THE ROLE OF PHYSICAL DESIGN AND INFORMAL COMMUNICATION AND

LEARNING IN REDUCING STRESS AND GAINING COMPETENCY AMONG

NEW NURSE GRADUATES

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ABSTRACT

Graduate nurses experience a tremendous amount of stress as they transition from a student to a practicing nurse. Much of this stress can be attributed to a feeling of not having learned enough to function independently. While various formal learning strategies, such as graduate nurse orientation programs, have been implemented to solve this problem, not much attention has been paid to the potential of informal opportunities for learning. This study examined how components of the nursing unit ecosystem, including culture, organizational factors, technology, and particularly the physical layout, influenced communication and opportunities for informal learning, stress, and the gaining of nursing competencies during the formal orienting period.

Five different data collection methods were used, including systematic observation of communication and interaction patterns, a survey of organizational climate and opportunities for informal learning, self-recorded blood pressure, competency ratings, and focused interviews. The physical environment, particularly backstage areas and clear sightlines within the nursing station, fostered opportunities for informal communication and on-the-job learning; as well as relationships among nurses that contributed to effective collaboration.

A combination of factors was found to influence the GN learning experience including past experiences, unit culture, personal learning style, unit layout, and interaction with staff. The gaining of competencies was not associated with a reduction in stress, suggesting that other factors, particularly staffing levels, had more of an impact on stress than nursing competencies per se. The extent to which other social, organizational, and personal factors interact with staffing levels to produce stress or mitigate its effects deserves further study.

BIOGRAPHICAL SKETCH

Sarah Nichole Hammer is from Middlesex, New York and received her Bachelors of Science in Design and Environmental Analysis from Cornell University in 2007. During her time at Cornell she developed a passion for healthcare design. Specifically, her primary interest is evidence-based design and the potential it holds for improving the quality of care and overall healthcare experience for both patients and staff. She returned to Cornell in the fall of 2007 to pursue her Masters of Science in Human Environment Relations in the department of Design and Environmental Analysis. In the fall of 2008, she accepted a position with an architecture firm in Ithaca, NY that specializes in healthcare facilities. There she intends to apply her skills in healthcare research, programming, and design and ultimately become an accredited evidence-based design professional.

Dedicated to my parents, John and Linda Hammer

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CHAPTER 1

INTRODUCTION

1.1 Opportunity for Change

Presently the U.S. healthcare industry is faced with a multitude of challenges, and with challenge comes the need for change. Some of the factors driving change are the shortage of nurses, increasing consumer demands, and the high prevalence of medical errors (Christmas, 2008; Neuberger, 2000; Institute Of Medicine, 2000). In addition, the industry is being confronted with more informed consumers and increasing competition among healthcare organizations, further pressuring hospital executives to strive for the utmost in quality care (Sweeney, 2008). These challenges and others are being tackled at all levels, from federal policy aimed at increasing interest in the nursing profession to community initiatives intended to meet baby boomers' demand for preventative care to individual hospitals adopting electronic order entry to reduce medication errors (Bates, 2000; Lumsdon, 2003; Wakefield, 2001).

In addition to these strategies, examining the role of the physical environment of healthcare facilities has exploded onto the scene as another means of improving healthcare quality. Often overlooked in the past, the view that the design and layout of space has a significant and measurable impact on the healthcare experience has gained credibility due to the rise of evidence-based design. Ulrich et al. (2008) cited a statistic from the work of Jones (2007) stating that the U.S. will spend more than $180 billion for new hospitals in the next five years alone, and healthcare construction is projected to exceed 70 billion per year by 2011. With the health, safety, and satisfaction of both patients and staff in mind, this surge in construction presents an

extraordinary opportunity to apply the findings of research aimed at improving the quality of healthcare's physical environment.

1.2 Evidence-Based Design

The current boom in the construction of hospitals is a reaction to the existing condition of the healthcare environment in the U.S. New facilities are needed to replace the outdated "Hill-Burton era" buildings of the mid 20th century and will address issues such as the nursing shortage, the rising expectations of consumers, the aging of baby boomers, advancements in information and medical technology, and the increase in life expectancy. Occurring alongside this transformation of the industry and its consumers is public concern for the shockingly high prevalence of medical errors in U.S. hospitals reported by the Institute of Medicine (IOM) in *To Err is Human: Building a Safer Health System* (1999). This report and others like it (IOM, 2001; IOM, 2003) have revealed the fact that hospitals are needlessly unsafe and stressful for both patients and staff.

The construction boom presents hospital executives and architects with an opportunity to embrace the practice of using evidence-based design – "a deliberate attempt to base design decisions on the best available research findings" (Hamilton, 2004). Thanks to advocacy from the Center for Health Design, there is a growing respect for the idea that a carefully considered and well-designed healthcare environment - based on the findings of research - can have a positive impact on the well-being of patients and staff. The Center for Health Design is promoting the use of evidence-based design to create healing environments through a pioneering initiative known as the Pebble Project. The goal of this project is to provide documented examples of how using evidence-based design can improve the quality of care as well as financial performance (The Center for Health Design, 2006). To date, a collection

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of more than 40 Pebble Project partners, such as healthcare organizations and manufacturers, have participated in research and are demonstrating that evidence-based facility design can improve the quality of care for patients, attract more patients, and recruit and retain staff (The Center for Health Design, 2006).

1.2.1 Examples of Patient-Centered Evidence-Based Design

The increasingly competitive nature of healthcare is forcing facilities to pay closer attention to consumer demands (Annunziato, 2000). As a result, much of hospital design today has become deinstitutionalized as part of a shift toward patient-centered design. There is a growing emphasis on creating supportive, aesthetically pleasing, comfortable healing environments developed with the patient perspective in mind. This movement toward humanistic design parallels, in time and philosophy, the Planetree model of patient-centered care. According to Planetree, a not-for-profit organization whose mission is to improve the patient experience, a patient-centered approach partners providers with patients and their family members to identify and satisfy a full range of patient needs and preferences (Planetree, 2008). The experience of Planetree and other research (Ulrich et al, 2008) indicates that there are a number of design factors that affect the patient and staff experience and the quality of care.

1.2.1.1 Access to Nature

In a number of studies over the past two decades, researchers have demonstrated the stress- and pain-relieving effect of nature, real or simulated. In a landmark study by Ulrich (1984), surgery patients who had a room with a view of a small group of deciduous trees had shorter hospital stays, fewer negative evaluative comments by nurses, and requested fewer painkillers than matched patients in rooms with a view of a brown brick wall. This exploratory study spurred other investigations

into the topic of nature as a therapeutic feature of the built environment. Whall et al. (1997) found that adding images of nature and audio recordings of chirping birds and running water to a shower room reduced stress and decreased the occurrence of aggressive behavior in patients with late-stage dementia. As a result of research on the pain- and stress-reducing impact of nature, many hospitals have been designed or renovated to include water features and close-up images of birds and flowers, such as the Pebble Project's Dublin Methodist Hospital in Dublin, Ohio (Ollanketo & Elsas, 2007).

1.2.1.2 Social Support

Another issue gaining recognition from researchers is the concept that the built environment can foster social support that has the potential to improve medical outcomes. In the 1990s, medical sociologists explored the intriguing possibility that social support could have an effect on cure rates and recovery rates (Gordy, 1996). Glass, Matchar, Belyea, and Feussner (1993) found that stroke victims with the greatest amount of social support functioned 65% better six months later than stroke patients who were socially-isolated. This study and others that indicated the positive effect of social support on patient well-being (Berkman, Leo-Summers, & Horwitz, 1992; Glass & Maddox, 1992) prompted additional research to investigate ways that the physical healthcare environment facilitates or hinders patients' access to social support. For example, many studies have demonstrated that single-bed rooms are better at accommodating the presence of family and friends than multi-bed rooms, and some evidence proposes that multi-bed rooms actually deter family presence (Sallstrom, Sandman, & Norberg, 1987). Evidence such as this in combination with the Institute of Medicine's patient-centered principles prompted the American College of Critical Care Medicine Task Force to include among its clinical practice guidelines

one stating that "The Environment should…improve social support using single-bed rooms...." (Barclay & Lie, 2007).

1.2.2 Examples of Staff-Centered Evidence-Based Design

Most research on the quality of the hospital environment has focused on the effect it has on patients. Despite the widely accepted idea that the well-being of patients is highly dependent on the well-being of the nurse or caregiver, there has been a limited focus on how the healthcare environment can be improved to better meet the needs of staff (Pati, Harvey, & Barach, 2008). Stress and fatigue that could potentially result from an environment designed without the perspective of nurses could affect alertness, irritability, attention to detail, problem solving ability, energy level, decision-making ability, and consequently contribute to errors (Pati et al., 2008).

1.2.2.1 Acoustic Environment

It is well documented that hospitals – nursing units in particular – are loud environments. The unrelenting beeping of equipment and alarms, the hum of nurses and doctors discussing patient care, the buzz of bedrails being moved up and down, and the ring of telephones all contribute to the noisy work settings of nurses. In fact, many hospitals experience noise levels far exceeding World Health Organization guideline values (Ulrich, Zimring, Quan, & Joseph, 2006). While these high noise levels have an impact on patient stress, they have a substantial impact on staff as well. There is evidence that staff perceive higher sound levels as stressful: noise-induced stress in nurses correlates with reported burnout (Topf & Dillon, 1988; Ulrich & Zimring, 2004). One method found by researchers to be successful in mitigating this stressor is installing acoustic treatments that help to absorb sound. A study by Blomkvist et al. (2005) examining the effects of replacing sound-reflecting ceiling

tiles with sound-absorbing ceiling tiles in an intensive-care unit resulted in positive outcomes. Specifically, during the period of lower noise, improved speech intelligibility, reduced perceived work demands, and lessened perceived pressure and strain were reported. Such outcomes could have positive effects on nurse retention.

1.2.2.2 Nursing Unit Layout

As hospitals strive to give nurses more time to devote to direct patient care activities, researchers have been investigating ways to reduce the amount of time they spend walking ("Study Devises Ways," 2008). Nurses spend a tremendous amount of time on their feet, which not only takes away from time spent with patients but also contributes to the physically demanding nature of the job. Burgio, Engel, Hawkins, McCorick, and Scheve (1990) found that walking accounts for close to one third of total nurse shift time. Most walking occurs between the patient room and the nursing station to locate supplies and to fill medications (Joseph, 2006; "Study Devises Ways," 2008). Research has shown that the layout of the nursing unit can impact the number of steps taken by nurses. Joseph (2006) cited studies by Shepley and Davies (2003), Sturdavant (1960), and Trites et al. (1970) that found that nurses spend significantly less time walking in radial units as compared to rectangular units. Studies have also found that decentralized nursing units, as opposed to centralized nursing units, reduce the amount of time spent walking by bringing staff and supplies closer to the patient (Hendrich, 2003). One study investigated the effect of implementing decentralized nurse servers, which are cabinets located in each room to store patient medications ("Study Devises Ways," 2008). The shift from a single centralized medication location to a hybrid model using both the nurse servers as well as a central medication room translated into a savings of 576 feet traveled over a 12-hour shift and increased time available for direct patient care by 30 minutes.

1.3 Nursing Shortage

The healthcare construction boom will undoubtedly prompt administrators to search for new and innovative ways to attract and retain staff through evidence-based design. The Registered Nurse (RN) workforce in the U.S. has been dwindling for the last decade. Fewer are pursuing nursing as a profession due to a negative image of the career that dominates society as well as an increase in alternative career opportunities for women (Goodin, 2003). And according to Dr. Peter Buerhaus and collegues (2008), there is no sign of relief in the future if trends continue with an estimated deficit of 500,000 RNs by the year 2025. While the U.S has experienced surpluses and shortages of RNs throughout its history, the current shortage can be characterized distinctly from the rest. Specifically, the current workforce is an aging one. Because fewer young nursing graduates are entering the workforce, the average age of RNs is 47 (Health Resources and Services Administration (HRSA), 2004). The deficit is anticipated to worsen when this baby boomer cohort of nurses retires around 2015 (Gabriel, 2001).

Society is experiencing the burden of the nursing shortage through negative patient outcomes. Due to a lack of adequate staffing, those who *are* working experience heavy workloads to compensate for the gap between supply and demand. One study found that over 90% of RNs report major difficulty in having enough time to maintain patient safety, detect complications in advance, and collaborate with team members (Buerhaus, Donelan, Ulrich, & Norman, 2005). Another study, which examined nurse staffing levels and quality of care, has drawn a direct link between the nursing shortage and serious complications. The findings revealed that a higher number of hours of nursing care was associated with lower rates of urinary tract

infections, pneumonia, cardiac arrest, and even death (Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky, 2002).

1.4 Job Stress in Nurses

Given the current shortage of nurses, consideration of the factors that influence voluntary nurse turnover is crucial. Job stress is of particular concern when it comes to understanding why nurses intend to leave the profession. According to a survey of registered nurses, the primary reason why nurses leave healthcare, other than for retirement, is to find a job that is less stressful and physically demanding (Peter D. Hart Research Associates, 2001). In addition to the physical demand associated with standing for long periods and lifting patients, nursing is emotionally taxing as well. French, Lenton, Walters, and Eyles (2000) have identified workplace stressors that could potentially affect nurses including problems with peers, coping with dying patients, workload, and uncertainty concerning treatment, to name just a few.   In addition, inter-professional conflict between nurses and physicians has been found to be a significant source of stress (Hillhouse & Adler, 1997; Bratt et al., 2000; Ball et al., 2002).

Although the intensity of these work-related stressors may vary between practice areas (McVicar, 2003), the literature is consistent in identifying stress as a major factor contributing to job dissatisfaction and burnout. A number of studies have investigated the reasons that RNs intend to quit, and job stress is consistently among the most frequently reported (Gardulf, 2005; Daily, 1990; Stolte & Myers, 1995; Collins et. al, 2000). In an exploration of predictors of turnover in RNs., Shader, Broome M., Broome C., West, & Nash (2001) found a correlation between high job stress and greater intention to quit. Considering the large body of literature establishing the reality of significant job stress in nurses and its relationship to

turnover, exploring ways to create a less-stressful working environment in an effort to attract and retain nurses is critical.

1.5 Graduate Nurse Transition and Stress

Within the general body of literature examining the role of stress in nursing, there is a growing body of literature on the experience of new graduate nurses as they transition from student to registered nurse. It is well documented that new nurse graduates experience significant levels of stress as they shift from school to the workforce. In fact, the first three to six months of employment following graduation represents the most stressful time in nurses' careers (Fisher and Connelly, 1989). In her study examining the transition experiences of graduate nurses, Delaney (2003) found that stress is the "most powerful, common experience" of graduate nurses.

According to Marlene Kramer's seminal work (1974) on the phenomenon known as "reality shock," stress and frustration dominate graduate nurses' feelings as they transition to becoming a qualified nurse. Kramer described the concept of reality shock as graduate nurses enter the role of a registered nurse to find themselves unprepared for the roles they believed they were prepared for. Studies have supported Kramer's theory: the literature consistently cites that a major cause of stress experienced by graduate nurses is the feeling that they do not have sufficient knowledge to function independently on a hospital ward. A statement by a graduate nurse in the previously mentioned study by Delaney (2003) provides a telling account of this feeling that typifies the transitional experience of new nurse graduates: "I thought, I'm the RN now, so I have to know the answers. I can't say I'm a student anymore. I worry about not knowing enough, not knowing what to do. Should I do this, or should I do that? Did I miss anything?" Other research supports this view. Newton and McKenna (2007) conducted focus group interviews of graduate nurses to

try to gain a better understanding of how graduate nurses develop their knowledge and skills. Commonly reported among the graduate nurses was the sense of being unprepared at the completion of their undergraduate studies to face the responsibilities and challenges of being a registered nurse. McVicar (2003) cites studies by Charnley (1999) and Brown and Edelmann (2000) that found that low levels of confidence in their clinical skills was a distinguishing source of stress for inexperienced nurses.

The nationwide nursing shortage exacerbates the problem. Chesnutt and Everhart (2007) point out that because there is a lack of experienced nurses who are willing to work, 40% of hired RNs in 2005 were recent graduates. Consequently, inexperienced graduate nurses are expected to be responsible for the work load of an experienced nurse almost immediately, placing them under a tremendous amount of pressure.

1.6 Teamwork in Healthcare

As discussed below, teamwork is an important factor in determining job satisfaction and may lead to lower burnout rates among nurses. In addition, the increasingly specialized and complex nature of healthcare necessitates collaboration and teamwork among multiple disciplines to provide an efficient and effective continuum of care for the patient. The members of the patient care team - nurses, doctors, technicians, receptionists, care coordinators, and so on - must work in a synergistic fashion to produce an outcome that is superior to any outcome that one team member could produce alone (Covey, 1995).

1.6.1 Impact of Teamwork on Patient Outcomes

If effectively executed, teamwork in healthcare has been shown to improve patient outcomes. In Ellingson's (2003) analysis of interdisciplinary healthcare

teamwork, she cites studies by Weiland et al. (1996), McHugh et al. (1996), and Langhorne, Williams, Gilchrist, and Howie (1993) that found that interdisciplinary teams correlate with decreased length of hospital stay, better coordination of patient care, and decreased mortality one year after discharge, respectively. A study by Baggs et al. (1999) revealed that teamwork between intensive care unit (ICU) physicians and nurses resulted in a reduced risk of readmission to the ICU and decreased mortality. They also found a perfect rank order correlation between unit collaboration and patient outcomes, that is, the higher the unit collaboration, the better the patient outcomes.

1.6.2 Impact of Teamwork on Nurse Job Satisfaction

Not only does teamwork among healthcare professionals benefit the patient, it also improves job satisfaction in staff. In a study of nurses' job satisfaction and organizational characteristics, nurses' views of cohesion with their ward nursing team and collaboration with medical staff were found to be the best predictors of job satisfaction (Adams & Bond, 2001). Not only did Rafferty et al. (2001) find a positive relationship between teamwork and job satisfaction, they also found that nurses with higher teamwork scores planned to stay in their jobs and had lower burnout scores. In the same study, it is also interesting to note that nurses with higher teamwork scores also exhibited higher levels of autonomy, which suggests the presence of synergy rather than conflict. Dutta (2008) cited a study by Borill et al (2001) that found that healthcare staff working in well-functioning teams reported much lower levels of stress and were less likely to leave their organization or profession. The mounting evidence that establishes the link between teamwork and nurse job satisfaction challenges hospital administrators and nurse managers to rethink organizational priorities in an effort to retain their nursing workforce.

1.6.3   Graduate Nurses' Sense of Belonging to a Team

Winter-Collins and McDaniel (2000) cite Marlene Kramer (1974) who asserts that a supportive environment is one that allows for new graduates to develop a sense of belonging which can help them overcome the stress of a first job. In a study identifying the six stages that graduate nurses experience in adapting to the real world of hospital nursing, identification, or lack thereof, with the team was found to be a critical aspect throughout the process (Brighid, 2002). One of the two major sources of stress during the first stage of vulnerability was concern over their ability to meet the expectation of the team to which they did not yet feel they were a member. The final stage of developing a new professional self-concept was accomplished by identifying strongly with and being respected by the team. Brighid concluded that the new graduates' professional identities seemed to have been socially constructed through interaction with the team. The previously mentioned study by Winter-Collins and McDaniel (2000) found that a strong sense of belonging was associated with the new graduates' satisfaction with his or her job. This finding confirms the need for managers to increase new graduates' sense of belonging to the team which may be a factor in the organization's ability to retain them in the future.

1.6.4 Importance of Communication for Effective Healthcare Teams

Because there is a wealth of evidence demonstrating the benefits of successful teamwork in healthcare, many researchers have sought to determine the factors that contribute to effective teams. A study by Mickan and Rodger (2005) identified six key characteristics of effective teamwork including mutual respect, goals, leadership, communication, cohesion, and purpose. A review of the literature revealed that one of these characteristics, communication, was consistently cited as a contributor to successful teamwork (Grubach & Bodenheimer, 2004; Lemieux-Charles & McGuire,

2006; Xyrichis & Ream, 2008; Rubin & Beckhard, 1972). Rubin and Beckhard (1972) assert that the effective flow of information is central to team functioning, and anything that inhibits communication will detract from group effectiveness.

1.7 Communication Patterns in Healthcare

A growing body of research suggests that despite the availability of more formal modes of information seeking, such as email and printed records, healthcare professionals prefer informal verbal conversation. Coiera and Tombs (1998) found that staff have a tendency to seek information from colleagues in preference to printed materials – 42 percent of calls for medical staff came from their medical colleagues. This finding is consistent with the work of Covell (1985) who found that about 50 percent of requests for information came from colleagues while only about a quarter came from personal notes, and even less came from laboratory data.

Specifically, researchers are observing a preference for a specific type of verbal conversation – face-to-face communication. Parker and Coiera (2000) cite a study by Safran et al. (1999) who reviewed information transactions in a hospital and found that 50 percent of information transactions occurred face-to-face between colleagues. In the previously mentioned study by Coiera and Tombs (1998), results concluded that staff showed a preference for face-to-face discussion. The study observed the communication patterns of physicians and nurses in a general hospital with the following available modes of communication: face-to-face meetings, both impromptu and planned; desktop telephones; paging; written notes for colleagues in patient notes; notes at ward desks; notice boards; and pigeon holes for personal memos. The study participants made little or no use of formal sources of information, except for data from the medical record. Coiera and Tombs hypothesize that medical staff may prefer to engage in opportunistic face-to-face discussion (as opposed to

formal face-to-face communication not unlike that which would occur in a meeting) because face-to-face discussion is highly valued but difficult to schedule, and any opportunity is avidly seized.

1.8 Communities of Practice and Knowledge Networks

The studies providing evidence of the tendency for healthcare staff to prefer informal, face-to-face conversation as a method of information seeking illustrate the communities of practice concept, which focuses on knowledge sharing across informal networks of people who share a common interest or task (Lave & Wenger, 1991). For our purposes, the network of people are the nurses, doctors, technicians, etc. who informally share information during a spontaneous encounter at, say, the nurses station as they focus on the common interest of patient care. The communities of practice framework emerged from ethnographic analysis of how groups *actually* worked and communicated in practice, which sharply contrasted with the work described in an organization's manuals, training courses, and job descriptions (Brown & Duguid (1991). Horsburgh's (1989) research confirms this notion, finding that the rhetoric and practice of the school of nursing is different from the rhetoric and practice of nursing within general hospital settings, causing graduate nurses to experience difficulty in transitioning from the classroom to their first job. Duchsher (2001) found similar results concluding that graduate nurses experienced disillusionment as they faced the inconsistencies between classroom theory and practice contexts.

Brown and Duguid (1991) describe the traditional perception of training as "the transmission of explicit, abstract knowledge from the head of someone who knows to the head of someone who does not in surroundings that specifically exclude the complexities of practice and the communities of practitioners." In contrast to this

traditional view, Wenger (1998) posits that learning is an integral part of our everyday lives, and it is not exclusive to classrooms, training sessions, and text books. He also presents a social theory of learning, which assumes that humans are social beings, and we learn through active participation in the practices of social communities.

Becker's (2007a) discussion of knowledge networks describes how "tacit knowledge," or knowledge primarily in the heads of people, flows through an organization primarily as a result of informal social networks and less as a result of formal programs and processes. Baldwin and Ford (1988) cite a statistic from the work of Georgenson (1982) stating that of the $100 billon annually spent on formal training and development in the U.S., no more than 10 percent of these expenditures actually result in transfer to the job. On the other hand, the communities of practice framework, which emphasizes organic, spontaneous, informal learning that results from shared information among networks of informally bound people, has proven to be successful for a number of organizations (Wenger & Snyder, 2000).

One factor worth noting that affects the propensity of an organization's employees to engage in a community of practice and benefit from informal learning is the organization's culture. The culture includes formal and informal values, policies, and practices about who can communicate with whom, what the preferred communication modalities are, and how much emphasis is placed on scheduled vs. impromptu and chance meetings and interactions (Becker, 2007a). If the organization's perception of "real work" (Becker, 2007b) doesn't include spontaneous, unplanned, opportunistic communication, then it will leave the organizational resource of informal knowledge networks untapped. Hunter, Spence, McKenna, and Iedema (2008) describe the subculture of the nursing unit as the beliefs, norms, attitudes, and assumptions that are usually manifested subconsciously, learned over time and shared by unit staff. In their ethnographic study exploring how nurses learn, they found that

interactive and interpersonal learning includes intuitive understandings of "how we do things here."

1.8.1 Impact of Informal Learning on the Graduate Nurses Experience

Currently a range of "formal" learning strategies aimed at easing the graduate nurse transition are being implemented, including orientation programs, internships, and the use of a preceptor (Godinez, Schweiger, Gruver, & Ryan, 1999). Although these programs can be beneficial in terms of increasing clinical competencies and reducing nurse turnover, they can be expensive. Maiocco (2003) provides estimates ranging from $18,000 for an 8-week orientation period to $25,000 for a 12-week period. She also states that orientation programs are not only costly in terms of dollars, but also in terms of experienced nurses' time and energy, now at a premium due to the nursing shortage. However, formal learning strategies may not be the only solution to the problem.

Informal learning opportunities may also facilitate the gaining of competencies among new nurse graduates. By overemphasizing the importance of formal learning strategies and failing to realize the value in informal, participatory learning, an organization can "undercut the various processes by which they can become effective learning organizations" (Wenger, 1999). The communities of practice perspective can be applied to the healthcare organization: Opportunities for informal, on-the-job learning and opportunistic communication - such as impromptu questions asked while passing a preceptor in the corridor or striking a spontaneous conversation while engaged in another task at the nurses' station - may help to increase graduate nurse competencies, thereby reducing levels of stress.

In their study of the factors that influence the learning ability of nurses, White et al. (1998) found that learning from peers facilitated integration of knowledge into nursing practice. Information from focus group interviews revealed that peers were perceived to be "unofficial resources" who provided education "on an as-needed basis – informal learning." Ready accessibility of information from colleagues who were on the floor was crucial. One nurse summarized by saying: "…the easier the access, the easier the learning." In an ethnographic study designed to investigate how nurses learn, Hunter, Spence, McKenna, and Iedema (2008) found that the orientation of new staff included informal, incidental, interpersonal, and interactive forms of learning. On-the-job learning took the form of role modeling where nurses who were skilled at performing certain procedures supported those who were unaccustomed to the practices. Less-experienced nurses called on their more experienced peers for advice, and this practice mediated the overwhelming feeling that resulted from being in such an intense learning environment.

We can summarize the literature reviewed up to this point with the following broad statements:

- Work-induced stress in nurses significantly contributes to high rates of nurse turnover, which exacerbates the current national nursing shortage.
- In the transition from the role of a student to the role of an RN, graduate nurses experience tremendous amounts of stress largely due to a perceived lack of knowledge and skill that is required to function independently in the clinical environment.

- Evidence-based design has the potential to not only improve patient outcomes but also reduce stress and burnout in nurses, which could positively affect nurse retention in hospitals.
- Effective communication is critical for the success of teamwork among healthcare professionals, which is proven to enhance patient care and nurse job satisfaction. A sense of belonging to a team can also help graduate nurses overcome the stress of a first job.
- Informal communication and the sharing of information among informal knowledge networks in the workplace is a crucial factor in graduate nurses' ability to learn and become effective members of the team.

Informal communication across knowledge networks has been shown to aid graduate nurses' learning process, which could reduce the stress caused by feeling incompetent. Evidence-based design could hold promise in addressing these issues. The next section focuses on how the built environment affects communication in the workplace.

1.9 Impact of the Built Environment on Communication in the Workplace

The study of the role played by the physical design and layout of the workplace in communication and informal learning can best be understood in the context of "organizational ecology." Becker (2007a) introduced the concept of "organizational ecology" which recognizes that the workplace of all organizations is a complex system in which physical design factors both shape and are shaped by work processes, the organization's culture (e.g., formal and informal values, norms, expectations, policies, and practices), workforce demographics, and information

technologies. He posits that one cannot understand organizational performance, including informal learning, by examining any single facet, component, or element of the overall system. Rather, the focus must be placed on the interdependencies among them. But because the organizational system is so large and complex, he suggests that one point of intervention is the planning, design, and management of physical space.

The degree to which the physical environment affords physical and visual proximity for its occupants has been shown to affect communication and interaction in the workplace. Based on his research and experience, Becker (2007a) has proposed the idea of "spatial transparency" which suggests that the greater the opportunity for employees to easily see and hear what others are doing from inside their own work space and as they move in and around their team, department, and other unit's work space, the greater the opportunities for modeling behavior and sharing information. This allows less experienced employees to learn by observing the behavior of the most experienced members of the organization.

The concept of spatial transparency is evident in the findings of numerous research studies. Becker and Sims (2001) conducted a study of small start-up firms to investigate how office design influences communication patterns. They compared the communication and interaction patterns in closed offices, high-paneled cubicles, and visually transparent team-oriented workstation clusters. The findings revealed that more open, visually transparent team-oriented clusters supported naturally occurring informal learning of a variety of types. Stryker (2004) found similar results in his exploration of workplace design and face-to-face communication in R&D project teams. The findings suggest that workstation visibility (defined by both type of workstation – open workstation vs. closed office - and worker visibility from major circulation paths) is a key variable in promoting team communication and can be said to reduce the impediments to communication in the physical work environment. He

concluded that high visibility workstations appear to promote communication by allowing face-to-face communication to occur more easily. Dutta (2008) cites a study by Allen (1977) who found that physical proximity in an R&D setting played a key role in the amount of interaction that occurred. The results showed that the likelihood of communication and collaboration between team members decreased rapidly with distance. In fact, communication reached its lowest point after the first twenty-five or thirty meters.

1.9.1 Impact of Nursing Unit Design on Communication

Although a moderate body of research exists concerning the effect of the physical design of space on communication in corporate settings, very little research has been conducted with the same focus in healthcare settings. Research in hospitals has confirmed the importance of communication not only for team functioning, which impacts the quality of patient care and nurse job satisfaction, but also for tacit knowledge transfer and informal learning. However, a gap in the literature exists when it comes to the influence of nursing unit design on opportunistic communication and on-the-job learning.

1.9.1.1 Centralized vs. Decentralized Nursing Unit Designs

The concept of spatial transparency that has been illustrated in many studies of corporate environments is applicable to healthcare as well. Visual and physical proximity and its impact on communication is particularly relevant in the current debate concerning centralized vs. decentralized nurses' stations. Researchers are beginning to explore their implications for quality of care and staff efficiency and are discovering that while the advantages of decentralized units, including a reduction in the time spent walking and being away from the patient, appear to surpass those of

centralized units, centralized units may hold one advantage that should not be neglected.

