<b>.281**</b>	1.00				
4. Patient general health	<b>-.194**</b>	-.071	<b>-.086*</b>	1.00			
5. Hospital days	<b>.077*</b>	<b>-.082*</b>	.052	-.036	1.00		
6. Patient age	.028	-.055	<b>-.074*</b>	-.011	.013	1.00	
7. Patient education	-.035	<b>.191**</b>	.031	<b>.109**</b>	.027	.034	1.00

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

	1	2	3	4	5	6	7
1. Communication	1.00						
2. Basic care	<b>.414**</b>	1.00					
3. Timeliness	<b>.399**</b>	<b>.281**</b>	1.00				
4. Patient general health	<b>-.194**</b>	-.071	<b>-.086*</b>	1.00			
5. Hospital days	<b>.077*</b>	<b>-.082*</b>	.052	-.036	1.00		
6. Patient age	.028	-.055	<b>-.074*</b>	-.011	.013	1.00	
7. Patient education	-.035	<b>.191**</b>	.031	<b>.109**</b>	.027	.034	1.00

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

Note: Listwise deletion

Patient reported general health status was positively correlated with both nurse communication and timeliness. Patients reporting having better general health reported receiving less missed nurse communication ( $N = 672$ ,  $r = -.194$ ,  $p = <.001$ ) and timeliness ( $N = 672$ ,  $r = -.086$ ,  $p = .026$ ).

There was a positive association between the number of days patients were in the hospital at the time of the survey and patient reports of nurse communication ( $N = 672$ ,  $r = .077$ ,  $p = .045$ ). Patients with longer stays reported more missed communication. Conversely, there was a negative correlation between nurse basic care and the number of days patients were in the hospital at the time of the survey ( $N = 672$ ,  $r = -.082$ ,  $p = .033$ ). Patients with longer stays reported receiving less missed basic care.

Patient age was negatively associated with missed timeliness indicating that older patients reported receiving their care quicker. Finally, patient education was positively correlated to nurse basic care. Patients with higher education reported more missed basic care.

Independent-samples t-tests were conducted to test for differences in patient reports of nurse communication, basic care, and timeliness between males and females, and between patients with or without certain medical diagnoses. The results are presented in Table 14.

Table 14

*Mean Differences Among Patient Variables*

Variable	Communication		Basic Care		Timeliness	
	Mean±SD	<i>t</i>	Mean±SD	<i>t</i>	Mean±SD	<i>t</i>
Male	4.32±0.70	0.06	3.78±1.03	1.72	4.55±0.59	2.52*
Female	4.32±0.70		3.64±1.08		4.42±0.69	
Psych Dx	4.21±0.78	-1.81	3.49±1.07	-2.40*	4.32±0.74	-2.64*
No Psych Dx	4.36±0.68		3.76±1.06		4.52±0.62	

\*  $p < .05$

There was a statistically significant difference between males ( $M = 1.45$ ,  $SD = 0.59$ ) and females ( $M = 1.58$ ,  $SD = 0.69$ ) on reports of missed timeliness  $t(676) = -2.52$ ,  $p = .012$  (two-tailed). Females reported more missed timeliness. The magnitude of the differences in means (mean difference = .12, 95% CI: .03 to .22) was very small (eta squared = .009).

Patients with a psychiatric diagnosis had significantly different reports of nurse basic care and timeliness than those without a psychiatric diagnosis. Patients with a psychiatric diagnosis ( $M = 1.68$ ,  $SD = .74$ ) reported longer wait times than patients without a psychiatric diagnosis  $M = 1.48$ ,  $SD = .62$ ;  $t(139) = 2.64$ ,  $p = .009$  (two-tailed). The magnitude of the differences in the means (mean difference = -.20, 95% CI -.35 to -

.05) was small (eta squared = .01). In terms of nurse basic care, patients with a psychiatric diagnosis ( $M = 2.51$ ,  $SD = 1.07$ ) reported receiving more missed basic care than patients without a psychiatric diagnosis  $M = 2.25$ ,  $SD = 1.06$ ;  $t(696) = 2.415$ ,  $p = .016$  (two-tailed). The magnitude of the differences in the means (mean difference =  $-.26$ , 95% CI:  $-.48$  to  $-.05$ ) was very small (eta squared = .008).

### **Research Question 2d**

Is nurse staffing, measured by RNHPPD, NHPPD, and RN Skill Mix, associated with patient reported missed nursing care in acute care hospital units after controlling for significant inpatient unit and patient characteristics?

Hierarchical linear modeling was used to explore the nested data for the dependent variable patient reported nurse timeliness. The hierarchical analysis began with the fitting of an unconditional model.

The estimated value of the variation between units ( $\tau^2$ ) = .02026, and the estimated value of the variation within units ( $\sigma^2$ ) = .3954. Hypothesis testing indicates that both variance components are significantly different from zero ( $p = .0268$  and  $p = <.0001$  respectively). These estimates suggest that units do differ in their average nurse timeliness scores and that there is even more variation among patients within units. The variance component within units is nearly twenty times the size of the variance component between units.

Based on the covariance estimates, the intraclass correlation was computed as follows:  $.02026 / (.02026 + .3954) = .05$ . This figure conveys the portion of the total variance that occurs between units. In other words, 5% of the variance in patient reported timeliness can be explained by the difference between units. The fixed effect intercept

estimate of 1.5241 indicates the average unit-level timeliness score. To measure the magnitude of the variation among units in their mean timeliness scores, the plausible values range was calculated as  $1.5241 \pm 1.96*(.02026)^{1/2} = (1.24512, 1.80308)$ .

### **Inclusion of Unit-Level Predictors**

In HLM, RNHPPD was found to be a significant predictor of timeliness ( $p = .0241$ ); however, there was no additional explainable variation present when RNHPPD was included into the model as a level-2 variable ( $\tau^2 = 0.01261$ ,  $p = .0711$ ). This suggests that RNHPPD cannot be included as a level-2 variable. The estimates of  $\gamma_{00}$  and  $\gamma_{01}$  were 1.5214 and -.06406 respectively, indicating that the unit mean timeliness score when RNHPPD is zero is 1.5214; and units that differ by one point in RNHPPD differ by .06406 points in patient reported timeliness.

