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Nursing Practice as Knowledge Work Within a Clinical Microsystem: A Dissertation

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"Nursing Practice as Knowledge Work within a Clinical Microsystem"

A Dissertation Presented

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Dedication

I dedicate this work to my parents, Don and Nancy LaFave, who have loved, believed in, and encouraged me throughout my life. And to my husband Mark Cowdrey, without whose love and support this endeavor would have been impossible.

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ABSTRACT

Nursing Practice as Knowledge Work within a Clinical Microsystem

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Nurses have a key role in keeping patients safe from medical errors because they work at the point of care where most errors occur. Nursing work at the intersection of patients and health care systems requires high levels of cognitive activity to anticipate potential problems and effectively respond to rapidly evolving and potentially harmful situations. The literature describes nursing work at the intersection of patient and health care system as well as barriers to providing safe patient care. However, little is known about the systems knowledge nurses use to negotiate the health care system on their patients' behalf, or how this systems information is exchanged between nurses.

Using the clinical microsystem as the conceptual framework, this qualitative descriptive investigation identified and described: 1) the components of systems knowledge needed by nurses, 2) how systems information is exchanged between nurses, and 3) systems information exchanged between staff nurses and travel nurses. Data were collected from a stratified maximum variation sample of 18 nurse leaders, staff nurses, and travel nurses working within a high-functioning neonatal intensive care nursery within a large academic medical center in New England. Data collection methods included participant observation, document review, individual interviews, and a focus group session. Data were analyzed

through constant comparison for emerging themes and patterns. Findings were compared for commonalities and differences within and across groups.

Three components of systems knowledge emerged: structural, operational, and relational. Systems information exchange occurred through direct and indirect means. Direct means included formal and informal mechanisms. The formal mechanism of orientation was identified by each participant. Informal mechanisms such as peer teaching, problem solving, and modeling behaviors were identified by participants from each of the three nurse groups. Travel nurses' descriptions of the common themes focused on individual efficacy. Staff nurses focused on fostering smooth unit functioning. Nurse leaders described common themes from a perspective of unit development. Four overarching domains of systems information were exchanged between staff nurses and travel nurses: practice patterns; staffing patterns and roles; tips, tricks, tidbits, and techniques; and environmental elements. Communication emerged as a common theme across nurse groups and domains of systems information exchanged. These findings have implications for nursing orientation and staff development, continuous improvement at the local level, and curriculum development.

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CHAPTER 1: INTRODUCTION

Alarming failures on the part of the U.S. health care system have resulted in as many as 98,000 patient deaths each year caused by preventable medical errors (Institute of Medicine[IOM], 2000). Subsequent reports challenge the accuracy of the IOM estimate, asserting that 195,000 preventable deaths each year more accurately reflects reality (HealthGrades, 2007). A recent study of health care systems in six countries found that the U.S. ranked first in health care costs, and last in providing safe care (Davis et al., 2007).

The IOM concluded in its report that medical errors more often result from health care system failures than the errors of individual clinicians (IOM, 2000). The basis of this conclusion was that individuals do not work in a vacuum, but are embedded in connections with other individuals, resources, and information systems within the greater health care system (Donaldson & Mohr, 2000; Dreyfus, 1979; Leape, 1994; Nelson et al., 2002). Errors made by individuals are usually caused by situations beyond the control of the individual, who has little ability to correct system failures (Leape, 1994). Leape (2004) conceptualized medical errors as symptoms of inadequate health care systems.

The IOM has called for a focus on developing systems thinking and systems-level interventions to prevent medical errors. Specific interventions include developing organizational cultures conducive to learning, safety, and change. Conventional interventions focus on individual or static systems components. Systems thinking applies a conceptual framework for seeing patterns of change within the dynamic interconnections among and between multiple systems components and their environments (Holden, 2005; Plsek & Greenhalgh, 2001; Senge, 1990).

High risk industries are those in which one small mistake by a worker can cause unpredictable, profound, and far-reaching damage unless safeguards are built into systems (Reason, 2000; Weick & Sutcliffe, 2001; Weick, Sutcliffe, & Obstfeld, 1999). High risk industries with low accident rates, such as nuclear energy production and aviation, are known as high reliability organizations (HROs). System level safeguards include cultivation of cultures of safety. Studies of cultures of safety in high reliability organizations provide a body of knowledge on developing safe systems through human factors engineering (Institute of Medicine, 2000, 2001, 2004).

Human factors engineering refers to designing systems, devices, software, and tools to fit human capabilities and limitations (National Center for Patient Safety [NCPS], 2007). In this type of engineering, safety protections are purposefully designed into systems based on the premise that human errors are inevitable because human beings are imperfect (IOM, 2004; Reason, 2000). Consequently, designing protective defenses into systems in which humans work is essential for HROs (Reason, 2000; Weick & Sutcliffe, 2001; Weick, Sutcliffe, & Obstfeld, 1999), including hospitals (Pronovost et al., 2006). The IOM focused heavily on cultivating effective "cultures of safety" (Aspden, Corrigan, Wolcott, & Erickson, 2004, p. 169; Pronovost et al., 2006, p. 1601), practices that aim to prevent or counter the effects of human error.

Nurses have a key role in keeping patients safe from medical errors because they work at the point of care where most errors occur (IOM, 2004). The nurse has been characterized as the "… central node in health care networks… [as]… information broker" (Allen, 2004, p. 276), and "liaison or coordinating hub" (Stewart, Stansfield, & Tapp, 2004, p. 447). The nurse has also been described as an "integrator" (J. G. Scott, Sochalski, &

Aiken, 1999, p. 15). In this context, effective integration is the ability to interact with other care providers on routine and emergent patient care issues (J. G. Scott, Sochalski, & Aiken, 1999). Lack of shared information has been identified as a barrier to providing high-quality care (Charters, 2003).

Communication failures account for greater than 60 percent of unanticipated adverse patient events (The Joint Commission, 2006). Causes of communication failures include inadequate flow of information, poor documentation, interpersonal issues, staffing problems, technological failures, deficient information exchange, and the context of a situation (Agency for Healthcare Research and Quality [AHRQ], 2003; Erdley, 2005; O'Neill, Dluhy, Fortier, & Michel, 2004). The impact of the current nursing shortage amplifies these issues (American Association of Colleges of Nursing [AACN], 2007; Joint Commission on Accreditation of Healthcare Organizations[JCAHO], 2002; O'Leary, 2003; Stanton & Rutherford, 2004).

The utilization of supplemental staff nurses represents one system level intervention implemented by many hospitals to address the nursing shortage (JCAHO, 2002; J. H. May, Bazzoli, & Gerland, 2006). Supplemental staff nurses are contracted by hospitals from outside agencies, and include agency nurses and travel nurses. Agency nurses may work as few as one or two shifts; travel nurses are contracted for blocks of three to six months at each assignment (Aiken, Xue, Clarke, & Sloane, 2007; J. H. May, Bazzoli, & Gerland, 2006; Shaffer, 2007). An estimated 75% of U.S. hospitals contracted for supplemental nursing staff in 2005 (J. H. May, Bazzoli, & Gerland, 2006), spending an estimated $5 to $7 billion annually (Hansen, 2002; JCAHO, 2002; Shaffer, 2007).

Some evidence suggests that utilization of supplemental nursing staff may have a positive impact on patient outcomes (Aiken, Xue, Clarke, & Sloane, 2007; Manias, Aitken,

Peerson, Parker, & Wong, 2003a; Newhouse, Johantgen, Pronovost, & Johnson, 2005; Strzalka & Havens, 1996). However, the introduction of supplemental nursing staff poses a potential barrier to patient safety because it represents a disruption in the continuity of patient care (Ebright, Patterson, Chalko, & Render, 2003; IOM, 2004; Kalisch & Aebersold, 2006; Leppa, 1996; Manias, Aitken, Peerson, Parker, & Wong, 2003b; J. H. May, Bazzoli, & Gerland, 2006; Potter et al., 2004; Tucker & Spear, 2006). Supplemental nurses must become acclimated to the distinctive structure and processes at each setting to which they are assigned.

At each new work setting travel nurses must simultaneously maintain and alter structure and process, generating a cycle of learning, adaptation, and reorganization. Because their assignments generally occur over long blocks of time, travel nurses have an opportunity to become familiar with various systems. Travel nurses' abilities to learn, adapt, and reorganize, combined with their experiences with different systems, suggest that they may be a valuable untapped source of knowledge about systems thinking.

Statement of the Problem

"The purpose of the modern health care system is to provide nursing care" (Diers, 2004, p. 60). When people are engaged with the health care system "… nurses are the health care providers they are most likely to encounter; spend the greatest amount of time with; and, along with other health care providers, depend on for their recovery" (IOM, 2004, p.2). Nurses interact with patients within the context of clinical microsystems which are the essential building blocks of the health care system. A clinical microsystem is "… a small group of people who work together on a regular basis to provide care to discrete subpopulations of patients. It has clinical and business aims, linked processes, and a shared information environment, and it produces performance outcomes" (Nelson et al. , 2002, p.

472). Clinical microsystems are characterized by “the five Ps”: purpose, patients, professionals, processes and patterns of care (Godfrey, 2004, p. 10). The interface between the patient and the health care system exists within the clinical microsystem.

Nurses work within the clinical microsystem solving complex and evolving problems in real time with frequent interruptions. In the routine course of work, nurses are frequently required to alter their planned sequence of care to address emerging problems. Such changes also require corresponding shifts in their point in the problem solving process (Allen, 2004; Potter et al., 2004; Tucker & Spear, 2006). At the same time, nurses coordinate services, treatments and procedures involving a range of other health care workers (Allen, 2004; Potter et al., 2004; Tucker & Spear, 2006). Continuous reprioritization entails balancing the changing status of patients with the continual flood of information within the dynamic care environment, and characterizes the knowledge work of nurses (Alexander & Kroposki, 2001; Allen, 2004; Ebright, Patterson, Chalko, & Render, 2003; Krichbaum et al., 2007; Potter et al., 2004; Tucker & Spear, 2006). Nursing work requires substantial levels of cognitive activity, and involves analysis and application of expertise to solve problems and keep patients safe (Sorrells-Jones & Weaver, 1999).

Many studies have focused on understanding clinical nursing knowledge (Benner, 1984; Buerhaus, 2006; Jennings, Staggers, & Brosch, 1999; National Institute of Nursing Research, 2007; Radwin, 1996, 1998; Whittemore, 2000). Little is known, however, about the systems knowledge needed by nurses working within a clinical microsystem, or about how nurse-to-nurse systems information exchange occurs. In addition to the clinical knowledge required for patient care, nursing work also requires systems thinking and the

application of systems knowledge. System thinking enables effective anticipation of potential problems and timely responses to rapidly evolving and potentially harmful situations.

Nurses represent the largest segment of the health care workforce (U.S. Department of Labor, 2006), and have a central role in providing health care. These two facts underscore the relevance of the nursing perspective to understanding the U.S. health care system. Helping nurses provide safe patient care within the context of a complex acute care hospital system represents a high priority for researchers searching for solutions to the problem of keeping patient safe from medical errors (AHRQ, 2006; IOM, 2004; NCPS, 2007; National Institute of Nursing Research, 2007).

Purpose and Type of Study

The purpose of this investigation was to identify and describe from nurses' perspectives the components of systems knowledge needed by nurses, and how nurse-to-nurse systems information exchange occurs within a clinical microsystem. Travel nurses were included because they offered perspectives based on their experiences in assignments across various systems. Little research exists in the professional literature on nurses' systems knowledge or nurse-to-nurse systems information exchange. This scarcity of literature indicated the need for this inductive inquiry. This study used qualitative description to answer the following three research questions:

1. What components of systems knowledge are needed by nurses in order to function within a clinical microsystem?
2. How does nurse-to-nurse systems information exchange occur within a clinical microsystem?
3. What systems information is exchanged between staff and travel nurses in a clinical microsystem?

Background

Several streams of activity and technological development in the second half of the 20th Century converged to a "perfect storm" of information explosion in the 1990s. Complexity science emerged as a result of new technology, and as an explanation for new realities that evolved as a result of the new technology (Capra, 1996; Holden, 2005; Spitzer, 1998). This information explosion impacted the health care system in profound, far-reaching, and sometimes unpredictable ways. Combined effects of increasing patient acuity, escalating health care costs, shorter hospital stays, and the nursing shortage amplified the complexity of the environment of care. This turn of events created a pressing need that stimulated interest and activity in the area of health services research.

An understanding of the importance of nurses' systems knowledge emerged through the convergence of at least three sets of circumstances. The first was the emergence of complexity science as way of understanding the world in the postmodern age. Complexity science informs the increasing complexity of the evolving environment of care as a multilayered open system in continual interaction with its environment.

The second set of circumstances was the emphasis on applying a systems-focus in the health care environment to improve patient safety. The third set of circumstances resulted from a heightened appreciation of professional knowledge as our economy shifted from one of production to one of service. Taken together these sets of circumstances provided the context for this study. Each of these sets of circumstances is discussed in the following sections.

Emergence of Complexity Science

Complexity science is an emerging body of knowledge that integrates concepts from a range of interest areas. Complexity science has application in management, leadership,

planning, building healthcare systems, clinical quality and community health improvement (Zimmerman, Lindberg, & Plsek, 1998). It represents the integration of technology and biology, and provides a mechanism for the inter-relation between micro and macro phenomenon (Arrow, McGrath, & Berdahl, 2000; Capra, 1996; Zimmerman, Lindberg, & Plsek, 1998).

Complexity science provides a view of the world as a set of embedded and hierarchical dynamical systems. It also explains the tensions caused by the coexistence of antithetical or paradoxical elements as the drivers in complex systems (J. P. Burns, 2001; Clancy & Delaney, 2005; Holden, 2005; Ray, 1998a; Stacey, 1996; Vicenzi, 1994; Wheatley, 1992; Zimmerman, Lindberg, & Plsek, 1998). An example of such a tension exists between the caring functions of nurses and the financial viability of the health care organization in which they provide care (Issel & Kahn, 1998; Ray, 1989, 1998a, 1998b; Ray et al., 1995; Turkel & Ray, 2000). Complex adaptive systems represent the central concept in complexity science.

Complex Adaptive Systems

A complex adaptive system (CAS) is "… a collection of individual agents with freedom to act in ways that are not always totally predictable, and whose actions are interconnected so that just one agent's actions changes the context for the other agents" (Plsek & Greenhalgh, 2001, p. 626). CASs offer a framework for understanding the way things work in the world. CASs provide a broad, fundamental unification of principles of general system theory (Bertalanffy, 1975, 1998; Capra, 1996), organizational development (Beckham, 2001; Senge, 1990; Stacey, 1996), and empowerment (Anderson, Issel, & McDaniel, 2003; J. P. Burns, 2001; Wheatley, 1992; Zimmerman, Lindberg, & Plsek, 1998).

A distinguishing characteristic of a CAS is its capacity to adapt to a changing environment over time (Crabtree, Miller, & Stange, 2001; Holden, 2005; Zimmerman, Lindberg, & Plsek, 1998). CAS processes are nonlinear, meaning that they result in situations not adequately described by direct cause and effect relationships. Nonlinear relationships exist whenever there are feedback loops or interdependence among parts of a system over time. Several settings within the health care arena have been examined through the CAS framework, including primary care practices (Crabtree, Miller, & Stange, 2001; W. L. Miller, McDaniel, Crabtree, & Stange, 2001), hospitals (Begun, Zimmerman, & Dooley, 2003; Clancy & Delaney, 2005; Plsek, 1997), and nursing homes (Anderson, Issel, & McDaniel, 2003).