Centralized unit designs typically include a centrally located nurses' station with patient rooms positioned around the perimeter. A defining characteristic is that this design concentrates all of the patient information, and hence the multitude of staff who need access to this information, in one location. The disadvantage to this type of arrangement is that it necessitates frequent trips between the patient room and the nurses' station to locate supplies, chart patient information, fill meds, and so on (Joseph, 2006). Consequently, most of the nurses' time is spent walking around the unit, and this is time that is taken away from direct patient care. Additionally, the core of the unit often becomes crowed, producing excessive noise that is stressful for both patients and staff (Wade, 2006). With the advent of the Planetree movement, which advocates more time spent by nurses with patients and their families, as well as advances in technology that allow for electronic record keeping, the decentralized unit has received more attention. A decentralized design brings staff and supplies visually and physically closer to patients, which helps reduce the time spent walking for nurses (Joseph, 2006). The decentralized unit accomplishes this by featuring multiple small computer workstations distributed around the unit as well as workspace outside of each patient room. However, the fact that this type of design disperses staff all around the unit is grounds for concern when it comes to the issues of interaction and information transfer. Conversely, the centralized unit causes staff to converge in one location providing more opportunities for frequent communication that leads to informal on-the-job learning. While the decentralized unit holds promise in terms of reducing staff walking and increasing time spent in direct patient care, researchers warn this type of design may have a negative impact on staff interactions (Joseph, 2006).

Joseph (2006) cites anecdotal evidence that staff members who move from a centralized unit to a decentralized unit often feel isolated and miss the camaraderie and support of the centralized unit. A similar reaction was echoed by staff at Sutter Roseville Medical Center in Roseville, California where lack of spatial transparency in a decentralized unit inhibited interaction and collaboration among staff (Flynn & Barista, 2005). The horseshoe shaped decentralized stations left the nurses feeling isolated and unable to effectively support each other. The Clinical manager reported that the stations were so decentralized that the staff would not even know if everyone showed up for a shift. Dutta (2008) conducted a pre-post design study to assess the impact of decentralized vs. centralized nursing station layout on opportunistic communication and interaction patterns. He found that the frequency of communication between medical staff decreased in a decentralized layout. In fact, in the new decentralized unit, there were 54% fewer short interactions per hour than in the old centralized unit.

1.9.1.2 Location of Communication on the Nursing Unit

To date, very little attention has been paid to *where* on the nursing unit different types of staff tend to communicate and for what reason. Developing a better understanding of the location of interactions could help designers plan nursing units that better support the desired forms of communication among the multidisciplinary healthcare team. The previously cited study by Stryker (2004) that investigated the effect of workplace design on face-to-face communication found that team communication was positively related to the informal spaces – corridors, break areas, informal meeting spaces – and non-team communication was associated with formal office space. Stated another way, members of the team took advantage of what are commonly perceived as unproductive, ancillary areas for opportunistic

communication, and those who weren't team members generally communicated in space formally dedicated to meetings. It would be interesting to explore whether or not these findings could be applied to the nursing unit.

Iedema and colleagues (2005) conducted a video-ethnographic study of how a multidisciplinary clinical team occupies clinical space and concluded that the corridor is a crucial resource. The traditional view of the corridor is that it is "in between" space with a purpose to facilitate more important events occurring somewhere else and to provide transit routes between events and spaces. However, this study found the corridor to be a valuable resource where hierarchies and formalities can be suspended, at least temporarily, and uncertainty is tolerated. The authors conclude that the increasing complexities of healthcare in the 21st century make the informality offered by the corridor space even more crucial to clinical communication.

1.10 Research Questions

A large body of literature has documented the difficulties and high levels of stress experienced by graduate nurses during their transition from the classroom to their first job as an RN. We know that a major cause of this stress is a perceived lack of competency and lack of belonging to a team. Research suggests that peer support and informal communication among nurses greatly facilitates on-the-job learning that could have the potential to reduce stress. Studies in both the corporate workplace as well as healthcare provide evidence of the impact that the built environment can have on communication and interaction patterns. These facts provided inspiration for the current study.

This thesis, while exploratory in nature, seeks to understand the roles played by the components of the nursing unit ecosystem, including culture, organizational factors, technology, and particularly the physical layout, in the opportunities for

informal learning and communication patterns of a graduate nurse during her orientation period. In addition, this case study examines whether or not there is a relationship between graduate nurse communication and interaction patterns, the gaining of competency, and the reduction of stress.

The formation of specific hypotheses wasn't appropriate for this study given that the topic has not been widely studied, and therefore no sound evidence exists on which to base assumptions. However, the following research questions served as a guide:

1. What are the communication and interaction patterns of a graduate nurse? More specifically, where on the nursing unit do graduate nurses interact, with whom do they interact, and for what reason? Do these patterns change over time?

2. What is the impact of the nursing unit's physical design on informal communication and learning? Do certain physical features inhibit or facilitate interaction and informal learning?

3. Is there a relationship between communication patterns and opportunities for informal learning and graduate nurse competency levels? If so, does this relationship change over the course of the orientation period?

4. Is there a relationship between graduate nurse competency levels and stress levels? If so, does this relationship change over the course of the orientation period?

CHAPTER 2

METHODS

2.1 Research Design

This was an exploratory case study designed to examine the ways in which the built environment affects opportunities for interaction, informal learning, and the exchange of knowledge and information. Additionally, the impact of this type of informal communication on graduate nurse job stress and competency level was explored. The study was conducted during the graduate nurse formal orientation program. During this time, information on graduate nurse interaction patterns, stress levels, and competency levels were obtained using five different data collection methods including: systematic observation of communication and interaction patterns, survey, self-recorded blood pressure, competency ratings, and focused interviews.

2.2 Site Selection

Crouse Hospital was selected for a number of reasons. The genuine interest of the hospital administrators and nursing unit managers in participating in academic research was of utmost importance, and without their support the study would not have been possible. In addition, the hospital featured conventional nursing unit design, providing a good example of the kind of spaces in which graduate nurses often begin their careers. Finally, Crouse Hospital was chosen for its practicality. Located only 54 miles from Ithaca, it was relatively convenient to commute to and from the site for data collection.

2.3 Site Description

Crouse Hospital

Located in Syracuse, NY, Crouse Hospital offers a full range of general and specialty care, inpatient and outpatient services, and community health education and outreach services. This not-for-profit organization is accredited by the Joint Commission on Accreditation of Healthcare Organizations and operates 576 acute-care beds as well as one of the longest running and largest ambulatory surgery programs in the United States.

6N Medical Surgical Nursing Unit

The unit studied, known as 6N, is a 36-bed medical surgical group which currently employs 50 employees. The unit's top four diagnosis-related groups (DRGs), which are the four most common diagnoses billed to Medicare, are:

1. Chronic Obstructive Pulmonary Disorder

2. Pneumonia

3. Esophagitis/Gastroenteritis/Miscellaneous digestive disorders

4. Septicemia

The unit is telemetry capable and takes any overflow telemetry patients including those on a limited number of continuous cardiac intravenous medications. The floor also houses a majority of the hemodialysis patients in the hospital and all of the peritoneal dialysis patients. The staff on 6N are trained to do peritoneal dialysis using an automated external machine or by manual exchange. All RNs are coronary certified through the hospital and are able to begin ACLS protocol prior to a physician arrival during a cardiac emergency.

2.4 Physical Layout

The physical configuration of 6N is best described as a double-corridor, or "racetrack" design (Figure 1). A racetrack plan is created by pulling apart the room blocks along the two sides of the corridor and inserting in the center a core containing an array of support amenities (Verderber & Fine, 2000). The unit is also a reflective plan: the two sides of the floor are essentially mirror images.
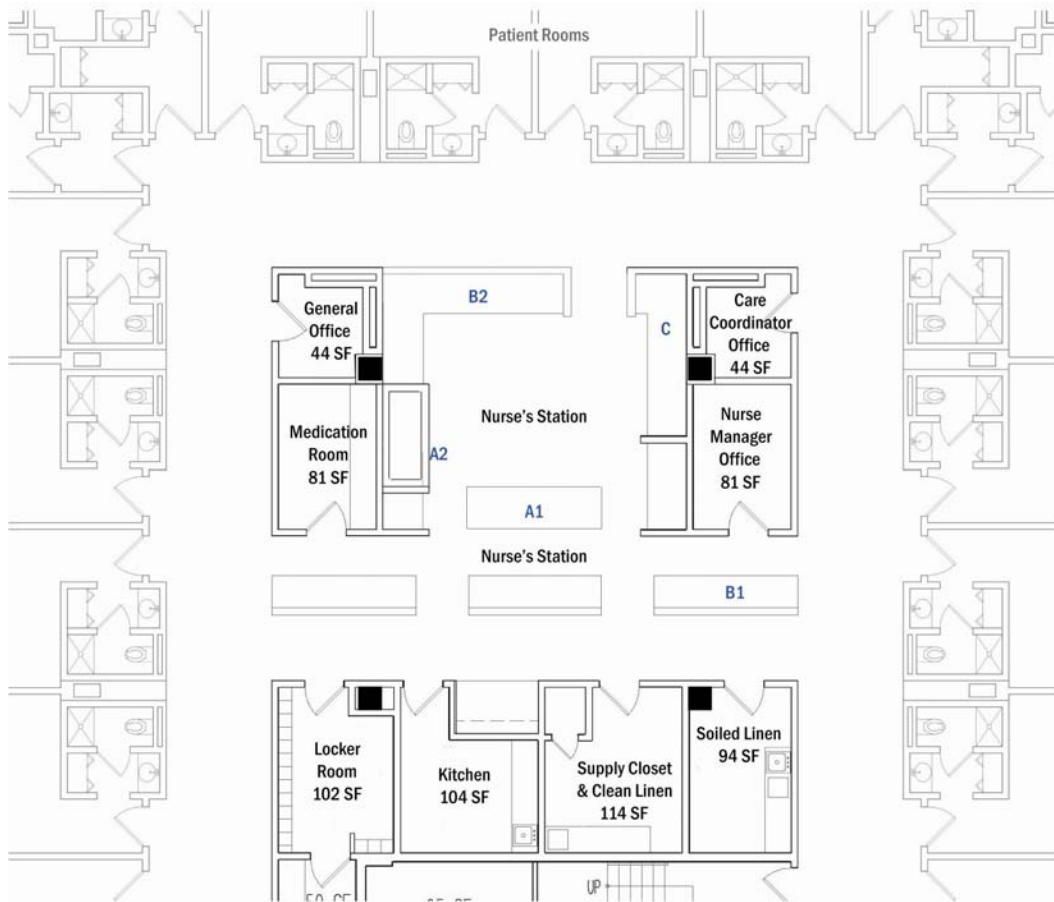
Figure 1 6N Floor Plan

The 20 patient rooms, 16 double-bed and 4 single-bed, are arranged in a U-shaped pattern separated from the service core area by a continuous hallway. A main corridor divides the service core into 2 sections. The smaller section is composed of two utility rooms, the kitchen, and the staff locker room. The larger portion is

primarily composed of the nursing station with the medication room and offices and flanking both sides. The centralized nursing station includes four large desks, each equipped with computers and seating for two to three people. These desks feature two work surface heights: a lower surface for those who are seated and a raised surface convenient for those who are standing. In addition, a large raised work surface is located in the center of the nursing station.

2.5 Sample Size and Selection

The original intent of the study was to compare the communication patterns, stress levels, and competencies of graduate nurses on two nursing units differing in physical layout. Based on previous staffing patterns, the nurse managers and administrators expected that each unit would hire three to four graduate nurses. However, their projections did not align with the available pool of incoming graduate nurses. Instead, only one graduate nurse was hired on 6N. Despite this turn of events, the study continued as an exploratory case study of the multiple social, physical, and technological factors impacting a graduate nurses' orientation experience. This alternative approach was deemed worthwhile and capable of providing valuable insight into a relatively unexplored area of research because it focused on the nursing unit as an integrated workplace system with diverse care providers, not on a single graduate nurse.

Since the study is an ecological analysis of the nursing unit as a system, the sample consisted of more than just the focus graduate nurse. In actuality, the sample also included a core group of personnel who worked on the unit between the hours of 7am and 3pm. The total number of each type of staff employed on the unit is shown below:

- RNs   24
- Travel RNs   5
- Graduate Nurse   1
- Nurse Manager   1
- LPNs   4
- Nursing Assistants   11
- Unit Receptionists   4

On any given day of observation, the actual group of registered nurses, travel RNs, and nursing assistants would consist of different individuals based on the work schedules of each staff member. However, the graduate nurse, nurse manager, LPNs, and unit receptionists were always the same individuals.

Due to the varied nature of medical needs of patients in a medical surgical unit such as 6N, a number of specialized medical staff would come and go as needed. Because the numbers of these specialized staff members fluctuated on the unit from day to day and even from hour to hour, it was not possible to assign a fixed number to each group. However, the following categories of medical staff were identified and were included in the sample whenever observed interacting with the graduate nurse on the unit:

- Specialist Doctors
- Physical Therapists
- Dieticians/Nutritionists
- NPs
- IV Team Members
- Medical Students

o   Nursing Students

The following non-medical persons were also a part of the sample, but only when they were observed interacting with the graduate nurse:

o   Medical Equipment Technicians

o   Care Coordinators

o   Patients' Family Members and Visitors

o   Housekeeping

o   Maintenance

2.6 Data Collection

Taking a systems approach to the study meant that information needed to be collected on a variety of variables relating to the components of the organizational unit. In order to avoid an incomplete reflection of the complex set of factors that affect the graduate nurse experience, a multi-modal approach was used. This technique employed a variety of methods to collect both qualitative and quantitative data on the following outcome measures: interaction patterns, competency levels, and stress levels. Information on the participants' perceptions of factors that influence these outcomes was also collected. The five data collection methods used were:

1. Clinical Work Measurement Tool

2. Survey

3. Blood Pressure Recordings

4. Competency Evaluations

5. Focused Interviews

The data collection period coincided with the graduate nurse's formal orientation program. In this 12-week formal orientation period, graduate nurses are co-assigned with an experienced nurse preceptor who assists graduate nurses in their transition from the student role to the RN role. The graduate nurse's orientation began the week of January 21st, all of which was spent in the classroom. It wasn't until week two of her orientation that she actually started working on the unit, at which point data collection began. The data collection period was intended to continue for 11weeks, concluding with the completion of the orientation program. However, because the study of 6N was done in conjunction with the study of another unit at the same hospital, both of which addressed the same research questions and used the same methodologies, data was only collected for 9 weeks because that was the time period in which the graduate nurse on the other unit was able to be observed, and the goal was to collect comparable data over the same time period.

Before data collection could begin, IRB requirements mandated that all 6N staff members be informed of the study and its purpose. To accomplish this, the researcher composed a memo briefly describing the study that was emailed to all 6N staff and was posted in various locations throughout the unit (see Appendix A). Furthermore the nurse manager as well as the clinical nurse specialists (CNS) involved with the unit informally talked with staff to create awareness about the study. Obtaining graduate nurse and Orientor consent to participate in the study was also required by the IRB. To achieve this, one-on-one meetings were held with both subjects to describe the study and answer questions, at which point consent was received (see Appendix B for graduate nurse consent form; Appendix C for Staff consent form).

In addition to satisfying IRB requirements, the researcher sought to develop a deeper understanding of the workings of the unit before data collection began.

Meetings were held over a three month period prior to commencing formal data collection with the nurse manager and CNS to gain insight into the graduate nurse orientation period and the daily operations of 6N. Additionally, the researcher received her own informal orientation of the unit as she spent several short periods of time on the floor with the CNS. During these periods, the CNS introduced staff members, noting their title and role on the unit, and also commented on how staff use the space.

2.6.1 Clinical Work Measurement (CWM) Tool

The CWM tool, developed by the Health Informatics Research & Evaluation Unit (HIREU) at The University of Sydney in Australia, uses multi-dimensional work classifications for measuring the work patterns of doctors, nurses and pharmacists. These classifications are programmed into hand-held PDAs equipped with specially developed software. An observer follows individual clinicians for periods of up to 2 hours as they undertake their daily work tasks. During this time, a PDA is used to collect information about work tasks (eg. what they are doing), as well as information about who is involved in the task and how the task is being completed (eg. with a telephone, computer, etc). Additionally, the tool allows the observer to capture interruptions and multi or parallel tasking as well as the distribution of clinicians' time across work tasks.

A major purpose of the study was to investigate ways in which the physical layout of the unit affects interaction patterns, yet the original CWM program was not designed to collect data on the location of interactions. Consequently, the existing pre-programmed "how" category, which recorded information on how the task was executed, was replaced with a "location" category (see Appendix D for modified categories). This change allowed the researcher to record where on the unit each

interaction occurred. These new location categories were developed after several on-floor meetings and "tours" of the unit with the CNS who helped map out the boundaries of the different location zones (Figure 2). It is important to note that shadowing did not occur in patient rooms in the interest of patient privacy.

In addition, the "work task" category was modified to better address the study's research questions. The original purpose of this category was to capture information on specific tasks. Instead the modified version allowed the researcher to collect data on the types of communication that occurred, with a focus on informal, on-the-job learning. The existing "with whom" category was also modified to reflect the actual staff present on 6N. All decisions regarding modifications to the CWM tool categories were informed by pilot research conducted from November 2007 through January 2008 at both Crouse Hospital and Cayuga Medical Center in Ithaca, NY. During this period, graduate nurse work patterns were observed, including types of communication and interaction with other staff. Drafts of new categories were developed, revised, and discussed with CNS, the nurse manager, and Orientor until final categories were put in place. This time was also used to familiarize the researcher to the CWM tool, and to become accurate at coding different types of communication and interaction. Furthermore, this time spent on the floor prior to the beginning of the study was instrumental in helping staff become comfortable with the researcher's presence.

Data collection with the CWM tool began on January 31st and continued until March 21st. Shadowing of the graduate nurse occurred 1-2 times per week depending on the work schedules of the graduate nurse and her Orientor and on the dates of formal orientation classes that took the graduate nurse off the floor. Between 3 and 6 hours of observation were completed each week on the A shift between the hours of 7am and 3pm, for a total of 25 hours of observation.
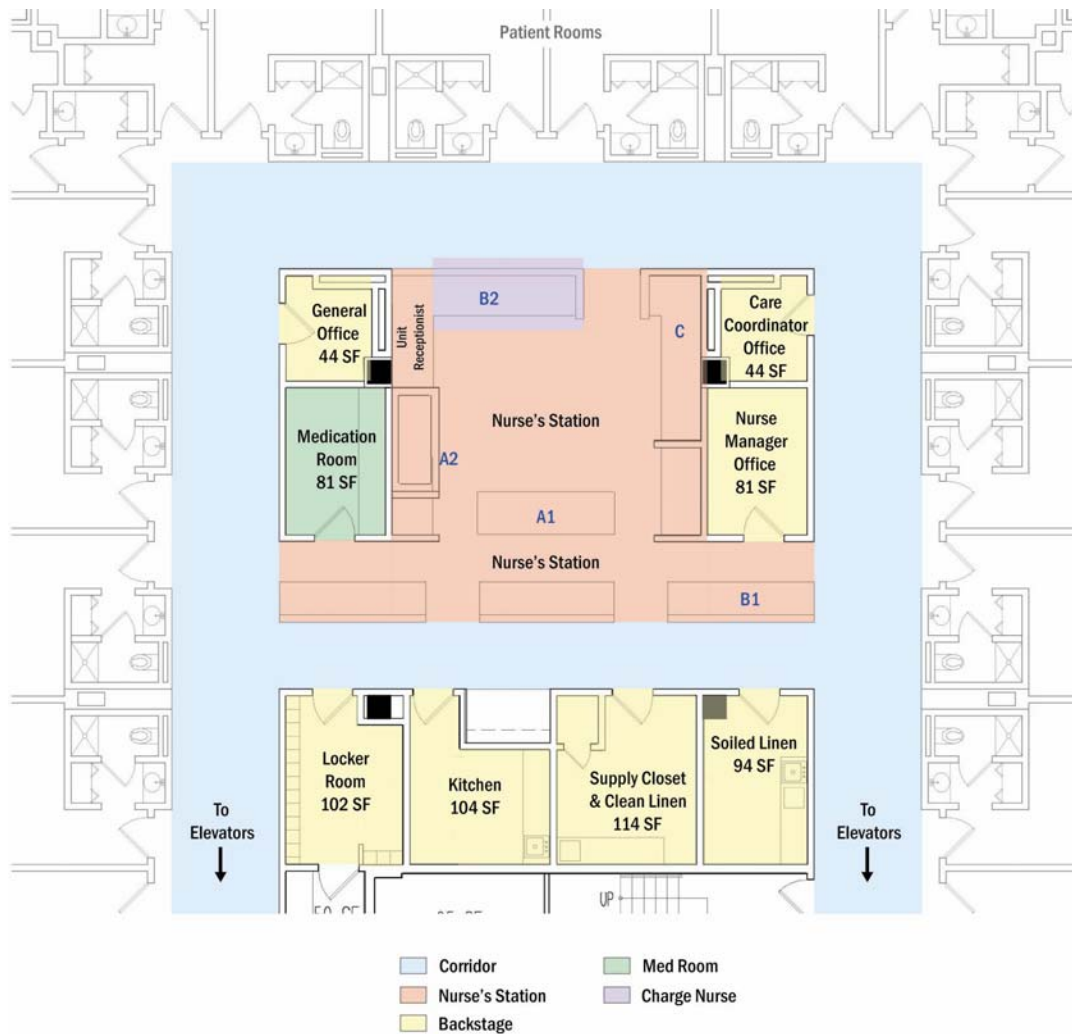
Figure 2 6N floor plan showing color-coded location zones

2.6.2 Survey

A paper-and-pencil survey was composed of two parts and developed to measure three constructs (see appendix E):

1. Perceived level of stress

2. Opportunities for informal learning

3. Unit Culture

Part I of the survey addressed the first construct, perceived level of stress (see Appendix F for survey items pertaining to stress). This was measured by the Nursing Stress Scale (NSS), an existing validated instrument developed by Gray-Toft and Anderson (1981). The purpose of using this subjective measure of stress was to determine whether or not there was a correlation with the physiological measure of stress obtained through blood pressure readings (see below). The scale consisted of 34 items that described situations that have been identified as causing stress for nurses in the performance of their duties. It provides a total stress score as well as scores on each of the seven subscales that measure the frequency of stress experienced by nurses in the hospital environment: Death and dying; conflict with physicians; inadequate preparation; lack of support, conflict with other nurses; work load; and uncertainty concerning treatment. Scores of test-retest reliability as well as four measures of internal consistency ranged between .79 and .89, indicating a satisfactory level of consistency between items (Gray-Toft & Anderson, 1981). This scale in its entirety, comprising part I of the survey, was kept separate from part II and was scored using a four-point scale. Nurses were asked how often, on their present unit, they found the following situations to be stressful: never (1), occasionally (2), frequently (3), and very frequently (4).

Part II of the survey addressed the second and third constructs, opportunities for informal learning and unit culture (see Appendix G for survey items pertaining to informal learning; see Appendix H for survey items pertaining to unit culture). These constructs were measured by indices that combined items from three different sources:

1. *Measurement of Work Satisfaction Among Health Professionals* (Stamps, Piedmont, Slavitt, & Haase, 1978). An instrument was developed to measure work satisfaction among health professionals and assessed six components of occupational satisfaction: pay, autonomy, task

requirements, organizational requirements, interaction, and job prestige/status. A Cronbach's alpha value for the 48 items was calculated to be .91, indicating an acceptable level of reliability.

2. *A Comparative View of Employee Perceptions of their Workplaces as Learning Environments* (Coetzer, 2006). This survey was designed to capture employee perceptions of their workplace as learning environments. The questionnaire was divided into 5 sections: Employee perception of work environment characteristics, supervisor's proximate support for learning, (dis) satisfaction with learning, perceptions of the usefulness of seven "aids to learning," and general information. The measure of internal consistency reliability of the scale items was satisfactory and exceeded the generally agreed upon lower limit for Cronbach's alpha (0.70).

3. *Measuring Organizational Traits of Hospitals: The Revised Nursing Work Index* (Aiken & Patrician, 2000). This paper describes how the Nursing Work Index (NWI), developed by Kramer and Hafner (1989), was redesigned to create the Revised Nursing Work Index (NWI-R). The original structure of the NWI contained a comprehensive list of items that provided the basis for the development of the NWI-R, which was designed to measure aspects of a professional practice environment. Four subscales were derived to measure organizational attributes that characterize environments supportive of professional nursing practice: autonomy, control over the work environment, relationships with physicians, and organizational support for caregivers. Reliability of the instrument was found to be acceptable with a Cronbach's alpha of .96

Items pertaining to both informal learning and unit culture were randomly combined to jointly form part II of the survey. For each item, nurses responded on a 7-point Likert scale, with choices ranging from Strongly Disagree (1) to Strongly Agree (7).

The survey was intended to be administered three times over the course of the 12-week orientation period (once in the beginning, again at the mid point, and a third time at the end). Because of unexpected circumstances, the survey was administered only twice to the graduate nurse. Despite this change, it was still be possible to assess whether or not there were changes in survey responses over time. The first administration occurred at the end of orientation week 3 (in actuality only her second full week on the unit since week 1 was spent in the classroom). The second administration occurred at the end of orientation week 7.

The survey was also administered once to the Orientor and to eight RNs who work the 7am – 3pm shift on 6N. This was done to provide a baseline assessment of the unit with which to compare the graduate nurse's responses.

2.6.3   Blood Pressure Recordings

Blood pressure measurements were used as a biological measure of stress that could be compared to subjective assessments of stress reported by the graduate nurse in the surveys. The decision to use blood pressure readings was informed by the body of research establishing the relationship between workplace stress and blood pressure. According to Krantz and Falconer (1995), the involvement of the cardiovascular system in processes such as emotion and arousal in combination with the increasing attention devoted to the effects of acute and chronic stress in the development of cardiovascular disorders, it is not surprising that cardiovascular variables are important and widely used measurement tools employed in stress research. For example, in a

study by Vrijkotte, van Doornen, and de Geus (2000) that investigated the relationship between work stress and cardiovascular disease, chronic work stress was defined as "high imbalance," or a combination of high effort and low reward at work. Their results showed that high imbalance was associated with a higher systolic blood pressure at work and during leisure time. Another study found that workplace stress management interventions can produce clinically significant reductions in blood pressure (McCraty, Atkinson, & Tomasino, 2003). Subjects participating in a 16-hour stress-reduction intervention exhibited a reduction in systolic and diastolic blood pressure that was significant in relation to the control group three months post-intervention. The literature also extends to research involving healthcare workers. O'Conner, O'Conner, White, and Bundred (2000) found that general practitioners experiencing high occupational stress exhibited elevated systolic and diastolic blood pressure compared to their low-stress counterparts. In addition to being an appropriate measure, blood pressure is also a time-efficient, non-invasive measure of cardiac function, which are important considerations when conducting research with busy nurses. For these reasons, blood pressure was chosen for this study as a biological measure of stress.

The graduate nurse was asked to measure and record her own blood pressure at three points during each shift that she worked for the duration of the data collection period. The first reading was taken ten minutes prior to the start of the shift, the second reading was taken mid-shift during the lunch break, and the third reading was taken at the end of the shift. According to Kranz and Falconer (1995), factors such as weight, health status, consumption of salt, and exposure to exercise can all influence blood pressure levels. Because of this, a single blood pressure measurement can be highly unreliable and multiple measures of blood pressure should be taken. Therefore, at each recording, the nurse was asked to take two consecutive readings, for a total of

six readings per day. These six readings were averaged to produce a single reading for each day that is more reliable than a single reading taken at one point in time. The graduate nurse recorded the blood pressure readings on a data sheet provided by the researcher (see Appendix I). The sheet also provided space for the graduate nurse to comment briefly on the stress level she was experiencing as a supplement to each reading.

Blood pressure readings were obtained from a single designated machine located on 6N in a quiet, infrequently used office adjacent to the nursing station. To ensure that the machine was used only for the study, it was clearly labeled "not for clinical use." To maintain consistency, the graduate nurse was fitted with an appropriately-sized blood pressure cuff that was used throughout the duration of the study.

2.6.4 Competency Evaluations

The purpose of tracking the graduate nurse's competency over the course of the orientation period was two-fold. Using the research questions as a guide, we sought to determine whether or not there was a relationship between competency levels and: 1) communication patterns and opportunities for informal learning, and 2) stress levels. If relationships did in fact exist, the question of whether or not the relationships change over time was also explored.

An evaluation procedure that tracked graduate nurses' progress existed as a component of the formal orientation program. Graduate nurses are assigned a personal yellow binder that contains orientation materials including evaluation sheets. For each week of orientation, a sheet exists describing the procedures and skills that the nurse should be familiar with up to that point in the orientation. At the end of each week, the graduate nurse and her Orientor meet to review the sheet and discuss the

graduate nurse's strengths and accomplishments for the week as well as her weakness and areas that need improvement.

In order to better address the research questions and to create a quantifiable method of evaluating competency for this study, an additional evaluation tool was created and added to the yellow binder (see Appendix J). The new tool consists of 15 categories (two of which have sub-categories) of skills that graduate nurses should develop throughout the course of orientation, ranging from clinical procedures to time management and critical thinking. The skill set represented was the result of extensive input from CNS and nurse managers who provided information on the core set of skills that are most important for the success of a graduate nurse.

For each of the 15 categories and five sub-categories, the Orientor rated the graduate nurse's skill level relative to where she should be by the end of the 12-week orientation. The skills were rated on a 10-point Likert scale with choices ranging from novice (1) to expert (10). The decision to use this scale was based on Patricia Benner's work (1984) on the process of gaining competency from novice to expert for a practitioner of nursing. Definitions of both "novice" and "expert" for each of the 15 categories and five sub-categories were developed by the CNS and shared with the Orientor to ensure a common interpretation by all (see appendix K). The Orientor completed this additional evaluation of the graduate nurse at the end of each week along with the existing evaluations in the yellow orientation binder.