RN Skill Mix was also found to be a significant predictor of patient reported nurse timeliness ( $p = .0272$ ). The estimates of  $\gamma_{00}$  and  $\gamma_{01}$  were 1.516 and -1.0423 respectively, indicating that the unit mean timeliness score when RN Skill Mix is zero is 1.516, and units that differ by one point in RN Skill Mix differ by 1.0423 points in patient reported timeliness. A 32% reduction in the between unit variance is explained by RN Skill Mix,  $(.02026 - .01375) / .02026 = .321$ .

NHPPD was not a significant predictor of nurse timeliness.

### **Inclusion of Patient-Level Predictors**

Patient age was found to be a significant predictor of nurse timeliness ( $p = .015$ ). The estimate of  $\gamma_{00}$  (1.5249) indicates the estimated average unit mean nurse timeliness score, controlling for patient age. The estimate for  $\gamma_{10}$  (-.0036) indicates the estimated

average slope representing the relationship between patient age and timeliness.

Covariance estimates indicate that there is a 17% increase in the within-unit variance of timeliness explained by patient age  $(.02121 - .3877) / .02121 = -17.28$ .

Patient reported general health was also a significant patient-level predictor of timeliness ( $p = .017$ ). The estimate of  $\gamma_{00}$  (1.5206) indicates the estimated average unit mean timeliness score, controlling for patient health. The estimate for  $\gamma_{10}$  (-0.05684) indicates the estimated average slope representing the relationship between patient health and timeliness. Covariance estimates indicate that there is a <1% increase in the within-unit variance of timeliness explained by patient health  $(.3894 - .3866) / .3894 = .007$ .

Lastly, having a psych diagnosis was also a significant patient-level predictor of nurse timeliness ( $p = .0041$ ). The estimate of  $\gamma_{00}$  (1.4904) indicates the estimated average unit mean timeliness score, controlling for patient health. The estimate for  $\gamma_{10}$  (.1887) indicates the estimated average slope representing the relationship between patient health and timeliness. Covariance estimates indicate that there is a 1% increase in the within-unit variance of timeliness explained by patient health  $(.3937 - .3897) / .3937 = .010$ .

Table 15 indicates the results for the final HLM model for nurse timeliness including both level-1 and level-2 predictors.

Table 15

*Final HLM Model for Timeliness (N=668)*

Fixed Effects	Coefficient	Standard Error	t	p
Intercept	1.4902	.03806	39.16	<.0001
Patient age	-.004142	.001515	-2.73	.0064
Patient general health	-.05587	.02424	-2.31	.0215
Psych diagnosis	.1355	.06666	2.03	.0426
RN Skill Mix	-1.2124	.4477	-2.71	.0144

The unit-level nurse staffing variables were not found to be significant predictors of patient reported nurse communication or timeliness. Therefore, HLM analysis was not used to explore nurse staffing predictors of these dependent variables.

### **Research question 2e:**

*What are the unit and patient characteristics that associate with patient reported missed nursing care?*

Regression analysis accounting for unit clustering was used to examine significant predictors of patient reported nurse communication and basic care. The Taylor expansion approximation technique was used for calculating the estimates of variance for multiple regression analysis with cluster variable. The units' identifier was used as the appropriate variable for the cluster.

The first regression model included nurse communication as the dependent variable and the independent variables previously found to have significant relationships

with nurse communication, including unit-level case mix index, patient reported general health, and the number of days in the hospital at the time of the survey. The regression model is presented in Table 16.

Table 16

*Summary of the Multiple Regression Model of Missed Communication (N = 697)*

Variable	B	SE	<i>t</i>	<i>p</i>
Log CMI	-0.28	0.094	-2.97	.0078
Patient health status	-0.12	0.026	-4.62	.0002
Hospital days	0.01	0.004	1.65	.1162

Note:  $R^2 = .057$

For every unit increase in the Log of CMI, a 0.28 unit decrease in nurse communication scores is predicted, holding all other variables constant. For every unit increase in patient health, a 0.12 unit decrease in communication scores is predicted, holding all other variables constant. Finally, for every unit increase in the number of hospital days, a 0.01 unit increase in communication score is predicted, however this is not statistically significant.

A second regression model was created for the dependent variable of patient reported nurse basic care. Previously significant independent variables including unit-level CMI, patient education, psychiatric diagnosis, and medical unit type were included. The results are presented in Table 17.

Table 17

*Summary of the Multiple Regression Model of Missed Basic Care (N = 693)*

Variable	B	SE	<i>t</i>	<i>p</i>
Log CMI	-0.58	0.10	-5.76	<.0001
Pt. Education	0.18	0.05	3.71	.0015
Medical Unit	0.22	0.12	1.85	.0799
Psych Diagnosis	0.25	0.12	2.08	.0511

Note:  $R^2 = .089$

For every unit increase in the Log of CMI, a 0.58 unit decrease in nurse basic care scores is predicted. For every one unit increase in patient education level, a 0.18 unit increase in basic care scores is predicted. For every unit increase in medical unit, a 0.22 unit increase in basic care scores is predicted, however this was not significant. For every unit increase in psychiatric diagnosis, a .25 unit increase in basic care scores is predicted, however this is borderline significant.

Figures 14 through 16 illustrate the predictors of patient reported missed communication, basic care and timeliness.