The IOM characterized the environment of care (Institute of Medicine, 2001, 2003b) as a CAS, existing in the form of a dynamic nested hierarchy. The dynamic nested hierarchy of a CAS undergoes continual adaptation and self-organization (Beckham, 2001; Begun & Kaissi, 2004; Begun, Zimmerman, & Dooley, 2003; Clancy, 2007; Clancy & Delaney, 2005; Holden, 2005; Institute of Medicine, 2000, 2001, 2004; Plsek & Greenhalgh, 2001; Zimmerman, Lindberg, & Plsek, 1998). The IOM has adopted the clinical microsystem as the target system level for examination and implementation of interventions (IOM, 2001). The clinical microsystem represents the smallest level of independent function within the health care system. The clinical microsystem will be discussed in detail as the conceptual framework for this investigation in Chapter 2. A clinical microsystems focus is appropriate as it encapsulates the point where the patient and the health care system intersect (Mohr & Batalden, 2002; Nelson et al., 2002).

Focus on Systems and Patient Safety

The systems focus of the IOM recommendations applies across care settings,

professional disciplines, and along the trajectory of education of health professionals. Negotiating the health care system requires that nurses recognize the complex nature of systems and the constant role of change in providing safe patient care (Batalden, 2005; Batalden & Splaine, 2002; Cronenwett et al., 2007; Plsek & Greenhalgh, 2001). The IOM recognized the role of "system-mindedness" in the health professional of the future. System-mindedness referred to "… asking yourself not 'What are the parts of me-what do I do?' but 'What am I part of?'" (Berwick, quoted in IOM, 2003a, p. 56).

The AACN recognized the importance of systems knowledge for baccalaureate level nursing practice in its *Essentials* document (1998). However, a renewed emphasis on developing and applying systems knowledge in nursing is evident (Cronenwett et al., 2007; Finkelman & Kenner, 2007). The design of effective safety systems depends upon systems knowledge to build, negotiate, and improve them. HROs are learning organizations. They are flexible and change-ready, characterized by outcome-oriented team-based work systems. HROs recognize and support the knowledge and expertise of team members as organizational assets (Blackler, Reed, & Whitaker, 1993; Drucker, 1993; Nonaka, 1991; Quinn, 1992; Weaver & Sorrells-Jones, 1999).

Value of Professional Knowledge

Cross pollination between disciplines that inform professional knowledge reflect the holistic and dynamic interconnectedness of complexity science. Advances in technology have resulted in a rapidly changing and dynamic health care workplace. Working effectively within the dynamic health care system requires knowledge and adaptive skills, particularly theoretical knowledge and expertise (Blackler, Reed, & Whitaker, 1993). Von Krogh et al. (2000) viewed knowledge as relative and dynamic, created, and constantly evolving, depending upon who is involved and how they relate to each other. In contrast to the

positivist perspective of knowledge as absolute truth, this viewpoint is consistent with postmodern constructivism.

Von Krogh et al. (2000) recognized the essential effect of the human dimension of knowledge as "context-specific and relational" (p. 48), deeply rooted in human value systems and social interactions. The convergence of product and service in post-industrial era organizations intensified the value of knowledge. The viability of organizations depended upon the productivity of its workers. The productivity of workers in the post-industrial era depends upon collective knowledge (Davenport & Prusak, 1998). The dynamic nature of knowledge and the knowledge intensity of such organizations render them learning organizations.

Knowledge work is a generative process that requires substantial levels of cognitive activity. Knowledge work involves analysis and the application of expertise to solve problems, generate ideas, create new products or services, and teach others (Drucker, 1993; Sorrells-Jones & Weaver, 1999). The concept of "knowledge worker" refers to a person with expertise in a particular area, who works with information, and is committed to continuous learning (Sorrells-Jones, 1999, p. 14). The activities of knowledge workers are often driven by continuously shifting situations and increasing volumes of information (Thomas & Schmidt, 1992). Experience provides an historical context for understanding situations that enables knowledge workers to identify and act upon patterns that are discernible only to experts (Benner, 1984; Davenport & Prusak, 1998).

Complexity, Knowledge, and Nursing Work

The ability to critically evaluate the value and applicability of continuous floods of information to the changing structures and processes of a particular health care environment is essential to nursing practice (Gurses & Carayon, 2007; Krichbaum et al., 2007; O'Neill,

Dluhy, Fortier, & Michel, 2004; Potter et al., 2004; Pronovost et al., 2006; Purkis & Bjornsdottir, 2006; Taylor, 1997; C. Thompson, Cullum, McCaughan, Sheldon, & Raynor, 2004; Tucker & Spear, 2006). Nursing work encompasses "… the nursing knowledge and nursing care processes used to change the status of a hospitalized patient into a discharged person" (Alexander & Kroposki, 2001, p. 778). The context-specific and dynamic nature of nursing work that draws on nursing expertise qualifies nursing work as knowledge work (Antrobus, 1997; Estabrooks et al., 2002; Hall, 2003; Herbig, Bussing, & Ewert, 2001; McCormack et al., 2002; Snyder-Halpern, Corcoran-Perry, & Narayan, 2001). The notion of nursing knowledge as an organizational asset is emerging in the literature (Hall, 2003; Hatcher et al., 2006; Mitchell, 2000; Moody, 2004; K. A. Scott, 2007).

The notion of systems thinking is not new to nursing. Nursing has built its science on systems (Henderson, 1991; King, 2006; Nightingale, 1859/1992); the nursing role centers on adapting care to the changing needs of patients. However, the emerging systems focus on the delivery of health care highlights the relative lack of literature on nurses' systems knowledge. The long history of nursing's function within, interactions with, and contributions to the health care delivery system suggests the existence of unarticulated nursing systems knowledge. Uncovering this knowledge has value in designing, developing, and maintaining systems that foster patient safety.

Summary

Chapter 1 has introduced the problem, the purpose and type of investigation, and the background, establishing the context of the problem and justification for the study. An increasing emphasis on systems perspectives is driven by the complexity of the health care system and the pursuit of safe patient care. The clinical microsystem is the level within the

health care system in which patients and nurses are embedded.

The purpose of this investigation was to identify, and describe from nurses' perspectives, the essential components of systems knowledge needed by nurses working within a clinical microsystem and how nurse-to-nurse systems information exchange occurs. Travel nurses were included to capture the unique point of view afforded by their range of experiences with diverse systems. Chapter 2 will provide a review of the literature on clinical microsystems, nursing work at the intersection of patient and health care system, nursing knowledge work, and nurse-to-nurse information exchange.

CHAPTER 2 LITERATURE REVIEW

This literature review examines theoretical and empirical literature related to: 1) the clinical microsystem as a complex adaptive system (CAS) and the local environment of care, 2) nursing work at the intersection of patient and health care system (NWI), and 3) nurse-to-nurse exchange of systems information. Literature queries included empirical and theoretical articles published English in Ovid Full Text, Ovid Medline, Ovid Medline (in process and other non-indexed citations) or in Cumulative Index to Nursing & Allied Health Literature (CINAHL) databases, excluding dissertations. Key search terms for specific content areas are noted in the following sections.

The Clinical Microsystem (CMS): Conceptual Framework

A literature search of the theoretical and empirical literature using the keywords "clinical microsystem(s)" yielded 16 articles. Reference lists within these articles yielded an additional seven publications relevant to this study. A search of Google Scholar yielded two more. Publication dates ranged from 1998-2007.

Theoretical Literature on the CMS

The CMS conceptual framework was derived from the concept of microunits described in the business management literature (Nelson, Batalden, Mohr, & Plume, 1998). Quinn (1992) described a microunit as the smallest replicable unit that carries out the core activities of the organization, often at the point of service (Quinn, 1992). From an analysis of several large successful corporations, Quinn (1992) found that these organizations focused on the small frontline functioning units to improve production time and quality, service, customer and worker satisfaction, and profitability.

Nelson et al. (1998) transferred this concept to the health care sector, defining microunits as "the essential engines for managing the care of small populations of patients" (p. 16). A CMS:

> … is a small group of people who work together on a regular basis to provide care to discrete subpopulations of patients. It has clinical and business aims, linked processes, and a shared information environment, and it produces performance outcomes. Microsystems evolve over time and are often embedded in larger organizations … As [complex adaptive systems] they must do the primary work associated with core aims, meet the needs of internal staff, and maintain themselves over time as clinical units (Nelson et al., 2002, p. 472).

Figure 1 depicts the placement of the CMS within the context of the hierarchical, tiered structure of the U.S. health care system. The CMS positioned at the top of the diagram (Figure 1) exists within the health care organization (mesosystem), which in turn, is embedded within the health care system (macrosystem). Figure 1 encompasses all levels of the nested hierarchy. The health care system is a distinct complex adaptive system (CAS) that exists within and interacts with its environment.

Contextual factors directly or indirectly affect the CMS. Direct influences on the CMS include: 1) geographic location, 2) service population demographics, 3) payers, 4) type of organization (e.g., community-based hospital or academic medical center), and 5) adequacy of health care workforce (Jiang, Friedman, & Begun, 2006; Ross et al., 2007). Indirect factors affecting the CMS include 1) societal values, 2) public policy, and 3) regulatory bodies such as the Occupational Safety and Health Administration (OSHA), The Joint Commission (TJC), and the Centers for Medicare and Medicaid Services. The CAS engages in continuous interaction and constant change.

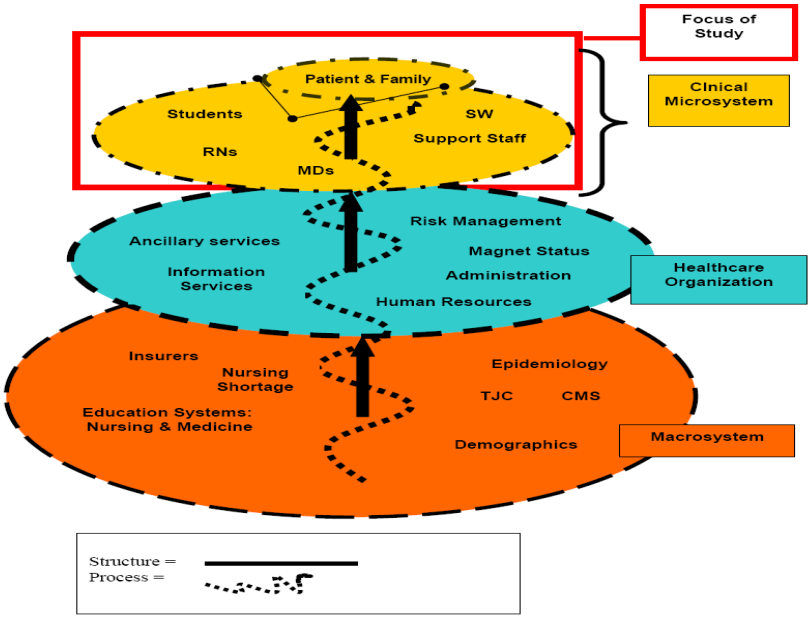

Figure 1. Components of the nested hierarchies of the health care system

The essential elements of a CMS include: 1) a core team of professionals; 2) a defined population of patients; 3) an information environment to support the actions of caregivers and patients; and 4) support staff, equipment and the work environment. Nelson et al. (2002) have termed these characteristics “The five Ps”: purpose, patients or population, professionals, processes, and patterns (Godfrey, 2004; Nelson et al., 2002), with the patient (and his or her family) as the center.

Processes are direct or indirect. Direct processes refer to activities such as communication and collaboration that occur at the CMS level. Indirect processes refer to supportive activities such as the hiring process occurring at the level of the health care organization. Assessments made during the hiring process determine the composition of the care team. That group collaborates to deliver care within the CMS.

Figure 2 depicts the process of information exchange as part of the infrastructure of the CMS. The two-way arrows and feedback loops represent the dynamic relationships between structure, process, and outcomes within a CMS. A nonlinear process of information exchange contributes to knowledge development within the CMS. This evolving knowledge base supports decision-making within the CMS. Within a functional CMS, information exchange also contributes to further knowledge development and sustainability.

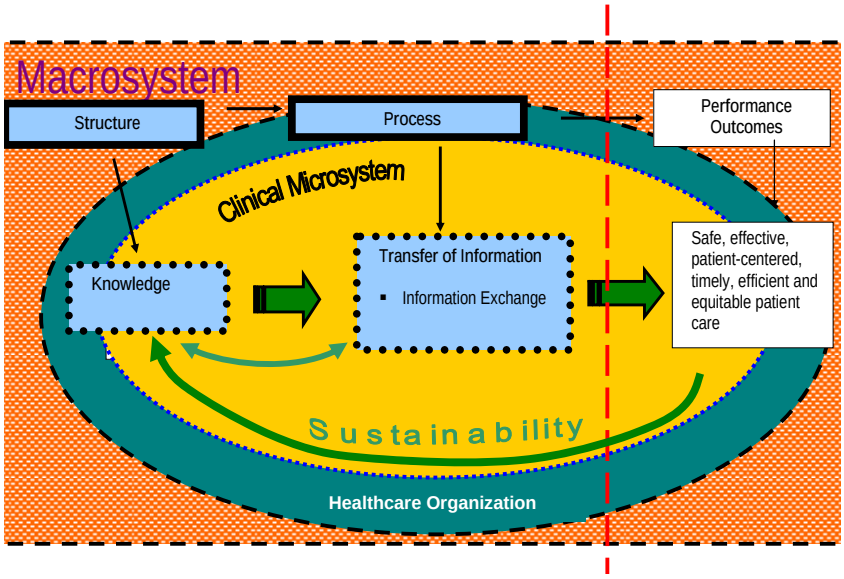

Figure 2. Clinical Microsystem infrastructure supporting information exchange

Empirical Literature on the CMS

Three empirical studies were found in the literature. Two studies examined CMSs directly (Donaldson & Mohr, 2000; Nelson et al., 2002). The third study (Gurses & Carayon, 2007) examined obstacles encountered by intensive care unit (ICU) nurses within the context of the CMS as the "local work environment" (p. 186).

Donaldson and Mohr (2000) utilized mixed methods to 1) identify characteristics that support continuous quality improvement, and 2) identify characteristics that enable improvement of population-based care. Knowledgeable individuals nominated 43 clinical sites noted for innovative care delivery models and technology use as well as high levels of

performance improvement. Interview data from primary, specialty, emergency, and hospice care settings supported hypothesis generation and testing. Eight dimensions of high-performing CMSs emerged from the data analysis (Table 1).

Table 1

Dimensions and Characteristics of Successful CMSs

Dimensions of High Performing CMSs	Interactive Success Characteristics of CMSs
Constancy of purpose	Patient focus, staff focus, leadership
Integration of information and technology into work flows	Information & information technology
Supportiveness of the larger organization	Macro-organizational support
Alignment of role and training for efficiency and staff satisfaction	Process improvement
Ongoing measurement of outcomes	Performance patterns
Connection to the community to enhance care delivery and extend influence	

Source: Donaldson and Mohr (2000) and Nelson et al. (2002).

Building upon the work of Donaldson and Mohr (2000), Nelson et al. (2002) designed a study to capture the principles, processes, and methods used by high-performing CMSs to provide high quality and cost-effective care. Nelson et al. (2000) conceptualized the CMS as the local milieu, which reflected the dynamic care environment. Data were collected through observation, interviews, surveys, medical record reviews, and financial analysis. A sample of 75 high performing CMSs from primary care, medical specialty, inpatient, home care, nursing home and hospice settings were included. Data analysis generated nine interactive success characteristics across study settings (Table 1). The only differentiation of findings from the two studies was that Nelson et al. (2002) did not identify connection to community. The small sample sizes require that these data are interpreted with caution.

Utilizing the CMS framework, Gurses and Carayon (2007) examined performance obstacles of ICU nurses. Data from a 36-item, investigator-developed survey administered to 272 nurses from 17 ICUs were analyzed. The authors concluded that in special care areas such as the ICU, improvements require analysis at the local microsystem level.