2.6.5 Focused Interviews

The purpose of conducting focused interviews was to gain a deeper understanding of nurse interaction and communication patterns, stress, and how and why different locations on the nursing unit are used (or not) for informal learning and communication. Focused interviews are a valuable resource for uncovering

information that otherwise wouldn't have been gathered from the other four methods of data collection. Five interviews were conducted with four different staff members on various occasions throughout the study. Interview guides were developed to focus the discussion, however probes were used and new questions added depending on the course of the interview (See appendix L). Consent was received from all to audio-record the interviews. This allowed the researcher to focus on what the nurse was saying rather than try to transcribe the entire discussion.

The first interview was with the graduate nurse regarding her history as a nurses' aide on 6N prior to her role as an RN. We believed the graduate nurse's familiarity with the unit was a unique situation that could affect her orientation experience in a different way than someone who has never seen the unit before.

The second interview was with the unit's nurse manager. Here the goal was to understand the organizational policies, norms, procedures, hierarchies and staffing patterns that affect the daily operations of the unit. In addition we sought to uncover any unique challenges faced by staff on 6N.

The third interview was with a nurse practitioner who worked on four different units at the hospital, including 6N. This interview was valuable in that the interviewee was able to provide a unique comparative assessment of the unit, commenting on how 6N differs from and is similar to other units.

The fourth and fifth interviews were with the Orientor and graduate nurse, respectively. In both cases, the goal was to dig deeper into their perceptions of the impact that the unit's physical layout has on opportunities for informal learning and communication and stress. Additionally, more specific information on the graduate nurse orientation process and experience was sought. These interviews were the most comprehensive and in-depth of them all.

2.8 Data Analysis

Focused interview responses were used primarily to provide a deeper understanding of findings from the other forms of data collection. The researcher listened to the audio recordings of the interviews and noted additional information that was not evident in other data. The CWM tool, blood pressure, survey responses, and competency evaluations were all analyzed using descriptive statistics.

The CWM tool data was analyzed by frequency of 1) type of interaction, 2) location of interaction, and 3) with whom the graduate nurse interacted. Average frequency per eight-hour shift for each was estimated by calculating frequency per hour and then extrapolating to an 8-hour frequency. The frequency data was also cross-tabulated to determine task by location, task by person, and location by person. Cross-tabs were performed to provide greater insight into how the variables inter-relate. For each of the three variables of task, location, and person, this data was also analyzed by time: 1) sum of time spent interacting over the data collection period, 2) mean time per interaction, 3) mean time spent interacting during an eight-hour shift, and 4) change over the data collection period.

The AM, noon, and PM blood pressure recordings were averaged to give a single mean blood pressure reading per day. The daily averages were then combined by week to produce a mean blood pressure reading per week. Finally, the weekly blood pressure readings were compared over the data collection period to find out if there was a pattern in change over time.

Parts I and II of the survey were analyzed similarly. Part I, which measured stress, was scored on a four-point scale with a "never" response coded as a '1' and a "very frequently" response coded as a '5.' Part II, which measured opportunities for informal learning and unit culture, was scored on a seven-point Likert scale with a "Strongly Disagree" coded as a '1' and a "Strong Agree" coded as a '7.' There were

two statements that were reverse coded so that a '7' meant "Strongly Disagree" and a '1' meant "Strongly Agree. These statements were: "My training didn't cover the basics I need to know" and "There is little encouragement to learn new skills." The GN survey responses were analyzed separately from the unit staff survey responses to provide mean ratings for each of the three constructs measured (stress, opportunities for informal learning, and unit culture). In addition, the T_1 and T_2 GN responses were analyzed separately to gauge whether or not there was a change over the course of the orienting period.

The competency evaluations were analyzed to provide an overall mean competency rating for each week by averaging the weekly ratings from all 18 categories. This data was used to determine how overall competency changed over the course of the orienting period.

CHAPTER 3

RESULTS

3.1 Organizational Ecology of the Nursing Unit

Field observation, focused interviews with staff members, and survey results were analyzed to obtain an understanding of the organizational ecology of 6N. The system was analyzed from three perspectives: Physical layout, Information Management & Technology, and Organization & Unit Culture.

3.1.1 Physical Layout

The physical layout of the nursing unit can be described as a traditional centralized design where patient rooms are wrapped around a central core service area (Figure 3). Three large, rectangular desks, represented by Desk B1, are situated at the entry to the unit and are equipped with computers and telephones (Figures 4 and 5). These desks are primarily used by doctors for charting and making phone calls. Nurses and allied health staff also sit here to document. Behind these desks is a large island work surface at standing-height where nurses stand to do charting, represented by A1 (Figure 6). This is also a common place for nurses to gather for "report," otherwise known as handoff which occurs at the end of one shift and the beginning of another. The patient charts are located at this island on a large, tall rotating chart carousel. At the back of the unit is Desk B2 which is home to the charge nurse and the unit receptionist – two staff members who must work closely together (Figure 7). Since the unit takes on overflow patients from cardiology, Desk C has been designated the telemetry station where a staff member sits and monitors patients' heart activity on computer screens (Figure 8).

The nurse's station is flanked on both sides by enclosed rooms. The nurse

manager and care coordinator have offices on the east side of the unit. On the west

side is an unassigned general office as well as the medication (med) room (Figure 9).

A corridor separates the nurse's station core from the utility rooms, kitchen,

and staff locker room where nurses store their personal belongings (Figure 10). Note

that the staff break room does not appear on the plan because it is located off the unit.

Instead the small break room is situated just off the elevator lobby which is down the

hallway halfway to the nursing unit at the south end of the hospital wing (Figures 11

& 12). The small size of the room accommodates only 2-3 nurses at a time and easily

feels overcrowded. Its size and location make for an unfrequented break room.

During the data collection period, 6N experienced a change in management

that had a significant impact on both the physical layout of space as well as the

staffing and organization of the unit. In early February, the unit's nurse manager

(NM) left, and the NM from 4S (the oncology/gynecology unit at Crouse) was hired

on 6N for a three month interim position. In order to better understand the unit that

she was to manage, the new NM initially spent time observing 6N and concluded that

there was much room for improvement. She addressed many challenges that she

believed stood in the way of the smooth, efficient functioning of the unit. This section

will address the physical changes to the unit; the organizational impact that resulted

from the change in management will be discussed later in the chapter.

The most significant physical change made by the new NM was the location of

the charge nurse (CN) and unit receptionist (UR). Before the change, the CN and UR

sat at the "back" of the nurse's station at Desk B2 (Figure 13). This was a problem

because as a visitor entered the unit and needed information about the location or status of a patient, the first encounter they had was with staff at the three large rectangular desks in the front of the unit (Desks B1). Recall that the people at these desks, often physicians and members of allied health, would not readily have this information available. Consequently, physicians were interrupted during documentation to redirect visitors to the back of the unit to speak with the charge nurse. Nurses' work flow was also frequently disrupted for the same reason. The initial observations made by the NM revealed that the CN and UR should be repositioned to the front of the unit at Desk B1 to better serve visitors (Figure 14). As a result of this change, doctors began to unofficially claim the now quieter Desk B2 as their location for documentation tasks, which led to fewer interruptions and distractions. It is important to note that this change occurred over time between mid and late February, and thus the locations of "charge nurse" and "nurses station" became somewhat blurred for a time. Consequently, the information collected by the CWM tool concerning these two locations after the change may be inaccurate to some extent.

The second physical change made by the new NM was the relocation of the patient charts. Before the change, the charts sat in a large, tall rotating chart carousel on Desk A1. This carousel was large enough that it reduced visibility across the unit. Recognizing seemingly minor design factor as a significant obstacle to communication and sense of cohesion, the NM moved the charts out of the major lines of sight to location A2 on a wall-mounted organizer (Figure 15). One nurse described the increased visibility that resulted:

"It didn't seem like a big deal when they (the charts) were there, but as soon as they were gone, it seemed less cluttered. It seemed like

you could see everybody on your unit and if you needed somebody,

you could just see them - they were there. You didn't have to search

for them."

In focused interviews, nurses reported on how the physical layout and visibility across the unit influenced the feeling of teamwork among staff. One nurse noted that when the charts were moved from Desk A1 to location A2, the increased visibility that resulted helped to create an increased feeling of teamwork and unity because "you can see people and feel like they're more accessible." In contrast, another nurse noted that sometimes teamwork suffered because the unit is a "box shape" and "whoever you're next to is who you usually go to for help." There were solid walls on the east and west sides of the nursing unit which limited visibility (Figure 16). Consequently, depending on where a nurse's patients are on any given shift, there wasn't much of a connection between staff on the different sides because of this physical barrier.
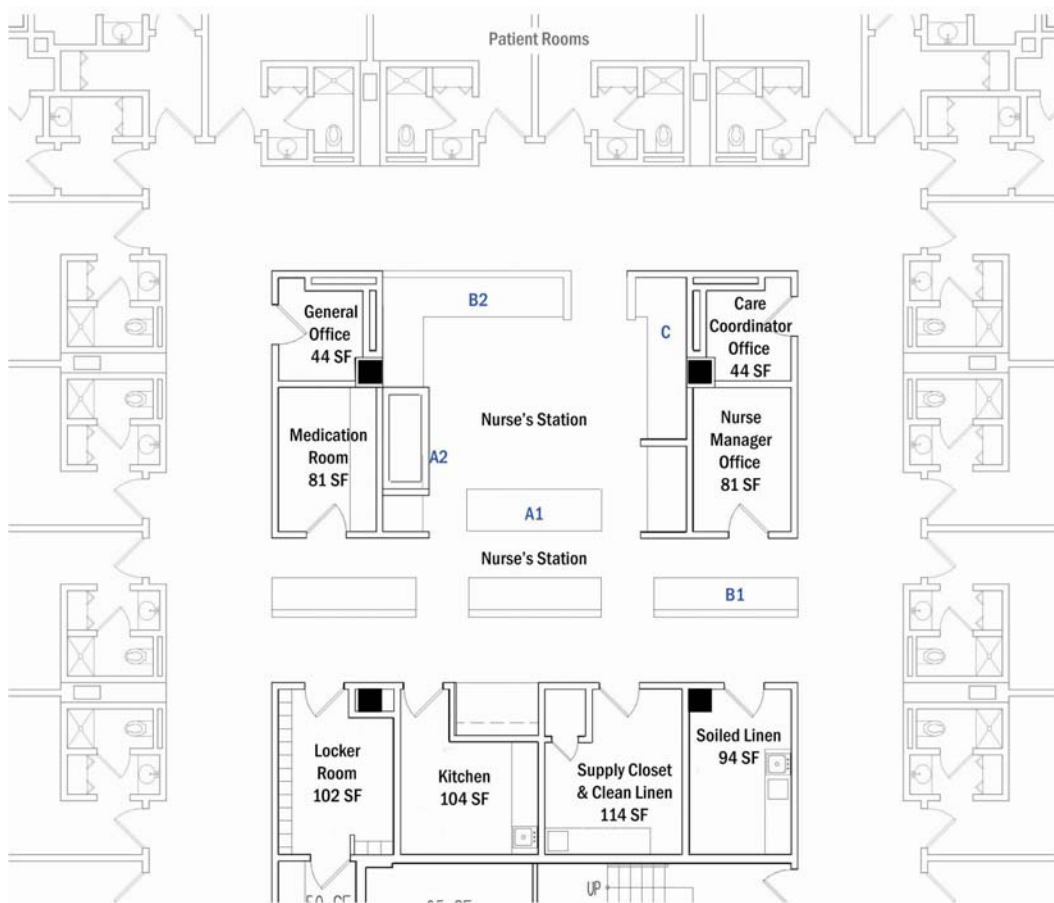
Figure 3 6N Floor Plan

Figure 4 View of Desk B1 upon entry to the unit

Figure 5 View of work surface from behind Desk B1

Figure 6 View of island work surface from in front of Desk B2

Figure 7 Charge Nurse and Unit Receptionist at Desk B2

Figure 8 Telemetry workstation at Desk C

Entrance to med room

Figure 9 View of med room location from in front of Desk B1
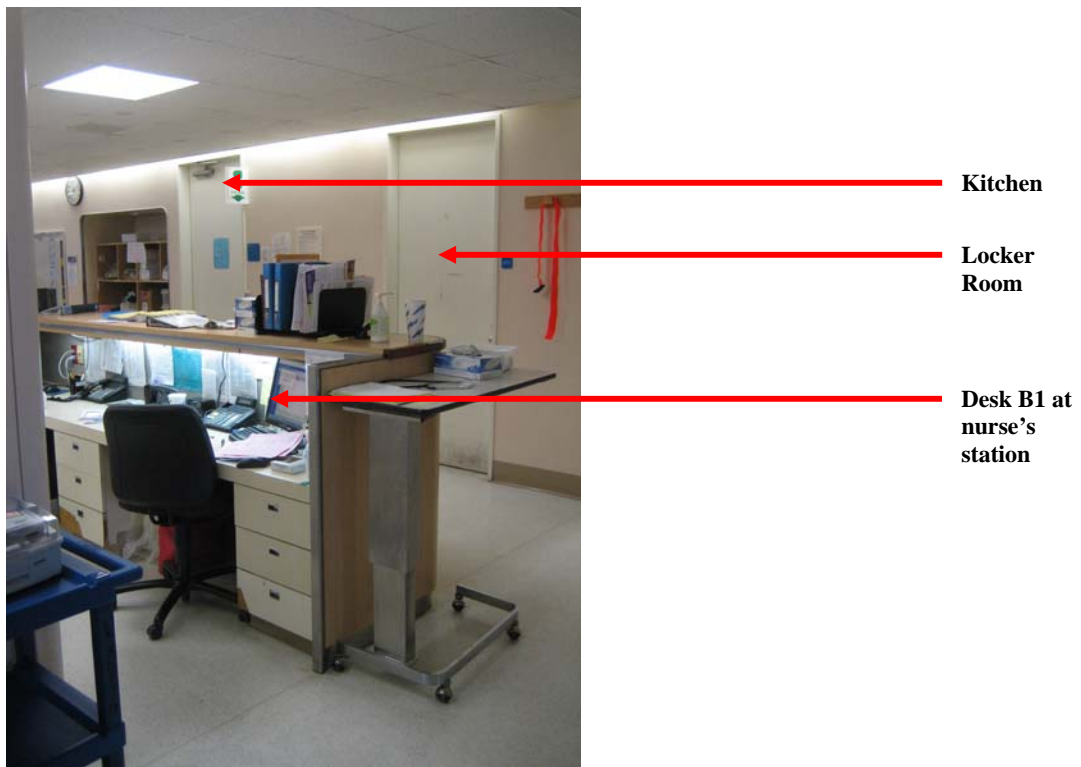
Figure 10 View of corridor separating nurses' station from support spaces from behind Desk B1

Figure 11 Sitting area in small break room

Figure 12 View out of break room to elevator lobby
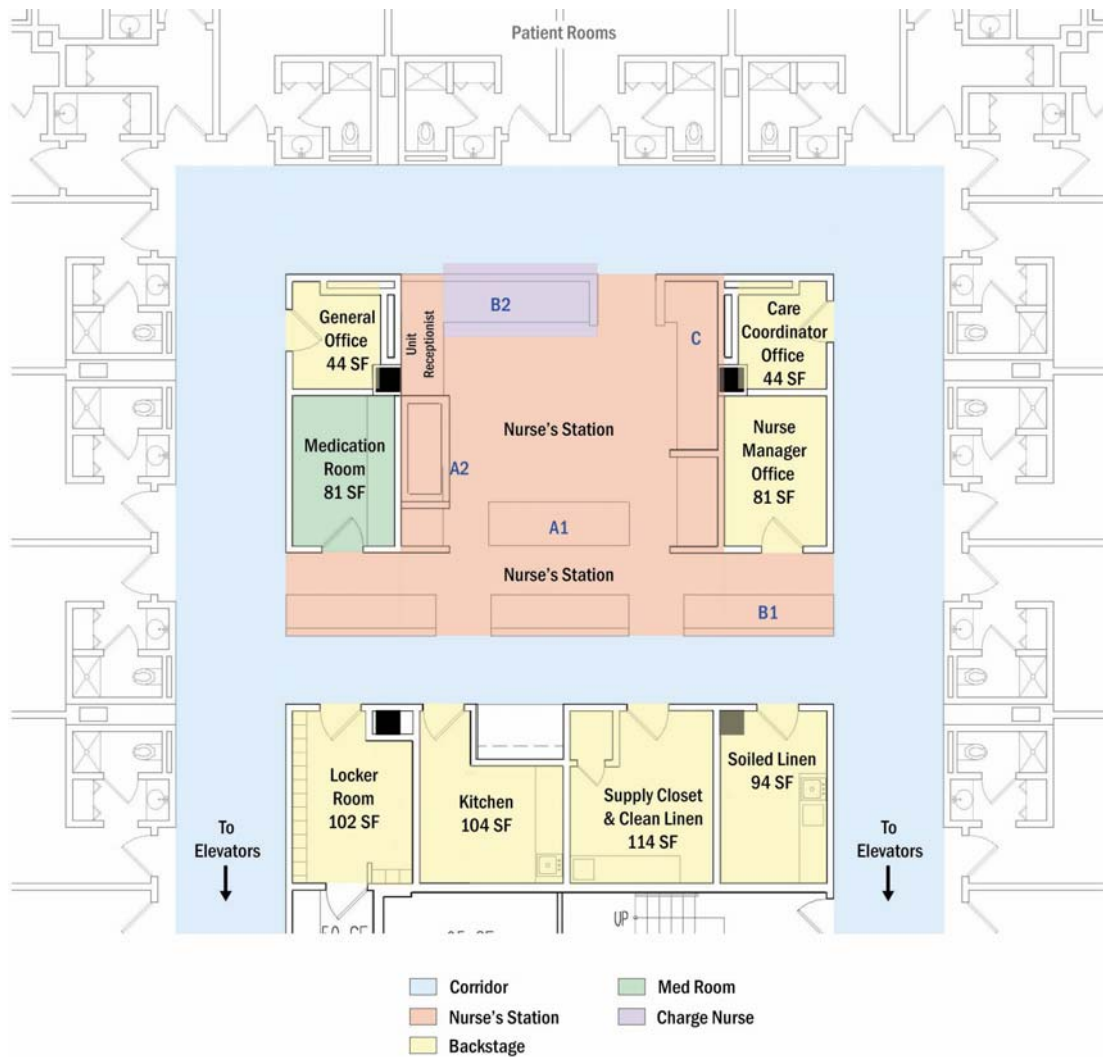
Figure 13 Existing layout prior to arrival of new nurse manager
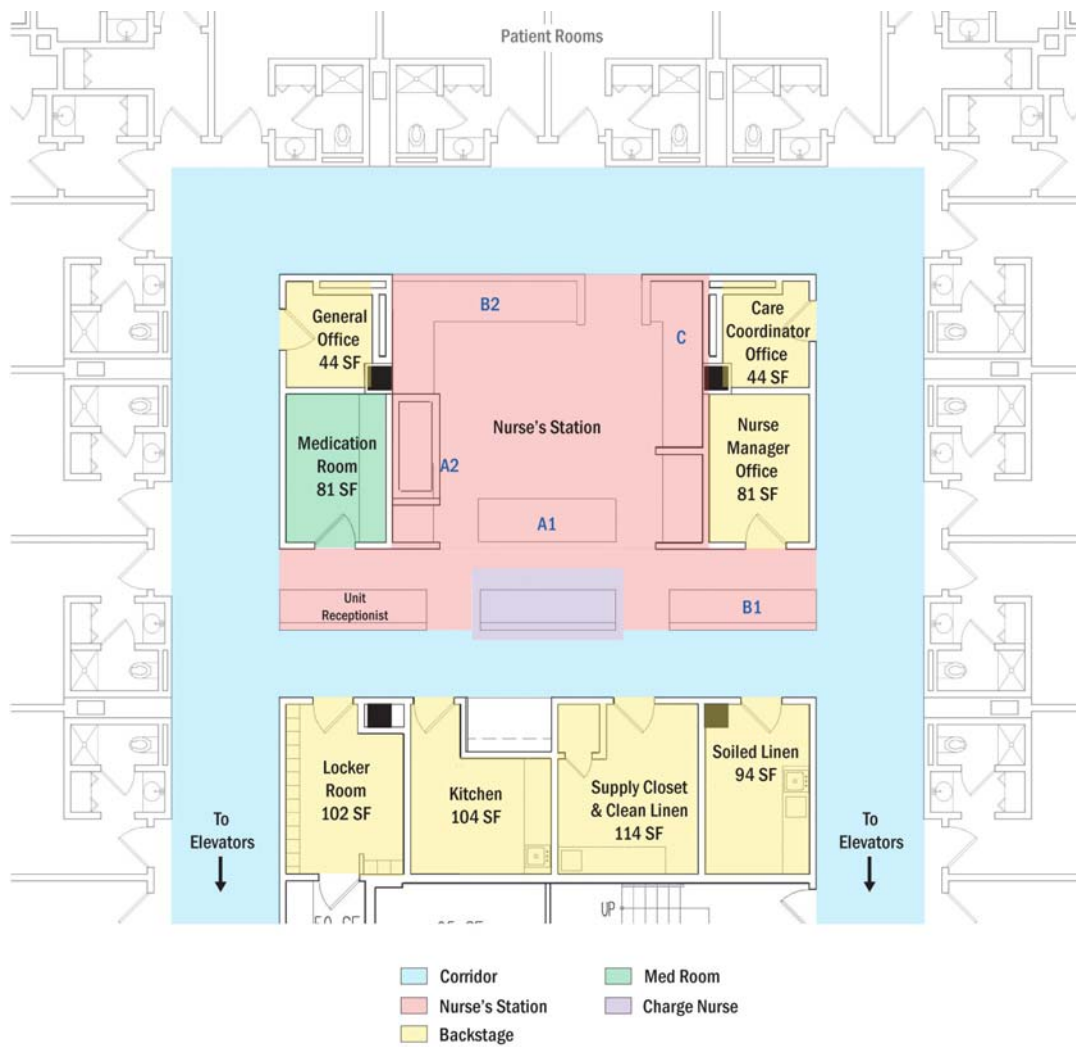
Figure 14 New layout showing changes made by new nurse manager

Figure 15 Wall-mounted chart organizer at location A2
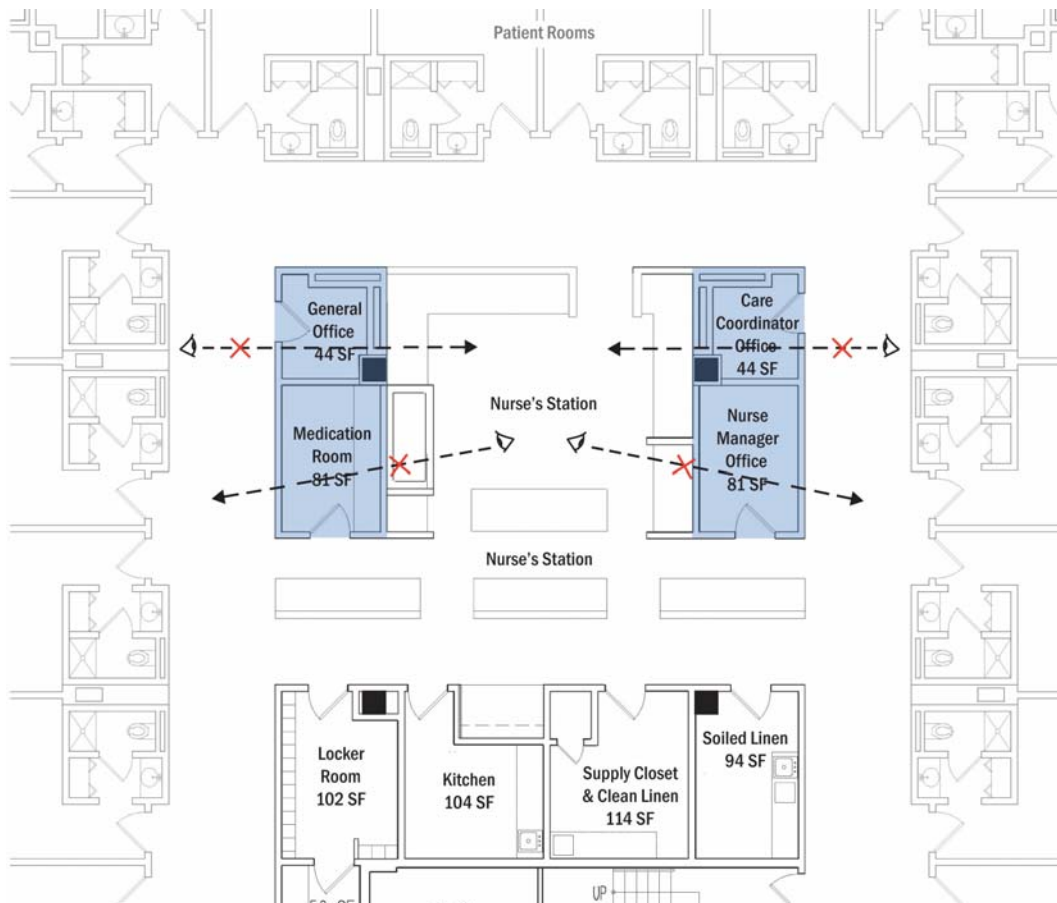
Figure 16 Floor plan showing obstructed sightlines and limited visibility across the unit

3.1.2 Information Management and Technology

1. Patient records and assignments

Paper medical records are used by both doctors and nurses. The nursing charts are kept on the wall just outside the patient room, easily accessible to nurses for logging progress notes as they exit. This documentation includes shift-to-shift vitals and other information like the number of times the patient got up to walk around, pain level, etc. Doctor's charts are kept in large blue binders located at the nurse's station (originally at Desk A2 and later moved to location A2). These blue binders include the patients' main charts, lab results, test results, doctor's notes and orders, etc.

When asked about the effectiveness of these charts in coordinating the flow of patient information, one nurse expressed concern that having two charts located in different places is not very efficient and results in fragmented information. The challenge is compounded by the fact that both medication records and a rolodex with patient information are located in totally different places on the unit. However, the unit has plans to convert to electronic record keeping, which will hopefully reduce the fragmentation of information and improve flow. On the other hand, observations and field notes revealed, as discussed below, that the charge nurse desk was often a hub of activity because charts were located in front of her. When the hospital converts to electronic records, it would be interesting to see if interactions at the charge nurse desk decreased.

The nurses' patient assignments for each shift are recorded on a paper chart that is kept at the charge nurse desk. Patient nurse, nursing assistant, doctor, and room assignments are displayed on a large white board on the wall between the kitchen and the supply closet.

2. Hill-Rom Nurse Communication System

This system incorporates locating technology and room-to-room communication. Use of wearable locator badges allows nurses to locate one another either from the home screen (located at the nurse's station) or from each patient room. Wall –mounted call buttons in patient rooms and at the nurse's station allow nurses to verbally communicate from room to room and from room to nurse's station.

Focused interview revealed that nurses view this technology as potentially valuable, yet the system is infrequently used. Nurses attribute the low use to a lack of sufficient training when the system was implemented. One nurse also hypothesized that the older, more experienced nurses may be reluctant to use the new technology. They concluded that more staff need to use the system in order for it to be an effective communication tool.

3. Patient Status Light System

This system consists of three colored light fixtures located outside of each patient room. In double-bed rooms, a red light corresponds to the patient closest to the door; a white light corresponds to the patient next to the window.

- Red or white light: activated by the patient if he/she needs assistance
- Blinking red or white light: activated when a patient has tried to get out of bed (bed-exit alarm)
- Blinking red *and* white light: activated by a patient in the bathroom
- Green light: activated when a nurse wearing a locator badge enters the room

4. Medications

Located in the medication room, the Pyxis MedStation is a large computerized station compartmentalized with many drawers containing medications. It uses automated medication management technology to facilitate communication between

nurses and pharmacists and dispenses patient medication. When it's time to administer meds to the patient, the nurse must input his or her code, and the machine will allow access to one of the many drawers containing the correct medication for that patient.

Narcotics are not located in the Pyxis machine. Instead they are kept in a locked cabinet in the medication room. Nurses do not have their own key to this cabinet, and observation revealed that when a patient needed a narcotic, nurses often had to search for the one nurse who had the key at that time.

3.1.3 Organization and Unit Culture

6N is a "medicine" unit which means that, as one nurse described, "We get a little bit of everything. Pneumonia, cardiac problems..." While the unit experiences a wide patient age range, the average age of patients on the unit is around 70, and they often get a lot of confused, elderly people who sometimes yell at and hit the nurses. Most of the patients on 6N also have a high physical need, meaning that many are bed-ridden patients who need assistance getting up and being mobile. Most patients require total care, and many body systems are failing at once. The unit experiences a consistent high average census of 33 patients 7 days per week. The Goal is a RN to patient ratio of 1:5, however this goal is rarely met and is realistically often 1:7.

During observation, the researcher could not help but notice the noisy, chaotic nature of the unit when compared to other units in the hospital. One cause for this type of atmosphere is that the range of diagnoses that the unit sees is so broad and the patients have such a wide variety of healthcare needs that the unit requires more and more varied types of staff (different types of doctors and allied health). These higher staff numbers produce a much noisier environment that creates an overall feeling of chaos on the unit. One nurse reported that the high noise level creates an environment

that is not conducive to focusing and concentrating on documentation tasks. When the noise level is especially high, she often resorted to going off the unit and down the hall to the benches outside of the elevator lobby where it was quieter and she could focus on documentation.   The higher number of different types of doctors also presented a challenge for nurses who had to learn to adjust to the varied doctors' work styles and personalities.

As previously mentioned, the change in NM brought organizational changes to the unit as well as physical changes. As reported in all of the focused interviews, the most significant and positive impact that the new NM had was her change of the staffing matrix. The staffing matrix is a guide to help determine the number of RNs, nursing assistants (NAs), and LPNs there should be on each shift, depending on patient census. When she arrived there was only one NA assigned to each shift. Each nurse interviewed reported the lack of NAs as a considerable problem with numerous negative consequences. The role of NAs is to provide routine care so that the RNs can provide the care that only they are licensed to perform, such as formulating care plans and administering medications. The NA is often responsible for the activities of daily living, which include bathing and feeding patients. When there are not enough NAs to perform these duties, the pressure is placed on the RNs to complete their tasks as well as the tasks of the NA. With too few NAs the resulting workload leaves nurses no time to emotionally connect with the patients as well as being physically exhausted, which was a concern for the nurses. One nurse described the staffing conditions prior to the changes made by the new NM:

"Before our staffing was so bad, you wouldn't even want to come

to work because you knew you would be having 7 patients and you

wouldn't have any help and it was awful."