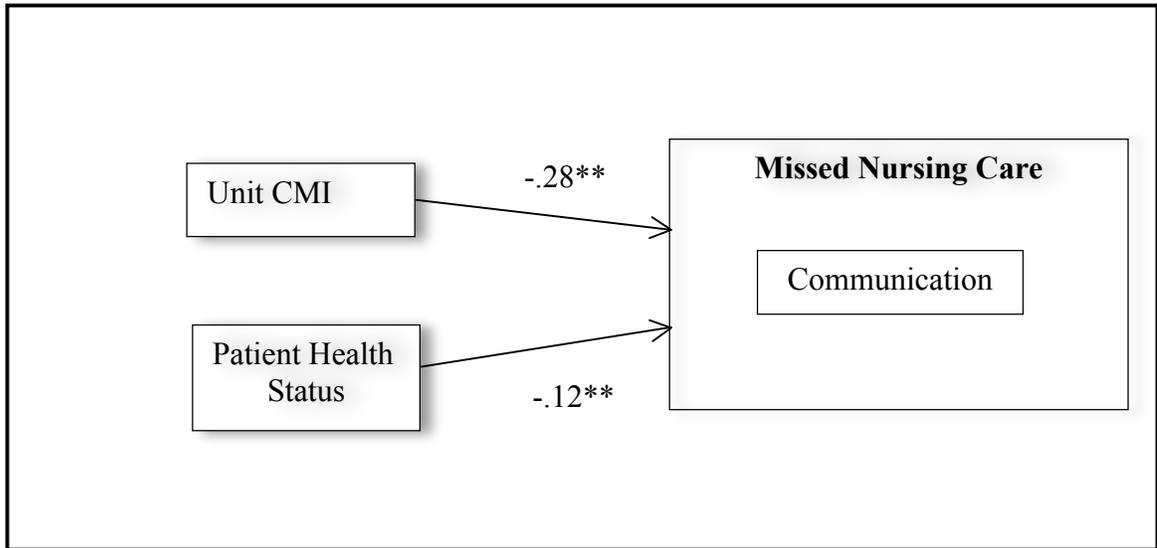


Figure 14. Predictors of patient reported nurse communication  
 \*  $p < .05$ , \*\*  $p < .01$

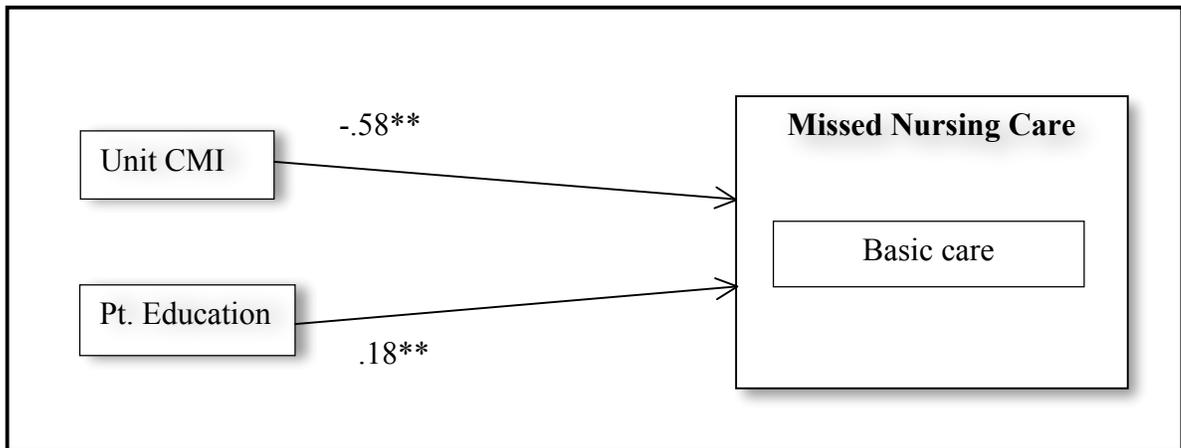


Figure 15. Predictors of patient reported nurse basic care  
 \*  $p < .05$ , \*\*  $p < .01$

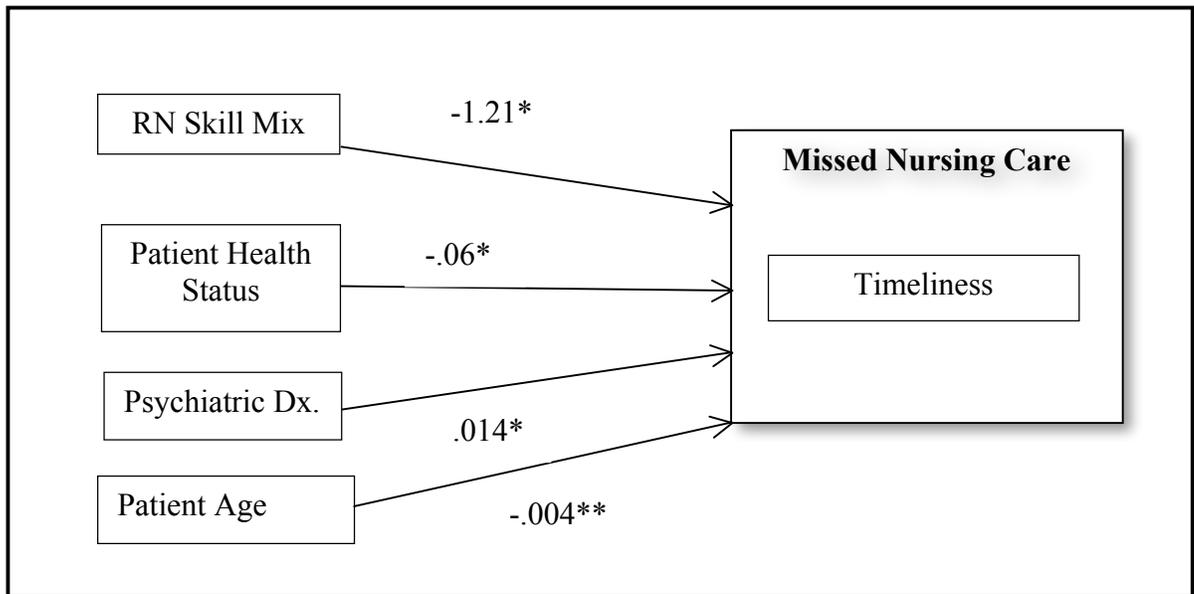


Figure 16. Predictors of patient reported nurse timeliness  
 \*  $p < .05$ , \*\*  $p < .01$

### Summary

This study surveyed adult inpatients as subjects to examine patient reports of nursing care received in the inpatient setting and the amount of missed nursing care present based on these reports. This study also tested a model linking nurse staffing factors and missed nursing care. The findings partially supported this proposition for nurse timeliness, but did not support the proposition for nurse communication and basic care.

## **CHAPTER 5**

### **DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS**

This study investigated patient reports of the nursing care they received in the inpatient unit setting, as well as the relationships between the reported nursing care received and nurse staffing levels, inpatient unit characteristics, and patient characteristics. First, the nursing care missed was examined in relation to three categories: nurse communication, basic care, and timeliness. Next, the relationships between these three categories of missed nursing care and the nurse staffing variables of registered nurse hours of care per patient day, total nursing staff hours of care per patient day, and registered nurse skill mix were investigated. Finally, the relationships among patient factors, unit factors, and patient reported nurse communication, basic care, and timeliness were also examined.