Application of the CMS in Practice

Although little research was available, the existing literature demonstrated broad application of the CMS framework. The IOM has adopted the CMS as the target system level for examination and implementation of interventions (IOM, 2001). Exemplars included: 1) planning patient centered services (Godfrey, Nelson, Wasson, Mohr, & Batalden, 2003), 2) developing small clinical units for peak performance (Batalden, Nelson, Edwards, Godfrey, & Mohr, 2003), 3) creating a rich information environment (Nelson et al., 2003), 4) fostering professional development and work life (Huber et al., 2003) and 5) supporting leadership (Batalden et al., 2003). Goldschmidt and Gordon (2006) reported on the use of CMS principles to reorganize a 50-bed "mega-ICN" into five "nursing care microsystems." Each of the nursing care microsystems represented its own front line unit of care.

The CMS framework has also been applied for quality improvement (QI) and designing care systems for patient safety in the U.S. (Barach & Johnson, 2006; Batalden & Splaine, 2002; Horbar et al., 2004; Horbar, Plsek, & Leahy, 2003; Mohr, Batalden, & Barach, 2004), the United Kingdom (Golton & Wilcock, 2005) and Sweden (Bodenheimer, Bojestig, & Henriks, 2007). The CMS framework has been used in rebuilding primary care practices in post-war Kosovo (Hedley & Maxhuni, 2005; E. Thompson, Harding, Pond, Hammond, & Taylor, 2006). In addition, it has been adapted to provide an evaluation for medical (P. V. Miles, 2006) and nursing (Thies & Ayers, 2007) education as academic

microsystems. Core knowledge for the clinical nurse leader includes understanding of CMSs (Tornabeni, Stanhope, & Wiggins, 2006).

Summary of Literature on the CMS

The CMS offers a framework for examining and understanding the function of front-line clinical units. The empirical literature has generated and tested the framework, which is comprised of varied interdependent components. The existing literature examined CMSs from a range of settings along the care continuum, and evidenced broad-based application of the CMS conceptual framework. This framework captures the essence of the CMS as a concerted force of informed and focused patients and professionals. The single study found in the nursing literature indicated that the CMS framework has value to nursing practice and patient care. A gap, however, existed in understanding CMSs from the perspectives of nurses providing direct patient care.

Nursing Work at the Intersection of Patient and Health Care System (NWI)

A literature search using keywords “nursing work,” “systems,” “context,” “role,” and “challenges” produced 105 articles. Additional articles were identified through article reference lists. A review of titles and abstracts for relevance to this study reduced the number to 22 articles ranging in dates from 1984 to 2007. The following two sections review challenges and management of challenges of NWI emerging from the literature.

Challenges of NWI

Nurses balance the tension between planning, an essential part of the nursing process, and uncertainty, a ubiquitous characteristic of the health care system.

Theoretical Literature on Challenges of NWI

Interruptions and distractions represent major sources of uncertainty in nursing work (Clancy & Delaney, 2005; IOM, 2003, 2004; Spitzer, 1998; Currie & Waterson, 2007). Regardless of setting, nurses are situated to provide the "in-between" work connecting people, departments, and agencies that makes healthcare possible (Liaschenko, 2002). Purkis and Bjornsdottir (2006) conceptualized nurses' work within the context of "ambiguous spaces" (p. 254) that exist where patient and health care system domains overlap. Nurses situated in these ambiguous spaces worked simultaneously within the realms of the health care system and the patient, negotiating the complexities within this union. Krichbaum et al.(2007) conceptualized "complexity compression" (CC) as "… what nurses experience when expected to assume additional, unplanned responsibilities while simultaneously conducting their multiple responsibilities in a condensed timeframe" (p. 88).

Empirical Literature on Challenges of NWI

Two broad study areas provided evidence of the challenges inherent to NWI. The first asked "What do nurses do at work?" (Allen, 2004; Jacques, 1993). The second addressed human and environmental factors affecting nurses' work (Benner, 1984; Ebright, Patterson, Chalko, & Render, 2003; Gurses & Carayon, 2007; Krichbaum et al., 2007; Leppa, 1996; Potter et al., 2004; Potter et al., 2005; Tucker & Spear, 2006).

What do nurses do at work? Jacques (1993) analyzed data from observations and interviews of medical/surgical nurses working in a medical center as part of a larger study. Jacques (1993) asserted that the connecting activities of nurses provided a vital function that enabled the work of the entire organization. Through networks of communication, nurses shared essential information with the care team. Although dependent upon this network of

communication, positive outcomes were rarely attributed to nurses. It should be noted that Jacques provided no information about sample selection or size.

Allen (2004) analyzed data from an ethnographic study of field studies examining the social organization of nursing work published between 1993 and 2003. A systematic selection process resulted in a sample of 54 studies inclusive of diverse work settings and international geographic locations (Allen, 2004). The investigator reported that nurses mediate individual patient needs and organizational demands to provide person-centered care despite an increasingly standardized care environment (Allen, 2004). Based on this finding, Allen (2004) concluded that the dissonance caused by this lack of alignment between expectations and experiences served as a source of low morale and job dissatisfaction (Allen, 2004).

Perhaps most significantly, both investigators identified the invisibility of nursing work as a challenge to NWI (Allen, 2004; Jacques, 1993). Because it is invisible, the value of NWI is felt only in its absence, and is therefore often unsupported and unrewarded (Jacques, 1993). These qualitative findings provided a general perspective and a context for examining specific challenges of NWI.

The second set of studies identified specific challenges inherent to NWI. Studies included in this set examined development of organizational and work-role competencies (Benner, 1984), work group disruption (Leppa, 1996), and work systems performance (Tucker & Spear, 2006). Studies also examined factors affecting cognitive work (Ebright, Patterson, Chalko, & Render, 2003; Potter et al., 2004; Potter et al., 2005), and performance obstacles (Gurses & Carayon, 2007; Krichbaum et al., 2007) of nurses. Investigators used qualitative (Benner, 1984; Krichbaum et al., 2007), quantitative (Gurses & Carayon, 2007;

Leppa, 1996), and mixed (Ebright, Patterson, Chalko, & Render, 2003; Potter et al., 2004; Potter et al., 2005; Tucker & Spear, 2006) research methods.

Data were collected through participant observation (Benner, 1984; Ebright, Patterson, Chalko, & Render, 2003; Potter et al., 2004; Potter et al., 2005; Tucker & Spear, 2006), interviews (Benner, 1984; Ebright, Patterson, Chalko, & Render, 2003; Tucker & Spear, 2006), focus groups (Benner, 1984; Krichbaum et al., 2007), and questionnaires (Gurses & Carayon, 2007; Leppa, 1996). Samples consisted of ICU (Gurses & Carayon, 2007) and medical/surgical (Benner, 1984; Ebright, Patterson, Chalko, & Render, 2003; Krichbaum et al., 2007; Leppa, 1996; Potter et al., 2004; Potter et al., 2005) nurses in community and tertiary care hospitals. Samples also included financial and personnel records (Leppa, 1996). Sample sizes ranged from one RN-patient care technician dyad (Potter et al., 2004) to 908 medical/surgical nurses (Leppa, 1996).

Benner (1984) examined data collected from 21 expert-novice nurse dyads and 72 additional nurses. Distinct differences between the two groups of nurses emerged from descriptions of the same clinical incidents. Nurses described the challenges they encountered and how they managed them. Content analysis revealed types of challenges and essential competencies. Specific domains of nursing practice emerged from the identified competencies. Challenges related to NWI are noted in Table 2.

Leppa (1996) examined relationships between job satisfaction and interpersonal relationships, work group disruptions, care quality, and patient safety among 908 registered nurses working in 72 nursing units across four U.S. hospitals. Leppa used the five-item, seven point nurse/nurse interactions subscale of the Stamps and Piedmonte Index of Work Satisfaction, (Cronbach's alpha = .71) to measure satisfaction with interpersonal

relationships. Leppa found that nurse/nurse interaction was the most important element of job satisfaction (5.1 – 5.4 on a seven point scale). across all settings.

Leppa (2006) found lower satisfaction with nurse/nurse interactions among nurses on units with higher absenteeism (r = -.2254, p = .05) and agency nurse utilization (r = -.2113, p = .05). Furthermore, Leppa (1996) found that nurse/nurse interactions were positively correlated with nurses' perceptions of care quality (r = .30, p = .01) and patient safety (r = .37, p = .01). Leppa (1996) reported that agency nurse utilization was the only factor significantly related to nurses' perceptions of decreased patient safety or quality of care. No statistical values supporting this finding were provided.

Table 2

Challenges of NWI

Investigators	Major categories	Examples
Benner, 1984	Workload, multiple patient needs, rapidly changing status, and ensuring quality of health care practices	Staff shortages, high turnover, working with temporary or inexperienced staff, inaccessible personnel
Leppa, 1996	Disruptions	Absenteeism, agency nurse utilization, personnel changes
Ebright et al., 2003	Supplies and equipment, repetitive travel/geography, interruptions, communication	Supplies or equipment frequently needed (e.g., linens) located away from patient rooms, patient assignment spread across unit, missing, or nonfunctioning supplies or equipment, difficulty accessing resources to continue or complete care, inconsistent or broken communication across providers or communication medium
Potter et al., 2004; Potter et al., 2005	Delays in starting care Interruptions	Staff inquiries, communication, and equipment or resource access
Tucker & Spear, 2006	Operational failures, interruptions, rapidly changing patient status requiring shift in care plan	Medication problems, medical orders problems, supply issues (e.g., incorrect or missing patient meals), inadequate staffing, broken or missing equipment, family member inquiries, system glitches (e.g., redundant pages)
Krichbaum et al., 2007	Personal, practice, environmental, systems and technology, administration and management, autonomy/control	Systems and Technology: systems failures, multiple concurrent system changes, lack of backup for system failures, and inadequacy of organizations' staffing systems Practice: conflicting responsibilities, working with nurses unfamiliar or unprepared for their role Administration and Management: unpredictable changes in management and administration impacting policy and procedures that guide nursing practice; insufficient knowledge of nursing work by administrators and managers

Gurses & Carayon, 2007	Environment, organization, tasks, technology or tools	Family issues (e.g., teaching, answering questions, distractions), unavailability of equipment, supplies or space, poor communication (delay in seeing new medical orders, inadequate information from physicians, or inadequate shift reports), noise

Ebright et al. (2003) observed eight nurses over two independent sessions, and then conducted individual interviews using the Critical Decision Method (CDM). The CDM technique was used to elicit information that influenced decisions made by nurses at specific points during the observation phase. Three categories of factors influencing nurses' decision making emerged. The first category was the complexity of human and environmental issues during actual work situations. The second category reflected care management strategies used to address complex situations. The third category included cognitive factors influencing decision-making. Ebright et al. (2003) identified eight patterns of work complexity (Table 2). Care management strategies and cognitive factors are discussed later in this review.

Potter et al. (2004) combined human factors engineering techniques and participant observation to map the nursing process against overt nursing activities and interruptions. Potter et al. (2004) observed 43 different interruptions to the work of one RN-patient care technician dyad over the first 10 hours of a 12-hour shift. The investigators reported that each interruption disrupted the flow of the nursing process, potentially delaying starting or completing care and increasing the potential for errors (Potter et al., 2004). These findings were supported in a subsequent study conducted by Potter et al. (2005) using the same methods.

Potter et al. (2005) studied seven direct care nurses working in acute care settings in a large tertiary hospital to determine the effects of care systems and work processes on nurses' cognitive work. Findings revealed that nurses engage in continual anticipation and attention to multiple tasks and shifting priorities. Interruptions over 43 hours of observation ranged on average 3.4 to 5.9 per hour (Potter et al., 2005). Nearly half of interruptions (47%) occurred as nurses performed interventions (Potter et al., 2005). Examples of interruptions are noted in Table 2.

In the first phase of a three phase study of work systems supplying information, materials and equipment, Tucker and Spear (2006) observed 11 hospital nurses at six hospitals to determine operational failures interfering with nursing work (Tucker & Spear, 2006). In this study, operational failures included "hassles" or "glitches" that interfered with the flow of nursing work (Tucker & Spear, 2006). More specifically, operational failures referred to "… the inability of the work system to reliably provide information, services and supplies when, where, and to whom needed" (Tucker & Spear, 2006, p. 646). Challenges identified by Tucker and Spear (206) are noted in Table 2.

Using data from focus groups, Krichbaum et al. (2007) identified system-related demands confronted by nurses (Table 2). Krichbaum et al. (2007) asked 58 nurses to describe a situation when they experienced complexity compression, identify feelings experienced while in the situation, and specify factors that created the feelings. The investigators provided no information about focus group facilitators or the number of focus groups.

Gurses and Carayon (2007) examined nurses' experiences of workplace performance obstacles through a multi-site cross-sectional study of 272 ICU nurses. Analysis of data from a 36-item investigator-developed questionnaire revealed 11 performance obstacles (Table 2).

The investigators identified their use of a self-administered survey for data collection as a study limitation. Across studies, disruptions, and interruptions presented environmental or human-related challenges to NWI.

Environmentally-related factors contributing to challenges of NWI.

Major challenges to NWI related to dealing with inaccessible or non-functioning equipment or supplies (Ebright, Patterson, Chalko, & Render, 2003; Gurses & Carayon, 2007; Krichbaum et al., 2007; Potter et al., 2004; Potter et al., 2005; Tucker & Spear, 2006). Environmental challenges also included lack of space, and noisy, hectic, and crowded work environments (Ebright et al., 2003; Gurses & Carayon, 2007; Krichbaum et al., 2007; Potter et al., 2004).

Human-related factors contributing to challenges of NWI.

Human-related factors contributing to challenges of NWI included inadequate staffing (Benner, 1984; Krichbaum et al., 2007; Leppa, 1996), conflicting responsibilities (Krichbaum et al., 2007), and working with nurses unfamiliar with or unprepared for their role (Benner, 1984; Krichbaum et al., 2007; Leppa, 1996). Another factor identified was administrators' and managers' lack of knowledge of nursing work (Krichbaum et al., 2007). Frequent changes in administration and management that subsequently resulted in shifts in nursing policies and procedures (Krichbaum et al., 2007) presented additional human-related challenges.

Communication issues included inconsistent or broken communication across providers or communication medium (Ebright, Patterson, Chalko, & Render, 2003; Gurses & Carayon, 2007; Leppa, 1996). Interruptions in care were related to staff requests for assistance and direction with procedures (Ebright, Patterson, Chalko, & Render, 2003; Potter et al., 2004; Potter et al., 2005). Family-related obstacles included answering frequent family

phone calls, spending time teaching families and dealing with family needs (Gurses & Carayon, 2007). Human- and environmentally-related factors posed challenges to NWI by contributing to the complexity and uncertainty of NWI.

Complexity and uncertainty.

The continual evolution of the work environment contributed to the complexity and uncertainty of NWI. Factors affecting the continually evolving work environment included increasing patient acuity and the associated surges of information regarding patient conditions and status (Benner, 1984; Ebright, Patterson, Chalko, & Render, 2003; Krichbaum et al., 2007). Frequent and routine operational failures (Ebright, Patterson, Chalko, & Render, 2003; Potter et al., 2004; Potter et al., 2005; Tucker & Spear, 2006) also contributed to complexity and uncertainty of NWI. Additional sources of uncertainty included system failures, lack of backup for system failures, and multiple concurrent system changes (Benner, 1984; Krichbaum et al., 2007).

Interactions among challenges amplified the complexity of NWI. Ebright et al. (2003) found that storage of frequently used supplies or equipment away from patient areas and wide geographic distribution of patient assignments presented challenges to NWI. Exposure to interruptions increased when patient assignments or supplies and equipment were not proximately located. However, these interruptions also became additional opportunities for sharing information (Potter et al., 2004; Potter et al., 2005)

Summary of Literature on Challenges to NWI

The literature identified a wide range of challenges inherent to NWI. Environmental- and human-related factors contributed to the complexity and uncertainty of NWI. Addressing and resolving these challenges fell into the realm of routine nursing work that required

unique nursing strategies and skills. The next section identifies strategies for managing challenges of NWI.