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Because patients on 6N have a particularly high physical need, the new NM saw a need for more assistive staff than licensed staff. Accordingly she changed the staffing matrix to 4 NAs on the day shift, 4 on the evening shift, and 2 on the night shift. However, the benefits of this change in staffing were not realized until after the completion of data collection because the hospital needed to hire employees to satisfy the new matrix, and this process that took months to complete.

6N is known hospital-wide as being a noisy, chaotic unit, and this impacts both staff turnover as well as graduate nurse (GN) recruitment. The turnover on this unit is the highest among the medicine units in the hospital. Poor staffing as well as having an inappropriate mix of staff were cited by nurses as two causes for low employee satisfaction. It has been difficult to recruit nursing school graduates to 6N because they are leery of the high turnover reputation. One nurse hypothesized about the reason that GNs don't want to work on the unit:

"A lot of people don't want to do this because you could be on a

floor where you're not running all the time."

The RNs' (n=8) responses to the culture section of the survey indicated a generally positive perception of their working environment (Figure 17; see Appendix E for complete survey). The inter-item reliability of the culture section was calculated after the survey had been administered and found to be acceptable (n= 22; $\alpha = .91$). The mean rating for all questions was 5.0 ($\sigma=1.4$) (on a 1-7 scale, where 7=strongly agree); four questions had a mean rating below 5. Of those four, the two questions with the lowest mean ratings were "Nurses on my unit who learn new skills are rewarded" and "Doctors show respect for nurses on my unit," with mean ratings of 3.38 (($\sigma=1.4$) and 4.25 ($\sigma=1.2$) respectively. Responses to four of the five questions with the highest mean ratings indicate a culture that embraces learning and

the sharing of information. These four questions were: "I feel well-informed about the current activities on my unit" (X^2=5.63; σ=1.19), "Nurses on my unit share knowledge and expertise with one other" (X^2=5.50; σ=1.20), "Nurses on my unit often share their learning experiences" (X^2=5.38; σ=1.06), and "There is encouragement to learn new skills" (X^2=5.38; σ=1.92). The question with the highest mean rating, "Nurses on my unit are friendly and outgoing" (X^2=6.00; σ=.93), conflicts with a statement made by a nurse in a focused interview indicating that many GNs express hesitation to work on 6N because of a reputation of poor relationships among nursing staff.

A sentiment about the culture of 6N not reflected in the survey but revealed in focused interviews was that it's a very tense atmosphere due to the fast-paced nature of the unit. One nurse elaborated:

"It's very tense up here. It's not easy to go with the flow.
Doctors and nurse practitioners expect so much from you. I think
it (the culture) makes you more likely to ask for information
because it's so chaotic you don't want to make a mistake."

This quote may help to explain why the survey results indicated a culture highly supportive of learning and sharing knowledge and expertise. Since the unit is so busy and chaotic, presumably producing many opportunities to make a mistake, the nurses guarded themselves from error by frequently asking questions and sharing information to ensure that they're doing the right thing.
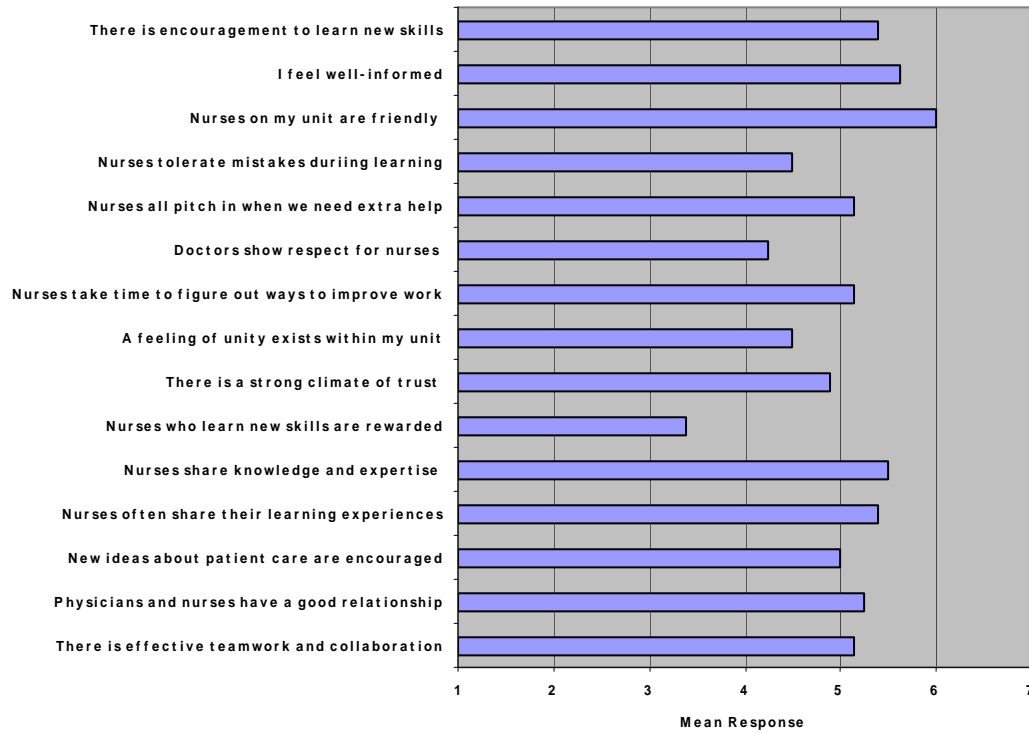
Figure 17 Mean RN responses to culture section of survey (1-7 scale; 7=strongly agree)

3.2 Graduate Nurse's Familiarity with 6N

A focused interview revealed that the GN had worked on the unit as a nursing assistant for a year and a half prior to being hired after graduating from nursing school. This experience meant that the GN began orientation being very familiar with the staff, procedures, and culture of 6N. However, while there was certainly an advantage to this familiarity, there was also a down side to having previously worked on the unit as a nursing assistant. When she entered the unit in the new role of registered nurse, some of the staff assumed that she already knew everything because she had worked on the unit before. This was difficult for her because the responsibilities of RNs are much different than the responsibilities of NAs. Consequently there was still a large knowledge gap that she had to bridge, and it seemed as though the staff sometimes overlooked this fact.

This difficulty may have been reflected in the GN's assessment of the unit in the culture section of the survey. The survey was administered at week 2 and week 8 of orientation to test if the GN's perception of the unit changed over time. The combined mean of T_1 and T_2 was somewhat lower at 4.50 than the staff mean of 5.0 (Figure 18). This lower score may be a reflection of the GN's difficult experience trying to fulfill the sometimes unrealistic expectations of staff who assumed she knew more than she actually did. Based on the T_1 and T_2 means, 4.27 and 4.73 respectively, it seemed as though her perception of the unit culture grew slightly more positive over time.
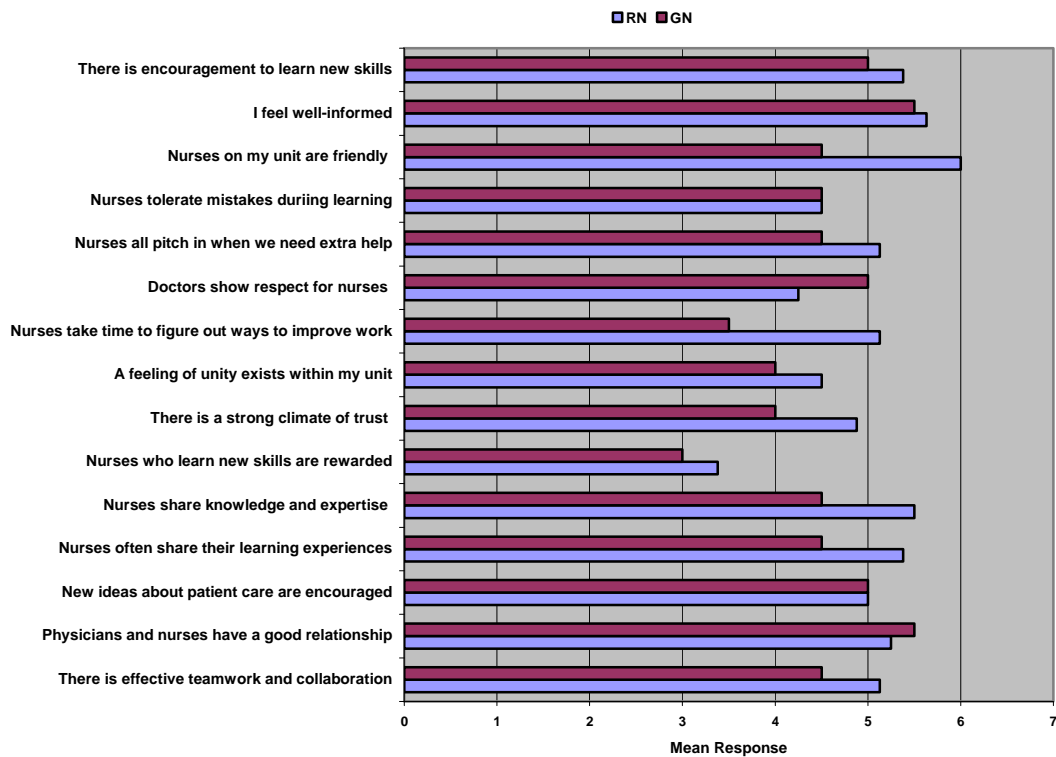
Figure 18 Mean RN and GN responses to culture section of survey (1-7 scale; 7=strongly agree)

3.3 Communication and Interaction Patterns

The communication and interaction patterns of the GN were analyzed from week 2 through week 9. Analysis began in week 2 because the first week of orientation was spent in the classroom, and therefore no data could be collected. A total of 1774 interactions over 25 hours were recorded. Data was collected on interruptions and multi-tasking. However, it was determined that this information was not directly relevant to the original research question – who the GN interacted with, about what, and where – so for the purposes of this thesis, this data was not analyzed. The data was analyzed by overall percent and frequency of interactions, estimated average frequency per 8-hour shift (by calculating frequency per hour and then

extrapolating to an 8-hour frequency), average time per interaction, and average time of each interaction during an 8-hour shift. The data was also analyzed by week to assess whether there was a change over time. Observation and responses from focused interviews were used to further make sense of the CWM tool data.

3.3.1 Analysis by Task

a) Frequency

Table 1 shows the percentage and frequency of each task over the entire eight weeks of data collection, and the average frequency during an 8-hour shift (see Appendix M for complete CWM tool category definitions). The "In Transit" category was used to record how frequently the GN walked between locations on the unit. As Table 1 shows, about one third of the GN tasks were "In Transit" (168 times on average during and 8-hour shift) which agrees with findings from previous research (Burgio et al., 1990). Note that "In Transit" was also the task with the highest frequency, followed by "Non Interactive," which accounted for about one fifth of the tasks and occurred 120 times on average during an 8-hour shift. Looking only within the communication categories (Figure 19), about one third of the GN communication was "Discussing Patient Care" (discussing patient status or care plan with staff or visitor) (30%), 27% was "Social," (non-work related or venting about work) and 11% was "providing advice" (providing advice or guidance when someone lacks skill or knowledge). Given that the subject is a graduate nurse, it might seem odd that within the top three most frequent interactions was "providing advice." However, it should be noted the staff the GN was advising were nursing assistants and nursing students, both of which have less training than the GN. During an average 8-hour shift, the GN discussed patient care 54 times, had 48 social interactions, and provided advice 21 times (Figure 20). The most infrequently performed communication tasks were

"Validation," at five times per 8-hour shift, and "Being Taught," at seven times per 8-hour shift.

Table 1 Overall percent & frequency of each task and average frequency per 8-hour shift

Task	Percent	Frequency	Frequency/8hr
Patient	10.1	180	55
Patient Interactive	8.3	148	47
Non-Interactive	20.9	370	120
In Transit	30.1	534	168
Communication	**Percent**	**Frequency**	**Frequency/8hr**
Social	8.2	146	48
Administrative	1.6	29	11
Being Taught	0.6	11	7
Seeking Assistance	2.4	42	16
Seeking Advice	2.3	40	15
Discussing Patient Care	9.1	162	54
Providing Assistance	2.1	37	14
Providing Advice	3.3	58	21
Validation	0.3	5	5
Other	0.7	12	7
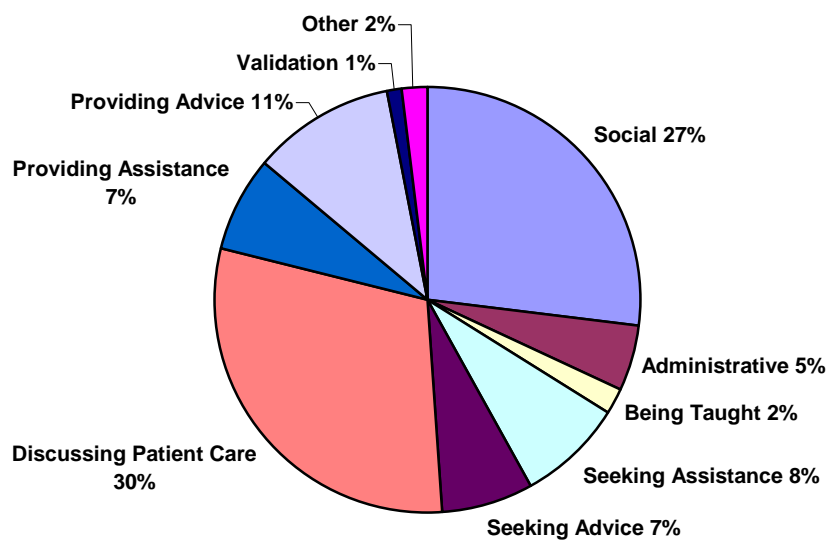
Figure 19 Overall frequency of communication tasks by type (excluding "In Transit")
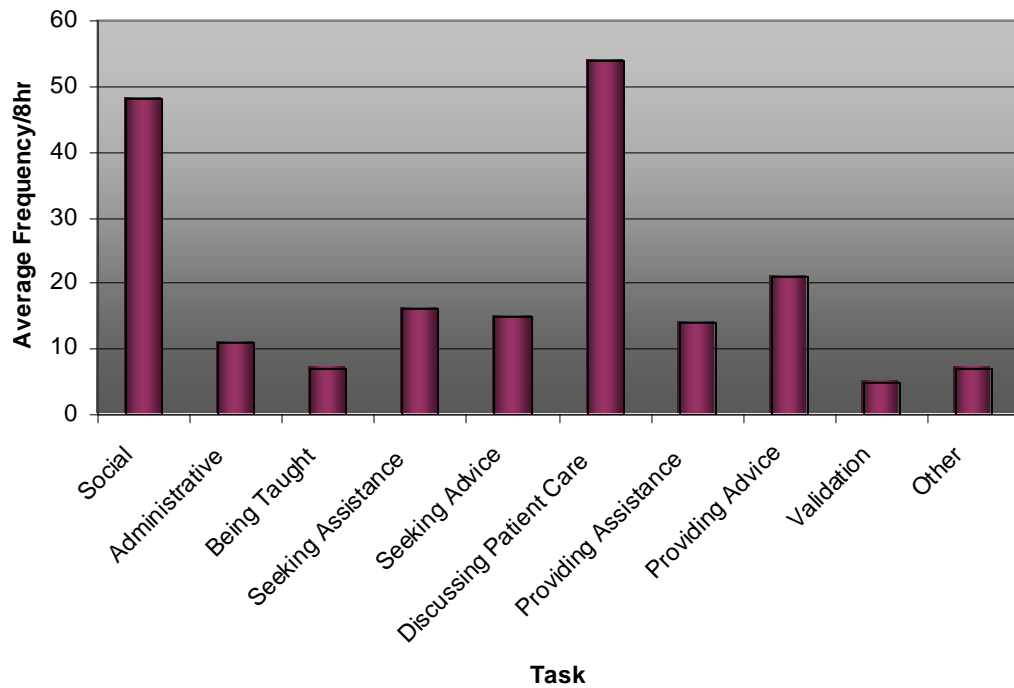
Figure 20 Average frequency per 8-hour shift of communication tasks

Table 2 shows the frequency of each task within each of the eight weeks, and it illustrates how the interaction patterns of the GN changed over time. The "In Transit" data was excluded from the frequency calculations to highlight changes over time in the communication categories. For most of the categories, the data does not show significant trends over time. Although the change in frequency from week to week varied between positive and negative in many instances, three categories showed significant differences between the week 2 and the week 9 values (Figure 21). "Social" decreased by 52%, "Discussing Patient Care" more then doubled, and "Patient Interactive" more then tripled.

Table 2 Frequency of tasks for each week of data collection

Task	Frequency (%) per Week							
	2	3	4	5	6	7	8	9
Patient	14.1%	10.1%	14.0%	10.6%	20.1%	16.0%	17.2%	13.4%
Patient Interactive	4.2%	17.6%	11.0%	5.6%	13.4%	13.2%	11.2%	18.3%
Non-Interactive	27.5%	31.8%	29.9%	33.1%	30.2%	32.0%	28.4%	24.6%
Social	16.2%	13.5%	12.8%	16.2%	9.4%	9.1%	10.4%	7.7%
Administrative	3.5%	0.7%	0.6%	1.4%	3.4%	4.6%	3.0%	0.7%
Being Taught	3.5%		1.2%	1.4%			1.5%	
Seeking Assistance	7.0%	2.0%	3.7%	1.4%	3.4%	3.7%	3.0%	2.8%
Seeking Advice	2.8%	5.4%	4.3%	5.6%	1.3%	1.8%	3.0%	2.1%
Discussing Patient Care	11.3%	10.8%	11.6%	12.7%	10.1%	10.0%	14.9%	25.4%
Providing Assistance	2.1%	3.4%	6.1%	6.3%	2.0%	0.5%	3.7%	0.7%
Providing Advice	7.7%	4.7%	4.3%	4.2%	4.0%	5.9%	2.2%	3.5%
Validation				0.7%	0.7%	1.4%		
Other			0.6%	0.7%	2.0%	1.8%	1.5%	0.7%
Total (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
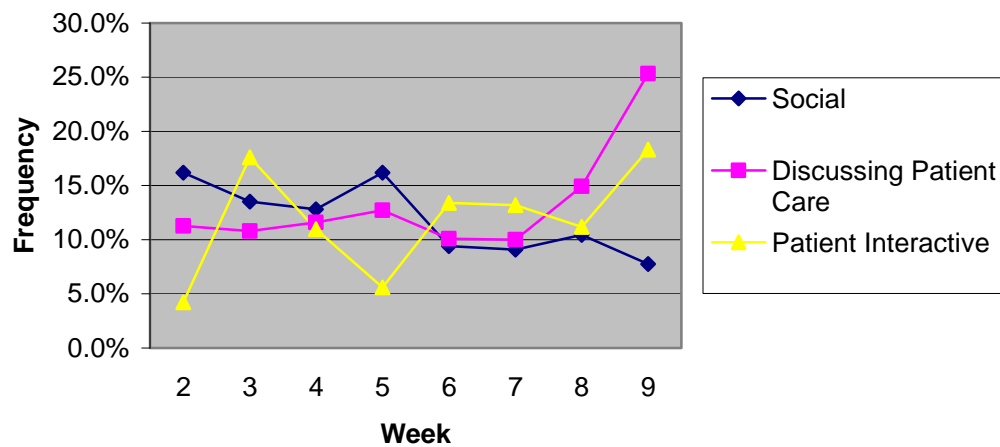
Figure 21 Frequency of communication tasks that show a pattern of change over time

b) Time

The percentage of total time (over 25 hours of data collection) spent on each task shows a very similar, though not identical, distribution as the frequency analysis. The highest percentage of time was spent in non-interactive tasks (25.9%) followed by "Patient" (24.6%), "In Transit" (12.1%), "Discussing Patient Care" (7.8%), and "Social" (6.5%) (See Table 3). Analysis by average time of a single interaction (Table

3) shows that all interactions were brief, with the longest of those taking place in the patient room, but lasting less than two minutes in duration. Of the communication tasks, "Being Taught" had the longest average time (1m 35s) followed by "Discussing Patient Care" and "Providing Assistance" (43s each), "Seeking Advice" and "Social" (39s each), and "Validation" (30s) (See Figure 22). Table 3 shows that, on average, over three hours are spent in the patient room in an 8-hour shift, and over two hours are spent in non-interactive tasks. Walking on the unit (the most frequently occurring task) accounted for nearly an hour of an 8-hour shift, yet each "In Transit" event averaged only 20s.

Table 3 Total time (over 25 hours of data collection), percentage of total time, average time per task, and average time per task per 8-hour shift

Task	Total Time	Percent	Avg. Time	Avg. Time/8hr
Patient	6:07:00	24.6%	2:02	1:58:12
Patient-Interactive	3:37:24	14.6%	1:28	1:10:01
Non-Interactive	6:25:35	25.9%	1:02	2:04:11
In Transit	2:59:48	12.1%	0:20	0:57:54
Social	1:37:01	6.5%	0:39	0:31:15
Administrative	0:11:43	0.8%	0:24	0:03:46
Being Taught	0:17:26	1.2%	1:35	0:05:37
Seeking Assistance	0:18:09	1.2%	0:25	0:05:51
Seeking Advice	0:26:03	1.7%	0:39	0:08:22
Discussing Patient Care	1:56:24	7.8%	0:43	0:37:29
Providing Assistance	0:26:59	1.8%	0:43	0:08:41
Providing Advice	0:19:31	1.3%	0:20	0:06:17
Validation	0:02:31	0.2%	0:30	0:00:49
Other	0:05:03	0.3%	0:25	0:01:38
Total	24:50:23	100.0%		
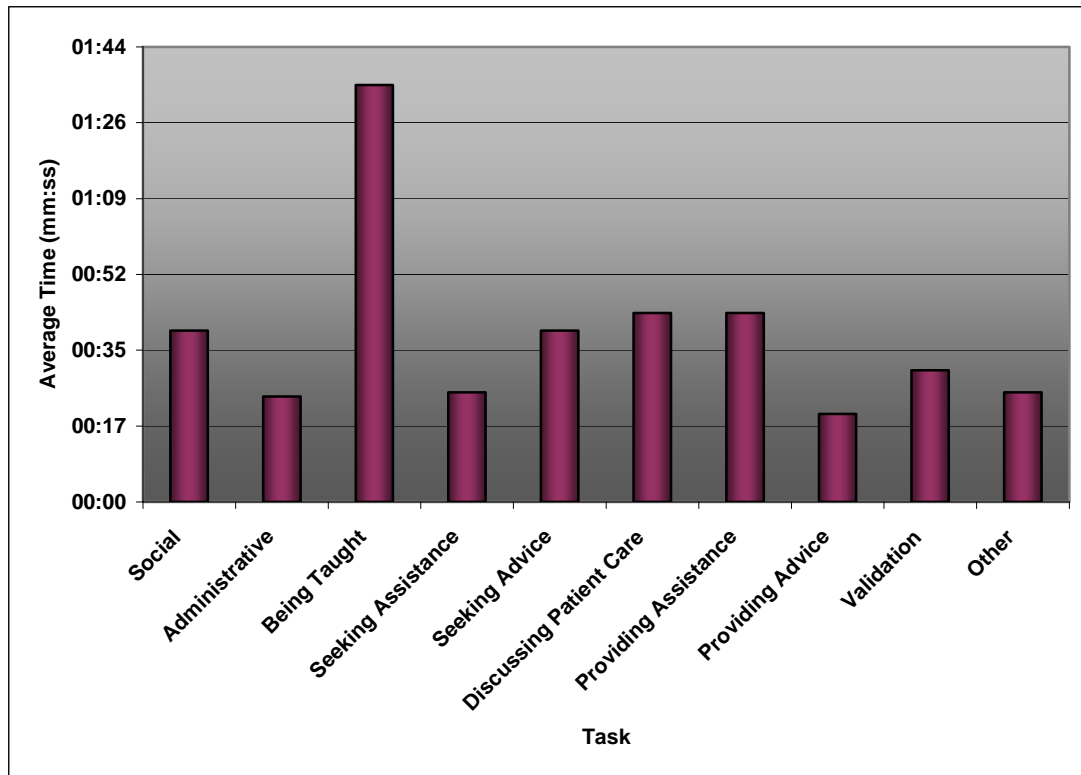
Figure 22 Average time of a single interaction for each communication task

3.3.2 Analysis by Person

a) Frequency

Table 4 shows the percent and frequency of who the GN interacted with over the entire eight weeks of data collection and the average frequency during an 8-hour shift. Note that there were two additional GNs on the unit during the data collection period. Over one third of activities were done alone, 20.4% of activities were done in the patient room, 14.7% of interactions were with a Nurse, and 13.9% were with the Orientor. During an average 8-hour shift, the GN interacted 107 times with a patient, 77 times with a Nurse, 72 times with the Orientor, and only 14 times with a Doctor (Figure 23).

Table 4 Overall percent & frequency of who the GN interacted with and average frequency per 8-hour shift

Person	Percent	Frequency	Frequency/8hr
Work Alone	35.2%	571	184
Patient	20.4%	332	107
Visitor	3.9%	64	21
Nurse	14.7%	238	77
Doctor	2.6%	42	14
Allied Health	7.2%	117	38
Orientor	13.9%	225	72
GN	2.2%	35	11
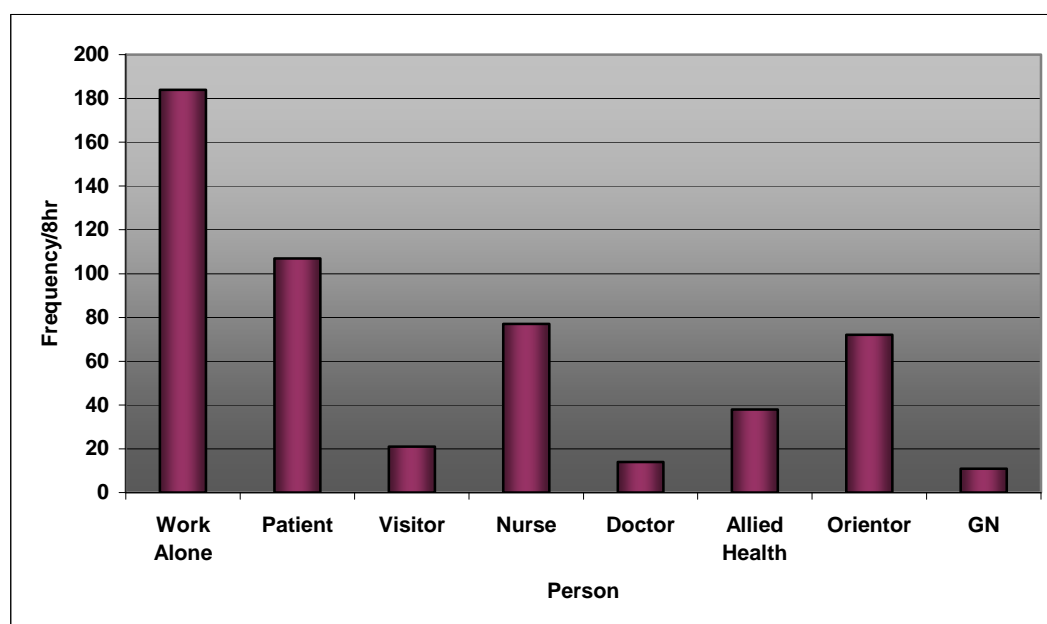
Figure 23 Average frequency per 8-hour shift of who the GN interacted with

Table 5 shows the frequency of who the GN interacted with in each of the eight weeks, and it illustrates how the interaction patterns of the GN changed over time. Similar to the task data, most patterns are not distinct. However, as Figure 24 illustrates, frequency of interaction with visitors and with the patient increased over

time, and the frequency of events when the GN worked alone decreased over time. Frequency of interactions with the Orientor were highly variable, and don't seem to correlate with any known event, such as changes in patient assignment.

Table 5 Weekly frequency of who the GN interacted with

	Week							
Person	2	3	4	5	6	7	8	9
Work Alone	37.1%	33.8%	35.5%	38.5%	36.3%	37.4%	34.8%	27.4%
Patient	15.3%	20.7%	19.4%	13.2%	24.9%	22.8%	20.7%	22.8%
Visitor	0.0%	4.5%	0.0%	1.7%	3.5%	7.6%	6.5%	5.6%
Nurse	28.2%	10.1%	15.2%	9.8%	5.0%	18.7%	13.0%	16.8%
Doctor	1.8%	4.0%	4.3%	0.6%	4.5%	1.7%	1.6%	2.0%
AH	3.5%	6.6%	4.3%	10.3%	13.9%	6.2%	8.7%	4.6%
Orientor	11.8%	15.7%	19.4%	23.0%	8.5%	4.8%	11.4%	20.8%
GN	2.4%	4.5%	0.9%	2.9%	3.5%	0.7%	3.3%	0.0%
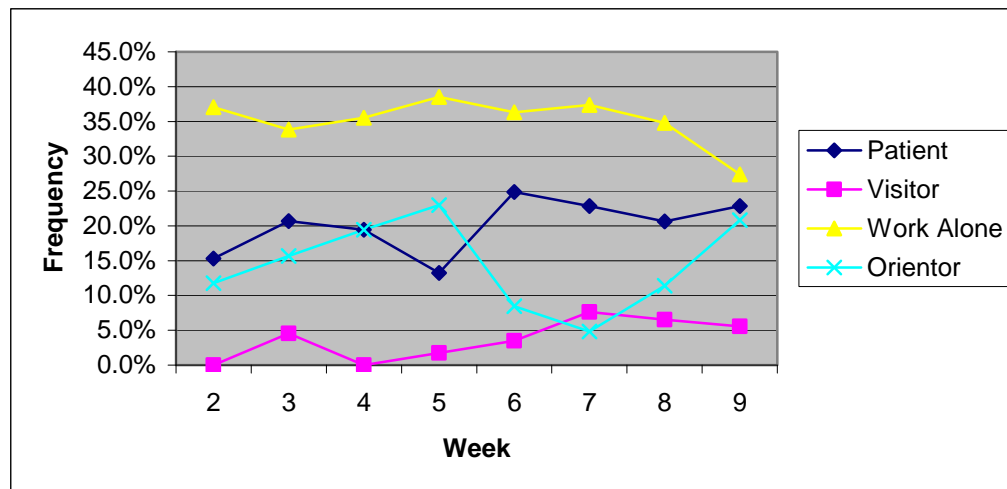
Figure 24 Weekly frequency of who the GN interacted with

b) Time

Table 6 shows the total and average time the GN spent interacting with each person over 25 hours of data collection. (Note: the total time used to determine the percentages was the time spent collecting data – 24:50:23 – minus the time spent "In

Transit" – 2:59:48. However, the individual times do not add up to 21:50:35 because there were occasions when the GN interacted with more than one person at a time).