A number of significant relationships were found which support findings from previous research. Also, the study revealed findings not previously reported in the literature which provide insight into patient reports of missed nursing care as well as patient and unit factors contributing to those reports.

In this chapter, the findings of the study are discussed, and the limitations are described. The significance of the study findings to nursing practice is also discussed, as well as implications for future research.

## **Demographic Findings**

This study introduces findings from adult respondents hospitalized in two acute care hospitals and receiving care on medical, surgical, or rehabilitation units. The representation of males and females was fairly equal with only 2% more males than females. The ages of the study participants were also equally distributed with a mean age of 59.8 years. Most of the participants had some college education, with 28.1% receiving a four year college degree or more. In terms of race, this study was not able to detect differences in patient reports of nursing care related to race due to the overwhelming number of white participants (81.4%). The sample is typical of other studies measuring patient reports of their nursing care, other than a few studies whose aim was to capture reports of patients from different racial groups (Goldstein, Elliott, Lehrman, Hambarsoomian, & Giordano 2010).

## **Missed Nursing Care**

In general, the study sample respondents gave relatively positive reports of the nursing care they received. When evaluating the amount of missed nursing care, a reference scale of one to five was used in which one indicated that there was no missed care and five indicated that there was a lot of missed nursing care. Inside the scope of this scale, the mean score of overall missed nursing care was 1.82. This indicates that patients usually received the nursing care inquired about and the care was generally timely (within 10 minutes). Though patient reports were generally positive, there were enough negative reports to indicate a need for improvement in nursing care process. The landmark publication *Crossing the Quality Chasm* noted that Americans should be able to

count on receiving the care that meets their needs and is based on the best empirical knowledge. However, as scientific knowledge has grown at a rapid pace, the health care delivery system has floundered in its ability to provide consistent, high quality care (Institute of Medicine, 2001a). Hence, it is important to examine areas that can be improved upon in order to reach organizational goals and quality standards. The reports of patients were investigated with the intention of increasing knowledge on the concept of missed nursing care and exploring needed improvements in nursing care from the viewpoint of those receiving the care.

### **Missed Basic Care**

The basic care of patients was the most frequently missed classification of nursing care reported by the patient sample. On a scale of one (least missed care) to five (most missed care), the mean score for basic care was 2.29. This result indicates that on average, patients “sometimes” received the nursing care inquired about which included ambulation, sitting in a chair, mouth care, and bathing. The percentage of missed basic care was greatest for mouth care (50.3%) and the ambulation of patients (41.3%). These were followed by missed sitting in a chair (38.8%) and bathing (26.8%). These results echo findings of previous studies of missed nursing care that used nursing staff as the reporters of whether nursing care was delivered or not. Table 18 displays the top three missed care items reported by patients and those reported by nursing staff. The nursing staff results were obtained from a ten hospital study in which the nursing staff reported top *frequently* or *always* missed care items to be ambulation, mouth care, and participation in patient conferences (Kalisch, Tschannen, Lee, & Friese, 2011).

Table 18

*Comparison of Top Three Missed Care Items*

Ranking	Patients	Nursing Staff
1	Mouth care	Ambulation
2	Ambulation	Patient conference participation <sup>2</sup>
3	Sitting in chair <sup>1</sup>	Mouth care

Note: <sup>1</sup> not included in nursing study. <sup>2</sup> Not included in patient study

It is noted that the top two missed items are in reverse order. Patients reported mouth care as the number one missed item, and nursing staff reported ambulation as the number one missed item. The reverse order of mouth care and ambulation between nursing staff and patients may be due to patient preferences of what is important to them and how they rank the priority of their needs. Mouth care may seem more important to patients as an element of basic daily hygiene, whereas ambulating may seem less frequently needed by some patients especially when not feeling well. In a study of patient ambulation, the researchers found that patients believed that assistance with their mobility was less important than other nursing staff duties (Brown, Williams, Woodby, Davis, & Allman, 2007). However, from the nursing standpoint, mouth care is a nursing task which may be low on the nurses' priority lists and seemingly not as important as other patient care needs such as ambulation.

Secondly, nursing staff may assume that some patients are able to provide their own mouth care and have the materials needed to do so such as a toothbrush, dental swab, toothpaste, or even denture cleaning materials. Furthermore, mouth care may

appear to be a patient comfort item to nurses without immediate medical indications. However, lack of mouth care could have medical consequences if left undone for an extended period of time. Not only can persistent dental plaque contribute to dental caries and gingivitis, but previous research has also found correlations between the preventive effects of oral hygiene, oral infections, and nosocomial pneumonia, mortality, and other general health complications (Azarpazhooh & Leake, 2006; Sjögren, Nilsson, Forsell, Johansson, & Hoogstraate, 2008). In a qualitative study of patient reports of inpatient nursing care, patients reported that they do value mouth care and that nursing staff often did not assist them to the bathroom to perform mouth care, nor did they inquire whether or not they had been able to complete their own mouth care (Kalisch, McLaughlin, & Dabney, 2012).

The patient reports of high levels of missed ambulation are not surprising, as previous studies have indicated a deficiency in inpatient ambulation occurrence (Callen, Mahoney, Grievs, Wells, and Enloe, 2004; Brown, Friedkin, & Inouye, 2004). The fact that patients also indicate ambulation as a frequently missed element of nursing care helps to validate these previous findings. Previous study of missed nursing care found the ambulation of hospitalized patients to be the most frequently missed element of inpatient nursing care. Ambulation was reported as being missed 76.1 – 88.7 % of the time (Kalisch, Tschannen, Lee, & Friese, 2011; Kalisch & Williams, 2009).

### **Missed Communication**

Communication was the next most frequently missed category of nursing care. Patient reports of overall communication yielded a mean score of 1.69 on the five-point Likert scale. A closer look at the missed communication items reveals that the provision

of information to patients about their treatment plans (missed 26.5% of the time) and providing information about tests and procedures to patients (missed 27.0% of the time) were the highest missed items within this factor. Communication with patients has long been an element of patient care in need of improvement and more recently has become a key element of providing patient-centered care. The provision of information, communication, and education has been identified as a key dimension of patient-centeredness because patients want to know what is wrong with them and what is being done to manage their health. Moreover, patients need accurate information presented in a language they can understand and at their level of understanding (Gerteis, Edgman-Levitan, Daley, & Delbanco, 1993).