Strategies to Manage Challenges to NWI

Much of the literature reviewed in the previous section on challenges to NWI also contributed evidence regarding management of these challenges.

Theoretical Literature on Strategies to Manage NWI

Management of the challenges to NWI requires mediation of unpredictable, nonlinear, and continual changes characteristic of a CAS. From the CAS perspective, strategies aim to stabilize the system through self-organization. Self-organization within a CMS requires continual flow of information and interaction among interrelated elements (Barach & Johnson, 2006; Batalden, Nelson, Edwards, Godfrey, & Mohr, 2003; Batalden, Nelson, Gardent, & Godfrey, 2005; Batalden et al., 2003; Begun & Kaissi, 2004; Begun, Zimmerman, & Dooley, 2003; Clancy & Delaney, 2005; Holden, 2005; Nelson et al., 2003; Penprase & Norris, 2005; Yourstone & Smith, 2002; Zimmerman, Lindberg, & Plsek, 1998).

As agents for patients, nurses manage complex systems through the use of self as an interpersonal actor to establish a context of care delivery (Antrobus, 1997; Gobbi, 2005; Purkis & Bjornsdottir, 2006). As agents, nurses manipulate the environment in which care occurs (Diers, 2004, 2005). From a system perspective, this extends to manipulating the system to work for patients by facilitating transitions through situational changes and across health care system boundaries, integration of care, and integration of multidisciplinary teams through collaboration (Curley, 1998, 2004; Kalisch & Aebersold, 2006; Purkis & Bjornsdottir, 2006).

Empirical Literature on Strategies to Manage NWI

In addition to the studies reviewed in the previous section on challenges of NWI, two additional studies identified strategies used to manage the challenges of NWI (McGirr & Bakker, 2000; Stewart, Stansfield, & Tapp, 2004). Stewart et al. (2004) examined 43 ICU nurses' understanding of professional autonomy. Data regarding nurses' levels of satisfaction in their clinical practice and work lives were collected through 12 focus group discussions. Nurses reported a sense of autonomy and satisfaction when they accomplished patient care goals in a timely manner. This was further enhanced if they applied their nursing knowledge and skills.

Nurses felt that frequent patient contact and the continuous nursing presence at the bedside provided unique and valuable perspectives of the total situation (Stewart, Stansfield, & Tapp, 2004). The total situation included patient needs and how the system works (Stewart, Stansfield, & Tapp, 2004). One nurse stated, "… We are major coordinators of healthcare because we … do the ground assessments … [identify patients' needs] and then follow through to make sure [it's done]" (Stewart, Stansfield, & Tapp, 2004, p. 447). Nurses viewed their autonomy within the context of the health care team. They perceived that positive patient outcomes resulted from health care team interdependence (Stewart, Stansfield, & Tapp, 2004).

This notion of autonomy (Stewart, Stansfield, & Tapp, 2004) was consistent with nurses' perceived roles in ensuring that "the unit ran smoothly" (McGirr & Bakker, 2000, p.8). Nurses across all three groups (organization-level directors of nursing, frontline managers, and direct care nurses) identified their individual contributions to ensuring the

smooth operation of the unit (McGirr & Bakker, 2000). No evidence of variation among responses of these groups of nurses was reported (McGirr & Bakker, 2000).

Studies reviewed in the previous section on challenges of NWI provided insight into expert nurses' management strategies (Allen, 2004; Benner, 1984; Ebright, Patterson, Chalko, & Render, 2003; Potter et al., 2004; Tucker & Spear, 2006). Research methods yielded a different number of strategies but congruent themes emerged. Managing the challenges of NWI required nurses to foster connections and promote workflow while simultaneously balancing stability and flexibility. Key strategies appeared to focus on continuous prioritizing and reprioritizing and fostering connection and communication. Table 3 summarizes the strategies for managing the challenges of NWI found in the literature.

Table 3

Nursing Strategies to Manage Challenges of NWI

Investigator(s)	Strategies
Benner, 1984	Coordinating multiple patient needs
	Contingency planning, prioritizing
	Fostering social support among nurses
	Anticipating and preventing extreme work overload
	Maintaining flexible stance towards patients, technology, and bureaucracy
	Getting appropriate and timely responses from physicians
Jacques, 1993	Establishing connections
	Conveying information between parties
	Engaging in multiple tasks simultaneously
Ebright et al., 2003	Stacking
	Prioritizing or delegating in anticipation of what might happen
	Proactively monitoring patient status
	Strategic delegation and handoff activities
	Stabilizing and moving on
	Use of memory aids to keep track of work
McGirr & Bakker, 2001	Ensuring quality of care
	Promoting social cohesion
Allen,	Managing multiple agendas
2004	Circulating patients
	Bringing the individual into the organization
	Managing the work of others
	Mediating occupational boundaries
	Obtaining, fabricating, interpreting, and communicating information
	Prioritizing care and rationing resources
	Maintaining a record
Potter et al., 2004	Reprioritizing
Potter et al., 2005	Organizing care by geographic area
	Simultaneous delivery of multiple interventions to a subset of patients

	Stacking
Stewart, Stansfield & Tapp, 2004	Understanding and influencing the treatment plan
	Bringing the physician into the situation
	"Going in the back door"
	Accessing and coordinating resources of the health care team
	Coordinating the treatment plan
Tucker & Spear, 2006	Ensuring patients receive services from other health care workers
	Partitioning
	Interweaving
	Reprioritizing

Summary on Strategies to Manage NWI

Nurses' strategies for managing the challenges of NWI appeared to be oriented toward fostering connections, promoting workflow, and balancing stability and flexibility. Managing the complexity and uncertainty of NWI required comprehending the whole situation within its context. Individual nurses adapted to meet evolving challenges through high-level thinking, which resulted from the synergy of experiential knowledge and cognitive processes. Strategies for managing NWI were the product of nurses' knowledge work, nursing activities based on the analysis and synthesis of experience-based knowledge and the situation. The next section will review literature examining how nurses' knowledge work is applied to manage the challenges of NWI.

Nursing Work as Knowledge Work related to NWI

A literature search using keywords "cognitive work," "knowledge work," "knowledge worker," "nursing knowledge work," "experiential knowledge," and "nurse" produced 56 articles. A review of titles and abstracts for relevance to this study reduced the

number to 10 articles. Additional articles were identified through article reference lists, yielding 18 sources ranging in dates from 1979-2007.

Theoretical Literature on Knowledge Work

Dreyfus (1979) and Dreyfus and Dreyfus (1986) developed a trajectory of skills acquisition from novice to expert which emerged through exploration of the limits of technology and artificial intelligence. Dreyfus (1979) and Dreyfus and Dreyfus (1986) suggested that professional experts contribute value added through their unique abilities to learn, to integrate contextual information, and to generalize. Knowledge work (KW) is a generative process requiring substantial levels of cognitive activity. It involves analysis and the application of expertise to solve problems, generate ideas, create new products or services, and teach others (Davenport & Prusak, 1998; Moody, 2004; Quinn, Anderson, & Finkelstein, 1996; Sorrells-Jones, 1999; Sorrells-Jones & Weaver, 1999).

Knowledge workers use knowledge, skills, judgment, and time to transform information within context. The measure of productivity for knowledge workers is found in the direct or indirect outcomes of their work (Hall, 2003; Moody, 2004). Transformation of a work product is a direct outcome. Indirect outcomes result from problem-solving behaviors, coordination of the work of others, and exercising professional judgment (Hall, 2003).

Nursing knowledge work related to NWI.

Nursing KW entails the roles of data generator, information user, knowledge user, and knowledge generator (Sorrells-Jones, 1999; Sorrells-Jones & Weaver, 1999; Weaver & Sorrells-Jones, 1999). Pesut (2000a) alluded to the generative nature of nursing KW in his contention that "… KW develops intellectual capacity" (p. 57).

The continuum in Figure 3 reflects the parallel developmental processes of skills acquisition and professional intellect. Proficient and expert practice (Benner, 1984; Dreyfus,

1979; Dreyfus & Dreyfus, 1986) reflect higher ordered thinking that accounts for context and recognizes patterns (Moody, 2004; Pesut, 2000a, 2000b; Quinn, Anderson, & Finkelstein, 1996). Systems understanding enables "… professionals to move beyond the execution of tasks to solve larger and more complex problems" (Pesut, 2000a, p. 57).

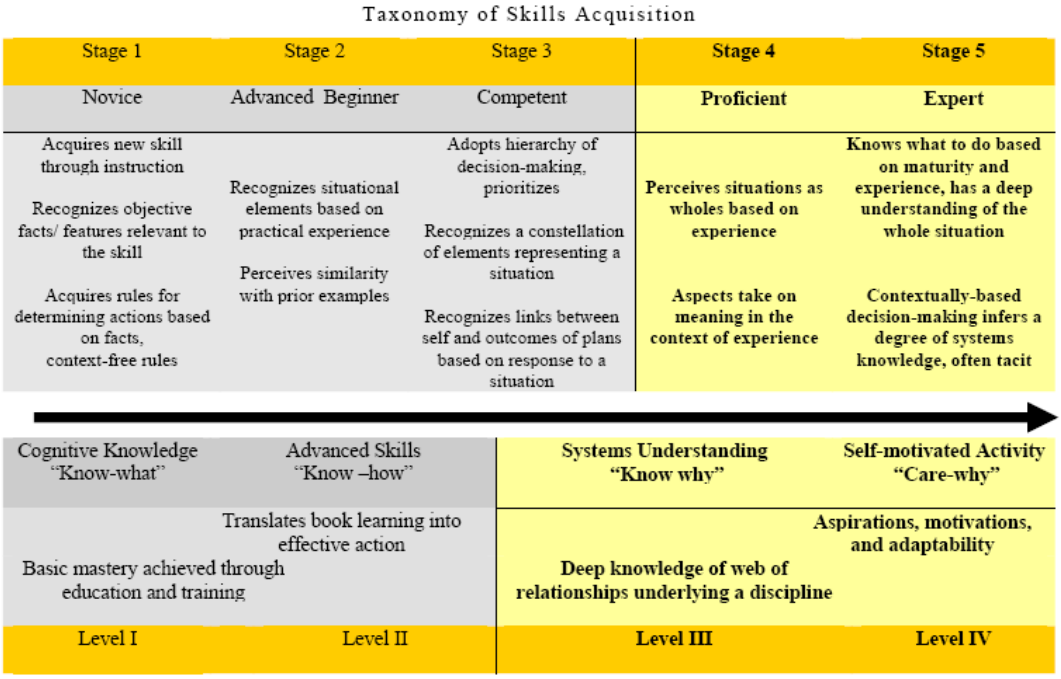

Figure 3. Continuum of professional intellect and skills acquisition development

Empirical Literature on Nursing Knowledge Work Related to NWI

Several articles reviewed in previous sections on challenges and managing challenges of NWI and one additional study (Kennedy, 2004) provided evidence of nursing work as KW. The following three sections review experiential knowledge, cognitive work, and the interaction between experiential knowledge and cognitive work related to NWI that emerged from the literature.

Experiential knowledge related to NWI.

The literature on experiential knowledge related to NWI was scarce. Most of the studies in the literature related specifically to clinical knowledge rather than the systems knowledge that is required for NWI. Systems knowledge was one aspect embedded in the experiential knowledge examined in the following two studies reporting findings germane to this study (Benner, 1984; Kennedy, 2004). Both studies used ethnographic research methods. Data were collected using observation (Benner, 1984; Kennedy, 2004), interviews (Benner, 1984; Kennedy, 2004), and focus groups (Benner, 1984). Studies used convenience samples in acute care (Benner, 1984) and community-based (Kennedy, 2004) settings.

Benner (1984) examined data collected from expert and novice nurses' descriptions of the same clinical incidents to determine whether distinct differences emerged between the two groups of nurses. Kennedy (2004) examined data collected from a separate study to determine knowledge used by district nurses during their initial assessment visits.

Benner (1984) further developed the novice to expert skills acquisition model proposed by Dreyfus (1979) and Dreyfus and Dreyfus (1986). This model focused on clinical decision-making, but recognized the increasing complexity of organizational demands placed on nurses. Specifically, Benner identified several competencies of expert nurses that fell into two specific domains relevant to this study. The first competency area related to this investigation was communication. Expert nurses effectively monitored and ensured quality of health care practices. This required knowledge of available support systems and back-up resources. It required knowing when and why to call, and also who to call. Organizational and work-role competencies were based on nurses' learning "… the local, the particular, the contingent, and the historical … on a particular unit" (Benner, 1984, p. 145).

Benner (1984) contended that expert knowledge transcended norms and standardized rules because it constantly evolved based on experience and reflection. "… Expertise … always involves an accurate interpretation of specific responses to a specific situation … there is no higher court than an expert's reading of a particular situation" (Benner, 1984, p. 177).

Based on findings from a study of 11 district nurses in Scotland, Kennedy (2004) concluded that context, knowing what might happen in the future, and knowing community resources were fundamental to the assessment process. Based on these findings, Kennedy (2004) developed a category called "knowing in action/use" (p. 403). This category was described as an amalgam of theoretical (knowing that) and practical (knowing how) knowledge. Knowing in action/use is consistent with characterizations on the higher end of the continuum in Figure 3.

Cognitive work related to NWI.

Three studies examining the cognitive work of nurses related to NWI (Ebright, Patterson, Chalko, & Render, 2003; Potter et al., 2004; Potter et al., 2005) were found in the literature. Ebright et al. (2003) observed nurses, then conducted individual interviews using the Critical Decision Method. Potter et al. (2004) and Potter et al. (2005) used a combination of human factors engineering techniques and observation. All three studies collected data through observation and interviews. All three studies used convenience samples within acute care settings. Sample sizes ranged from one RN-patient care technician dyad (Potter et al., 2004) to eight direct care nurses (Ebright, Patterson, Chalko, & Render, 2003).

Ebright et al. (2003) identified three patterns of cognitive factors driving performance and decision-making to address complexity of NWI. The three patterns were knowledge of 1) individual patient information, 2) typical patient profiles, and 3) unit routines and workflow.

These cognitive patterns were reflected in strategies used to manage the complexity inherent in nurses' work.

Potter et al. (2004) developed a cognitive pathway that outlined steps of the nursing process as they were applied in caring for one patient, and across multiple patients, over a period of time. The cognitive pathway also incorporated occurrences of interruptions over the same period of time. This cognitive pathway demonstrated nurses' recursive cognitive processes that included induction and deduction, and entailed multiple cognitive shifts throughout the nursing process. Potter et al. (2004) reported 43 interruptions to the work of one RN-patient care technician dyad over the first 10 hours of a 12-hour shift. Similar findings were reported from a subsequent study of seven direct care nurses working in a large tertiary hospital in the midwest (Potter et al., 2005). In addition to frequent cognitive shifts and interruptions, nurses also managed a cumulative workload over the course of a shift (Potter et al., 2005).

Interaction of experiential knowledge and cognitive work related to NWI.

This section draws upon literature that has been described in detail earlier in this section of the literature review on NWI. Investigators consistently described the central and adaptive character of NWI that called upon high level thinking and experience-based knowledge (Table 4). Nursing activities based on the analysis and synthesis of experience-based knowledge and the situation represent nursing knowledge work.

Table 4

Descriptors of Nursing at the Intersection of Patient and Health Care System

Investigator(s)	Descriptor(s)
Jacques, 2003	"Connector" Scan the environment, select appropriate information and deliver information to appropriate recipients, thereby ensuring smooth system functioning.
McGirr & Bakken, 2000	Ensure "unit ran smoothly"
Allen, 2004	"Central node" "information broker" "mediator" "intermediary"
Ebright et al., 2003	Adapt, anticipate, accommodate, react, and cope to provide and coordinate care
Stewart et al., 2004	"Major coordinator of health care" "coordinating hub" "liaison"

Allen (2004) concluded that the unique place of nurses at the intersection of the health care system and its users, identified nurses as "… central nodes in health care networks" (Allen, 2004, p. 276). The key nursing contribution within this niche was that of "information broker" (Allen, 2004, p. 276). These findings were consistent with those reported by Stewart et al. (2004) that nurses perceived their roles as "'liaison[s]' or 'coordinating hub[s]'" (p. 447). Several investigators identified ensuring the smooth function of the unit as nursing work (Jacques, 1993; McGirr & Bakker, 2000; Stewart, Stansfield, & Tapp, 2004).