The percentage of total time (over 25 hours of data collection) spent with each person shows a similar distribution as the frequency analysis. The one significant difference is that, when analyzed by time, 45% of the GN interactions were with the patient, compared to 20% when analyzed by frequency. This can be attributed to the fact that the average amount of time per interaction with the patient was approximately three times greater (1:46) than with staff (53s). During an average eight hour shift, approximately one and a third hours were spent with the Orientor, one hour was spent with nurses, and only eight minutes were spent with doctors (Figure 25).

Table 6 Total time (over 25 hours of data collection), percent of total time, average time, and average time per 8-hour shift the GN spent with each person

Person	Total Time	Percent	Avg. Time	Avg. Time/8hr
Work Alone	6:18:59	29%	0:01:01	2:18:47
Patient	9:44:23	45%	0:01:46	3:34:00
Visitor	1:22:11	6%	0:01:17	0:30:06
Nurses	2:50:20	13%	0:00:42	1:02:22
Doctor	0:23:24	2%	0:00:33	0:08:34
AH	1:50:13	8%	0:00:56	0:40:22
Orientor	3:47:36	17%	0:01:00	1:23:21
GN	0:21:14	2%	0:00:36	0:07:47
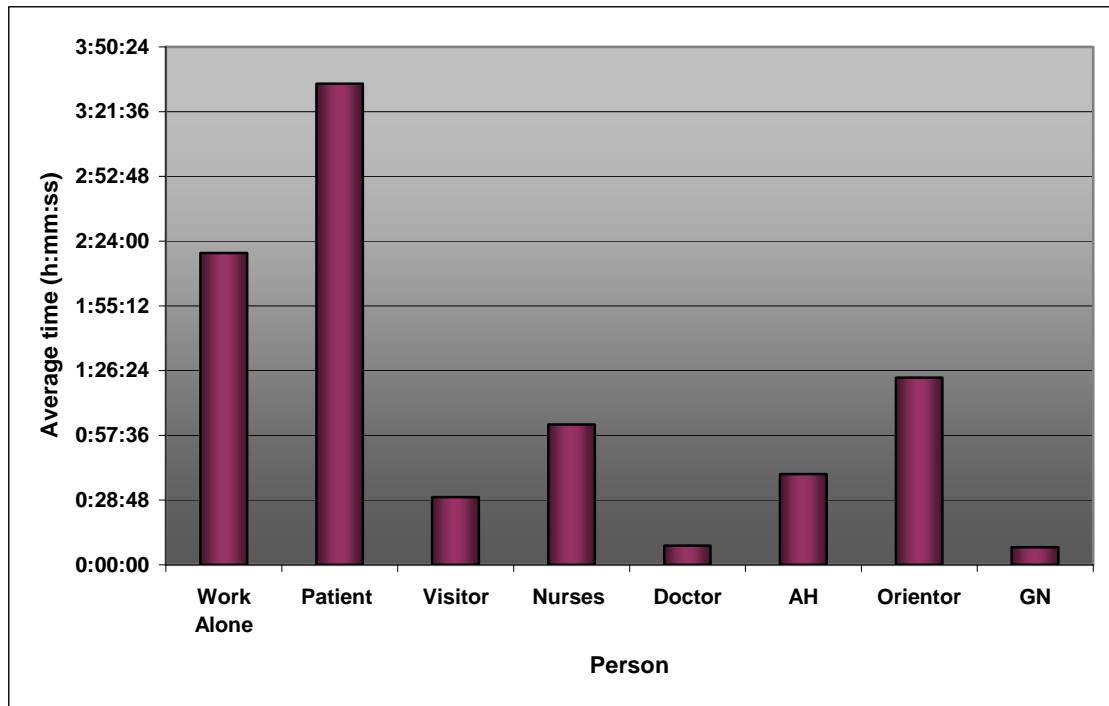
Figure 25 Average time during an 8-hour shift the GN spent with each person

When the average time data was analyzed by week, the time per interaction with patients decreased by 50% over the course of orientation from 2:12 in Week 2 to 1:04 in week 9 (Figure 26). This may be attributable to the GN's patient assignment which increased over time. In week 2, the GN was responsible for just three patients, and by week 9 she was responsible for 6 patients. It is possible that the more patients she was responsible for, the less time she was able to spend per interaction with each patient, hence the shorter average interaction by week 9. A second pattern of interest is that the average times with patients and nurses seem to correlate over the 8 week period. When the average time spent with patients increased or decreased, the average time spent with nurses followed the same pattern in every week except week 7. No other trends were found in the data.
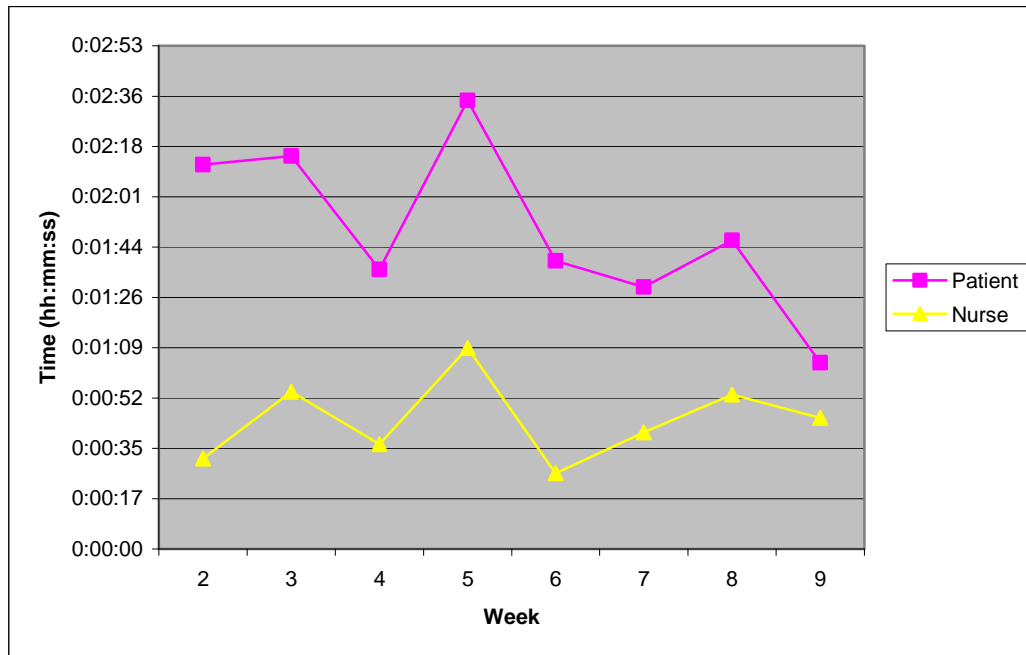
Figure 26 Weekly analysis of average time per single interaction with Paitent and Nurse

3.3.3 Analysis by Location

a) Frequency

Table 7 shows the percent and frequency of where the GN interacted over the entire eight weeks of data collection and the average frequency during an eight-hour shift. During an average eight-hour shift, the GN interacted 105 times in the patient room, 97 times at the nurses station, 81 times in the med room, and 74 times in the corridor (Figure 27). As Figure 28 illustrates, 28% of interactions occurred in the patient room, 25% occurred at the nurses station, 21% occurred in the med room, and 19% occurred in the corridor. The data accurately reflects the fact that, while working, the GN never entered the break room.

Table 7 Overall percent, frequency, and frequency per 8-hour shift of where the GN interacted

Location	Percent	Frequency	Frequency/8hr
Backstage	4.3%	51	16.43
Med Room	21.1%	253	81.48
Charge Desk	2.8%	34	10.95
Corridor	19.2%	230	74.07
Nurses Station	25.2%	302	97.26
Patient Room	27.4%	328	105.63
Break Room	0.0%	0	0
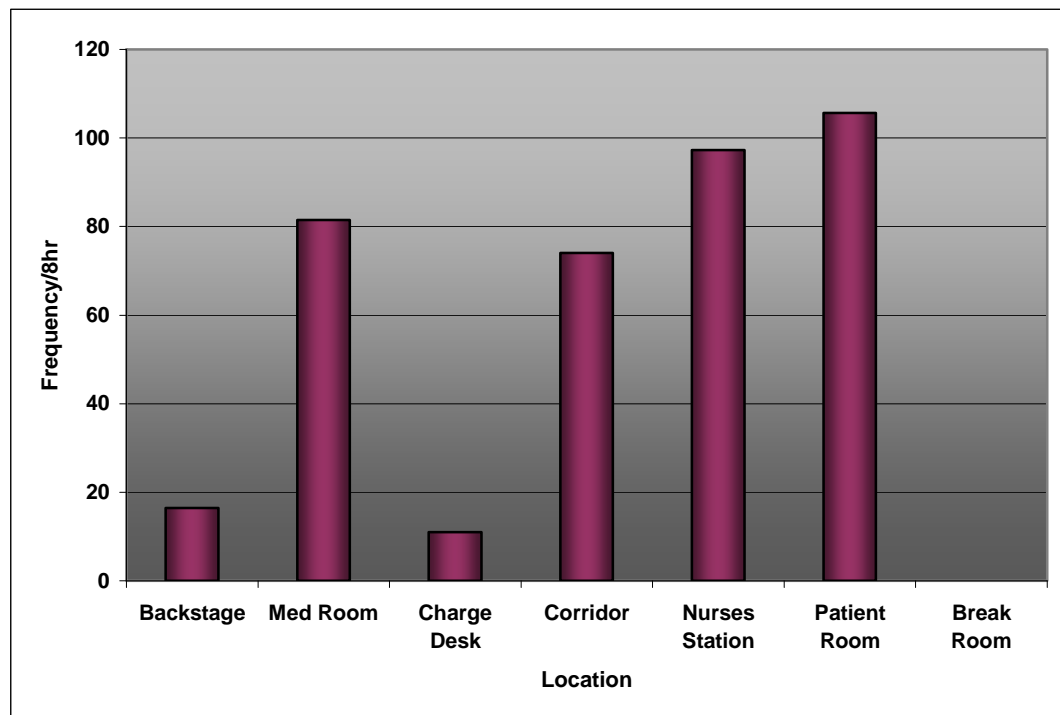
Figure 27 Frequency per 8-hour shift of where the GN interacted
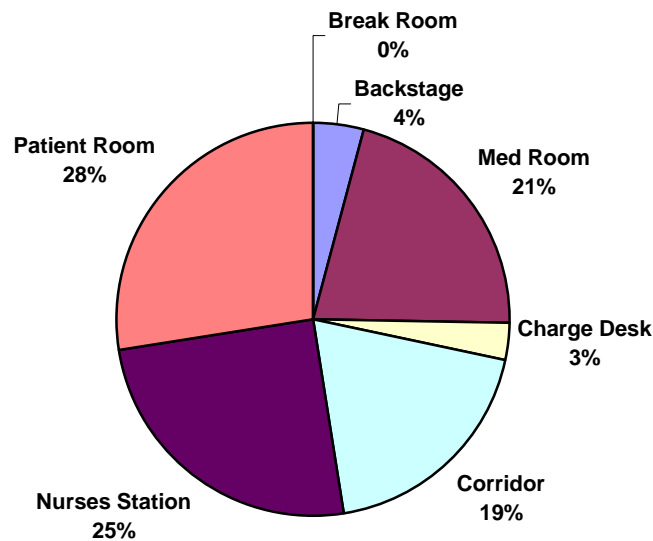
Figure 28 Overall frequency of where the GN interacted over 8 weeks of data collection

b) Time

Table 8 shows the total and average amount of time the GN spent interacting in each location over 25 hours of data collection, and the average amount of time during and eight-hour shift. (Note: the total time used to determine the percentages was the time spent collecting data - 24:50:23 - minus time spent "In Transit" – 2:59:43). The percentage of total time, over 25 hours of data collection, spent in each location shows a similar distribution as the frequency analysis. However, the percentage of total time spent in the patient room was significantly higher than the percentage calculated in the frequency analysis. This can be attributed to the fact that the GN had relatively long interactions in the patient room averaging close to two minutes. Conversely, the percentage of total time spent in the corridor was significantly lower than the

percentage calculated in the frequency analysis simply because the average time per interaction in this location was brief at 32s (See Figure 29).

When the time data was analyzed by week, there were no distinct patterns of change over time.

Table 8 Total time, average time, and average time per 8-hour shift the GN spent interacting in each location

Location	Total Time	Percent	Avg. Time	Avg. Time/8hr
Backstage	0:26:09	2.0%	0:00:26	0:10:20
Medroom	4:34:07	21.5%	0:01:07	1:48:14
Charge Desk	0:20:42	1.6%	0:00:32	0:07:54
Corridor	2:19:48	11.0%	0:00:32	0:55:12
Nurses Station	3:50:26	18.1%	0:00:51	1:31:00
Patient Room	9:44:23	45.8%	0:01:57	3:50:45
Total	**20:15:35**	**100.0%**		
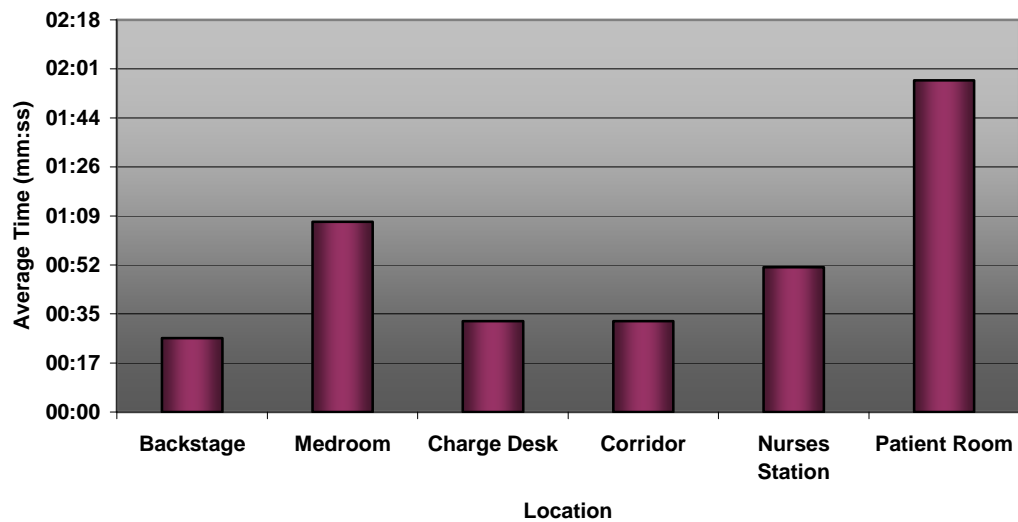
Figure 29 Average time of a single interaction by location

3.3.4 Analysis of Task, Person and Location

After analyzing the data separately by task, person, and location, the frequency data was cross-tabulated to determine a) task by location, b) task by person, and c) location by person.

a) Task by Location

Table 9 shows the frequency of tasks by location. The patient room and backstage are not shown because the researcher did not follow the GN into these spaces. The patient room was not entered to abide by HIPAA regulations and preserve patient privacy. The backstage areas (kitchen, utility rooms, and locker room) were not entered due to lack of space for the researcher to shadow.

Table 9 Task frequency by location

Task	Location			
	Med Room	Charge Desk	Corridor	Nurses Station
Non-Interactive	33.0	1.1	23.2	29.7
Social	45.0	1.7	28.3	23.3
Administrative	10.3	0.0	41.4	41.4
Being Taught	9.1	18.2	9.1	63.6
Seeking Assistance	16.7	14.3	38.1	23.8
Seeking Advice	32.5	7.5	2.5	55.0
Discussing Patient Care	19.1	6.8	27.8	43.2
Validation	40	20	0	40
Providing Assistance	37.8	2.7	10.8	37.8
Providing Advice	10.3	6.9	41.4	39.7

The CWM tool data indicates that the nurses station was both a hub of activity, with at least 23% of each type of interaction occurring there, and the place where the GN chose to do close to one third of her non-interactive work. The nurses station also proved to be an important site for learning since 63.6% of "Being Taught," 55% of "Seeking Advice," 40% of "Validation," and 39.7% of "Providing Advice" occurred

there. Close to 40% of "Seeking Assistance" occurred in the corridor which coincides with observation of the GN frequently exiting the patient room and walking into the corridor to find a staff member to assist her. The corridor was also the site of 41% of "Providing Advice," also confirmed by observation of the GN answering nursing assistants' questions outside of patient rooms.

The CWM tool data, observation, and interviews revealed that the med room served as an important space for social interaction. In fact, 45% of all social interaction occurred there. The med room is a place where all RNs need to go frequently throughout their shift, so there was often more than one RN in the room at once. When in the med room during observation, it was common to see RNs working while socializing – that is, dispensing meds while making a joke, venting about a patient's family member, talking about their kids, etc. There was also a radio in the med room, and it was on about half the time, almost serving as a signal that this is an informal place where it is acceptable to discuss certain topics that wouldn't be appropriate elsewhere on the unit. It is important to note that the med room is a space enclosed by four walls and a door, as opposed to being open to the rest of the unit. According to information obtained in focused interviews, this design is the reason that so much social interaction occurs there. As one interviewee describes it:

"Everyone thinks that because the door is shut, that it's like a little

room and no one can hear you. Because it's the four walls and

you're in there."

Another interviewee provides a similar response:

"That's the only place out of earshot of patients that you can, just

like, say whatever you feel like, you know, you don't have to

sensor yourself because it's closed."

However, when asked if all of this socializing impacts the ability to focus on the tremendously important responsibility of dispensing meds, the interviewees did report that it is sometimes a problem:

> "That's the pros and cons of being in that med room, is that, you
>
> have that space but at the same time if you're not in the interaction,
>
> it's frustrating because you can't concentrate."

Interviews also revealed that the kitchen (for preparing/accessing patient snacks and drinks) is a space commonly used for social interaction for the same reason – it is an enclosed space where staff cannot be seen or heard by patients and visitors. Unfortunately the kitchen is one of the "backstage" areas where the researcher did not follow the GN, so this information was not captured by the CWM tool. A final note about the med room is that while it is a hub for social interaction, it is also where the GN did one third of her non-interactive tasks. Observation revealed that the GN often did not participate in the socializing that was occurring, but rather kept her head down and her back to the others as a signal that she was concentrating.

Table 9 shows that little interaction occurred at the charge nurse desk. However, this is an inaccurate representation because, as explained previously, the relocation of the charge nurse from Desk B2 to B1 resulted in unreliable data collection when it came to recording the actual location of the charge nurse desk. Fortunately, field notes revealed that there was actually a fair amount of interaction that occurred around the charge nurse. Because the charge nurse always has in front of her a pile of patient charts that she is updating and because she has information about the status of all patients, including doctors' orders, test results, etc, nurses often hover around the charge nurse desk because it's the primary source of information. While not reflected in the CWM tool data, "Seeking Advice," "Being Taught," and "Validation" often occurred at the charge nurse desk. Importantly, these activities

relate to learning and the sharing of information. The GN was often observed asking

the charge nurse questions about how to carry out certain tasks and received informal

training in process. In addition, because the charge nurse could provide patient

information quickly for the busy nurses, "Discussing Patient Care" also occurred

frequently at the charge nurse desk.

Table 10 shows the frequency of task by location when the communication

categories are grouped as "Procedural" ("Administrative," "Seeking Assistance,"

"Providing Assistance") and "Knowledge Transfer" ("Being Taught," "Discussing

Patient Care," "Validation," and "Providing Advice"). As Figure 30 shows, nearly

half (45.9%) of "Knowledge Transfer" interactions occurred at the nurses station,

23.6% occurred in the corridor, and 19.6% occurred in the med room. Recall that,

although not reflected in the CWM tool data, much of the "Knowledge Transfer"

interactions reported for the nurses station actually occurred at the charge nurse desk.

**Table 10 Frequency of task by location with tasks grouped to emphasize
knowledge transfer**

Task	Location			
	MedRoom	Charge Desk	Corridor	Nurses Station
Non-Interactive	33.3	1.1	23.2	29.7
Social	45.0	1.7	28.3	23.3
Procedural	24.2	7.1	32.3	36.4
Knowledge Transfer	19.6	7.8	26.3	45.9
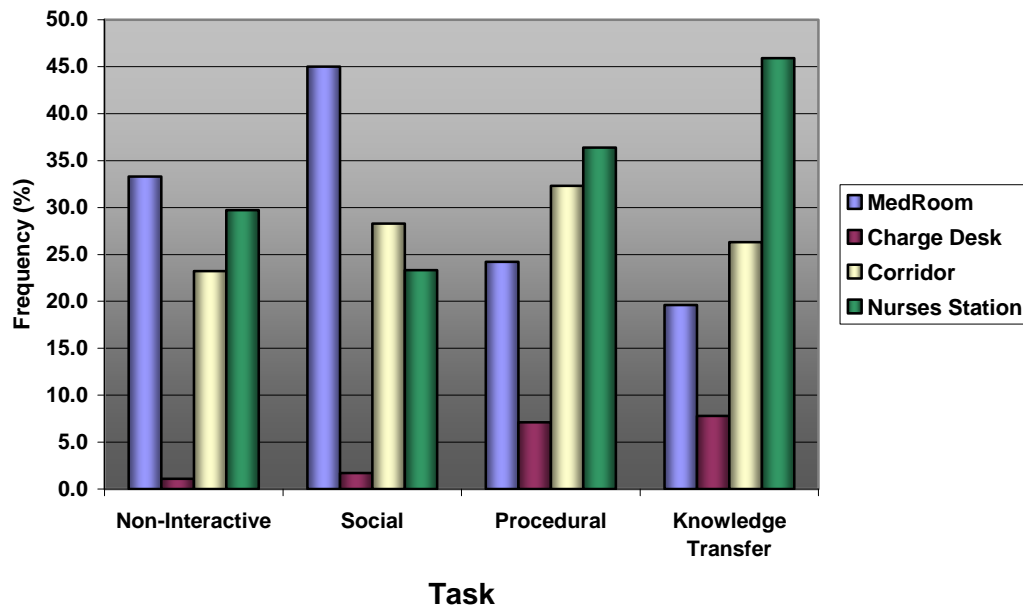
Figure 30 Frequency of tasks by location with tasks grouped to emphasize knowledge transfer

b) Task by Person

Table 11 shows the frequency of task by person. The CWM tool data shows that the majority of the GN interactions were with the Orientor and nurses and that no more than 10.3% were with a doctor. "Seeking Advice" occurred almost equally with nurses and the Orientor, at 42.5% and 45% respectively. However, "Being Taught" occurred over two times more often with the Orientor (63.3%) than with nurses (27.3%). Conversely, "Validation" occurred about two times more often with nurses (66.7%) than with the Orientor (33.3%). This relationship may be attributable to an observed safety procedure that safeguards against medication errors. When dispensing "high alert" medications (a drug that could have a serious negative effect on the body in a short period of time), RNs are required to ask another RN to verify that they have dispensed the correct drug in the correct dose at correct time. Observations revealed

that this occurred frequently throughout a shift, and the GN often asked whoever was in the med room with her at the time, more often another RN than the Orientor, to verify her meds. Finally, the fact that the "Nurse" category included interactions with both RNs *and* nursing students may help to explain whey over 40% of "Providing Advice" occurred with nurses. Similarly, over 20% of "Providing Advice" occurred with members of allied health which included nursing assistants.

Table 12 shows the frequency of task by person when the communication tasks are grouped as "Procedural" ("Administrative," "Seeking Assistance," "Providing Assistance") and "Knowledge Transfer" ("Being Taught," "Discussing Patient Care," "Validation," and "Providing Advice"). As Figure 31 shows, "Knowledge Transfer" occurred almost equally with nurses and the Orientor, at 38% and 34.4% respectively, while 14.1% occurred with allied health and 7.2% occurred with doctors.

Table 11 Frequency of task by person

Task	Person					
	Visitor	Nurse	Doctor	Allied Health	Orientor	GN
Patient-Interactive	33.1	22.3	10.1	30.4	20.9	4.1
Non-Interactive	0.0	0.0	0.0	0.0	0.0	0.0
Social	0.7	38.4	4.1	7.5	35.6	9.6
Administrative	0.0	55.2	0.0	20.7	20.7	6.9
Being Taught	0.0	27.3	0.0	18.2	63.3	0.0
Seeking Assistance	0.0	38.1	2.4	21.4	33.3	2.4
Seeking Advice	0.0	42.5	2.5	5.0	45.0	5.0
Discussing Patient Care	2.5	36.4	8.0	13.6	40.7	1.9
Validation	0.0	66.7	0.0	0.0	33.3	0.0
Providing Assistance	0.0	21.6	0.0	0.0	62.2	10.8
Providing Advice	0.0	41.4	10.3	22.4	5.2	5.2

Table 12 Frequency of task by person with tasks grouped to emphasize knowledge transfer

Task	Person				
	Nurse	Doctor	Allied Health	Orientor	GN
Patient	22.3	10.1	30.4	20.9	4.1
Social	38.4	4.1	7.5	35.6	9.6
Procedural	37.0	0.9	13.9	39.8	6.5
Knowledge Transfer	38	7.2	14.1	34.4	2.9
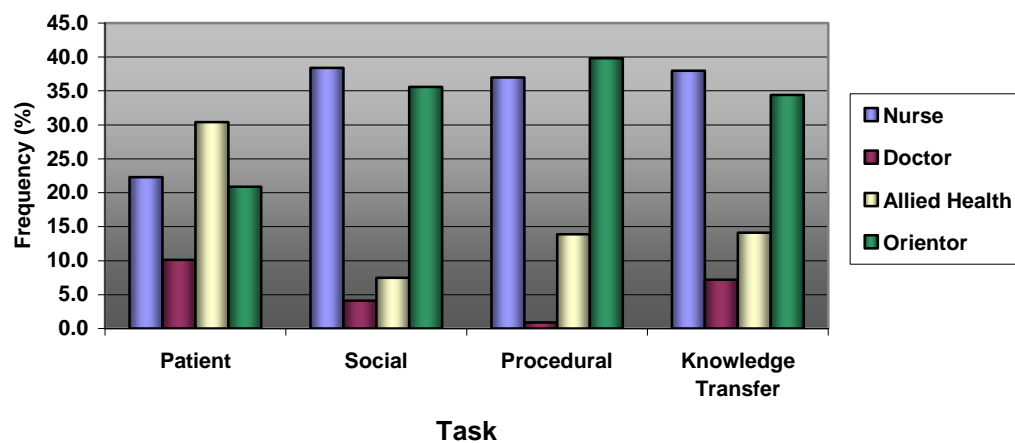
Figure 31 Frequency of task by person with tasks grouped to emphasize knowledge transfer

c) Location by Person

Table 13 and Figure 31 show the overall frequency of location by person interactions. The CWM tool data shows that when the GN was in the med room, 23.7% of interactions were with the Orientor, 21.3% were with nurses, and 0% were with a doctor because doctors generally did not enter the med room. 20.6% of interactions with doctors were at the charge desk, most often at Desk B2. When in the corridor, 24.3% of interactions were with nurses, 16.1% were with the Orientor, 13.5% were with allied health, and 2.2% were with a doctor. One quarter of interactions occurring at the nurses station were with the Orientor, 23.2% were with a nurse, and 3.3% were with a doctor.

Table 13 Frequency of location by person

Location	Person							
	No One	Patient	Visitor	Nurse	Doctor	AH	Orientor	GN
Med Room	48.2%	0.0%	0.0%	21.3%	0.0%	0.8%	23.7%	6.3%
Charge Desk	11.8%	0.0%	2.9%	41.2%	20.6%	2.9%	20.6%	0.0%
Corridor	37.4%	1.7%	3.9%	24.3%	2.2%	13.5%	16.1%	2.2%
Nurses Station	36.4%	0.0%	1.3%	23.2%	3.3%	11.3%	25.2%	2.3%
Patient Room	0.0%	100.0%	15.2%	10.1%	4.6%	14.3%	9.5%	1.8%
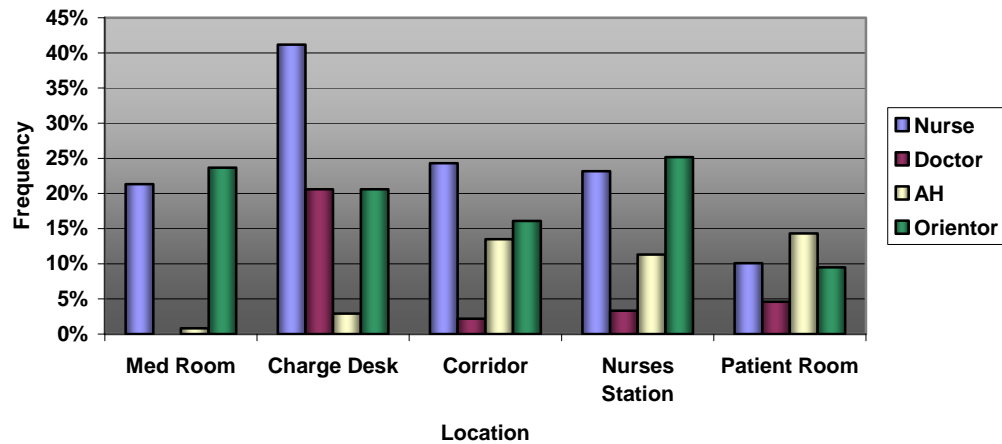
Figure 32 Frequency of location by person

As table 14 and Figure 32 illustrates, 30.8% of all interactions with nurses occurred at the nurses station 24.7% occurred in the corridor, and 23.8% occurred in the med room. Interactions with the Orientor followed a similar pattern, with 36% occurring at the nurses station, 28.4% occurring in the med room, and 17.5% occurring in the corridor. Observation confirmed that interaction with nursing assistants (included in the allied health category) often occurred either in the corridor (27%) or at nurses station (29.6%).

Table 14 Frequency of person by location

Person	Location					
	Transit	Med Room	Charge Desk	Corridor	Nurses Station	Patient Room
No One	63.3	25.3	5.8	27.8	37.1	0
Visitor	0.0	0.0	1.6	14.1	6.3	78.1
Nurse	0.0	23.8	6.2	24.7	30.8	14.5
Doctor	0	11.9	16.7	11.9	23.8	35.7
Allied Health	0	1.7	0.9	27	29.6	40.9
Orientor	0	28.4	3.3	17.5	36	14.7
GN	0	47.1	0	14.7	26.3	17.6

3.3.5 Summary of Findings: Interaction and Communication

Analysis of the communication and interaction patterns of the GN can be summarized as follows:

- GN communication was: 30% "Discussing Patient Care," 27% "Social," and 11% "Providing Advice."