Often nurses may view the explanation of tests or procedures as a responsibility of another health care provider such as the patients' physician or the technician performing the test. Certainly, identification of reasonable options to treat illness or disease is primarily the responsibility of the physician, which also requires interaction with the patient and identifying the patients' goals and concerns related to the treatment, as well as obtaining their decisions about their care (Fowler, Levin, & Sepucha, 2011). In reality however, these interactions are often rushed and short. Consequently patients generally require reinforcement of the information as well as details as to the timing of test/procedures including updates when test/procedures are delayed or rescheduled. This is a nursing responsibility that when missed diminishes the patient-centeredness of care and can increase patient anxiety.

The least missed nurse communication item was listening to patients (missed 7.8% of the time). Increased efforts of health systems to infuse patient-centeredness into

the delivery of health care have promoted the importance of listening to patients.

Although improvements in patient communication may have been made in terms of listening, provision of true patient-centered care requires the complete package including the other aspects of communication such as informing patients of their care and education them. Epstein, Fiscella, Lesser, & Stange (2010) synthesized the literature to produce a definition of patient-centered care and what it entails. They noted that patient-centered interactions require that there be shared information, shared deliberation, and shared mind.

Shared information between nurse and patient not only entails providing the facts and figures, but also framing and tailoring the information in response to an understanding of the patient's concerns, beliefs, and expectations, taking into account the patient's level of health literacy. The result of 27% of patients reporting not receiving information about their tests or procedures, and 26.5% reporting not discussing their treatment with the nurse reflects poorly on how acute care nursing is doing with achieving the "shared information" aspect of patient-centered care. Thus shared deliberation would also be lacking as these conversations are not taking place to the degree in which they need to, preventing the deeper delving into personalized conversations of patient needs and preferences. Consequently, shared mind, or a consensus about an approach of care, is never achieved in these instances.

### **Timeliness**

The timeliness of nursing care was the least missed element of care in this study. Patients reported an overall nurse timeliness mean score of 1.52. The timeliness measure was different from that of basic care and communication in that instead of ranking

answers from 1 = always to 5 = never, it asked participants to indicate how much time it took to receive care. Scores ranged from 1=less than 5 minutes to 5=more than 30 minutes. The mean score of 1.52 indicates that generally, patients reported receiving care within ten minutes of request. The item of care that took the longest time to receive was getting help to go to the bathroom, which was missed 10.9% of the time. The majority of patients ( $N = 117$ ) reported that it took between five to ten minutes to receive help to the bathroom; however ( $N = 33$ ) patients waited eleven to twenty minutes for help to the bathroom, while 7 patients reported waiting more than twenty minutes for assistance to the bathroom, which is unacceptable. Previous studies have found that when patients attempt to take themselves to the bathroom there is an increased risk for falls, with 45% of falls attributable to patients falling on the way from their bed or chair to the bathroom (Tzeng, 2010). With this in mind, protecting patients from having to attempt to toilet themselves when not medically ready should be a nursing priority.

In order of most to least missed timeliness, help to the bathroom was followed by receiving the help requested once a call light was answered (missed 10.3% of the time), the answering alarms or monitors (missed 8.8% of the time), and the answering a call light (missed 8.6% of the time).

## **Relationships Between Missed Nursing Care and Study Variables**

### **Missed Care and Nurse Staffing**

A great deal of research has been done on the impact of nurse staffing levels on patient outcomes (Blegen, Goode, & Reed, 1998; Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky, 2002b; Lankshear, Sheldon, & Maynard, 2005). However study

of nurse staffing and patient reports of their nursing care has not been done before. Additionally, the closer look on specific aspects of nursing care such as communication, basic care and timeliness is new. The nurse staffing variable of RN Skill Mix measured the proportion of nursing care hours that were provided by registered nurses. This variable provides information on the impact of registered nurses on an inpatient unit in relation to that of other nursing staff included LPNs, LVNs, and UAPs. The fact that RN Skill Mix was positively correlated with nurse timeliness as well as being a predictor of nurse timeliness indicates that having a higher ratio of registered nurses to other nursing staff was associated with patients receiving their care quicker.

There is previous evidence that having more registered nurses relative to other nursing staff (LPNs, LVNs, UAPs) is associated with better patient outcomes (Lichtig, Knauf & Milholland, 1999; Lankshear, Sheldon & Maynard, 2005). However, little is known about the relationship between RN Skill Mix and the timeliness of care. The fact that registered nurse hours of care per patient day and total nursing staff hours of care per patient day were also positively correlated with nurse timeliness, but were not predictors of it, indicates that further study is needed in this area. This study did not find statistically significant correlations or predictive relationships among the nurse staffing variables and the other missed care variables of nurse communication and basic care.

In summary, all three of the nurses staffing variables were found to be significantly and negatively correlated with nursing timeliness, with higher staffing levels correlated to less missed timeliness. The nurse staffing variables were however not found to be correlated to nurse communication or basic care.

## **Missed Care and Unit and Patient Related Variables**

The unit-level case mix index was found to be negatively correlated to and a predictor of nurse communication and basic care, but not timeliness. On units with higher case mix index levels, less missed communication and basic care were reported. In other words, on units with sicker or more complex patients, the patients reported receiving more communication. Additionally, on units with sicker or more complex patients, they reported receiving more basic care in terms of mobilization, bathing, and the provision of mouth care. Kalisch, Tschannen & Lee (2011) also found in a previous study of nursing staff reports of missed nursing care a negative association between unit case mix index and missed nursing care. The higher patient needs could be a contributor to this. It would be logical for nurses to have a need to speak more with more complex patients and provide them with more physical care and basic care. One would also conjecture that the more complex patients would also require a more timely response time, however this was not found in this study.