Ebright et al. (2003) identified five "goal patterns" (p. 635) that drove nurses' management strategies of complex NWI. The five goal patterns were: 1) maintaining patient safety, 2) preventing getting behind at work, 3) avoiding increasing the complexity of situations, 4) appearing confident and efficient to co-workers, and 5) maintaining patient and family satisfaction (Ebright, Patterson, Chalko, & Render, 2003). These goal patterns shaped

the development and implementation of nursing strategies to manage the complexity of NWI. Meeting these goals depended upon nurses' application of cognitive patterns within situation-specific contexts.

Jacques (1993) exemplified NWI as knowledge work:

> [The nurse is the one person on the unit] whose job is to care about anything that might happen in the universe of the patient and to connect any parties who need to be connected in order to assure a successful outcome for the patient (p. 3).

Summary of Literature on Nursing Work as Knowledge Work

These studies supported the notion of nursing practice as knowledge work. The nature of NWI exemplifies KW in that it requires that the nurse know what it is that needs to be known or acted upon, and acting upon it. Acting upon what needs to be known or acted upon requires knowledge of the encompassing system. Nursing KW entails a synergy of experiential knowledge and cognitive work.

Successful nursing work requires the application of systems knowledge to ensure patient safety. Nursing knowledge work is essential in creating ".... safe passage for patients and patients' families within the health care system" (Curley, 1998, p. 67). NWI provided a framework for clarifying nursing work as knowledge work. This phenomenon has not been studied at the point of care.

Summary of Literature on NWI

Nursing work in this body of literature fell along a continuum extending from novice to expert, and from basic mastery of knowledge to a deep understanding of systems and adaptability to evolving contexts. Across the continuum, the literature supported the importance of context to nursing work within a CMS. Challenges to NWI included environmental- and human-related factors that contributed to uncertainty and complexity of NWI. Strategies to manage NWI reflected nursing activities that facilitated self-organization

of the CMS. Strategies aimed to establish and maintain smooth flow of information and connections between persons and systems directly or indirectly involved in patient care. These nursing activities required analysis and synthesis of experience-based knowledge and the situation, and therefore constituted nursing knowledge work. The next section will examine literature related to nurse-to-nurse information exchange related to NWI.

Nurse-to-Nurse Exchange of Systems Information

A literature search using keywords “nurse,” or “nurses,” and “systems information,” and “information exchange” yielded 14 articles. A hand search of titles and abstracts resulted in one article pertinent to nurse-to-nurse exchange of systems information.

Erdley (2005) used the Hybrid Model of Concept Development to develop a definition of nursing information. This process included theoretical, fieldwork, and final analytical phases. The theoretical phase entailed forming a working definition through the available literature. The second phase entailed observations of and interviews with 13 expert ICU nurses. The analytical phase entailed comparison and analysis of data collected during the two prior phases to develop the final definition of nursing information (Erdley, 2005).

Erdley (2005) identified exchangeability as an attribute of nursing information. Exchangeability referred to “giving, taking, or concurrent giving and taking of nursing information … [and] included the ability to access or retrieve nursing information outside of one’s self” (Erdley, 2005, p. 97). Communication of nursing information referred to giving and receiving of nursing information between nurses, other care providers, patients, and technologies. The resulting definition was, “Nursing information is contextually dependent, multidimensional, complex, and necessary for patient care” (Erdley, 2005, p. 98). The

importance of context is integral to information exchange and has implications for applying knowledge across settings.

Orientation Programs and Systems Information Exchange

Entering the keywords “nursing orientation,” “employee orientation and nursing,” and “staff nurses” yielded 79 articles. A hand search for relevant titles and abstracts and omitting articles pertaining to the orientation of new graduates, resulted in 14 pertinent articles. Articles published earlier than 1997 were eliminated based on the rapid changes in the health care system over the past ten years, and relevance to this investigation. Seven articles published in 1997 to 2006 were included in this review.

Empirical Literature on Orientation Programs and Systems Information Exchange

Three empirical studies examining systems level orientation of experienced acute care nurses were found in the literature. Studies used qualitative (Bartz, 1999; Connelly & Hoffart, 1998) and quantitative (Thomason, 2006) research methods. Studies examined organizational level (Connelly & Hoffart, 1998) and unit level (Bartz, 1999; Thomason, 2006) orientations in acute care settings. Connelly and Hoffart (1998) conducted interviews of 64 staff nurses, nurse managers, nurse educators, and nurse administrators, and also used participant observation and document review. Bartz (1999) interviewed 10 experienced RNs in their first or third year of employment at an urgent care setting. Thomason (2006) surveyed clinical nurse specialists from 24 hospitals that were either magnet designated or in the process of applying for magnet status. This literature focused primarily on nurses’ clinical competencies. Purposes and outcomes for each of these three studies are noted in Table 5.

Table 5

Purposes and Outcomes of Orientation

Investigator(s)	Purpose	Successful Outcome of Orientation
Connelly & Hoffart, 1998	To obtain a more complete picture of orientation that illustrated both individual and organizational aspects for the purposes of model development and evaluation	Affective (welcomed and incorporated into the workplace): new nurse feels comfortable within the organization Clinical (oriented to and evaluated in clinical role): new nurse is clinically competent within the organization Effective nurses are competent in accomplishing things within the organization. [Physical plant, work groups, management system, policies & procedures]
Bartz, 1999	To characterize and explain unique features related to the orientation of newly hired nurses	New nurse is: welcomed by those who hired and those who will be working with her or him introduced to: organizational cultural and philosophy, goals, policies, role expectations, and other factors necessary to function in this specific work setting
Thomason, 2006	To obtain information about adult ICU orientation and post-orientation practices throughout the US	New nurse: completes orientation competencies demonstrates knowledge, skills and attitudes to work successfully in the unit demonstrates ability to practice safely demonstrates ability to handle a full patient assignment

Connelly and Hoffart (1998) developed a model that reflected the mutual orientation needs of individuals and organizations. “Being oriented” (Connelly & Hoffart, 1998, p. 35) was comprised of two components. Participants identified the goal of integrating the new team player into the work group with a focus on communicating role expectations. Employees felt that they needed “to learn about the organization as a whole… [and an]

introduction to the medical center: how it functions, how it is set up, how patient care services relates to another department" (Bartz, 1999, p.5).

Although systems knowledge was not specified as an orientation component in any of the studies, investigators identified competency in systems thinking as an outcome of successful orientation (Table 5). New employees were expected to "… learn the way things are done here" (Connelly & Hoffart, 1998, p.35). One participant stated "you may know nursing, but you don't know nursing here" (Connelly & Hoffart, 1998, p. 35). Thomason (2006) reported the expectation that upon completion of orientation "… new nurses have demonstrated knowledge, skills, and attitudes to work successfully in the unit" (p. 243). As formal mechanisms of systems information exchange, orientation programs informed new employees of responsibilities specific to a particular role within the context of a particular organization (Connelly & Hoffart, 1998; Thomason, 2006).

Supplemental Nurses' Orientation

Entering keywords "supplemental nurse" or "travel nurse" or "casual nurse" or "agency nurse" or "contract nurse" or "registry nurse" or "temporary nurse" and "orientation" yielded only six relevant articles since 2001.

Theoretical literature on supplemental nurses' orientation.

The theoretical literature focused on screening, hiring processes, and credential verification (Richardson & Allen, 2001; Stiehl, 2004). Richardson and Allen (2001) discussed the implications of sending a supplemental nurse to different wards, which included the nurse not knowing the procedures, or the location of equipment on the wards (Richardson & Allen, 2001). Only two articles described the development of orientation programs for supplemental nurses (Novak, 2005; C. M. Smith, 2005).

Empirical literature on supplemental nurses' orientation.

Of the two studies that examined orientation for supplemental nurses, the first study examined the professional relationship between hospitals and nursing agencies (Peerson, Aitken, Manias, Parker, & Wong, 2002). The investigators surveyed managers of 30 acute care hospitals and six agencies. The second study examined agency nurses' perceptions of working through a nursing agency (Manias, Aitken, Peerson, Parker, & Wong, 2003a). The investigators interviewed 10 agency nurses registered with one of three nursing agencies. The focus was on structural factors of orientation. The investigators found that 24 of the hospitals had policies, and all had orientations for supplemental nurses (Manias, Aitken, Peerson, Parker, & Wong, 2003a; Peerson, Aitken, Manias, Parker, & Wong, 2002). Few details were provided for these Australian-based studies.

Evidence emerged, however, that supplemental nurses viewed systems information as lacking. First, the participants recommended that hospitals provide written packets containing the mission, daily objectives for the agency nurse, emergency protocols, documentation guidelines, and name of the emergency contact at the hospital. And second, participants related feeling isolated and inadequately supported particularly during busy situations. One participant stated, "… part of your working time … is social contact with other nurses, camaraderie, that feeling of give and take with humor and information exchange. You don't get any of that when you are doing agency" (Manias, Aitken, Peerson, Parker, & Wong, 2003a, p. 275).

The lack of existing literature suggested that little is known about how supplemental nurses integrate into the CMS. This dissertation offered the opportunity to begin to build the knowledge base on supplemental nurses by including them as key informants about these processes.

Intershift Report and Systems Information Exchange

A literature search using the keywords “intershift report,” “nursing shift report,” and “handover process” yielded 48 articles. Most of these articles focused on exchange of patient information. One study mentioned context (Lamond, 2000), but without definition or further information. Only one study referred directly to exchange of systems information in intershift report (Lally, 1999).

The main focus of intershift reports was the transfer of patient information (Greaves, 1999; Lally, 1999; Lamond, 2000; Payne, Hardey, & Coleman, 2000) However, the role of intershift report in fostering social cohesion was also recognized (Hays, 2003; Hopkinson, 2002; Lally, 1999; Payne, Hardey, & Coleman, 2000). “Learning the ropes” (p. 32) served as a key function of intershift report, and referred to information helpful in the enculturation of new nurses (Lally, 1999). Social chatting and passing on of informal information was also identified as a key function of intershift report (Lally, 1999). Hints of systems information exchange exist in the literature, but it has not been identified as a formal construct in nursing.

Summary of Nurse-to-Nurse Exchange of Systems Information

The scant literature available on nurse-to-nurse systems information exchange revealed a significant gap in the literature. The existing literature provided evidence that nurse-to-nurse systems information exchange occurs at organizational and CMS levels. However, it is not explicit, and has not been studied directly.

Literature Review Summary

This literature review examined literature published from 1979 to 2007. Nursing work occurred at the intersection of patient and health care system within the CMS, which was embedded within the larger health care CAS. Inherent complexity and uncertainty that characterized NWI presented specific systems-related challenges. The direct care nurse

served a unique role as information broker within the CMS. This role required recognizing relevant issues, and knowing how to bring available resources together to meet unique and ever changing patient needs.

NWI requires a synergy of experiential knowledge and cognitive work. Nursing activities that required analysis and synthesis of experience-based knowledge and the specific situation constituted knowledge work. Although the literature clearly supports the nature of NWI as systems-based, little research has been conducted on the nurse-to-nurse systems information exchange. The questions remain: What are the components of systems knowledge needed by nurses to function within a CMS, how is nurse-to-nurse systems information exchanged, and what systems information is exchanged between direct care staff nurses and travel nurses in a CMS? Chapter 3 outlines the methods for this investigation.

CHAPTER 3: METHODOLOGY

Introduction

Chapter 3 describes the study design including the setting, gaining access to the setting and the participants, the sampling plan, and data collection, management and analysis methods. Trustworthiness measures and ethical concerns are also described. The study was conducted through a three-phase process using participant observation (PO) and document review, individual interviews, and focus group methods. Utilizing a range of techniques yielded breadth and depth of information (Marshall & Rossman, 1999) and rigor (2001; Morse & Field, 1995).

Research Questions

The following three research questions were addressed:

1. What components of systems knowledge are needed by nurses in order to function within a clinical microsystem?
2. How does nurse-to-nurse systems information exchange occur within a clinical microsystem?
3. What systems information is exchanged between staff and travel nurses in a clinical microsystem?

Description of Qualitative Approach

Qualitative methods discern the meaning a person holds for a phenomenon. The purpose of qualitative descriptive research is to provide an accurate accounting and understanding of a phenomenon in the everyday terms of participants. Qualitative description (QD) is free of the preexisting philosophical or theoretical commitments to which other qualitative methodologies are bound (Sandelowski, 2000). It entails little interpretive activity on the part of the investigator. QD was used in this study to identify and describe from

nurses' perspectives: 1) the systems knowledge components needed by nurses in order to function within a CMS, and 2) how nurse-to-nurse systems information exchange occurred.

Although interpretation is minimized with QD, any description entails some degree of interpretation. QD entails decisions regarding which data to include in the description. (Sandelowski, 2000; Wolcott, 1994). The low inference interpretation of qualitative description is likely to result in description of events that are readily agreed upon between researchers even if the events are viewed differently (Sandelowski, 1993). QD draws upon inductive principles using the investigator as instrument to study a phenomenon in its natural state. Inductive analyses occur through emergent design and negotiated outcomes (Lincoln & Guba, 1985).

Characteristics of qualitative findings include complexity and discovery (Kearney, 2001). Richness of research findings yield evidence of linkages between discrete findings to form a multifaceted web of interactions (Kearney, 2001). By design, QD produces lower levels of complexity than other methods, such as phenomenology and grounded theory, which seek to discover symbolism and meaning. However, QD offers potential for high degrees of discovery which Kearney (2001) defined as

> … new perspectives on or information about the human phenomenon under study [which may be] revealed in verbatim accounts that portray the experience under study for the first time or with previously uncaptured richness, or in a theoretical or interpretive framing of the phenomenon that sheds light on how it came to be and what it is like (p. 146).

The literature suggested that the phenomena of interest, e.g. systems knowledge and exchange of systems information, were embedded in day-to-day nursing work. The goal was to gain insider perspective from the outside, through "objective observation" (p. 115) of situations and processes which would be unavailable to a deeply involved insider (Creswell, 1998).

Resources for nursing knowledge development are directed at the development of safe, efficacious, and effective interventions for improving health care quality (IOM, 2001; 2003; 2004); the context of care is a target area for nursing knowledge development (Naylor, 2003). QD has an essential role in intervention development. QD yields information and enhances understanding of complex processes, participants, contextual phenomenon, and theoretical conceptualizations (Whittemore, 2000; Whittemore & Grey, 2002).

Outcomes of descriptive research provide information helpful in establishing the content, strength, and timing of interventions, as well as outcome measures (Sullivan-Bolyai, Bova, & Harper, 2005; Whittemore & Grey, 2002). QD is an appropriate methodology for examining issues especially relevant to practice and policy (Sullivan-Bolyai, Bova, & Harper, 2005). Scarcity of research in the area of systems knowledge and systems information exchange supported the selection of qualitative method to begin to build a nursing knowledge base.

Study Design

Setting

This investigation was conducted within the natural setting of a clinical microsystem (CMS) within a 396-bed Joint Commission-accredited, Magnet-recognized teaching hospital and research center in northern New England. Magnet designation increased the likelihood that a CMS within the hospital would be high-functioning. Fewer than five percent of U.S. hospitals are recognized as Magnet Hospitals (American Hospital Association, 2006; American Nurses Credentialing Center, 2007; Haase-Herrick & Herrin, 2007). Nurses were employed at will; there was no nursing union. Its status as an academic medical center contributed to the complexity of the clinical setting. The medical center had an established relationship with a national travel nurse agency, which it utilized exclusively. This exclusive

contracting arrangement enabled parsimony and clarity in terms of structures and processes involving travel nurses (TNs).