- Out of the communication categories, "Being Taught" (1:35) had the longest average interaction time followed by "Discussing Patient Care" (43s) and "Providing Assistance" (43s).

- "Providing Advice" (20s) and "Administrative" (24s) had the shortest average interaction times.

- Most of the categories did not show distinct patterns of change over time, however, between weeks 2 and 9, "Social" decreased by 52%, "Discussing Patient Care" more then doubled, and "Patient Interactive" more then tripled.

- During an average eight-hour shift, the GN interacted 72 times with the Orientor, 77 times with a nurse, 107 times with a patient, and 14 times with a doctor. On average, the GN spent 1.5 hours with the Orientor, 1 hour with nurses, 3.5 hours with patients, and 8.5 minutes with a doctor.

- The average length of an interaction with patients was cut in half between week 2 (2:12) and week 9 (1:04).

- During an average eight-hour shift, the GN interacted 97 times at the nurses station, 81 times in the med room, and 74 times in the corridor. The average duration of interactions in the corridor (32s) was brief compared to interactions at the nurses station (51s) and in the med room (1:07).

- The physical design of the med room – a room enclosed by four walls and a door – facilitated the abundance of social interaction that occurred there by serving as an acoustic and visual barrier between patients/visitors and staff.

- "Knowledge Transfer" occurred mostly at the nurses station, med room, and corridor, and was most often with the Orientor and nurses. Only 7% of "Knowledge Transfer" occurred with a doctor.

3.4 Learning and Gaining Competency

Through observation and focused interviews, data was collected on the unit's approach to GN orientation. A survey was used to assess the degree to which the unit supported and encouraged learning, from the perspective of both the GN and RNs. A Competency Rating Tool was used to collect weekly quantitative data on how GN competency changed over the course of the orientation period. The Competency Rating data was complemented by information obtained in focused interviews.

3.4.1 The GN - Orientor Relationship

In order to get the most out of the CWM tool data, it was important to gain insight into the unique relationship between the Orientor and the GN in this study. A quick look at the interaction data shows that the GN had less interaction with the Orientor – the designated mentor and guide during orientation – than one would have predicted. It is not unreasonable to expect that most learning and teaching would be between the GN and her Orientor, yet most of the "Knowledge Transfer" interactions

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occurred in equal amounts with the Orientor and nurses. This can be explained by the GN's personal learning style and the Orientor's ability to adapt her teaching style accordingly. The GN was highly independent and desired less guidance than most GNs, according to the Orientor. The GN describes her learning style:

> "I think it's personality. I don't like to be bothered unless I need
> something. And as an Orientor, I would rather you not be
> watching everything I do because I need to know I'm capable. I
> don't need someone hovering over me. It's like, 'don't bother me,
> I'm doing my own thing.   I'll let you know if I need something'."

In fact, the GN was so independent that sometimes when the Orientor helped her, it actually hindered her learning process. When asked about obstacles that stood in the way of the GN gaining competency, the Orientor had the following response:

> "If I would help her with anything. She did not like that. If I
> would help her with anything, she felt incompetent. What ever it
> would be, even if it was just writing down a vital sign or
> something, she felt incompetent if you did any little thing for her.
> Or if I would do anything, she would be like 'oh my God, I don't
> know where I'm at, I don't know what's going on.' If I would help
> her with one little thing, it threw her off track. So I had to let her
> do her totally own thing, let her know I'm there… She wanted to
> do everything on her own, and that's why she's such a great
> nurse."

This relationship is important to keep in mind when interpreting the CWM tool data as well as for understanding the GN learning process and orientation experience as a whole.

3.4.2 Unit Approach to Orientation and Support for Learning

The role of an Orientor is to be an aid in the learning experience of GNs as they transition from nursing school to their first job as an RN. The Orientor frequently monitors the actions of the GN, checking medications and charts until the Orientor feels comfortable that they are competent enough to function on their own. As previously mentioned, the Orientor must be flexible in their teaching styles since some GNs require more assistance than others. In this study, the GN needed much less guidance than the other GN on the unit who started orientation at the same time. During orientation, the Orientor did not have patient assignments, but rather shared patients with the GN. However, sometimes the staffing shortage on 6N required the Orientor to have her own patients, which placed a strain on the GN because the Orientor was not always available when needed.

Staff (n=8) ratings from the learning section of the survey showed the unit to be generally supportive of learning with only two average scores below 5, and an overall mean score of 5.5 ($\sigma=.73$) out of 7. The inter-item reliability of the learning section was calculated after the survey had been administered using Cronbach's Alpha, and found to be acceptable (n=22; $\alpha = .90$). The highest mean rating was for the statement "I am satisfied with my personal development since joining this unit" ($X^2=6.5$; $\sigma=.76$). The lowest mean rating was for the statements "The process of trial and error is an aid to my learning" ($X^2=4.1$; $\sigma=2.41$) and "Other nurses on my unit ask me what I feel I need to learn to do my job more effectively" ($X^2=4.1$; $\sigma=1.56$). The GN mean ratings from the learning section of the survey increased one half point from T_1 ($X^2=5.5$) to T_2 ($X^2=6.0$), and the overall mean was 5.7 - slightly higher than the staff mean rating. The GN gave the lowest rating to the statement "My training on this unit covered the basics I need to know" ($X^2=3.5$). This is consistent with findings from prior research that documents the overwhelming feeling of unpreparedness

experienced by many GNs. Figure 33 shows that the staff and GN ratings were similar except for four questions that differed by at least one point: "The process of trial and error is an aid to my learning" (RN X^2=4.1; GN X^2=5.5), "Nurses on my unit are given opportunities to take on challenging tasks" (RN X^2=5.1; GN X^2=6.5), "On-the-job learning is an aid to my learning" (RN X^2=5.3; GN X^2=6.5), and "My training on this unit covered the basics I need to know" (RN X^2=4.6; GN X^2=3.5).
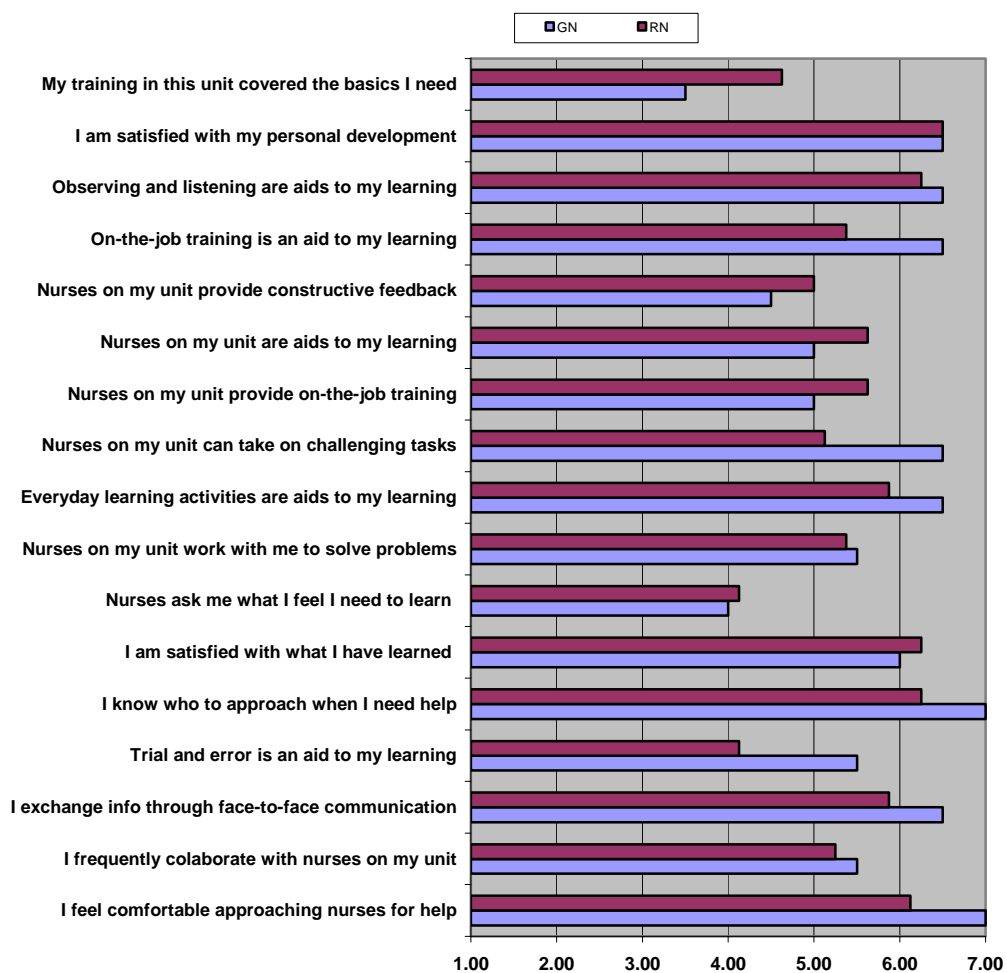
Figure 33 Mean RN and GN learning survey responses

3.4.3 Weekly Competency Ratings

GN competency levels were rated by the Orientor from week 1 through week 9 (See Appendix J for Competency Rating form). The mean rating went from 2.44 to 8.44, an increase of 245%, putting the GN just below the "Expert" level by the end of week 9 (See Figure 34). The GN mean competency ratings followed a pattern that coincided with the GN's changing patient assignment throughout orientation. With the exception of week 1, every time the average competency rating plateaued or decreased, the GN's patient assignment has recently increased. This data may reflect the difficulty experienced when the GN must adjust to taking on one more patient per shift.
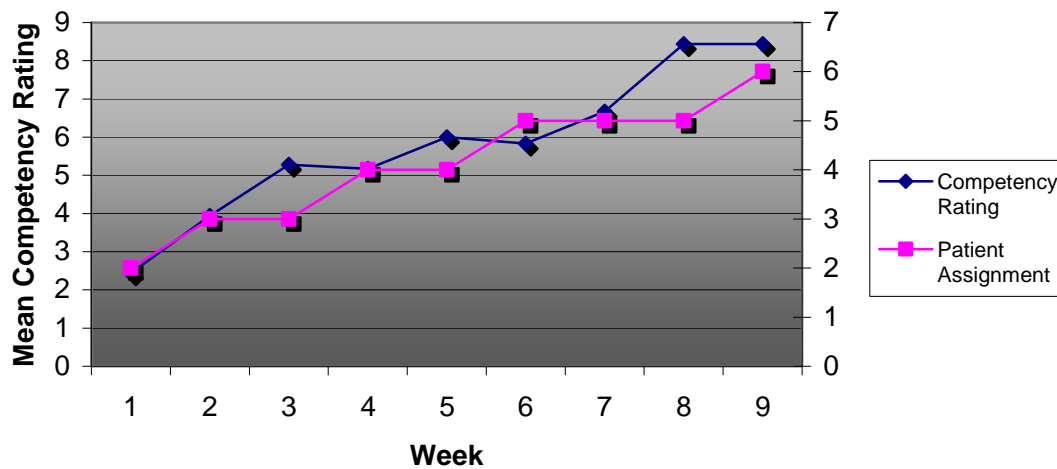
Figure 34 Average competency ratings by week and GN patient assignment

Figure 35 shows the competency ratings at the end of weeks 1 and 9. The competency category with the lowest rating by week 9 was "Computer: Patient Education," which refers to the hospital's computerized Care Notes program where staff can access and print patient-ready educational sheets that explain medical

conditions in laymen's terms. The competency categories that increased most

significantly by week 9 were "Care Plan" (formulating or identifying an appropriate

plan for patient care) and "Identifying and Utilizing Resources" (knowing who to

contact for specific information and utilizing appropriate sources of information), both

increasing by 7 points.
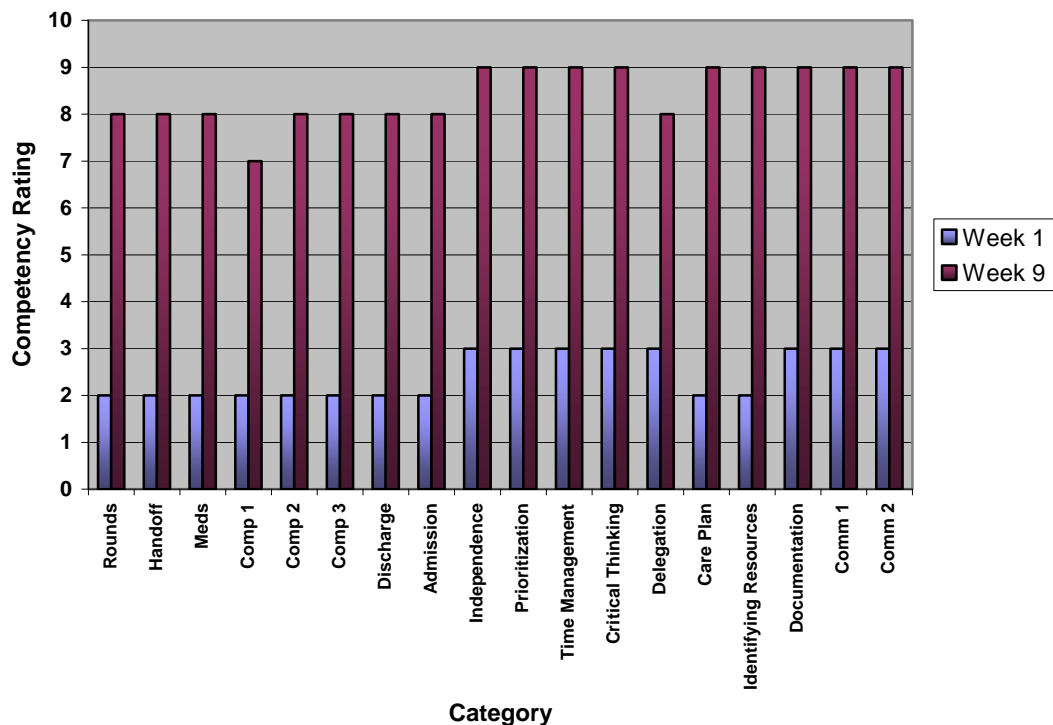
Figure 35 Competency ratings by category at weeks 1 and 9

When asked what the greatest aid to gaining competency was, the GN reported

that feedback from the Orientor and working with nursing assistants (aides) who asked

her questions were both extremely helpful:

"Feedback from the Orientor and working with aides. Having to delegate to aides and them even asking me questions…Just interaction with other staff."

It is important to note that the exchange between the GN and nursing assistants, whose level of required knowledge is lower than that required of an RN, forced the GN to assume a teaching role on the spot in many instances. According to the GN, the process of answering the nursing assistants' questions facilitated her own learning process and increased her confidence.

3.4.4 Summary of Findings: Gaining Competency

Analysis of the nursing unit as a learning environment and the GN's process of gaining competency can be summarized as follows:

- The unique GN learning style had a significant impact on the GN – Orientor relationhip and consequently on the interactions between them as well. According to both the GN and Orientor, the GN was highly independent and required little guidance.

- Survey results showed that the unit supported and encouraged learning, and that the GN found the unit to be a supportive environment for gaining competency during the orientation process.

- The GN competency ratings reached 8.44 by week 9, putting her close to the "Expert" level. At week 9, "Computer: Patient Education" was the category with the lowest competency rating.

- With the exception of week 1, every time the average competency rating plateaued or decreased, the GN's patient assignment increased, possibly reflecting the difficulty experienced when the GN must adjust to caring for one more patient per shift.

- According to the GN, the greatest aids to learning were feedback from the Orientor and interaction with nursing assistants. Being asked questions by the nursing assistants put the GN in a teaching role which facilitated her own learning in the process.

3.5 Biological and Perceived Stress

The GN's perceived and psychological stress levels were assessed over the course of orientation. Perceived stress was assessed through the stress section of the survey and was compared with the mean stress ratings of the unit staff. Biological stress was assessed by taking blood pressure readings three times daily (twice at each recording) from week 2 through week 9. Mean weekly blood pressure readings were then compared to weekly competency ratings.

3.5.1 Perceived Stress: Survey Responses

The GN mean rating for T_1 and T_2 of the stress survey was 1.99. The means for T_1 and T_2 decreased slightly from 2.12 to 1.85. The ratings for each question didn't change by more than one point from T_1 and T_2. When the survey items were grouped by the six sub-scales used by Gray-Toft & Anderson (1981), situations relating to "Conflict with Other Nurses" had the lowest mean rating (Table 15). Situations relating to "Work Load" had the highest mean rating. In addition, the two situations reported as the most stressful (both given the highest mean rating of 3.5) by the GN were "Unpredictable staffing and scheduling" and "Not enough staff to adequately cover the unit." The fact that "Work Load" was reported as the largest perceived stressor is not surprising given the shortage of nursing assistants on 6N as described by nurses in interviews.

The staff (n=8) mean stress rating was 2.08 (σ=.53), 4.5% higher than the GN mean rating. According to the staff ratings, the two most stressful situations were "Unpredictable staffing and scheduling" (X^2=3.5; σ=.93) and "Not enough staff to adequately cover the unit" (X^2=3.63; σ=.74) - the same as those reported as most stressful by the GN. As shown by Figure 36, most of the GN and staff ratings averaged below 3, or "Frequently" stressful. Note that the situation "Not enough time to provide emotional support to a patient" was rated the third most stressful and is also related to poor staffing levels. This concern over being too busy to spend time emotionally supporting patients was echoed in all focused interviews. One nurse explained:

> "It feels like you're getting away from the whole nursing thing the
> way the staffing is because you're more task-orienting. And that's
> not what it's about. Some of these people are finding out that they
> have life-altering diagnoses or cancer or that they're dying and you
> feel like you don't have enough time to talk and sit and
> emotionally connect with your patients. It's awful. You feel so
> awful."

Table 15 Mean GN stress ratings, grouped by Gray-Toft & Anderson categories

I: Death & Dying	1.86
II: Conflict with Physicians	1.90
III: Inadequate Preparation	2.00
IV: Lack of Support	1.83
V: Conflict with Other Nurses	1.60
VI: Work Load	2.80
VII: Uncertainty Concerning Treatment	1.80
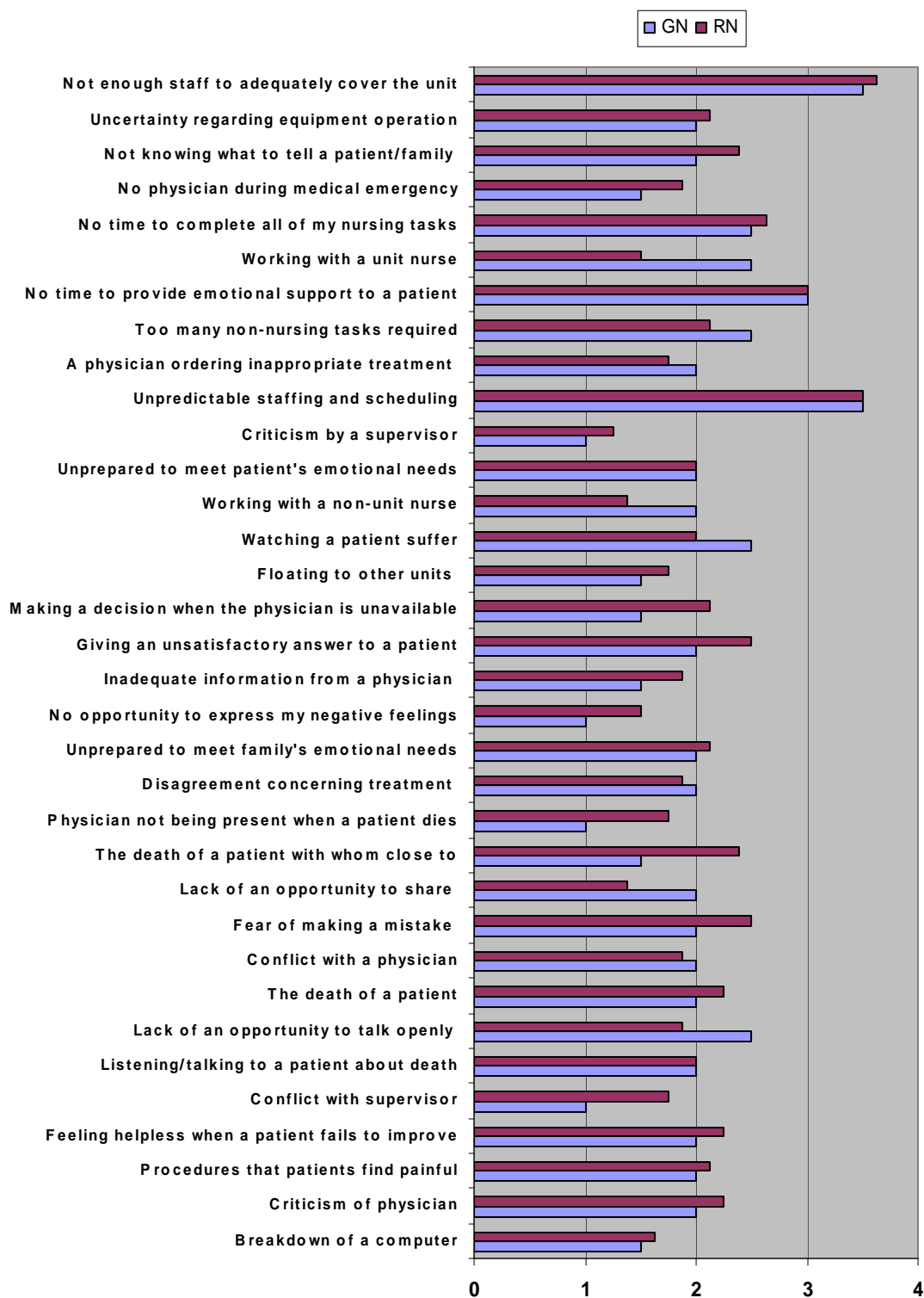
Figure 36 Mean RN and GN stress survey responses (where 1= never stressful and 4=very frequently stressful

Table 16 illustrates how GN stress ratings changed from T_1 to T_2, showing 1) situations where the GN stress decreased by one point, 2) situations where the GN stress increased by one point, and 3) situations where GN stress was reported as frequent or greater (rating = 3 or 4) for both T_1 to T_2. The situations are grouped by the six sub-scales used by Gray-Toft & Anderson (1981). There were no significant increases, decreases, or frequently stressful situations in the "Inadequate Preparation" category, yet this category had the second highest mean stress rating. Given the earlier discussion regarding poor staffing on 6N, it is not surprising that the "Work Load" category contained all situations rated as "frequently" stressful. However, note that all situations in this category decreased from T_1 to T_2. This data is consistent with the fact that the new nurse manager increased the number of nursing assistants on each shift, which took effect toward the end of the data collection period, and this change in the staffing matrix decreased the work load on nurses.

Table 16 Change in GN stress rating from T_1 to T_2 grouped by Gray-Toft & Anderson categories; green arrows indicate where GN stress decreased by one point, yellow arrows indicate where GN stress increased by one point, and red circles indicate where GN stress was reported as frequent or greater.

I: Death & Dying	
a. The death of a patient with whom you developed a close friendship	⬆ (yellow)
b. Watching a patient suffer	⬇ (green)
II: Conflict with a Physician	
a. Making a decision concerning a patient when the physician is unavailable	⬆ (yellow)
III: Inadequate Preparation	
IV: Lack of Support	
a. Lack of an opportunity to talk openly about problems on the unit	⬇ (green)
V: Conflict with Other Nurses	
a. Floating to other units that are short-staffed	⬇ (green)
b. Difficulty in working with a particular nurse (or nurses) on the unit	⬇ (green)
VI: Work Load	
a. Breakdown of a computer	⬇ (green)
b. Unpredictable staffing and scheduling	⬇ (green) 🔴
c. Too many non-nursing tasks required, such as clerical work	⬇ (green)
d. Not enough time to provided emotional support to a patient	🔴
e. Not enough time to complete all of my nursing tasks	⬇ (green)
f. Not enough staff to adequately cover the unit	⬇ (green) 🔴
VII: Uncertainty Concerning Treatment	
a. Inadequate info from a physician regarding the medical condition of a patient	⬇ (green)
b. A physician not being present in a medical emergency	⬇ (green)

⬇ (green)	Stress decreased
⬆ (yellow)	Stress increased
🔴	Frequent or very frequent stress

3.5.2 Biological Stress: Blood Pressure

The GN recorded 29 days of blood pressure (BP) readings (see Appendix I for recording sheet) over the course of eight weeks. Since BP was recorded twice in succession three times per day, a total of 172 readings were obtained. Because the two readings at each time of day were averaged, 86 readings were generated for further analysis. When the AM, noon, and PM readings were analyzed separately, they showed similar patterns over time, and were therefore averaged to give a single mean BP reading for each day. The daily averages were then combined by week to produce a mean BP reading for each week. Figure 37 shows how the mean weekly BP changed over time. Neither the systolic or diastolic readings show a distinct pattern over time. Note that systolic BP tends to fluctuate more rapidly with acute conditions such as pain, stress and anger while diastolic BP tends to change with more chronic conditions. However, the GN's blood pressure was slightly higher at the end of orientation in week 9 than at the beginning in week 2.

Figures 38 and 39 compare how the BP and competency ratings changed over the course of orientation. There does not seem to be any distinct patterns regarding a relationship between BP and competency.
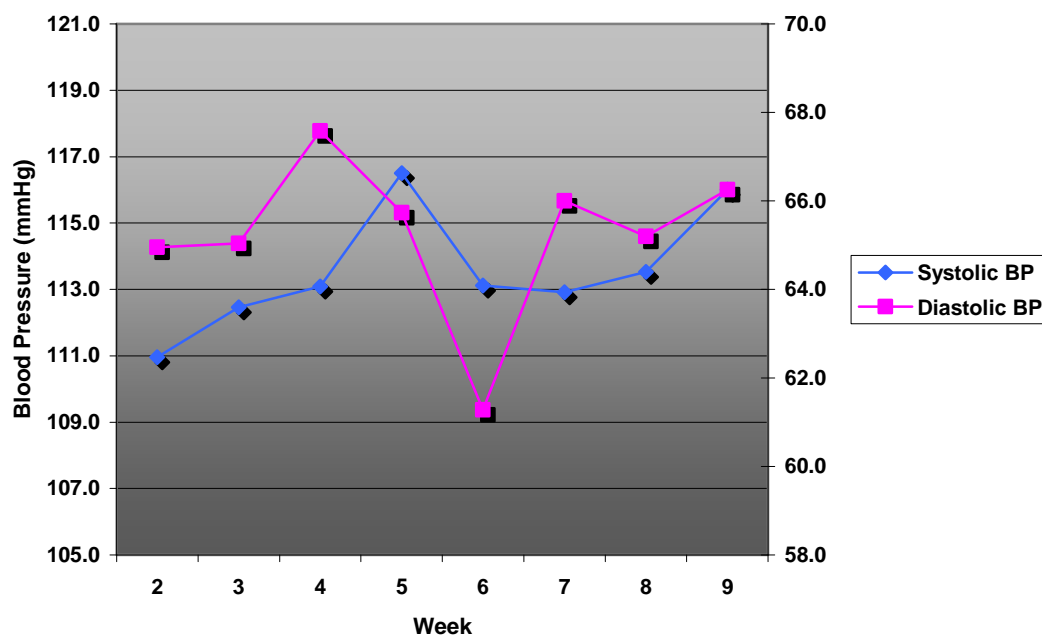
Figure 37 Mean systolic & diastolic blood pressure by week
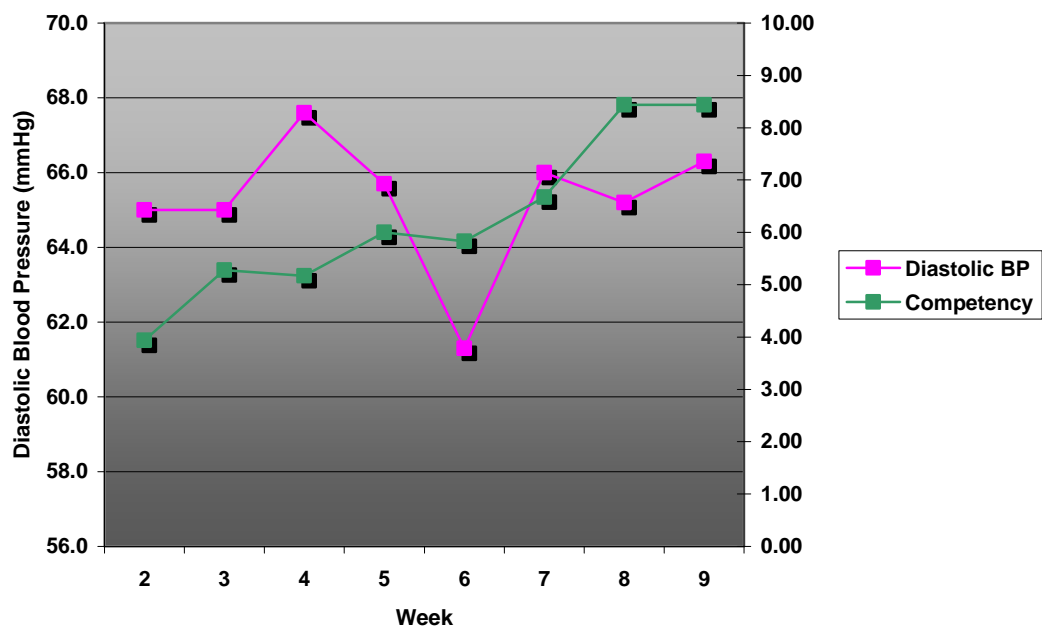
Figure 38 Mean diastolic blood pressure and competency by week
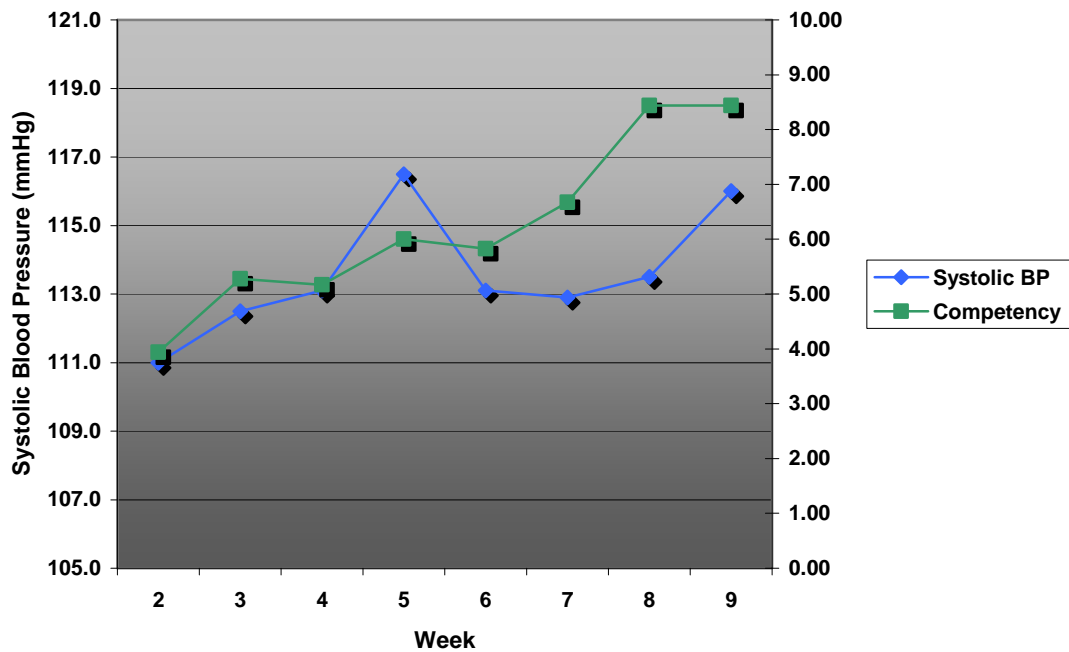
Figure 39 Mean systolic blood pressure and competency by week

3.5.3 Summary of Findings: Stress

Analysis of perceived and biological stress can be summarized as follows:

- The mean staff stress rating was slightly higher than the GN rating. Situations relating to "Conflict with Other Nurses" had the lowest mean stress rating. Situations relating to "Work Load" not only had the highest mean stress rating, but also became increasingly stressful over time.