Several patient characteristics were discovered to contribute to the missed care reports including the patients' perceptions of their general health status, patient age, patient education level, and the presence of a psychiatric diagnosis. The patient reported general health status was found to be positively correlated with and a predictor of nurse communication and timeliness, but not basic care. Patients with better perceived general health reported receiving more nurse communication and receiving more timely care. Previous research has found that generally, patients with better health report higher satisfaction with their care (Bacon & Mark, 2009; Rahmqvist & Bara, 2010).

Patient age was positively correlated with and a predictor of nurse timeliness only. This result could indicate that either nurses respond to older patients quicker, anticipating that their needs may be more urgent, or that older adults are more patient and therefore do not perceive their wait times to be as long. In general, previous studies have found older patients to report higher satisfaction with their care than younger patients (Bacon & Mark, 2009; Rahmqvist & Bara, 2010).

Patient education was a predictor of and negatively correlated with nurse basic care only. Patients with more education reported more missed mouth care, ambulation, sitting in a chair, and bathing. This result may be because people with more education tend to expect more from their care and generally report less satisfaction with their care (Rahmqvist & Bara, 2010).

There was also a significant difference in the reporting of nurse basic care and timeliness between patients with a psychiatric diagnosis and those with without. Patients with a psychiatric diagnosis reporting more missed basic care and timeliness. Not having a psychiatric diagnosis was a predictor of nurse timeliness only. Psychiatric disorders such as anxiety may contribute to patients needing quicker responses.

## **Summary**

In summary, a negative relationship between the nurse staffing variables and patient reports of nurse timeliness was found with higher RNHPPD, NHPPD, and RN Skill Mix correlated to patients receiving their care quicker. RN Skill Mix was also found to be a predictor of nurse timeliness. Having a higher ratio of RNs to other nursing staff resulted in more timely care. Other predictors of nurse timeliness were the age of 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 more timely care.

Evaluation of predictors of missed communication reveals that the unit case mix index and patient reported general health status were significant predictors of nurse communication. Patients on higher acuity units reported better communication. Interestingly however, patients who perceived higher levels of overall general health status also reported better nurse communication. The difference may lie in differences between case mix index scores which are calculated based on APR DRGs and how individual patients perceive their general health to be. Patients in an acute state of disease may still consider themselves to be in good health overall and their current medical state to be just temporary.

Regarding nurse basic care, the unit case mix index and the education level of patients were significant predictors. Again, higher patient acuity led to less reported missed care. Patients with higher education levels reported more missed basic care.

### **Significance to Nursing**

McNamara (2012) notes that one aspect of the health care business is the perceived reputation of a hospital and the nursing care patients receive there. Increasingly, the public reporting of hospital quality metrics is being required. The U.S Department of Health and Human Services has provided the public with information via the internet through Hospital Compare, where individuals may review hospital patient survey results, the timeliness and effectiveness of care, as well as outcomes measures such as readmission rates, complications, and deaths (Hospital Compare, 2012). The patient survey results allow patients to scrutinize and compare nursing care received

between hospitals which could be a determining factor for patients when choosing which hospital to go to. Studies have supported the validity of using patient reports of care as measures for nursing care quality in the inpatient setting. Using Hospital Consumer Assessment of Health Providers and Systems (HCAHPS) scores, patient reported experiences of the inpatient care have been linked to the technical quality of care (Isaac, Zaslavsky, Cleary, and Landon, 2010). When areas of needed improvement in elements of nursing care are exposed, they must be addressed and quantifiable improvements made in order to provide the quality of care patients desire and compete with neighboring hospitals.

The incorporation of patient reports in nursing research that evaluates nursing care is a form of patient engagement. Patient engagement is a health care improvement strategy critical to achieving the goals set out by the Patient Protection and Affordable Care Act and is necessary for the provision of patient centered care (DHHS, 2013). Valuing information gathered from patient reports is necessary and should be taken into account when making changes to clinical practices. Ultimately, nursing care can be improved by incorporating the patient's reports of nursing care into plans for nursing interventions and improvements in the delivery of care.

Based on the results of this study and previous study of missed nursing care, improvements are needed in basic nursing care in the areas of patient mouth care and mobilization especially. Education that sensitizes nurses to the importance of mouth care to patients and the health benefits related to proper mouth care is required. Additionally much work is needed to improve inpatient mobility including the ambulating of patients and getting patients up to a chair. Nurse managers are responsible for providing the

resources needed to provide adequate mobility including proper staffing levels and needed equipment (Kalisch, Dabney, & Lee, 2013). However a team approach within the inpatient unit microsystem is required where registered nurses, nursing assistants, physical therapists, and physicians work together to devise plans aims at ensuring that every patient is mobilized while inpatient as medically indicated.

The Institute of Medicine (2001a) notes that in order to have higher quality and safer care, we will need to have re-designed systems of care, including the use of information technology to support clinical practices. Electronic reminders and checklists can be used to decrease the frequency of missed care.

The relationships between nurse staffing and the timeliness of nursing care indicate the importance of having adequate staffing levels to the safety of inpatient care. This study found that having higher ratios of registered nurses to other nursing staff was particularly important. Inpatient units who find themselves with problems providing timely care could benefit from evaluating their nurse staffing and possibly increasing the number of registered nurses on their units.

### **Limitations**

This study was conducted in two hospitals in the Midwest region of the United States. The hospitals were in fairly close proximity to each other (within fifty miles), thus limiting the generalizability of results. Further, the sample was a convenience sample of inpatients willing to participate in the survey. The demographic information of patients who decided not to participate in the study 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 is a consideration,

however comparison of patient reports to those of nursing staff is comparable, thus lessening this concern.

The over representation of whites in the sample does not allow for adequate analysis of racial differences contributing to missed care reports.

Due to the inability to match patient surveys to a date, the mean nurse staffing and unit-CMI scores were used for data analysis. Though unit staffing and CMI values remained fairly stable across months, matching patient surveys to their actual staffing and CMI levels for a particular month in which the survey was taken would allow for more accurate assessment.

### **Implications for Future Research**

The results of this study provide evidence of missed nursing care in the inpatient setting and the impact of nurse staffing on the missed care; however, further studies must be conducted to confirm these findings using more diverse patient populations. In addition, future studies incorporating simultaneous data collection from both nursing staff and patients should be conducted to use for comparison of reports of missed care and to obtain a clear picture of missed nursing care occurring.

Further study of the relationships between missed nursing care and nurse staffing is also needed with direct matching of patient responses to the nurse staffing occurring at the time of the survey as opposed to an average nurse staffing across several months.