Nursing administrators identified the Intensive Care Nursery (ICN) as an optimal site for this study based on informed perceptions that it met the following criteria: 1) nursing leadership engagement with direct care staff, 2) direct care staff participation in decision-making processes, 3) high quality relationships between nurses and physicians, and 4) consistent utilization of TNs to meet staffing needs. Each of the first three criteria were associated with high functioning CMSs (Donaldson & Mohr, 2000; Nelson et al., 2002). The fourth criterion was included because TN utilization was an essential component of the study, e.g., introducing TNs into the clinical microsystem provided contrast within the system illuminating existing and emerging structures, processes, and patterns.

The 30-bed ICN had an allocated 61.5 full-time nursing equivalents (FTE), and contracted consistently for 10 to12 TNs. The ICN had one unit leader (UL), one clinical nurse specialist (CNS), and nine advanced registered nurse practitioners (ARNPs). TN utilization accounted for approximately 20% of FTE.

As a strategy for holistic contextual understanding of a particular, qualitative research is case-oriented. Case-orientation focused on making sense of how this particular case was unique in its wholeness (Sandelowski, 1996). Case-oriented qualitative research aims to understand commonalities among diverse elements of a case using an inductive approach (Ragin, 1999; Sandelowski, 1995a). As is typical, this within-case sample had a property of "nestedness" (M. B. Miles & Huberman, 1994). The setting was initially selected based on organizational level properties, and then, on specific properties of the CMS. This

characteristic nestedness is consistent with the CMS conceptual framework (Nelson et al., 2002; Zimmerman, Lindberg, & Plsek, 1998).

Gaining Access

Lofland and Lofland (1984) emphasized the effectiveness of using "preexisting relations of trust" (p. 25) to remove barriers to access. The investigator accessed the CMS and the sample through professional networking resulting from an established service-academic partnership. The nursing leadership had committed their support through the Office of Nursing Research that provided access to the CMS.

Gaining Access to the CMS

The UL agreed to support the study, and allowed access to the nurses on the unit. pending approval by the medical center's Institutional Review Board (IRB). The investigator met with and garnered the support of the CNS and the lead ARNP within the ICN. This strategy served as part of the recruitment process by allowing members of the CMS to identify the most appropriate representatives to the focus group. This approach has been found to facilitate smooth entry into the study process (Havens, 2001).

In addition to the inclusion criteria previously described, the ICN nursing leadership was stable, a key characteristic of high-performing CMSs (Nelson et al., 2002). The UL had worked in the ICN for 22 years, the most recent two and a half years in her current position. The lead ARNP had been employed in various roles within the ICN for 25 years. The CNS had been employed in her current role for 10 years. The CNS was acquainted with the investigator through a positive collaboration experience on a previous study. This established relationship allowed access to the CMS and to its individual nurse members.

A brief announcement explaining the investigator's presence on the unit (Appendix G) was provided to the UL who distributed it, as appropriate, to physicians, clerical support

staff, respiratory therapists, and members of other disciplines working with the nurses in the CMS.

Gaining Access to the Participants

The plan for accessing nurses within the CMS followed a similar pattern. The study proposal was approved by IRBs at the University of Massachusetts Medical Center and the medical center where the investigation occurred.

Sample

The sample was comprised of 18 professional nurses practicing in various roles within the ICN. Although the CMS was clearly understood as a multidisciplinary unit, the scope of this study was limited to nurses' perspectives of the CMS. In qualitative inquiry, adequacy of sample size depends upon the quality of information gained from each participant rather than the number of participants included (Sandelowski, 1995b). Maximum variation sampling, a form of purposeful sampling commonly used in qualitative studies (Lincoln & Guba, 1985; Sandelowski, 1995b), may include demographic, phenomenal, or theoretical variation. A stratified maximum phenomenal variation sample included nurse leaders, SNs, and TNs, provided a range of experience-based nursing perspectives (Lincoln & Guba, 1985; M. B. Miles & Huberman, 1994; Sandelowski, 1995b).

Inclusion Criteria.

Eighteen individuals from two pools of potential participants comprised the sample for the three phases of the study. The first pool included travel and staff nurses who would begin working in the ICN upon completion of orientation. The second pool consisted of ARNPs, SNs, and TNs already working in the ICN. New graduate nurses were excluded to prevent introducing into the study issues associated with socialization into a new role.

Recruitment.

Recruitment for Phase 1 participants began with an initial contact with newly hired SNs and TNs through an introduction letter (Appendix H). This letter, along with a consent form (Appendix I), was included in the materials they received at the medical center general orientation.

Upon completion of the medical center general orientation, the new nurse employee followed one of three paths. Newly hired experienced SNs followed the first path. Newly hired experienced SNs attended a general nursing orientation that occurred over a week and a half before starting in the ICN. Upon completion of the general nursing orientation, they attended the ICN-specific orientation. Each newly hired experienced SN was then matched with a nurse preceptor for shift orientations that were based on the particular needs of the individual orienting nurse. TNs followed the second path. TNs attended an ICN-specific orientation the Wednesday following the medical center general orientation. TNs worked two precepted 12-hour night shifts before independently assuming a full patient caseload. New graduate nurses followed the third path. New graduate nurses completed an extensive nine-month nurse residency program. New graduate nurses were excluded from this study.

The ICN nurse educators allowed the investigator a 15-minute block of time at the beginning of ICN-specific orientation sessions to inform and recruit potential participants. Nurse orientees were invited to contact the investigator if they were willing to participate. Nurse educators asked orientee participants' preceptors to contact the investigator by email if they had questions about or were willing to participate in Phase 1. Nurse educators provided a copy of the introduction to ICN nurses' letter (Appendix J) which all potential preceptors had already received in their mailboxes.

Recruitment for Phase 2 participants was less complicated. An introductory letter from the investigator (Appendix J) was delivered to SNs' mailboxes. The investigator attended two staff meetings, one during the day shift, and one during the night shift (for agenda, see Appendix K) to introduce and explain the purpose of the study. Interested nurses were invited to contact the investigator.

Negotiations with potential participants included ensuring confidentiality, disclosing how data would be collected, and emphasizing the voluntary nature of participation. Participants were also informed of the potential time commitment in case clarification or verification of data was needed later in the study.

Several potential benefits of participation were communicated to participants prior to enrollment. Participation in this study provided an opportunity to contribute to the development of the nursing knowledge base (M. B. Miles & Huberman, 1994). On a personal level, participation provided a formal opportunity for reflection on their nursing practice, an essential element of professional competence and development (Gustafsson & Fagerberg, 2003; Kuiper & Pesut, 2004; Schon, 1983, 1987).

Important recruitment considerations and potential barriers included the unpredictable work pace and intensity in the ICN. The investigator remained flexible in terms of scheduling and rescheduling. The investigator demonstrated effective communication by projecting a level of knowledge, preparation, and professional competence, balanced with acknowledgement of potential participants' expertise. This stance was intended to communicate respect for the unique knowledge and time commitment of prospective participants (Lofland & Lofland, 1984).

Temporal considerations.

Consideration of temporal issues is essential to understanding context and an important factor in sampling for phenomenal variation (Sandelowski, 1999). Focus on phenomenal variation in this case purposefully included participants who were experienced with the CMS as well as participants who were inexperienced with this CMS, but who were experienced with other CMSs. Time is an inherent element in experience. Time was particularly important in this study because TN contracts occurred in 13-week blocks, although they were not limited to a single 13-week commitment. Shift work introduced another temporal consideration.

Time mattered also in phasing of collection, management, and analysis of data, as data collection occurred upon arrival and orientation of nurses to their new assignments or work settings. Demographic data regarding length of time in nursing as well as in current position were relevant to this study as participants included permanent SNs, orienting SNs, and TNs. From a macro perspective, time was essential in the evolution of the health care system that provided the historical context and informed the relevance of this inquiry.

Data Collection, Management, and Analysis

The investigator conducted data collection, management, and analysis. Analysis began with the collection of the first data and continued throughout data collection, a process comprised of overlapping rather than discrete phases (Marshall & Rossman, 1999; Schatzman & Strauss, 1973). Strengths and limitations of each data collection strategy are described below. Informed consent was obtained at each phase of interaction between the investigator and each participant (Appendix I).

The investigator assured participants that their choice to participate in the study was entirely voluntary and would have no bearing on their employment. Participants were

informed that that they could opt to not answer any particular question and could discontinue the interview at any time without ramifications. Finally, participants were assured that the investigator would maintain confidentiality throughout the research process and in any subsequent publications. Reconfirmation of informed consent at each phase of the study provided opportunities for participants to review their willingness to continue participation, and provided formal structures for withdrawal at various points of the process. Each participant provided demographic data using an investigator-developed tool (Appendix L).

Qualitative investigators aim to reduce the extent of research bias by recognizing personal values, views and assumptions, and the potential for these to affect data collection and analysis. This is accomplished through reflexivity, and was used in various ways throughout the process as outlined in the following sections. A schematic of the data collection process is outlined in Figure 4. The emergent nature of qualitative inquiry required a flexible design. However, no substantive deviation from the original research plan occurred.

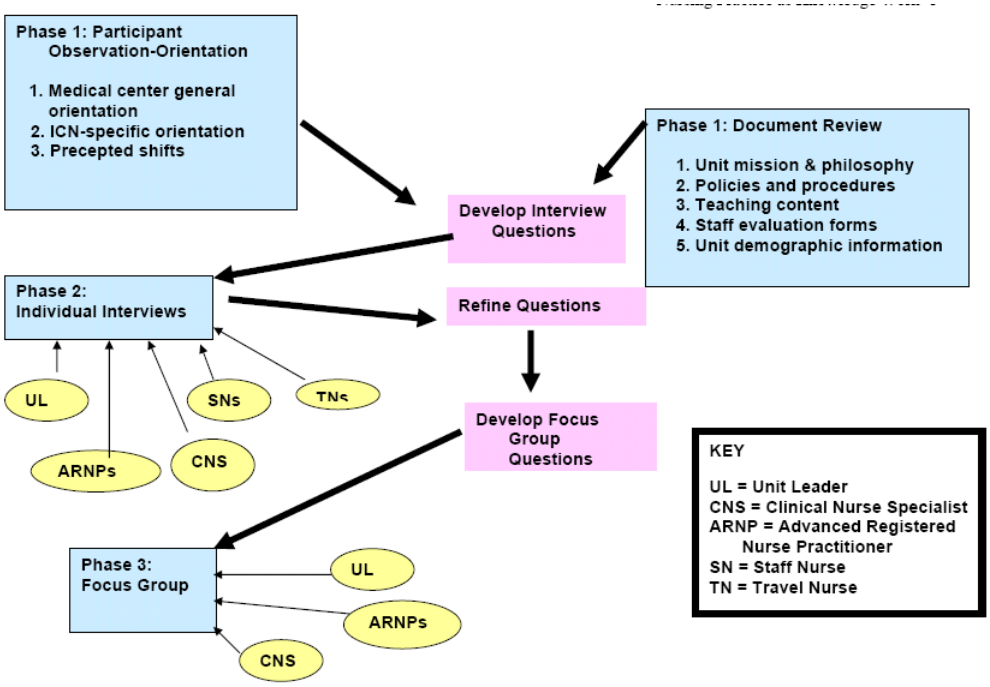

Figure 4. Methods design

Phase 1: Participant Observation and Document Review

The purpose of Phase 1 was to begin to collect data to answer each of the three research questions and to begin to formulate specific questions for individual interviews and the focus group session. Phase 1 had two parts: 1) participant observation (PO) and 2) document review. The investigator observed the orientation process of nurses beginning with their assignments at the medical center's ICN. As a core component in any process (Sandelowski, 1999), and an element in qualitative data collection, time was a particularly important element in Phase 1. This phase was designed to observe and describe the orientation and integration of nurses new to the CMS.

Documents provided data that could not be observed (Patton, 2002), as well as historical context (Ingersoll, McIntosh, & Williams, 2000; Marshall & Rossman, 1999; Patton, 2002). Estabrooks et al.(2005) identified documents as one of four sources of nursing

practice knowledge. Documents offered a rich source of data in that they were actively and collectively produced, exchanged and used, and provided meaning into systems of practice (F. A. Miller & Alvarado, 2005).

Sample.

SNs and TNs on the first day of their assignments at the medical center who agreed to participate in this study, and documents from the medical center and the ICN provided data for Phase 1. Three sets of TN orientee-preceptor dyads and two sets of new SN orientee-preceptor dyads were enrolled in Phase 1. Documents relevant to the operation of the CMS were identified and reviewed (M. B. Miles & Huberman, 1994; Patton, 2002).

Data and data collection.

At the start of an observational period with each nurse, the investigator explained the study and encouraged participants to ask questions prior to signing the informed consent form. Data collected in Phase 1 were primarily descriptive accounts of routines, processes, experiences, thoughts, and reactions of participants as well as the investigator. Data existed in the forms of fieldnotes, memos, and document summary sheets. PO is a basic consideration in all forms of data collection in qualitative studies, because it addresses the role of the investigator as instrument. As Sandelowski and Barroso (2002) pointed out, findings in constructivist research are:

> … not so much found as they are made in particular and … irreplicable social interactions and milieus … [and are] partly composed of the knowledge, beliefs, and proclivities of researchers: that is, everything researchers are and bring with them into the project (p. 215).

The importance of self-questioning, self-awareness, and documentation of reflexivity can not be overemphasized. The fundamental purpose of qualitative inquiry is discovery of participants' perspectives. However, it is the investigator who makes observations, records

notes, conducts interviews, and interprets responses (Lofland & Lofland, 1984; Marshall & Rossman, 1999; M. B. Miles & Huberman, 1994; Patton, 2002; Sandelowski, 1993). The context for qualitative findings lies in part in the perspectives the investigator brings to the study. Rigor required that the investigator engaged in a process of reflexivity as a means of "owning" her perspective (Patton, 2002, p. 64).

The investigator had several pre-existing links with the medical center including personal and professional identity as a nurse, affiliation through academic-service partnership, and shared memberships in professional organizations. This mixed "insider-outsider" status presented a range of potential implications, both positive and negative. It was possible that participants viewed the investigator as intrusive or as an outsider who could not recognize significant findings (Creswell, 2003; Lofland & Lofland, 1984). On the other hand, outsider status may have allowed the investigator to enter the setting with a broader perspective than would have been possible as an insider who would face the challenges that accompany enmeshment in the structures and processes of a setting. In addition, the investigator's genuine naiveté about the structures and processes of the CMS or the organization were authentic. This fact may have made it easier to question participants about the how and why than if she had personal knowledge about the workings of the systems (Kennedy, 1999). It is possible that the investigator's knowledge and experience of working within a range of CMSs may have been beneficial (Locke, Spriduso, & Silverman, 2000).

Demographic data collected on individual participants included age, gender, ethnicity, education, years in nursing, position, length of time in position, professional certification, and membership in professional organizations (Appendix L). Demographic data for the ICN

derived through document review and PO provided descriptive statistics of the ICN, including indicators of process and performance outcomes.

Since the investigator was known to the participants under study, she filled the role of observer as participant. In this study, PO entailed the investigator's attendance at general medical center orientation sessions and ICN-specific orientations. PO also included shadowing TNs who were orienting as they worked through their precepted, but routine orientation shifts.

PO continued until saturation, or data adequacy, evidenced by the collection of data until no new information was forthcoming (Morse, 1995). Data collection to saturation allowed for the emergence of themes or patterns as the complete picture emerged, in this case, until the investigator observed no new findings related to the five Ps of the CMS (Godfrey, 2004; Nelson et al., 2002).

The quality of observational data depends upon the attending and observing skills of the investigator. Utilizing PO as a data collection strategy provided opportunities for personal exchange between the participants and the investigators and to note unusual elements and record data as they were revealed or became apparent (Creswell, 2003).