- There does not appear to be a significant relationship between competency and BP.

3.6 Overall Summary of Findings

- Throughout orientation the GN engaged in a high percentage of social interaction – almost as high as "discussing patient care" – although the frequency did decrease by week nine. Most of these social interactions occurred in the med room because of the privacy afforded by it.

- Despite the generally positive perception of the unit as a supportive, collaborative environment, only 2% of interactions occurred with doctors.

- The importance of sightlines for teamwork was manifested more than once throughout the study. The presence of solid walls on both sides of the unit created visual and physical separation that negatively influenced a feeling of cohesion among staff.

- Biological stress fluctuated and did not decrease over the course of orientation, even though competency increased steadily over time.

- The graduate nurse reported learning as much from informally being asked questions by nursing assistants as she did from receiving formal feedback given by the Orientor.

CHAPTER 4

DISCUSSION & CONCLUSIONS

4.1 Social Interaction and Backstage Spaces

Data analysis revealed that backstage spaces were frequently used for social interaction among staff. This finding addresses the first research question: "What are the communication and interaction patterns of a graduate nurse?" The backstage areas were defined as spaces not entered by patients and visitors and included the kitchen, locker room, utility rooms, and break room. However, while the med room was designated as a location on its own, it could also be considered a backstage space since it fits the definition given above (note, however, that interactions in the med room were strictly recorded as "med room" with the CWM tool and never recorded as "backstage").

The decision was made not to enter the kitchen, locker room or break room due to lack of space, yet the data obtained from the med room was worthy of note. In fact, 45% of all social interaction occurred in the med room. Interviewees reported that the presence of four walls and a door that enclosed the space served as both physical and acoustic barriers from patients, visitors, and other staff. In essence, the physical design of the med room facilitated the abundance of social interaction that took place there. Focused interviews revealed that the kitchen was also often the site of social interaction for the same reason – the design of the space prevented the need for staff to censor themselves.

A study by Adams (2008), conducted in conjunction with the current study on a separate nursing unit and using the same research questions and methodology, revealed similar findings. Specifically, she found that backstage areas were crucial for facilitating social support versus "frontstage" areas, where interactions focused more

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on validation, discussing patient care, and seeking assistance. In a study examining the role that hospital corridors play in the functioning of multidisciplinary teams, Iedema and colleagues (2005) refer to "backstages" as "spaces that are experienced as being less inscribed with conduct regulations and institutional prerequisites." If this definition is applied to the backstages in the current study, it provides additional support as to why so much social interaction occurred in those spaces. Stated another way, staff may have perceived backstages as spaces where formal professional conventions are removed due to the presence of four bounding walls.

Backstage areas are important in another way. These spaces are used by all nurses frequently throughout a shift, regardless of where their assigned patients are located on the unit. Consequently, backstages often brought nurses together since they were the primary sites where nurses crossed paths. This idea can be explained in the context of "affordances." Dutta (2008) cited the work of Gibson (1977) who refers to "affordances" as whatever it is about the environment that contributes to and supports the behavior that occurs in it. In the context of the current study, the backstage areas attract activity because the nurses need to visit these spaces regularly as a part of their daily routine. The term "affordance" can also be used to describe the pattern of interaction observed in backstage spaces: the design of the space afforded nurses the ability to engage in social discussions.

4.2 Relationship between GN Competency Levels and Stress Levels

Previous research findings indicate that a major cause of stress experienced by graduate nurses is the feeling that they do not have sufficient knowledge to function independently on a hospital ward (Kramer, 1974). This fact stimulated the generation of the fourth research question: "Is there a relationship between graduate nurse competency levels and stress levels?" Based on prior studies showing that low levels

of confidence in their clinical skills was a distinguishing source of stress for inexperienced nurses (Charnley, 1999; Brown and Edelmann, 2000), we expected the stress level of the GN to decrease as competency levels increased over the course of orientation. However, the findings of the current study did not align with this evidence-based assumption. While the GN competency steadily rose to just under "Expert" level by week nine, her biological stress showed a highly variable pattern and was actually slightly higher in week nine than in week two. In contrast, Adams (2008) found a negative relationship between competency and stress. At week six, when the competency was increasing, both the systolic and diastolic blood pressure were decreasing.

There are two possible explanations for the lack of a relationship between competency and stress in this study. First is the issue of low staffing levels on 6N. Focused interviews with nurses revealed that there was a shortage of nursing assistants on the unit that dramatically increased the workload of RNs. Questionnaire data confirmed the concern over poor staffing levels. On the section of the survey that measured perceived stress, work load proved to be the most stressful component of the job for the GN as well as the RNs. Given the nation-wide nursing shortage, other research has explored the effect that poor staffing levels have on nurse stress, and these findings are consistent with the observations and findings on 6N. The American Nursing Association (2001) posted a national nursing survey online. Quantitative data revealed that increased patient load and decreased time to provide direct patient care led 40-60% of respondents to report frequently skipping meals and breaks to care for patients and feeling increased pressure to accomplish their work. Interviewees in the current study also reported experiencing stress resulting from having to perform the duties of a nursing assistant in addition to the duties of an RN because of low staffing levels. This finding corresponds with a study by Buchanan and Considine (2002) who

found that a major stressor for nurses was having to perform duties other than their specialty due to lack of staff. In addition, Chang et al. (2005) cited the results of a study by Healy and McKay (2000) reporting that work overload was found to be a major source of stress for nurses.

The second possible explanation for the lack of an inverse relationship between competency and stress in this study is the fact that the particular unit studied was inherently noisy, busy, and chaotic. This medicine unit experienced a broad range of diagnoses with patients having a wide variety of healthcare needs. Consequently the unit required more and varied types of staff. These higher staff numbers produced a much noisier environment than more specialized units (e.g., cardiology, oncology) and created an overall feeling of chaos on the unit. In contrast, Adams (2008) studied an oncology unit which, according to hospital staff as well as observation, was much calmer and quieter as a result of patients having similar diagnoses and a relatively static, small group of doctors and other staff on the unit on a day-to-day basis. According to previous research, the noise generated from the high activity level on 6N could be one reason why the GN stress levels did not decline. Joseph and Ulrich (2007) cited a study by Morrison et al. (2003) who found that noise was strongly related to stress and annoyance in nurses.

4.3 Sightlines and Teamwork

All interviewees reported concern regarding limited visibility across the nursing unit and its impact on teamwork and communication. These findings address the second research question: "What is the impact of the unit's physical design on informal communication and learning?" Nurses reported that the placement of two solid walls on the east and west sides of the unit obstructed sightlines that would otherwise visually connect the two sides of the unit. Because nurses were generally

assigned patients on one side of the unit or the other, each side of the unit became spatially isolated from one another on a daily basis. This visual separation compromised teamwork because, according to nurses, they would most often seek advice from who ever happened to be in sight, and this may or may not have been the appropriate staff member to answer the question. The relocation of the large chart carousel to the west wall part way through the data collection period opened a major line of sight across the core of the unit, and, according to interviewees, increased visibility that helped to create an increased feeling of teamwork.

These findings provide support for previous research demonstrating the importance of visual proximity for communication in the workplace. Becker (2007a) suggests that greater visual proximity, or "spatial transparency," in the workplace affords opportunities for modeling behavior and sharing information. The findings of the current study align with work by Kalisch and Begeny (2005) who suggest that less visual proximity reduces the likelihood of chance encounters and the subsequent opportunities to engage in information sharing. Specifically they suggest that if a nurse is working on a unit with two hallways and no line of sight, as is the case on 6N, she will find it difficult to know how her team members are functioning and whether or not they need assistance. While this is relevant to all nurses, it is a particularly significant finding for graduate nurses who, it can be argued, could stand to benefit the most from frequent chance encounters that could potentially result in on-the-job, informal learning.

4.4 Informal Learning and Gaining Competency

Focused interviews revealed that the greatest aid to learning for the GN was interaction with staff, including nursing assistants. This finding addresses the third research question: "Is there a relationship between communication patterns and

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opportunities for informal learning and graduate nurse competency levels?" While we expected that the prime source of informal learning for the GN would be with more experienced RNs, in fact interactions with nursing assistants were highly valued. Specifically, when the GN was asked questions by the nursing assistants, it forced her to assume a teaching role on the spot which facilitated her own learning and increased her confidence. The type of learning that the GN experienced can be termed "reactive" or "opportunistic" learning as described by Eraut (2004). According to Eraut, reactive learning is near-spontaneous and occurs in the middle of action, when there is little time to think. This definition closely approximates the type of situation that occurred when a nursing assistant unexpectedly approached the GN with a question. This is in contrast to "deliberative" learning, where there is a definite learning goal and time is set aside for acquiring new knowledge (Eraut, 2004). Henry B. Slotnick, of the University of Wisconsin Medical School in Madison, conducts research on how physicians learn. Slotnick (2004) argues that "you never know anything as well as you do after you've taught it to someone else." He describes a situation in which someone is asked a question unexpectedly and is required to reflect more carefully on what is taking place in order to respond to the interesting situation that has been created. This kind of reflection in the heat of the action results in new insights for both the "teacher" and the "student." This concept can be used to explain why the GN believed she learned so much from answering the questions of nursing assistants.

Another interesting finding regarding the GN learning experience was that there was perhaps less interaction with the Orientor than one would expect. In fact, interactions involving "knowledge transfer" occurred in roughly equal amounts with the Orientor and other RNs. This came as a bit of a surprise since the role of the Orientor was to be the designated mentor and guide for the GN during orientation. In

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Adams' (2008) study, 28% of all interactions were with her Orientor versus 16% with an RN. In contrast, the GN in the current study spent 13% of all interactions with her Orientor compared to 14% with an RN. One explanation for this inconsistency could be differing learning styles. The GN in this study was highly independent and desired less guidance than most GNs, according to the Orientor. The literature proposes that to be able to direct their own learning, people should first know *that* they learn and *how* they learn (Barrie & Pace, 1998). Berings et al. (2007) suggests that knowledge about their own and others' on-the-job learning styles can make nurses aware of their options and choices in learning behavior and therefore offer opportunities for adaptation. Further they suggest that awareness can improve communication and collaboration between team members. In order to help nurses improve their learning skills, Berings et al. (2007) have developed an instrument, called the "On-The-Job Learning Styles Questionnaire for the Nursing Profession," to help raise nurses' awareness of their on-the-job learning styles. Had this study and Adams' (2008) study included this instrument in data collection, it would have been interesting to compare the learning styles of the GN in each study, and to find out if there was a corresponding pattern in interaction with the Orientor.

4.5 Implications for Practice: Communities of Practice

The current study provides support for the importance of embracing the communities of practice framework which focuses on knowledge sharing across informal networks of people who share a common interest or task (Lave & Wenger, 1991). Many of the key findings of this study point to the importance of the role that the physical environment plays in fostering these informal networks of people through which information is shared. The fact that staff members reported compromised teamwork and communication resulting from obstructed sightlines across the nursing

unit suggests that designers and hospital administrators need to consider the way unit design affords opportunities for visual connectivity that can have a profound impact on communication among staff members. White et al. (2008) similarly reports that ready accessibility of information from colleagues who were on the floor was crucial in influencing the learning ability of nurses. Reducing or eliminating visual barriers such as solid walls and large obtrusive columns and replacing them with three- to five-foot half-walls or glass panels could increase spatial transparency. White et al. (1998) provided a quote from a nurse in their study that may best summarize this important implication for practice: "…the easier the access, the easier the learning."

A second major finding that highlights the role that the physical environment plays in fostering informal networks of people is that backstage spaces were found to be key sites for social support. The fact that 27% of all interactions were social may be alarming at first glance given that it was almost as frequent as discussing patient care, at 30%. However, this time spent in social conversation – that is, venting about difficult work experiences or socializing about life outside of work – should be considered valuable. This is time invested in fostering the personal relationships that build the cooperation, commitment, and trust that forms the social capital that provides team members with the resources (e.g. information and support) they need to learn and do their job effectively (Becker, 2007).

The implication for practice here is two-fold. First, hospital architects should consider backstages as valuable spaces that promote the formation of trust and personal relationships that build teams when allocating square footage. The fact that 45% of social interaction occurred in the med room, reportedly because the space was completely enclosed and afforded acoustic and visual privacy, suggests that in the absence of *planned* backstage areas, staff will create their own from existing spaces, even when doing so may, as in the case of the med room, reduce patient safety by

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increasing the potential of medication errors. However, the social interaction, while valuable for the above-mentioned reasons, poses the risk for medication errors when it occurs in abundance in the med room, as it did on 6N. Designers must ascertain a way to balance the need for supporting social interaction while at the same time limiting its potentially negative effect on performance and the quality of care.

The second implication for practice regarding social interaction is that nurse managers and hospital administrators must redefine the culture of the nursing unit to include these informal, social interactions as "real work." Becker (2007b) contends that if the organization's perception of "real work" doesn't include spontaneous, unplanned, opportunistic communication, then it will leave the organizational resource of informal knowledge networks untapped.

4.6 Implications for Practice: Value of Observation

On 6N, the data collection period coincided with the arrival of a new nurse manager. In order to better understand the unit she was about to manage, the new nurse manager spent time observing 6N and discovered inefficiencies that stood in the way of the optimal functioning of the unit. According to staff, the changes that were made after observation had tremendous success, including fewer disruptions for nurses and doctors, unobstructed sightlines through the core of the unit, and more convenient access to information for visitors. The practical implication is that observation is a cheap, simple, and effective method for gaining insight into the operation of the unit as a system. Existing hospitals that have tight budgets yet are interested in improving operational efficiency can use observation as a tool to discover problems. Managers and administrators may very well find that there are simple, relatively inexpensive solutions to these problems that can have significant positive results, as was the case on 6N. The idea that increasing operational efficiency is a costly endeavor that

usually leads to expensive renovations may be true in some cases, but hospital administrators would be wise to begin the process with observation and see how far it can take them.

4.7 Overall Conclusion

The aim of this study was to understand the roles played by the components of the nursing unit ecosystem, including culture, organizational factors, technology, and particularly the physical layout, in the opportunities for informal learning and communication patterns of a graduate nurse during her orientation period. In addition, this case study examined whether or not there was a relationship between graduate nurse communication and interaction patterns, the gaining of competency, and the reduction of stress. The results of this study suggest that the physical environment plays an important role by fostering opportunities for informal communication and on-the-job learning. Specifically, it was found that backstage spaces and clear sightlines across the unit fostered the formation of relationships that in turn provided the foundation for effective collaboration. The communities of practice framework can be aptly applied to these findings and serves as an overarching theme.

A combination of factors was found to influence the GN learning experience including past experiences, unit culture, personal learning style, unit layout, and interaction with staff. The finding that their gaining of competencies was not associated with a reduction in stress suggests that other factors, particularly staffing levels, have more of an impact on stress than nursing competencies per se. The extent to which other social, organizational, and personal factors interact with staffing levels to produce stress or mitigate its effects deserves further study. However, this study provided support for the notion that the GN experience is indeed influenced by the

nursing unit ecosystem and its web of interacting components and not by factors that operate mutually exclusive of one another.

4.8 Study Limitations

The small sample size of one GN limits the extent to which conclusions can be generalized to other GNs and settings. It is important to note that the original methodology for this study included a sample of 10-12 GNs to be shadowed on nursing units with differing layouts. However, because the available pool of incoming graduate nurses was much smaller than expected, it was possible to shadow only one GN. Despite this limitation, the study's value lies in the fact that it is an exploration of the nursing unit ecosystem as an integrated workplace with diverse care providers, not of a single graduate nurse. The validity of these findings are also strengthened, as noted earlier, by other research reporting similar results.

In order to protect patient privacy, data was not collected in patient rooms. Therefore, unique interaction patterns that perhaps did not occur outside of the patient room could have been missed. One significant daily event that was never captured was unit rounds, where the care team gathers in each patient room to share information, address patient concerns, and formulate or revise the care plan. Manias and Street (2001) cite many studies involving nurse–doctor interactions during the ward round that have identified nurses' passivity and their lack of confidence about asserting themselves in discussions. Not only could rounds have been prime occasions for GN on-the-job learning interactions, which would have been missed, but they also would have provided insight into GN-doctor interactions and the extent to which these progressed, if at all, over the course of orientation. CWM data shows that only two percent of all interactions occurred with doctors, yet there is no way of knowing if this small percentage was offset by those taking place inside patient rooms or elsewhere,

including off the nursing unit or away from the hospital. There is, however, no research that suggests that this occurs frequently.

4.9 Directions for Future Research: The Healthcare Team

Some of the findings discussed above pose questions for future research. Specifically, the small percentage of interactions with doctors is of interest. Survey data revealed a generally positive perception of the unit as a supportive, unified work place that encouraged the exchange of information. Despite this positive assessment of unit culture, CWM data revealed that only two percent of interactions occurred with doctors, and survey data confirmed that nurses perceived the nurse-doctor relationship as relatively negative compared to other aspects of unit culture. These findings raise the question of whether or not nurses view doctors as part of the unit "team." One factor affecting the relationship might be the type of hospital unit in question. For example, in surgical units, doctors and nurses frequently work together in the operating room, minimizing the physical separation between them. This, coupled with the sheer amount of time they spend together during long procedures, set this type of working environment apart from other units. This is in contrast to the environment of 6N, in which a variety of doctors come and go throughout the day and spend relatively little time with nurses. Given that the 1999 Institute of Medicine report concluded that hospitals need to promote effective team functioning in an effort to improve patient safety, future research should focus on who constitutes the healthcare team, how these teams are perceived by different types of staff, and how these teams and perceptions vary on different types of hospital units. If subsequent research were to indicate that certain types of units foster a more positive relationship between doctors and nurses and a healthier team environment, the challenge going forward would be to determine how to cultivate that particular kind of environment in other types of units.

4.10 Directions for Future Research: Rethinking the CWM Tool Categories

In the future, researchers interested in using the CWM tool as part of their methodology should consider rethinking the organization of the "with whom" category. While analyzing the results of the current study, it became apparent that staff who were less experienced and less knowledgeable were included in the same categories as staff who were highly experienced and knowledgeable.   For example, nursing assistants were coded as "allied health" along with other more skilled and specialized professionals such as nutritionists, care coordinators, physical therapists and so on. Similarly, nursing students were coded as "nurses" even though they were still in nursing school. Had these categories been delineated more specifically, a more accurate representation of nurse interaction could have been obtained. Future researchers should consider creating a category of staff whose level of experience and knowledge is less than or equal to that of the GN. An advantage of this categorization would be the ability to examine how often the GN was on the "giving" end of knowledge transfer interactions with this new category of staff and whether or not the pattern changed over time.

APPENDIX A

Memo Describing Study

Cornell University Research Project:
New Nurse Graduate Study

Who: 2 graduate students, Rosie Adams and Sarah Hammer, from Cornell University will be conducting research for their Master's thesis.

Purpose: To explore ways to reduce the stress and increase the gaining of competencies among new nurse graduates. Specifically, they will be investigating how the design and layout of the nursing unit affects informal communication and learning among new nurse graduates during their orientation period.

What: Rosie and Sarah will be "shadowing" (i.e. following at a distance) new nurse graduates and recording their tasks and interactions on a PDA (Palm Pilot). In no way will the shadowing interfere with the work of the nurses, and all recorded data will remain anonymous.

When: Rosie and Sarah will be collecting data starting January 14th for the duration of the 12-week orientation period. They will be on the units 1-2 days per week for 2-hour shifts, once in the morning and again in the afternoon.

APPENDIX B

Graduate Nurse Consent Form

Informed Consent Form for New Nurse Graduates

Title of Study: The Role of Physical Design of Nursing Units On Informal
Communication and Learning Among New Nurse Graduates

Background/Purpose: You are invited to take part in a Cornell University-Crouse
Hospital research study exploring ways to reduce the stress and increase the gaining of
nursing competencies among new nurse graduates (NNG). Specifically, the purpose
of this study is to learn how the design and layout of hospital physical facilities
influence informal communication, interaction, and learning among new nurse
graduates during the formal orientation process on a medical unit; and to explore the
relationship between such communication patterns and job stress, job satisfaction, and
gaining of nursing competencies. Please read this form carefully and ask any questions
you may have before agreeing to take part in the study.

Procedures: If you agree to be in this study you will be asked to participate in the
following activities during your 3 month orientation period. The time commitment
will be minimal and all data will remain confidential.

- Self obtain daily blood pressure readings using a designated blood pressure machine located
  on your floor each day that you work. During each shift we will ask that you obtain six
  readings daily in the following manner; two consecutive readings taken 5 minutes prior to the
  start of your shift, two consecutive readings following your lunch break, and two consecutive
  readings immediately following the conclusion of your shift for a total of six readings daily.
  This will require that you come to work 10 minutes prior to the start of your shift so as to
  obtain the first set of readings five minutes prior to beginning work. Each reading should take
  approximately 20 seconds resulting in a total of twelve minutes per day.
- Fill out a brief questionnaire three times during the twelve week new nurse formal orientation
  period for a total of three surveys. Survey completion will occur while you are at work and
  should take no more than 20 minutes of your time per survey.
- Participate in brief interviews at your convenience at various times during the research
  observation period. The purpose of the interviews is to better understand the new nurses'
  experience from your perspective. When convenient, we will ask to record the conversations
  using a portable digital recorder. If you decline, no recorder will be used. Transcriptions of
  the recordings will remain confidential in all presentations and reports of the findings.
  Recording interviews simply allows the researcher to focus on what the nurse is saying, rather
  than trying to manually capture the discussion; and to let the nurses' own voices be heard
  (confidentially) in presenting the findings.

Additional data collection methods employed in this study but which require no direct
time or involvement on your part will include:

- Members of the Cornell research team "shadowing" (i.e., following at a distance) new nurse graduates such as yourself a few days a week for two hours at a time during a twelve hour shift while you work, recording the tasks that you perform as well as with whom you interact on a PDA (like a Palm Pilot) programmed for this form of data collection. In no way will the shadowing interfere with your work, and all recorded data will remain confidential.
- An evaluation of the physical qualities (e.g., the design, layout) of your work setting such as the nurse station, break and lounge areas, and even the general building itself so that we can better understand and describe the physical setting in which you work.
- Access to the initial self-assessment form and weekly evaluation sheets (completed jointly by both yourself and your preceptor), which are both components of the regular orientation program. As with all other data collected, this information will be kept strictly confidential and confidential in all presentation and reports of the study.

Voluntary Participation: Your participation in this study is entirely voluntary and you may refuse to participate in part or all of the study, or discontinue participation at any time without penalty. Your decision about whether or not you participate in the study will not affect your current or future relationship with Cornell University or Crouse Hospital.

Risks and Benefits: We do not anticipate any risks to you participating in this study other than those encountered in the day-to-day routine of a new nurse.

There are no direct benefits to you other than that of contributing to the scientific knowledge in this field. The degree of stress experienced by new nurses is well documented and we hope to better understand how multiple factors in the work environment of new nurse graduates contribute to their health and well being. We do expect that the results of this research will contribute to the growing body of knowledge of evidence-based design that is helping transform hospital design.

Alternatives:
1. If you decide that you don't want to participate in certain aspects of the study you may still participate in the aspects of the study for which you provide consent.
2. If, at any point during the study, you decide to withdraw from part of the study, you can continue with the remaining aspects of the study as originally planned.

Costs/Payments: As partial compensation for your time, we will offer you a $50 gift certificate at the Carousel Mall for completion of the blood pressure and survey components of the data collection. Additionally, you will receive seven $2 vouchers to be used at the Crouse cafeteria. We will also provide you a summary of our study results when the project is completed. There will be no costs to your for participating.

Confidentiality. The records of this study will be kept private. We will assign an ID number to each participant, so that we can relate different sources of data collected (e.g., interaction data and survey responses) to each other. The list linking the ID number to names will be seen only by the Cornell research team and will be kept in a locked file cabinet at Cornell University. In any presentation or report of the study

findings we make public we will not include any information that will make it possible to identify you. In no cases will actual recordings of voice be used. Crouse Hospital will not have access to any individual's data collected by the Cornell Team (i.e., survey data, interaction data, blood pressure data, and interview data). Research records will be kept in a locked file in the research team's offices at Cornell University. Only the researchers will have access to the records.

You may change your mind and take back this authorization at any time by writing to Professor Franklin Becker (see below). If you do this you will no longer be able to participate in the research. However, even if you take back this authorization, the information already obtained may be used and shared as permitted by this Informed Consent.

Questions: The Principal Investigator for this study is Franklin Becker, Professor of Design & Environmental Analysis, Cornell University. Please ask any questions you have now. If you have questions later, you may contact Professor Becker at fdb2@cornell.edu or at 607.255.1950. If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Cornell Institutional Review Board for Human Participants (IRB) at 607.255.5138 or irbhp@cornell.edu or access their website at http://www.irb.cornell.edu. This project has also been reviewed and approved by the Crouse Institutional Review Board (IRB).

You will be given a copy of this form to keep for your records.

Consent to participate in research: I have read the above information, and have received answers to any questions I asked. I consent to take part in the study.

_____   _____

Signature of subject   Date

Consent to audio record interview _____

Exceptions to consent (if applicable):_____

_____

___

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_____   _____
Signature of person obtaining consent   Date

IRB Approval: IRB Expiration:

This form will be kept by the researcher for at least 3 years beyond the end of the study and was approved by the Cornell IRB on _____.

APPENDIX C

Staff Consent Form

Informed Consent Form for Staff

Title of Study: The Role of Physical Design and Informal Communication and Learning in Reducing Stress and Gaining Competency Among New Nurse Graduates

Background/Purpose: You are invited to take part in a Cornell University-Crouse Hospital research study exploring ways to reduce the stress and increase the gaining of nursing competencies among new nurse graduates (NNG). Specifically, the purpose of this study is to learn how the design and layout of hospital facilities influence informal communication, interaction, and learning among new nurse graduates during the formal orientation process on a medical unit; and to explore the relationship between such communication patterns and job stress and the gaining of nursing competencies. Please read this form carefully and ask any questions you may have before agreeing to take part in the study.

Procedures: If you agree to be in this study you will be asked to participate in the following activities during the 3 month new nurse orientation period. The time commitment will be minimal and all data will remain anonymous.

- Fill out a brief questionnaire three times during the twelve week new nurse formal orientation period for a total of three surveys. Survey completion will occur while you are at work and should take no more than 20 minutes of your time per survey.
- Participate in brief interviews at your convenience at various times during the research observation period. The purpose of the interviews is to better understand the new nurses' experience from your perspective. When convenient, we will ask to record the conversations using a portable digital recorder. If you decline, no recorder will be used. Transcriptions of the recordings will remain anonymous in all presentations and reports of the findings. Recording interviews simply allows the researcher to focus on what the nurse is saying, rather than trying to manually capture the discussion; and to let the nurses' own voices be heard (anonymously) in presenting the findings.

Additional data collection methods employed in this study but which require no direct time or involvement on your part will include:

- Members of the Cornell research team "shadowing" (i.e. following at a distance) new nurse graduates to track type, duration, and location of interactions with other staff (such as yourself) using a Palm Pilot programmed for this form of data collection. In no way will the shadowing interfere with your work, and all recorded data will remain anonymous.
- An evaluation of the physical qualities (e.g., the design, layout) of your work setting such as the nurse station, break and lounge areas, and even the general building itself so that we can better understand and describe the physical setting in which you work.

Voluntary Participation: Your participation in this study is entirely voluntary and you may refuse to participate in part or all of the study, or discontinue participation at any time without penalty. Your decision about whether or not you participate in the study will not affect your current or future relationship with Cornell University or Crouse Hospital.

Risks and Benefits: We do not anticipate any risks to you participating in this study other than those encountered in the day-to-day routine of a new nurse.

There are no direct benefits to you other than that of contributing to the scientific knowledge in this field. The degree of stress experienced by new nurses is well documented and we hope to better understand how multiple factors in the work environment of new nurse graduates contribute to their health and well being. We do expect that the results of this research will contribute to the growing body of knowledge of evidence-based design that is helping transform hospital design.

Alternatives:
3. If you decide that you don't want to participate in certain aspects of the study you may still participate in the aspects of the study for which you provide consent.
4. If, at any point during the study, you decide to withdraw from part of the study, you will continue with the remaining aspects of the study as originally planned.