The variables studied only accounted for a fraction of the total missed nursing care reported. Thus, studies including other factors found to influence nursing care, such as nurse interruptions and multitasking should be conducted. Additional qualitative

studies aimed at gathering patient perceptions of contributors to missed nursing care could also be helpful in unveiling appropriate research variables for further studies.

Finally, once the above is accomplished and sound interventions are revealed, implementation studies addressing high missed care items are required.

## APPENDIX A

### MISSCARE Survey - Patient

To the extent you can remember, please answer the following questions, if you cannot remember, leave the answer blank.

1. How often were you clear about which specific **nurse** was assigned to take care of you for the shift?

- 1) \_\_\_\_\_ NEVER
- 2) \_\_\_\_\_ RARELY
- 3) \_\_\_\_\_ SOMETIMES
- 4) \_\_\_\_\_ USUALLY
- 5) \_\_\_\_\_ ALWAYS

2. How often did your nursing staff **discuss your treatment** with you?

- 1) \_\_\_\_\_ NEVER
- 2) \_\_\_\_\_ RARELY
- 3) \_\_\_\_\_ SOMETIMES
- 4) \_\_\_\_\_ USUALLY
- 5) \_\_\_\_\_ ALWAYS

3. How often did your nursing staff give you information about **tests** (e.g. x-ray, MRI, CT scan) **and/or procedures** you received during this hospitalization (timing, what would be involved, etc.)?

- 1) \_\_\_\_\_ NEVER
- 2) \_\_\_\_\_ RARELY
- 3) \_\_\_\_\_ SOMETIMES
- 4) \_\_\_\_\_ USUALLY
- 5) \_\_\_\_\_ ALWAYS

4. When you had a question or concern about your care or illness, did your nursing staff **listen to you**?

- 1) \_\_\_\_\_ NEVER
- 2) \_\_\_\_\_ RARELY
- 3) \_\_\_\_\_ SOMETIMES
- 4) \_\_\_\_\_ USUALLY
- 5) \_\_\_\_\_ ALWAYS

5. When you had an opinion about what needed to be done relative to your care, did the nursing staff **consider your opinions and ideas**?

- 1) \_\_\_\_\_ NEVER
- 2) \_\_\_\_\_ RARELY
- 3) \_\_\_\_\_ SOMETIMES
- 4) \_\_\_\_\_ USUALLY
- 5) \_\_\_\_\_ ALWAYS

6. How often did the nursing staff **check with you** to make sure your teeth were brushed and mouth rinsed (or provide the care if you could not do it yourself)?

- 1) \_\_\_\_\_ NEVER
- 2) \_\_\_\_\_ RARELY
- 3) \_\_\_\_\_ SOMETIMES
- 4) \_\_\_\_\_ USUALLY
- 5) \_\_\_\_\_ ALWAYS

7. How often did the nursing staff check with you to make sure you had **a bath or were kept clean** throughout your hospitalization?

- 1) \_\_\_\_\_ NEVER
- 2) \_\_\_\_\_ RARELY
- 3) \_\_\_\_\_ SOMETIMES
- 4) \_\_\_\_\_ USUALLY
- 5) \_\_\_\_\_ ALWAYS

8. If you could **not** feed yourself at any time during your hospitalization, did your nursing staff **help** (feed) **you** within 10 minutes after the arrival of the tray?

- 1) \_\_\_\_\_ NEVER
- 2) \_\_\_\_\_ RARELY
- 3) \_\_\_\_\_ SOMETIMES
- 4) \_\_\_\_\_ USUALLY
- 5) \_\_\_\_\_ ALWAYS
- 6) \_\_\_\_\_ I DID NOT NEED HELP TO FEED MYSELF
- 7) \_\_\_\_\_ I COULD NOT EAT

9. On average, how often did the nursing staff **help you or monitor** that you **got out of bed and sat in a chair**?

- 1) \_\_\_\_\_ NEVER
- 2) \_\_\_\_\_ RARELY
- 3) \_\_\_\_\_ SOMETIMES
- 4) \_\_\_\_\_ USUALLY
- 5) \_\_\_\_\_ ALWAYS
- 6) \_\_\_\_\_ CHECK HERE IF YOU WERE UNABLE TO GET OUT OF BED

10. On average, how often did the nursing staff **help you or monitor** that you **walked**?

- 1) \_\_\_\_\_ NEVER
- 2) \_\_\_\_\_ RARELY
- 3) \_\_\_\_\_ SOMETIMES
- 4) \_\_\_\_\_ USUALLY
- 5) \_\_\_\_\_ ALWAYS
- 6) \_\_\_\_\_ CHECK HERE IF YOU COULD NOT WALK

11. On average, how often did the nursing staff **reposition you in bed**?

- 1) \_\_\_\_\_ NEVER
- 2) \_\_\_\_\_ RARELY
- 3) \_\_\_\_\_ SOMETIMES
- 4) \_\_\_\_\_ USUALLY
- 5) \_\_\_\_\_ ALWAYS
- 6) \_\_\_\_\_ CHECK HERE IF YOU DID NOT NEED HELP MOVING AROUND IN BED

12. On average, how often did your nurses **check your IV or other line** (central venous catheter, PICC line, or port)?

- 1) \_\_\_\_\_ NEVER
- 2) \_\_\_\_\_ RARELY
- 3) \_\_\_\_\_ SOMETIMES
- 4) \_\_\_\_\_ USUALLY
- 5) \_\_\_\_\_ ALWAYS
- 6) \_\_\_\_\_ CHECK HERE IF YOU DID NOT HAVE AN IV OR OTHER LINE

13. When a monitor or other **machine beeped**, how long did it usually take the nursing staff to respond?

- 1) \_\_\_\_\_ LESS THAN 5 MINUTES
- 2) \_\_\_\_\_ 5 TO 10 MINUTES
- 3) \_\_\_\_\_ 11 TO 20 MINUTES
- 4) \_\_\_\_\_ 21 TO 30 MINUTES
- 5) \_\_\_\_\_ MORE THAN 30 MINUTES
- 6) \_\_\_\_\_ NO MACHINE BEEPED