Data recording and management.

Data recording occurred through brief written field notes of observations during the field experience and detailed reflexive memos recorded immediately after the observational experience. Document sources were summarized.

Signed consent forms were kept in a locked file separate from data collection materials to ensure confidentiality. No identifiable information regarding individuals or the medical center was noted on fieldnotes or other documentation. Only the investigator was

able to identify participants through the demographic data collection tool (Appendix L) which was kept separate from other data. Written notes were labeled with unique identifiers, and imported into and stored in NVivo software, where they were password-protected. A separate de-identified set of data was downloaded and stored in a password protected USB flash drive.

Types of data collected included the four sets of records noted in Table 6. These sets of records and data sources were developed through an adaptation of types of data identified in the literature (Lincoln & Guba, 1985; Lofland & Lofland, 1984; M. B. Miles & Huberman, 1994; Munhall, 2001; Sandelowski, Davis, & Harris, 1989; Schatzman & Strauss, 1973). Methodological, theoretical/analytical, and reflexive notes were captured as memos, and linked through NVivo to observational data.

Table 6

Types and Sources of Data Collected

Type of data set	Sources of data
Observational	Raw data, field notes, document summaries, transcripts
Methodological	Notes on the process of doing the research
Theoretical/Analytical	Development and coding; notations about ongoing theorizing about the data
Reflexive	Personal journal identifying personal expectations, reactions, biases; bracketing

Data analysis.

Data analysis began with the first data collected and continued throughout the data collection process. Qualitative data analysis is an iterative process moving fluidly between induction and deduction through data reduction and synthesis processes. Constant comparison was used to identify core categories and patterns that could explain most of the

variation in the data. Constant comparison also integrated data, codes, and memos generated over the course of the study (Sandelowski, Davis, & Harris, 1989), a process that entailed back and forth movement among sets of data to identify patterns and their characteristics.

The process began with the wholistic philosophical stance, and aimed to capture the whole through the data collection process. Summaries and codes were products of data reduction for analysis. Data reconstruction and synthesis occurred through the identification of themes, relationships, findings, and impressions (Lincoln & Guba, 1985). Data analysis occurred through a process of steps: 1) organizing the data; 2) generating categories, themes, and patterns; 3) coding; 4) testing emergent understandings; 5) searching for alternate explanations; and 6) writing the report (Knafl & Webster, 1988; Marshall & Rossman, 1999).

Organizing the data began with reading and rereading fieldnotes, document summaries, and transcripts. It also entailed immersion in the data. This process of familiarization through immersion fostered the generation of categories, themes, and patterns. Through qualitative content analysis the investigator first identified references to the five Ps of the CMS. Qualitative content analysis enabled pattern identification. Comparative analysis enabled pattern identification across groups (Morgan, 1993) of nurse leaders, SNs, and TNs.

Each set of data was summarized and coded before additional data were collected. Similarities among and differences between observation sessions were analyzed through constant comparison. This strategy allowed the analysis to guide further data collection, illuminated connections between findings that validated prior findings, and exposed the investigator to the widest possible ranges of particular findings through comparison. Analyst-constructed typologies, created by the investigator based upon the CMSs conceptual

framework, were used to categorize the data. This step initiated the process that transforms data to findings (Patton, 2002). As patterns were identified in field notes, salient categories emerged within these broad typologies. Data were then coded based on these categories and themes.

Testing emergent understandings occurred as categories and themes were identified through coding (Marshall & Rossman, 1999). Plausibility of the investigator's developing understanding was examined by searching the data for negative instances of patterns and integrating these findings. Data were evaluated for their usefulness and centrality to answering the research questions (Marshall & Rossman, 1999). This process led to the next step, searching for alternative explanations for the identified categories and patterns (Marshall & Rossman, 1999). Alternative explanations were identified, explored, analyzed, and compared to identify the most plausible explanation. Peer debriefing played an important role in this part of the analysis. In addition to consulting her dissertation committee, the investigator conferred at several points throughout the process with three nurse colleagues (Rudesham & Newton, 2001) familiar with the phenomena and process. Peer debriefing assisted the investigator in considering findings in context as well as identifying negative cases.

Data were analyzed as described above using NVivo software. NVivo was selected based on its data management and analytical capacities (coding, memoing, and hierarchical layering of codes). It reportedly interfaced with other software and documents (facilitating importing and exporting data), was widely available, had a wide range of applications, and was user-friendly (QSR International, 2003). The investigator completed a two-day

workshop on using NVivo software for qualitative data analysis. The process started using NVivo 2.0, but upgraded to NVivo 7.0 during data collection.

Phase 1 was completed when saturation, or data redundancy, occurred (Morse, 1995) through PO of the nurses' initial shift orientations. By the end of Phase 1, the investigator had analyzed and compared data collected during Phase 1 and described elements comprising the initial procedure for orientation of nurses to the CMS, and developed interview questions for Phase 2.

Phase 2: Individual Interviews

The purpose of Phase 2 was to enhance and enrich data collected during Phase 1 and to develop focus group questions for Phase 3. Phase 2 began when the investigator initiated individual interviews. Interviews are commonly used as a strategy for the study of human beings, particularly where actions are complex, to provide context (Schatzman & Strauss, 1973). Qualitative interviewing is predicated on the assumption that the perspectives of others are meaningful, accessible, and knowable (Patton, 2002). Questions posed during individual interviews addressed each of the three research questions.

Sample.

During Phase 2, interviews were conducted with individuals from each of the identified stakeholder groups: nurse leaders (n = 4), SNs (n = 3), and TNs (n = 2) working in the ICN.

Data and data collection.

Guided interview questions (Appendix M through Appendix O) were designed to gain the participants' views on the systems knowledge needed for nurses functioning within the CMS and how nurse-to-nurse systems information exchange occurred. Guided interviews emphasized the status of the participant as expert (Grbich, 1999). An interview guide

outlined issues to be explored with each participant prior to the interview (Patton, 2002) and served as a checklist to ensure consistent basic lines of questioning among participants and participant groups. This format enabled investigator flexibility by establishing a conversational style to explore, probe, and ask questions. Individual interviews also increased the potential for yielding comprehensive data (Patton, 2002).

Flexibility in wording and sequencing of questions, however, opened the possibility of omitting important issues or yielding varied responses that could reduce comparability of findings across participants or participant groups (Patton, 2002). Strategies that assured consistency of data included the investigator being the sole interviewer and using the same interview guide to address the same issues with individual members of each stakeholder group. A final interview question for each participant asked for any further information that had not been covered during the interview. Creswell (1998) recommended approximately four to five open-ended questions for the initial interview with an expected duration of an hour (Schatzman & Strauss, 1973). The number of questions in the interview schedules included three main questions that each corresponded to one of the research questions. Length of participant interviews ranged from 45 to 90 minutes.

At the beginning of each interview, the purpose and expected length of the interview was explained. In addition to the procedure to secure informed consent outlined in Phase 1, verbal consent was included on tape at the beginning of each interview. Interviews occurred at times convenient for participants, usually directly following a shift worked, although some interviews occurred during meal breaks or during days off from work. Creswell (1998) emphasized the importance of private interview settings. Interview locations included staff offices, the nursing teaching lab on the unit, and an isolated corner of the cafeteria at a slow

time of day apart from any other patrons. The cafeteria setting was the participant's expressed choice.

Nurse leader participants provided a broad perspective of the CMS including facilitators, barriers and other factors regarding the orientation and integration of nurses to the CMS. The UL was interviewed first, followed by the CNS. These interviews were compared for similarities and differences. The ARNP leader interview followed and this set of data was analyzed. Subsequent ARNPs were interviewed, and additional data analyzed for similarities among and differences between ARNP participants. ARNP interviews were continued to saturation of the five Ps of the CMS as previously mentioned, and compared for similarities and differences with UL and CNS data. Upon completion of interviews with and data analysis of the nurse leaders, e.g., UL, CNS, and ARNP's, individual interviews of SNs were conducted sequentially and separately from TNs.

The first SN was interviewed and this set of data analyzed. As each subsequent SN was interviewed the additional data were analyzed for similarities among and differences between individual SN participants. SN interviews continued to saturation as previously mentioned. SN data were then compared for similarities and differences with the nurse leaders' data. This provided separate sets of analyzed data for each group allowing for comparison of groups.

Following completion of SN interviews and data analysis, the same procedure was implemented for TNs. Data derived from TN interviews were compared for similarities and differences with nurse leader and SN data. Focus group questions were developed using data generated through Phase 2.

When the investigator felt that the interview was no longer productive, she terminated the interview in two steps. First, she asked the participant whether there was anything she would like to add that was not asked, supporting the emergent study design (Patton, 2002). The second step entailed the investigator summarizing what she believed the interviewee said over the course of the interview. This process served three purposes. First, it provided an opportunity to clarify and verify interview content. Second, it allowed for a degree of participant checking. Third, it provided an opportunity for the participant to add new information or expound on what was said earlier (Lincoln & Guba, 1985).

Conducting individual interviews provided investigator access to in-depth information. The quality of data collected through individual face-to-face interviews depended upon the perception and articulation skills of the participant, and the ability of the investigator to make the participant feel comfortable sharing information. Techniques for focusing interviews included silence, probing, and tracking of topics (Sandelowski, Davis, & Harris, 1989). Using silence allowed participants time to fully express themselves before probes were utilized. Probes were used to: 1) elicit information about details and timing of events, and 2) encourage explanation and clarification (Schatzman & Strauss, 1973). Tracking of topics refers to the strategy of redirecting participants to topics requiring probing, but only after they have finished their thoughts. Tracking facilitated flow of participant responses by minimizing interviewer interference (Sandelowski, Davis, & Harris, 1989). Examples of probes are included in the interview guides (Appendices G through I).

Sorrell and Redmond (1995) emphasized the importance of pilot testing interview questions. Interview schedules for SNs and nursing leaders were pilot tested with two experienced nurses and three senior nursing students. The experienced nurses practiced in

hospice home care and ambulatory orthopedic service settings. The nursing students worked in a community hospital. Pilot testing resulted in revision of some questions and further development of others.

Data recording and management.

Phase 2 of this investigation required two tape recorders, high quality 60 minute tapes, additional blank tapes, and extra batteries (Beyea & Nicoll, 2000a; Patton, 2002). The investigator took pencil and paper notes during the interview as a back up to damaged tapes (Creswell, 2003; Schatzman & Strauss, 1973). Although there were no incidents of damaged tapes, this strategy assisted the investigator in tracking questions for further exploration. Prior to discontinuing the tape at the end of the interview, the investigator thanked participants and reassured confidentiality of their responses. Finally, the investigator requested permission to recontact them if needed for clarification or if new questions arose as the study progressed.

Data collection through face-to-face interviews precluded anonymity because the investigator was aware of who had been interviewed (Connelly & Yoder, 2000). Several precautions were taken, however, to maintain confidentiality. The investigator assigned a unique identification number to each participant. This identification number was noted on the consent form and used as the sole means of identification in all subsequent documents. Potential participants were informed that reported findings would include thick, context-embedded descriptions, which could result in recognition of individual participant contributions.

The investigator was familiar with taping equipment before beginning interviews. Interview locations were identified prior to data collection to promote comfort, privacy, and adequate electrical outlets. Batteries were available when electrical outlets were not. Tapes

were locked securely in a cabinet in the investigator's home office until transcribed by the investigator at which point they were destroyed. Transcripts were imported into NVivo, and a copy of each was downloaded onto a password protected USB flash drive as described in Phase 1. All transcripts will be destroyed within three years of completing this study.

Data analysis.

Data analysis began with the first interview and continued throughout the interview process. Data analysis used the constant comparison method described earlier. Methodological, theoretical/analytical, and personal memos were linked to transcripts as described in Phase 1. Phase 2 was complete when interview data reached the point of saturation, and data collected during Phase 2 had been analyzed and compared to data collected during Phase 1.

Phase 3: Focus Group

Phase 3 began when focus group questions had been formulated and participant recruitment was completed. Focus groups are commonly used in social science research (Krueger & Casey, 2000). Focus group research provides understanding or insight through systematic and verifiable inquiry (Krueger & Casey, 2000). Information generated through focus groups is used for: 1) decision-making (VanCott et al., 1997), 2) product or program development, 3) customer satisfaction, 4) planning and goal setting, 5) needs assessment, 6) quality improvement, 7) understanding employee concerns, 8) policy making and testing, and/or 9) as a primary or secondary research tool (Krueger & Casey, 2000). The purpose of Phase 3 was to enrich, enhance, and establish the validity of the findings generated through Phases 1 and 2.

Sample.

Five members of the ICN nursing leadership comprised the focus group: the UL, CNS, nurse educator, and two ARNPs. The focus group participants had worked together for several years. Only one of the participants had not participated in Phase 2, since she was unavailable during that time. As an essential member of the ICN nursing leadership team she was invited specifically to participate in the focus group. An overview was provided at the beginning of the session to update members on the status of the research.

The focus group provided a means of collecting both individual and group level data (Krueger & Casey, 2000). Segmentation refers to the sorting of participants into groups with common characteristics that are important to the investigator. Segmentation facilitated discussion by promoting free expression of thoughts, feelings, and behaviors (Asbury, 1995; Krueger & Casey, 2000; Morgan, 1995). Nurses who had been involved in a previous phase or phases helped to orient the nurse who had not been involved in Phase 1 or Phase 2.

Data and data collection.

Data were in the form of words, transcribed from audiotapes and field notes. Participants were assured that the investigator would maintain confidentiality throughout the study, and in any subsequent publications. Participants were asked at the beginning of the session to refrain from sharing with outside individuals what others in the focus group had said (M. W. Smith, 1995). Participants were also asked to select a pseudonym of their choice for identification on focus group tapes (Fetterman, 1998), but declined. As with Phase 2, tapes were destroyed upon transcription.

The focus group supported an environment reflective of the natural setting where participants influence and are influenced by each other (Krueger & Casey, 2000). The focus

group also supported the development of rich description from multiple perspectives. The focus group agenda included welcome, personal introductions, brief review of the purpose of the study and overview of the goals for the session. Consent forms were signed, and group rules were articulated (see Appendix P for the focus group guide). Questions followed a logical sequence beginning with general questions that became more focused as the session progressed. General questions promoted engagement as participants were urged to think and talk about the topic; more specific questions generated more useful information (Krueger & Casey, 2000; Morgan, 1995). A lively session ran for two hours.

A research assistant supported the investigator in conducting the focus group. The investigator debriefed the assistant prior to the focus group session. Debriefing provided an overview of the study, a detailed description of the assistant's role, and an explanation of the rationale for her assigned activities. The assistant's primary roles were to ensure that the equipment was functional and the physical environment comfortable. The assistant also supported comprehensive data collection by taking notes during the focus group session. The research assistant's notes supplemented the tape recordings by capturing interpersonal interactions that were only observable. The assistant also provided a function of verification of investigators' focus group impressions, which were discussed in a debriefing session immediately following the focus group session.

An administrative support person at the medical center assisted the investigator to identify a mutually convenient time for all participants and to secure an appropriate space. The two-hour focus group session was conducted in January of 2007 from 9:30 to 11:30 AM. The session was held at the research site in a private conference room, consistent with recommendations in the professional literature (Asbury, 1995; Beyea & Nicoll, 2000b). The

large conference room filled with movable furniture had a white board at one end. The tables were rearranged into a square formation with seating for two at each side at the end of the room near the white board. Participants, moderator, and research assistant were seated so that each could make eye contact with all the others (Asbury, 1995; Beyea & Nicoll, 2000b) and could easily view the white board.

Questions were addressed to the entire group. The session began with simple, general, neutral questions designed to place participants at ease (Beyea & Nicoll, 2000b). As moderator, the investigator encouraged participation, encouraged diverse views, and maintained appropriate focus (Asbury, 1995; Beyea & Nicoll, 2000b).