Costs/Payments: There will be no payment for your participation, and there will be no costs to you for participating.

Confidentiality. The records of this study will be kept private. In any presentation or report of the study findings we make public we will not include any information that will make it possible to identify you. Crouse Hospital will not have access to any individual's data collected by the Cornell Team (ie., survey data, interaction data, blood pressure data, interview data). Research records will be kept in a locked file in the research team's offices at Cornell University. Only the researchers will have access to the records.

You may change your mind and take back this authorization at any time by writing to Professor Franklin Becker (see below). If you do this you will no longer be able to participate in the research. However, even if you take back this authorization, the information already obtained may be used and shared as permitted by this Informed Consent.

Questions: The Principal Investigator for this study is Franklin Becker, Professor of Design & Environmental Analysis, Cornell University. Please ask any questions you have now. If you have questions later, you may contact Professor Becker at fdb2@cornell.edu or at 607.255.1950. If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Cornell University

Committee on Human Subjects (UCHS) at 607-255-5138 or access their website at http://www.osp.cornell.edu/Compliance/UCHS/homepageUCHS.htm. This project has also been reviewed and approved by the Crouse Institutional Review Board (IRB).

You will be given a copy of this form to keep for your records.

Consent to participate in research: I have read the above information, and have received answers to any questions I asked. I consent to take part in the study.

_____ _____
Signature of subject   Date

Exceptions to consent (if applicable):_____
_____
__

_____ _____
Signature of person obtaining consent   Date

UCHS Approval: UCHS Expiration:

APPENDIX D

Modified CWM Tool Categories

<u>Modified Categories for the Clinical Work Measurement Tool</u>

Interaction/Communication Categories

1. Working *independently* to provide patient care, in *patient room*
2. Working with *other staff* to provide patient care, in *patient room*
3. Non-interactive
4. Interactive -Social
5. Interactive - Work
   a. **Administrative**
   b. **Being Taught**
   c. **Seeking Assistance**
   d. **Seeking Advice**
   e. **Discussing Patient Care**
   f. **Validation**
   g. **Providing Assistance**
   h. **Providing Advice**
   i. **Other**

With Whom Categories

1. Patient
2. Visitor
3. Doctor
4. Nurse
5. Allied Health
6. Preceptor
7. Graduate Nurse
8. No-one

Location Categories

1. Backstage
2. Med room
3. Corridor
4. Nurses' Station
5. Charge Nurse Desk
6. Break Room

APPENDIX E

Complete Survey as Administered

New Graduate Nurse Workplace Survey

This survey is one of several methods being used to collect data as part of the study on "The Role of Physical Design and Informal Communication and Learning in Reducing Stress and Gaining Competency among New Nurse Graduates". The only people who will see completed surveys are members of the Cornell research team. No names will appear anywhere in any reported data analysis, publications, or reports. All data will be reported at an aggregate level, with no personal identifying information. All participation is voluntary. The goal of the study is to improve the design of health care facilities for staff, patients, and visitors. If you have any questions, please contact,

Michele Kosinski
Principal Investigator
Director Emergency Services, Critical Care and Prompt Care
Crouse Hospital
e: MicheleKosinski@crouse.org
t: 470.7959

Thank you very much for your participation. It is greatly appreciated.

Please indicate, to what extent you *agree* or *disagree* with the following statements according to your experience

		Strongly Disagree						Strongly Agree
1	I feel comfortable approaching nurses on my unit for help or advice	1	2	3	4	5	6	7
2	I frequently collaborate with nurses on my unit to come up with mutually acceptable decisions	1	2	3	4	5	6	7
3	I exchange information/ideas frequently with nurses through face-to-face communication	1	2	3	4	5	6	7
4	The process of trial and error is an aid to my learning	1	2	3	4	5	6	7
5	There is effective teamwork and collaboration between different levels of the nursing staff	1	2	3	4	5	6	7
6	I know who to approach when I need specific help or advice on a clinical issue	1	2	3	4	5	6	7
7	Physicians and nurses on my unit have a good working relationship	1	2	3	4	5	6	7
8	New and innovative ideas about patient care are encouraged on my unit	1	2	3	4	5	6	7
9	Nurses on my unit often share their learning experiences with each other	1	2	3	4	5	6	7
10	Nurses on my unit share knowledge and expertise with one another	1	2	3	4	5	6	7
11	Nurses on my unit who learn new skills are rewarded	1	2	3	4	5	6	7
12	There is a strong climate of trust within my unit	1	2	3	4	5	6	7
13	I am satisfied with what I have learned since joining this unit	1	2	3	4	5	6	7
14	Other nurses on my unit ask me what I feel I need to learn to do my job more effectively	1	2	3	4	5	6	7
15	A feeling of unity exists within my unit	1	2	3	4	5	6	7

16	Nurses on my unit work with me to solve problems	1	2	3	4	5	6	7
17	Everyday work activities are aids to my learning	1	2	3	4	5	6	7
18	Nurses on my unit are given opportunities to take on challenging tasks	1	2	3	4	5	6	7
19	Nurses on my unit provide on-the-job training when I need it	1	2	3	4	5	6	7
20	Nurses on my unit often take time to figure out ways to improve how work is done	1	2	3	4	5	6	7
21	Nurses on my unit are aids to my learning	1	2	3	4	5	6	7
22	Nurses on my unit provide constructive feedback on my performance	1	2	3	4	5	6	7
23	Doctors show respect for the skills and knowledge of the nurses on my unit	1	2	3	4	5	6	7
24	Nurses on my unit all pitch in when we need extra help	1	2	3	4	5	6	7
25	Nurses on my unit tolerate mistakes when someone is learning a new task or skill	1	2	3	4	5	6	7
26	On-the-job training is an aid to my learning	1	2	3	4	5	6	7
27	Nurses on my unit are friendly and outgoing	1	2	3	4	5	6	7
28	Observing and listening are aids to my learning	1	2	3	4	5	6	7
29	I am satisfied with my personal development since joining this unit	1	2	3	4	5	6	7
30	I feel well-informed about the current activities on my unit	1	2	3	4	5	6	7
31	My training in this unit didn't cover the basics I need to know	1	2	3	4	5	6	7
32	There is little encouragement to learn new skills	1	2	3	4	5	6	7

	How *often*, on your present unit, have you found the following situations to be *stressful*?	Never (1)	Occasionally (2)	Frequently (3)	Very Frequently (4)
1	Breakdown of computer	N	O	F	VF
2	Criticism of physician	N	O	F	VF
3	Performing procedures that patients experience as painful	N	O	F	VF
4	Feeling helpless in the case of a patient who fails to improve	N	O	F	VF
5	Conflict with supervisor	N	O	F	VF
6	Listening or talking to a patient about his/her approaching death	N	O	F	VF
7	Lack of an opportunity to talk openly with other unit personnel about problems on the unit	N	O	F	VF
8	The death of a patient	N	O	F	VF
9	Conflict with a physician	N	O	F	VF
10	Fear of making a mistake in treating a patient	N	O	F	VF
11	Lack of an opportunity to share experiences and feelings with other personnel on the unit	N	O	F	VF
12	The death of a patient with whom you developed a close friendship	N	O	F	VF
13	Physician not being present when a patient dies	N	O	F	VF
14	Disagreement concerning the treatment of a patient	N	O	F	VF
15	Feeling inadequately prepared to help with the emotional needs of a patient's family	N	O	F	VF
16	Lack of an opportunity to express to other personnel on the unit my negative feelings toward patients	N	O	F	VF
17	Inadequate information from a physician regarding the medical condition of a patient	N	O	F	VF
18	Being asked a question by a patient for which I do not have a satisfactory answer	N	O	F	VF
19	Making a decision concerning a patient when the physician is unavailable	N	O	F	VF
20	Floating to other units that are short-staffed	N	O	F	VF
21	Watching a patient suffer	N	O	F	VF
22	Difficulty in working with a particular nurse (or nurses) outside the unit	N	O	F	VF
23	Feeling inadequately prepared to help with the emotional needs of a patient	N	O	F	VF
24	Criticism by a supervisor	N	O	F	VF
25	Unpredictable staffing and scheduling	N	O	F	VF
26	A physician ordering what appears to be inappropriate treatment for a patient	N	O	F	VF

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27	Too many non-nursing tasks required, such as clerical work	N	O	F	VF
28	Not enough time to provide emotional support to a patient	N	O	F	VF
29	Difficulty in working with a particular nurse (or nurses) on the unit	N	O	F	VF
30	Not enough time to complete all of my nursing tasks	N	O	F	VF
31	A physician not being present in a medical emergency	N	O	F	VF
32	Not knowing what a patient or a patient's family ought to be told about the patient's condition and its treatment	N	O	F	VF
33	Uncertainty regarding the operation and functioning of specialized equipment	N	O	F	VF
34	Not enough staff to adequatly cover the unit	N	O	F	VF

APPENDIX F

Survey Items Pertaining to Stress

How _often_, on your present unit, have you found the following situations to be _stressful_?

		Never	Occasionally	Frequently	Very Frequently
1	Breakdown of computer				
2	Criticism of physician				
3	Performing procedures that patients experience as painful				
4	Feeling helpless in the case of a patient who fails to improve				
5	Conflict with supervisor				
6	Listening or talking to a patient about his/her approaching death				
7	Lack of an opportunity to talk openly with other unit personnel about problems on the unit				
8	The death of a patient				
9	Conflict with a physician				
10	Fear of making a mistake in treating a patient				
11	Lack of an opportunity to share experiences and feelings with other personnel on the unit				
12	The death of a patient with whom you developed a close friendship				
13	Physician not being present when a patient dies				
14	Disagreement concerning the treatment of a patient				
15	Feeling inadequately prepared to help with the emotional needs of a patient's family				
16	Lack of an opportunity to express to other personnel on the unit my negative feelings toward patients				
17	Inadequate information from a physician regarding the medical condition of a patient				
18	Being asked a question by a patient for which I do not have a satisfactory answer				
19	Making a decision concerning a patient when the physician is unavailable				
20	Floating to other units that are short-staffed				
21	Watching a patient suffer				
22	Difficulty in working with a particular nurse (or nurses) outside the unit				
23	Feeling inadequately prepared to help with the emotional needs of a patient				
24	Criticism by a nurse				
25	Unpredictable staffing and scheduling				
26	A physician ordering what appears to be inappropriate treatment for a patient				
27	Too many non-nursing taks required, such as clerical work				
28	Not enough time to provide emotional support to a patient				
29	Difficulty in working with a particular nurse (or nurses) on the unit				
30	Not enough time to complete all of my nursing tasks				
31	A physician not being present in a medical emergency				
32	Not knowing what a patient or a patient's family ought to be told about the patient's condition and its treatment				
33	Uncertainty regarding the operation and functioning of specialized equipment				
34	Not enough staff to adequately cover the unit				

APPENDIX G

Survey Items Pertaining to Informal Learning Opportunities

Please indicate, to what extent you *agree* or *disagree* with the following statements according to your experience.

		Strongly Disagree						Strongly Agree
		1	2	3	4	5	6	7
1	I feel comfortable approaching nurses for help							
2	I frequently colaborate with nurses on my unit							
3	I exchange info through face-to-face communication							
4	Trial and error is an aid to my learning							
5	I know who to approach when I need help							
6	I am satisfied with what I have learned							
7	Nurses ask me what I feel I need to learn							
8	Nurses on my unit work with me to solve problems							
9	Everyday learning activities are aids to my learning							
10	Nurses on my unit can take on challenging tasks							
11	Nurses on my unit provide on-the-job training							
12	Nurses on my unit are aids to my learning							
13	Nurses on my unit provide constructive feedback							
14	On-the-job training is an aid to my learning							
15	Observing and listening are aids to my learning							
16	I am satisfied with my personal development							
17	My training in this unit covered the basics I need to know							

APPENDIX H

Survey Items Pertaining to Culture

Please indicate, to what extent you _agree_ or _disagree_ with the following statements according to your experience.

		Strongly Disagree						Strongly Agree
		1	2	3	4	5	6	7
1	There is effective teamwork and collaboration							
2	Physicians and nurses have a good relationship							
3	New ideas about patient care are encouraged							
4	Nurses often share their learning experiences							
5	Nurses share knowledge and expertise							
6	Nurses who learn new skills are rewarded							
7	There is a strong climate of trust							
8	A feeling of unity exists within my unit							
9	Nurses take time to figure out ways to improve work							
10	Doctors show respect for nurses							
11	Nurses all pitch in when we need extra help							
12	Nurses tolerate mistakes during learning							
13	Nurses on my unit are friendly							
14	I feel well-informed							
15	There is encouragement to learn new skills							

APPENDIX I

Blood Pressure Recording Sheet

DAILY BLOOD PRESSURE READINGS

Participant ID: 1

Reading	DATE		A.M. READINGS			NOON READINGS			P.M. READINGS	
			First	Second		First	Second		First	Second
1										
2										
3										
4										
5										
6										
7										
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APPENDIX J

Competency Evaluation Forms

New Nurse Graduate Orientation
Skill Set Evaluation

Please use the provided scale to rate the orientee's competency in the following skills:
Check the appropriate number

	Novice		Advanced Beginner		Competent		Proficient			Expert
1. **Unit rounds - Multidisciplinary rounds**	1	2	3	4	5	6	7	8	9	10
2. **Report & Handoff -change of shift/transfer**	1	2	3	4	5	6	7	8	9	10
3. **Medications - administration process**	1	2	3	4	5	6	7	8	9	10
4. **Computer**										
a. Patient Education - care notes	1	2	3	4	5	6	7	8	9	10
b. Labs & Test Results- Net access	1	2	3	4	5	6	7	8	9	10
c. Policy & Procedure -locating, and using	1	2	3	4	5	6	7	8	9	10
5. **Discharge -** process	1	2	3	4	5	6	7	8	9	10
6. **Admission -** process	1	2	3	4	5	6	7	8	9	10
7. **Independence** (on assignments)	1	2	3	4	5	6	7	8	9	10
8. **Prioritization**	1	2	3	4	5	6	7	8	9	10
9. **Time Management**	1	2	3	4	5	6	7	8	9	10
10. **Critical Thinking**	1	2	3	4	5	6	7	8	9	10
11. **Delegation & Follow Through**	1	2	3	4	5	6	7	8	9	10
12. **Care Plan-** Identifying appropriately	1	2	3	4	5	6	7	8	9	10
13. **Identifying & Utilizing Resources**	1	2	3	4	5	6	7	8	9	10
14. **Documentation**	1	2	3	4	5	6	7	8	9	10
15. **Communication**										
a. Family & Patients	1	2	3	4	5	6	7	8	9	10
b. With co-workers	1	2	3	4	5	6	7	8	9	10

APPENDIX K

Competency Category Definitions

Competency Category Definitions

1. Unit Rounds

  - o *Novice* – answers questions about the patient

  - o *Expert* – explains patients' medical needs and diagnoses, nursing care relating to discharge; able to identify other disciplines that need to be consulted prior to patient discharge; able to follow up on patient care needs that are identified on rounds; able to facilitate rounds without need for prompting

2. Report and Handoff

  - o *Novice* – repeats what was heard at the beginning of own shift during handoff and states any major changes

  - o *Expert* – doesn't merely repeat info but also identifies key issues that need further assessment or follow up

3. Medications

  - o *Novice* – gives medications on time, but slow; needs to be prompted to check for drug interactions

  - o *Expert* – administers medication on time; checks for negative reactions/drug interactions without prompting; checks for appropriateness of a drug based on patient condition; educates patient on self-administration of medication; questions physician or pharmacy if medication is thought to be inappropriate in type or amount

4. Computer: Patient Education

  - o *Novice* – accesses Care Notes (web-based patient education program) and searches for a topic

  - o *Expert* – proactively gathers info for patients; uses discretion regarding the type and form of information given based on individual patient needs and competencies.

5. Computer: Labs and Test Results

  - o *Novice* – accesses Net Access, looks at labs and write down info

o **Expert** – interprets labs; consults physician when labs are abnormal; recognizes patterns in labs that signify changes in patient condition; correlates patient's physical symptoms to the labs that correspond to those symptoms

6. Computer: Policy and Procedure

o **Novice** – accesses Crouse's internal search engine to look up policies and procedures (dictates what a nurse can and can't do and should and shouldn't do)

o **Expert** – questions policies and procedures when it might not be appropriate for a given situation (based on their clinical expertise) and brings it to the attention of the appropriate staff member; violates policies if based on a matter of patient safety

7. Discharge

o **Novice** – accomplishes the task; reviews discharge docs; removes IV

o **Expert** – assesses patient safety; verifies that patient understands medications, instructions, and makes sure they're going home to an appropriate environment; verifies that patient is going home with proper supplies (cane, nebulizer, etc); prepares patient for discharge from the time of admission; works with family, not just patient, during the process

8. Admission

o **Novice** – gets patient into the bed, starts physician's orders, checks vitals

o **Expert** – makes sure medications are consistent with what they're taking at home; understands diagnosis and sets room up in advance (proper equipment); examines psychosocial issues and works with family (may have to stop normal work tasks to do this); charts out course of hospitalization for the patient (tests, duration of stay, when physician will see patient)

9. Independence

o **Novice** – needs someone to tell them what to do at all times

o *Expert* – needs no input from orientor; approaches orientor when they have never performed a task and suggests a way to proceed versus having no plan

10. Prioritization

o *Novice* – needs to be told what to do first (which task, which patient to see first); often will perform tasks in systematic order instead of prioritizing

o *Expert* – decides who is the most critically ill patient at that time and can modify as day goes on and as patient status changes; recognizes when multiple patients/tasks are equally important and can delegate

11. Time Management

o *Novice* – often fails to complete tasks on time; tends to stay late beyond shift; often needs someone else to step in so that work will get completed

o *Expert* – completes routine tasks on time; adjusts when patient conditions change, but manages to stay on time with tasks; has time for break, has time for other tasks (patient education, time to discuss psychosocial aspects with patients/family)

12. Critical Thinking

o *Novice* – performs little critical thinking because of lack of experiential knowledge; tends not to think critically because of being so focused on the task at hand

o *Expert* – draws from experiential and theoretical knowledge and relates current situations to situations that they've seen before and develops a hypothesis for what they think is going on

13. Delegation & Follow through

o *Novice* – fails to recognize when delegation is needed; lacks knowledge on how to delegate

o *Expert* – recognizes when delegation is needed (not necessarily when they're very busy); has mastered the social skills needed to

delegate (using the right words when delegating so that person feels important and not like they're being ordered around); follows through to ensure that the task was completed; recognizes that they're ultimately responsible for the task; deals effectively with the person they delegated the task to

14. Care Plan

- o *Novice* – identifies the main problems with the patient

- o *Expert* – plans for potential or future needs (needs associated with the main problem that may potentially arise)

15. Identifying and Utilizing Resources

- o *Novice* – often overwhelmed and fails to identify who they should ask for help

- o *Expert* – recognizes when they're overwhelmed; knows when something is outside their realm of knowledge and knows who to approach; knows who to contact, know who "back-up" people are if main contacts are unavailable; utilizes other appropriate sources of info such as internet

16. Documentation

- o *Novice* – documents what they're told to document

- o *Expert* – writes a note that will explain in more detail about a focused area and report what was done and not done; gives a narrative of what was done, not just the basics

17. Communication: Family and Patient

- o *Novice* – often so focused on tasks that they don't have the ability to pick up on subtle cues from family or patient about what the patient really needs/wants; lacks skill in dealing with irate or upset patients

- o *Expert* – picks up on subtle cues; asks patient what his/her goals are for the day; completes tasks as if they're second nature while also communicating with patient, which is the main priority

18. Communication: Co-workers

- o *Novice* – often timid or hesitant to talk to co-workers; lacks knowledge regarding what kind of info to communicate; fails to gather all the info before talking to the physician/allied health

- o *Expert* – Approaches co-workers with relevant and appropriate information and questions

APPENDIX L

Interview Guides

Interview Guide – Graduate Nurse

Learning:
1. At the beginning of orientation, with what skills did you feel most competent? Least competent? How did this change during the course of your orientation?
2. We're interested in how the design and layout of the unit affects on-the-job learning and communication with other RNs and doctors. By that I mean how the design affects how often and where you interact with others for certain types of communication and discuss certain things. I'm asking this because people often learn "on the job" from informally talking with others and asking questions.
   a. Is there anything about the design of the unit that would make it more or less likely to ask for or offer information, knowledge or experience?
   b. Is there anything about the culture of the unit that would make it more or less likely to ask for or offer information, knowledge or experience?
   c. What do you think were the greatest aids to increasing your competency and confidence? What was detrimental?

Verification and advice:

1. I noticed that you often asked another nurse (RN, Orientor, GN) to verify your medication. Can you tell me about that process? For example, was it required that you do that with certain medications or is it just something that some nurses do?
2. I noticed that there wasn't a lot of work-related guidance or educational communication between you and your Orientor during the times that I shadowed you. So when, if at all, and where did you communicate in this way? Did you seek out just any RN when you had a question or if you needed verification? Or did you and your Orientor communicate in this way on Fridays when the two of you went through your orientation binder?

Stress:
1. During your regular shift, what did you find to be the most stressful? How did you deal with those stressful situations?
   a. Did the layout or design of the unit affect your stress level and your ability to deal with those situations? If so, how?
   b. Did the culture of the unit affect your stress level and your ability to deal with those situations? If so, how?
   c. Did your relationship with your Orientor affect your stress level and your ability to deal with those situations? If so, how?
   d. Did staffing levels affect the amount of stress you experienced? If yes, how so?
2. Has the change in Nurse Manager had an affect on the stress level of the unit? If so, in what way?

3. Does the current patient:nurse ratio have an affect on the stress level of the unit? If so, in what way?

4. 6N is known to be a very busy, noisy, sometimes hectic unit. How does this environment affect your stress level?

Space/Layout:

1. I noticed that you often document in the hallway just outside of patient rooms. Often the only surface you have to write on is the top of the trash bin. Does this bother you? Do you wish you had a dedicated surface for that purpose?
2. How do you think the physical layout affects teamwork among staff members?
3. Are there certain locations within the unit that you feel more comfortable approaching a doctor to discuss patient care?
4. I noticed that while attending to a patient, you often had to run to the supply room. How did this affect your ability to provide optimum patient care? How could the design of the unit be changed to better accommodate you while attending to the patient?
5. I noticed that social interaction often takes place in the med room. Do you agree? If so, can you tell me why you think that is?
6. Does the social interaction that takes place in the med room ever impact your ability to concentrate or dispense meds?
7. 6N is known to be a very busy, noisy, sometimes hectic unit. Where do you go if you need a quiet place to concentrate or focus on a task?
8. You mentioned to me that the small space between the nurses' station and the med room is a poorly designed area that is a source of frustration. Can you tell me more about that?
9. What is it about 6N that makes it such a busy, noisy, hectic unit? Do you have any ideas as to what causes such a difference between 6N and other units, say 4S?
10. If you could change aspects of the layout or physical design of your unit that would improve your work experience (communication, efficiency, walking time, etc), what would you change?

Technology:

1. What are the computers used for by both nurses and doctors?
2. When there are problems with a computer, is there an IT support service?
    a. If so, how effective is it?

3. When was the Hill-Rom system implemented?
    a. Was there training for the system?
    b. How effective is it?
    c. Do you use it? How often?

4. How long has this unit been using the Pyxis for medication?
    a. How effective is it?
    b. Is there a tech support service for the Pyxis?

<u>Interview Guide - Orientor</u>

Learning:
3. We're interested in how the design and layout of the unit affects on-the-job learning and communication with other RNs and doctors. By that I mean how the design affects how often and where you interact with others for certain types of communication and discuss certain things. I'm asking this because people often learn "on the job" from informally talking with others and asking questions.

    a. Where was the best place to talk about X with 1) other RNs; 2) Drs; 3) AH
        i. specific procedures you were not sure about

        ii. verification of medications

        iii. patient care plan/patient status

        iv. socializing/emotionally venting

        v. teaching or providing advice

    b. Is there anything about the design of the unit – its size, layout, adjacencies of equipment and different rooms - that make it more or less likely to ask for or offer information, knowledge or experience?

        -offering advice, guidance, or correcting a GN?

    c. Were you ever uncomfortable discussing certain issues because there was no appropriate place to do so?

    d. Is there anything about the culture – formal or informal values/expectations - of the unit that would make it more or less likely to ask for or offer information, knowledge or experience?

    e. What do you think were the greatest aids for helping your GN gain competency and confidence? What was detrimental?

Space/Layout:

11. How do you think the physical layout (the kind of space available and how it is organized and designed) affects teamwork among staff members?

12. I noticed that social interaction often takes place in the med room. Do you agree? If so, can you tell me why you think that is?

13. Does the social interaction that takes place in the med room ever impact your ability to concentrate or dispense meds?

14. 6N is known to be a very busy, noisy, sometimes hectic unit. Where do you go if you need a quiet place to concentrate or focus on a task?

15. You mentioned to me that the small space between the nurses' station and the med room is a poorly designed area that is a source of frustration. Can you tell me more about that?

16. What is it about 6N that makes it such a busy, noisy, hectic unit? Do you have any ideas as to what causes such a difference between 6N and other units, say 4S?

17. If you could change aspects of the layout or physical design of your unit that would improve your work experience (communication, efficiency, walking time, etc), what would you change?

Verification and advice:
3. What is your role as the "orientor" of the GN? What does this mean? Do you offer guidance or assist her more than other RNs? Is she required to report to you about anything? Do you go through the orientation binders on a weekly basis?

Stress:
5. During your regular shift, what did you find to be the most stressful? How did you deal with those stressful situations?

   a. Did the layout or design of the unit affect your stress level and your ability to deal with those situations? If so, how?

   b. Did the culture (social and professional relations among the people working on the floor and how people generally interact and communicate) of the unit affect your stress level and your ability to deal with those situations? If so, how?

     c. Did staffing levels affect the amount of stress you experienced? If yes, how so?

6. Has the change in Nurse Manager had an affect on the stress level of the unit? If so, in what way?

7. Does the current patient:nurse ratio have an affect on the stress level of the unit? If so, in what way?

8. 6N is known to be a very busy, noisy, sometimes hectic unit. How does this environment affect your stress level?

Technology:

5. What are the computers used for by both nurses and doctors?
6. When there are problems with a computer, is there an IT support service?
     a. If so, how effective is it?

7. When was the Hill-Rom system implemented?
     a. Was there training for the system?
     b. How effective is it?
     c. Do you use it? How often?

8. How long has this unit been using the Pyxis for medication?
     a. How effective is it?
     b. Is there a tech support service for the Pyxis?

Interview Guide - Nurse Manager

Staffing
1. When did you start working as the Nurse Manger for this unit?
    a. Did you have prior experience as a Nurse Manager?
    b. What are your primary roles and responsibilities as a Nurse Manager?
    c. What was most challenging about taking on this position?

2. Have there been any other changes in staffing in the past 6 months, such as different types of staff or staff turnover?

3. How far ahead is the schedule planned?
    a. Once the schedule is set, are there changes made? If so, to what degree?

4. How often are nurses floated from this unit, or onto this unit?

5. What general categories of AH are there, such as dietician, physical therapy?
    a. How are their schedules coordinated and integrated into the unit?
    b. Ease of contacting AH when not on unit?

6. What general categories of doctors are there, such as specialty, employer etc?
    a. How are their schedules coordinated and integrated into the unit?
    b. How frequently are they on the unit?
    c. Ease of contacting doctors when not on unit?

7. Among the nurses, what is the hierarchy of experience?
    a. Where does the Orientor fall?

8. How would you describe the relationship between the nursing staff and
    a. The AH
    b. The doctors
    c. Each other

Patients
1. Are patient beds generally full?
    a. If yes, how often are there patients waiting to enter onto this unit?

2. What RN:patient ratio does this unit strive for? Is this usually met?

3. NP/PA:patient ratio?

4. Doctor:patient ratio?

5. What unique challenges do staff face on this unit, in dealing with med surge patients?

Information
1. How are various patient records and recommendations from doctors, nurses and AH coordinated and shared?
    a. How effectively do these approaches work?

2. How are you, as the Nurse Manager, informed of hospital-wide events or changes?
    a. How effective are these approaches?

3. How are you, as the Nurse Manager, informed of challenges, changes, or suggestions pertaining to the unit?
    a. How effectively does this occur?

4. How are staff informed of events, activities or changes pertaining to both the unit and the hospital at large?
    a. How effective are these approaches?

5. Are there educational classes available to nursing staff at Crouse?
    a. If so, are nurses encouraged to participate in such classes?
    b. Would their participation be recognized by the unit?

Technology
1. What are the computers used for by both nurses and doctors?

2. When there are problems with a computer, is there an IT support service?
    a. If so, how effective is it?

3. When was the Hill-Rom system implemented?
    a. Was there training for the system?
    b. How effective is it?

4. How long has this unit been using the Pyxis for medications?
    a. How effective is it?
    b. Is there a tech support service for the Pyxis?

Final question: Did you feel adequately informed about our research? What could we have done differently to better inform? Make staff feel more comfortable?

APPENDIX M

CWM Tool Task Category Definitions

CWM Tool Task Category Definitions

PATIENT
- In patient room alone

PATIENT INTERACTIVE
- In patient room with at least one other person i.e. visitor, doctor, other nurse.

NON-INTERACTIVE
- Any task done along

SOCIAL
- Any interaction that is not work-related
    - EXCEPTION: Venting about work-related experience, such as complaining or expressing frustration

WORK INTERACTIVE
1. Administrative
    - Any activity which relates to the functioning of the ward in general, including organization of staff and resources, i.e. staff meetings, bed allocation, staff coordination, scheduling

2. Being Taught
    - Actively being taught new skills or information; initiated deliberately by other staff member.

3. Seeking Assistance
    - Seeking assistance with procedures, equipment, data entry, locating people or items
        - NOTE: Does not refer to lack of skill or knowledge

4. Seeking Advice
    - Seeking advice or guidance when there is a lack of skill or clinical knowledge
        - EXAMPLE: Asking how to do a procedure or administer a medication

5. Discussing Patient Care
    - Discussing information with another caregiver or visitor regarding patient status or care plan

6. Providing Assistance
    - Providing assistance with procedures, equipment, data entry, locating people or items.
        - NOTE: Does not refer to lack of skill or knowledge

7. Providing Advice
    - Providing advice or guidance when there is a lack of skill or clinical knowledge

8. Validation
    - Verifying the accuracy or appropriateness of a decision, procedure, care plan, strategy or approach.

9. Other

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