14. When you pushed your **call light**, how long on average did it take the nursing staff to answer?

- 1) \_\_\_\_\_ LESS THAN 5 MINUTES
- 2) \_\_\_\_\_ 5 TO 10 MINUTES
- 3) \_\_\_\_\_ 11 TO 20 MINUTES
- 4) \_\_\_\_\_ 21 TO 30 MINUTES
- 5) \_\_\_\_\_ MORE THAN 30 MINUTES
- 6) \_\_\_\_\_ I NEVER PUSHED MY CALL LIGHT

15. Once your call light was answered, how long on average did it take for you to **receive the help** you requested?

- 1) \_\_\_\_\_ LESS THAN 5 MINUTES
- 2) \_\_\_\_\_ 5 TO 10 MINUTES
- 3) \_\_\_\_\_ 11 TO 20 MINUTES
- 4) \_\_\_\_\_ 21 TO 30 MINUTES
- 5) \_\_\_\_\_ MORE THAN 30 MINUTES
- 6) \_\_\_\_\_ I NEVER PUSHED MY CALL LIGHT

16. Did you ask for **pain medication**?

- 1) \_\_\_\_\_ YES (*if yes, go to question 17*)
- 2) \_\_\_\_\_ NO (*if no, go to question 19*)

17. If you answered yes to question 16, how long did it take you to get the pain medication?

- 1) \_\_\_\_\_ LESS THAN 5 MINUTES
- 2) \_\_\_\_\_ 5 TO 10 MINUTES
- 3) \_\_\_\_\_ 11 TO 20 MINUTES
- 4) \_\_\_\_\_ 21 TO 30 MINUTES
- 5) \_\_\_\_\_ MORE THAN 30 MINUTES
- 6) \_\_\_\_\_ I NEVER RECEIVED THE PAIN MEDICATION

18. If you answered yes to question 16, did the nursing staff check back to see if the **medication helped reduce your pain**?

- 1) \_\_\_\_\_ NEVER
- 2) \_\_\_\_\_ RARELY
- 3) \_\_\_\_\_ SOMETIMES
- 4) \_\_\_\_\_ USUALLY
- 5) \_\_\_\_\_ ALWAYS

19. If you needed help to **go to the bathroom**, how long did it take the nursing staff to get into your room to help you?

- 1) \_\_\_\_\_ LESS THAN 5 MINUTES
- 2) \_\_\_\_\_ 5 TO 10 MINUTES
- 3) \_\_\_\_\_ 11 TO 20 MINUTES
- 4) \_\_\_\_\_ 21 TO 30 MINUTES
- 5) \_\_\_\_\_ MORE THAN 30 MINUTES
- 6) \_\_\_\_\_ I DID NOT REQUEST OR NEED HELP

20. **Overall**, how would you **rate your nursing care** while you were a patient during this hospitalization?

- 1) \_\_\_\_\_ POOR
- 2) \_\_\_\_\_ FAIR
- 3) \_\_\_\_\_ GOOD
- 4) \_\_\_\_\_ VERY GOOD
- 5) \_\_\_\_\_ EXCELLENT

21. Did you experience any of the following problems during this hospitalization?

	Yes	No	Unsure
<b>Fall</b>			
<b>Skin breakdown / Pressure ulcer</b>			
<b>Medication Administration Error</b>			
<b>New Infection</b>			
<b>IV running dry</b>			
<b>IV leaking into your skin</b>			
<b>Other problem</b>			
Explain: _____			

## GENERAL INFORMATION

1. Name of the unit: \_\_\_\_\_
2. How many days have you been in the hospital this time? \_\_\_\_ days
3. Have you been hospitalized before: \_\_\_\_ yes \_\_\_\_ no
4. How many times in the last 5 years? \_\_\_\_\_
5. Age: \_\_\_\_\_ years old
6. Gender: \_\_\_\_ male \_\_\_\_ female
7. Which one of these groups would you say best represents your race?
  1. WHITE/EUROPEAN AMERICAN
  2. BLACK/AFRICAN AMERICAN
  3. HISPANIC OR LATINO
  4. ASIAN
  5. NATIVE HAWAIIAN / PACIFIC ISLANDER
  6. AMERICAN INDIAN / ESKIMO / ALEUTIAN
  7. OTHER ***PLEASE SPECIFY.*** \_\_\_\_\_
8. What is your highest level of education?
  1. LESS THAN HIGH SCHOOL
  2. HIGH SCHOOL DIPLOMA/GED
  3. SOME COLLEGE
  4. 4 YEAR COLLEGE DEGREE
  5. MORE THAN 4 YEAR COLLEGE DEGREE

9. What is your marital status?

1. MARRIED
2. SEPARATED
3. WIDOWED
4. DIVORCED
5. NEVER MARRIED

10. In general, would you say your health is:

1. \_\_\_\_\_ POOR
2. \_\_\_\_\_ FAIR
3. \_\_\_\_\_ GOOD
4. \_\_\_\_\_ VERY GOOD
5. \_\_\_\_\_ EXCELLENT

11. Patient type (current hospitalization):

1. \_\_\_\_\_ MEDICAL
2. \_\_\_\_\_ SURGICAL
3. \_\_\_\_\_ REHABILITATION
4. \_\_\_\_\_ OTHER

12. Diagnosis (*Patient report*): \_\_\_\_\_

13. Who completed this survey? \_\_\_\_\_ Patient      \_\_\_\_\_ Family

14. Have you ever been diagnosed or treated for any of the following health problems?

	<b>Yes</b>	<b>No</b>	<b>Don't Know</b>
a. <b>Cancer</b>	1	2	3
b. <b>Lung Disease</b> (such as chronic bronchitis, or emphysema, or chronic asthma, or chronic wheezing, or regular use of inhalers)	1	2	3
c. <b>Heart Disease</b> (such as a heart attack, or coronary heart disease, or chest pain due to your heart, or arrhythmia)	1	2	3
d. <b>High Blood Pressure</b>	1	2	3
e. <b>Stroke</b>	1	2	3
f. <b>Psychiatric Problems</b> (such as Depression, Manic-Depression, Anxiety, or Schizophrenia)	1	2	3
g. <b>Substance Abuse</b>	1	2	3
h. <b>Diabetes</b>	1	2	3
i. <b>Rheumatoid Arthritis</b>	1	2	3



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