The use of a focus group was methodologically congruent with the constructivist standpoint where knowledge is not only shared between members, but generated through their very interaction (Lincoln & Guba, 1985; Lofland & Lofland, 1984). This offered a suitable method to examine the complex and dynamic CMS (Begun, Zimmerman, & Dooley, 2003). Refreshments were provided.

Data recording and management.

The focus group session was audiotaped using two tape recorders to ensure back up in case of tape recorder malfunction (Beyea & Nicoll, 2000b; N. Burns & Grove, 2001). Tape recorders were placed in corners diagonal to one another to capture the discussion from two points in the room. In addition, the assistant took written notes during the session. The use of the white board to make notes of the discussion enabled participants to see the whole of the group's responses to each overarching question as the session progressed (Beyea & Nicoll, 2000a; Krueger, 1995). Data management processes described for Phases 1 and 2 were also applied during Phase 3.

Data analysis.

Data analysis continued as described for Phases 1 and 2. Focus group data were compared to the data obtained at the end of Phase 2. At the end of Phase 3, data from all three phases had been analyzed using the constant comparative method.

Trustworthiness/Rigor

Trustworthiness criteria are used in naturalistic inquiry to judge the quality or goodness of qualitative research (Lincoln & Guba, 1985; Morse & Field, 1995). Validity of qualitative studies refers to the extent to which the research findings reflect reality (Morse & Field, 1995). Lincoln and Guba (1985) identified four criteria for determining trustworthiness: 1) truth value, 2) applicability, 3) consistency, and 4) neutrality. An additional set of criteria, authenticity, was later used to judge qualitative inquiry. These criteria are outlined at the end of this section in Table 7, along with strategies used to ensure them.

Truth Value/Credibility/Authenticity

Truth value, also referred to as credibility or authenticity, is comparable to internal validity in quantitative research (Creswell, 1998, 2003; Lincoln & Guba, 1985; M. B. Miles & Huberman, 1994; Morse & Field, 1995). Truth value depends upon capturing participant judgment. Because the qualitative paradigm is based on a pluralistic reality, truth value is dependent upon the reporting of multiple perspectives (Lincoln & Guba, 1985; Morse & Field, 1995). Reporting of multiple perspectives was accomplished in this study through the inclusion of UL, CNS, ARNP, SN, and TN perspectives.

Investigator bias presents a threat to the truth value or credibility of qualitative research. Strategies to reduce investigator bias included recognizing its potential and documenting reflections through reflexive journaling after each participant contact, and more

frequently, as needed. Participant checking refers to asking participants whether the descriptions offered by the investigator were congruent with the participants' experiences. Participant checking also provided a measure of truth value (Connelly & Yoder, 2000; M. B. Miles & Huberman, 1994).

At the end of each interview and the focus group, the investigator summarized her perceptions of the main points of the discussion. Participants were asked to add any further information they felt was important, and encouraged to contact the investigator if they thought of anything further they wished to share. Basing the questions for each subsequent phase on data collected during prior phases also provided a measure of participant checking. This was particularly the case with the development of focus group questions from participant observation and interview data. Each interview, as well as the focus group session, included reviewing the process and outcomes as part of the session while the tape recorder was still running.

An additional measure of credibility guarding against investigator bias was peer debriefing. This strategy entailed discussion with nurse colleagues familiar with and knowledgeable about the phenomena of CMSs and knowledge work. Colleagues provided feedback individually as well as collaboratively by assisting in the exploration of feasible alternative explanations for the findings (Connelly & Yoder, 2000).

Applicability/Transferability/Fittingness

Applicability refers to the extent that findings can be applied within other contexts, settings, or among other groups (Creswell, 1998, 2003; Lincoln & Guba, 1985; Morse & Field, 1995). Also referred to as transferability or fittingness (Morse & Field, 1995), applicability is a measure of whether the findings of a study have any transferable value (Lincoln & Guba, 1985). Transferability depends upon the degree of similarity or congruence

between the two contexts or settings (Lincoln & Guba, 1985; M. B. Miles & Huberman, 1994).

Use of the CMS framework provides a means of comparison between this study and other studies, this setting and other settings, and between this population or sample, and other populations (M. B. Miles & Huberman, 1994). The basis for judging applicability, transferability, or fittingness depends upon the development of adequate context to understand the findings (Lincoln & Guba, 1985). Adequate context is achieved through the development of thick description. Audiotaped individual interviews and the focus group session based on questions derived from data collected in preceding phases provided a rich source of thick description.

Consistency/Dependability/Auditability

Consistency in qualitative research is comparable to reliability in quantitative research (M. B. Miles & Huberman, 1994; Morse & Field, 1995). Consistency was established by ensuring that the research process was consistent over time and across methods. Reflexive memos, and development and maintenance of an audit trail provided evidence of consistency through the research process.

Neutrality/Objectivity/Confirmability

The final criterion refers to freedom from investigator bias and is known as neutrality (Lincoln & Guba, 1985) or confirmability (Morse & Field, 1995). Neutrality is comparable to objectivity in the quantitative tradition. The interactive and interpretive characteristics of qualitative research pose threats to neutrality. In the qualitative paradigm, neutrality or objectivity, depend upon confirmability of the data (Lincoln & Guba, 1985). The essential measure of confirmability is whether or not the study can be replicated by others using the

documentation generated through the planning and implementation of the research (M. B. Miles & Huberman, 1994).

Confirmability was established by creating adequately detailed process and decision-making notes so that the process can be followed by others (M. B. Miles & Huberman, 1994). Use of NVivo software for qualitative data analysis provided the means of establishing and maintaining an audit trail through the development of observational, methodological, theoretical/analytical, and personal records, as described in the data management section in Phase 1. Establishing an audit trail ensured the ability to follow and replicate the study process (Lincoln, 1990; Munhall, 2001).

The issue of investigator bias was acknowledged and examined. This was accomplished through reflexive introspection and acknowledgement of biases, values, and interests (Creswell, 2003; C. May, 2003). The use of memos and participant checking provided checks against investigator bias. Ordered and dated field notes placed PO, individual interview, and focus group data in context. Questions posed during individual interviews and the focus group session were based on emergent themes or concepts. Memos recorded decisions regarding modification of methods, and rationales for making them. Documenting such changes, along with subjective interpretations of events, provided records of potential sources of investigator bias (Morse & Field, 1995). The status of the investigator as an outsider without vested interest in the existence or absence of particular structures or processes presented a strength in the study design.

Appropriateness and Adequacy of Data

Appropriateness of data depends upon the selection of participants who can best inform the research (Morse & Field, 1995). The use of maximum variation phenomenal sampling provided a measure to ensure appropriateness of data. Interviewing various

stakeholder participants ensured richness of data. Data adequacy depends upon obtaining enough data, which is determined by saturation (Morse, 1995). The criteria for saturation were met at each phase of data collection. In addition, findings from each phase supported findings from each of the other two phases. Participant checking provided another means of ensuring data adequacy. Multidimensional perspectives enabled the generation of thick and rich descriptions (Hunter, Lusardi, Zucker, Jacelon, & Chandler, 2002). The combination of multilevel, centrally positioned participants and varied data collection methods generated rich and thick descriptions.

Strategies to minimize the effects of investigator bias began with identification of its potential and continued throughout the development of the research questions, and methods of data collection, management, analysis, and interpretation (Marshall & Rossman, 1999, p. 194). The generation of methodological, theoretical/analytical, and reflexive memos provided evidence of decision-making in terms of the study process, category development and coding, and personal expectations, reactions and biases. This was discussed in detail in the data analysis section under Phase 1.

Table 7

Trustworthiness Criteria

Qualitative Constructs	Description	Proposed Strategies
Credibility	Fit between participants' views and investigator's reconstruction and representation of them.	Triangulation of data sources (various nurse stakeholders) and methods (PO, document review, individual interviews, focus groups)
	Requires plausible interpretations and constructs.	Development of rich description of complexities of processes, interactions
		Participant checking
		Reflexive journaling
		Peer debriefing
Transferability	Sufficient detail provided to establish a degree of similarity between this and another case.	Establishment of theoretical parameters (conceptual framework)
		Rich description of population, setting, theoretical framework
		Triangulation of data sources (PO, interviews, focus groups, documents)
Dependability	Consistent, logical, traceable, and documented process.	Emergent focus of inquiry: PO contributing to development of interview questions, which contribute to the generation of focus group questions
		Data archiving (creating an audit trail)
		Peer review
Confirmability	Assertions, findings, interpretations are linked to data.	Auditing
		Peer review
		Search for disconfirming evidence
		Reflective journaling
Authenticity	Generates a true understanding of experiences from participants' perspectives.	PO
		Unstructured interviewing

Source: Devers (1999), Lincoln and Guba (1985), Munhall (2001), and Schwandt (2001).

Ethical Concerns

The investigator role in naturalistic inquiry presents unique ethical considerations (Munhall, 1988). As May (2003) stated:

> Qualitative inquiry can never be politically neutral, and in work that is directed at understanding the social organisation [sic] of health care practice it does contribute to the shaping and reshaping of institutional patterns of practice themselves (p. 25).

Several approval processes occurred prior to initiating the study. The investigator's dissertation committee reviewed and approved the investigation proposal prior to submission for IRB approval from the University of Massachusetts Medical School (UMMS) Committee for the Protection of Human Subjects (CPHS). The research proposal was also approved by the CPHS for both the UMMS and the medical center. Each IRB renewed its approval for each of the three years of the study. All individuals involved in directing or conducting the study completed the mandatory UMMS Human Subjects Educational Training Program.

The medical center approval process occurred in two phases. Prior to submitting a research proposal to the medical center IRB, the Office of Professional Nursing (OPN) conducted a departmental scientific review. The proposal submitted to the medical center IRB included revisions recommended by the OPN.

No barriers to the approval process were encountered, although the medical center IRB considers employees a vulnerable group entitled to special protections. These IRB concerns were addressed through assurance of voluntary participation free from inducement, and maintenance of confidentiality through coding and safeguarding data. Rationale for inclusion of specific participants, and the mode and timing of recruitment were included. Informed consent, as described in Phase 1, was obtained from each participant at each phase of the study.

Summary and clarification of interview and focus group data provided verification through participant checking, This increased the likelihood of accurate portrayal demonstrated respect for participants, and reinforced trustworthiness of the study (Munhall, 1988).

Summary

The lack of professional literature regarding nurses' systems knowledge indicated a need for this study. Utilizing qualitative description was an appropriate strategy to begin to build a knowledge base in this understudied area. A three phase study design generated data which were analyzed through constant comparison. Study findings are reported in Chapter 4.

CHAPTER 4: FINDINGS

Introduction

This chapter begins with descriptions of the setting, the participants, and the orientation process. The findings as they relate to the three research questions follow in a subsequent section, beginning with a report of themes that emerged through data analysis. Findings from each of the three research questions are reported first from the perspectives of travel nurses (TNs), followed by staff nurses (SNs), and finally nurse leaders (NLs). Commonalities and differences within and between participant groups are reported with supporting evidence.

Description of the Setting

The Intensive Care Nursery (ICN) is part of the children's hospital, which is part of the medical center. The medical center has a long tradition as a teaching hospital for doctors, nurses, and other clinicians. It has an affiliated medical school, and formerly housed a diploma program for nursing. It provides clinical sites for students from a number of educational institutions in a range of practice disciplines.

The Medical Center

An entirely new facility opened in 1991. The medical center appeared new and well-maintained. Entering the medical center from the main entrance a nurse new to this setting passed a mural chronicling the history of the hospital, the medical school, and the school of nursing. Beyond this mural was the entrance to a large atrium that opened to a skylight two stories above, allowing an infusion of natural lighting. A large information kiosk staffed by pleasant volunteers was located in the center of the atrium. Works of various artists from the local community were displayed throughout the facility. At lunchtime, volunteers played the grand piano in the center atrium, filling the common areas of the medical center with music.

The absence of overhead pages was notable. The design communicated a clean, calm, and spacious ambience.

The medical center facility housed parts of the medical school, ambulatory office practices of primary and specialty care providers, ancillary services, and an array of vendors. Evidence of the organizational values of learning and education existed in many forms. A wealth of literature on health issues, services, learning opportunities and regional cultural events was posted throughout the facility. Research posters presenting current or recent research by medical students, nurses, and interdisciplinary teams were exhibited throughout the medical center.

The Children's Hospital

The children's hospital was comprised of a 30-bed ICN, a 23-bed pediatric/adolescent inpatient unit, and a 10-bed pediatric intensive care unit, which were proximal to one another. These three units shared some administrative leadership, staffing, and support services. One participant described the children's hospital as a "hospital within a hospital."

An emergency resuscitation room, accessible from both units, connected the ICN and the birthing center. The connecting areas between the ICN and the birthing center were designed to facilitate rapid access to emergency birthing rooms by ICN nurses (see Appendix A for ICN floor plan). The resuscitation room was renamed "The Panda Room" at the request of ICN babies' families.

A hallway off one of the upper level north-south corridors provided access to the ICN. Another hallway opened on the right to an exterior patio garden available to birthing center patients and families, and families of ICN patients. Various administrative offices were situated along this hallway. Locked hallways housing staff-only areas (e.g., locker room) were also located off this hallway. Bulletin boards that displayed information about

the status of various quality improvement (QI) projects lined the private hallway that provided access to these staff-designated areas.

The Intensive Care Nursery

The hallway continued through the open entry to the ICN. Posted immediately to the right upon passing through this doorway was a framed copy of the ICN mission and philosophy (Appendix B). On the left side was a bulletin board which included, at different times throughout the course of this investigation, pictures of "ICN baby graduates" and their families. ICN baby graduates included former patients taking their first steps, getting on the school bus on the first day of school, or going to their high school proms. Another posting during the course of this investigation was an aesthetically-pleasing and informative display supporting the healthy choice of breastfeeding. This display included evidence supporting the benefits of breastfeeding, along with pictures of babies and moms with stories about its meaning to them.

The reception desk was positioned perpendicular to this entrance and hallway. As the physical point of intersection between visitors and the unit, this area was a steady hub of activity. This area housed the nurses' station and the "fishbowl," a small room designated for medical staff members, so named for the glass walls on two sides. Patient care areas were accessible only through the reception area. Although any visitor could walk onto the unit at any time, the design of the reception area afforded some security features. The reception desk was staffed 24 hours per day, and a duress alarm button was located behind the desk. Fish-eye mirrors and security cameras provided surveillance capacity.

Directly across from the reception area was the designated "party table." This was the only place on the unit where food was allowed and where one could find any kind of free food at any time. The access point for the "tube" system for transporting laboratory

specimens was also located in the reception area, as were the copy and fax machines, and scheduling materials. This area also housed policy and procedure manuals. The level of activity at the reception area hinted at the huge volume of information and rapid pace of communication and activity that blended several streams of clinical, administrative, and social unit-based activities.

Patient Care Areas

Patient care areas were designated based on the babies' acuity levels. There were three general care areas which were accessible only from the reception area (see Appendix A). Each care area was equipped with scrubbing stations. Bottles of hand sanitizer were abundantly available throughout the ICN. The critical care area designated for the most acutely ill babies was located to the right when facing the reception desk. This critical care area contained three pods of four isolettes and a high-intensive care room of two isolettes (with ventilators). Partial wall dividers separated the three pods, and provided privacy and noise reduction. These wall dividers also enabled communication between and among staff members working with critically ill babies. Stations dedicated to respiratory therapy, medication and nourishment, point of care testing and equipment, and linens and supplies were located within this area.

The second care area was located to the left when facing the reception area. This was designated an intermediate care area for babies with less acute needs. Similar to the critical care area, the intermediary care area had three pods of four isolettes, and stations for medication and nourishment, point of care testing and equipment, and linens and supplies. Children's books for siblings and educational resources for parents and families were located at the entrance to the intermediary care level. The discharge planner's office was adjacent to

the main supply room which was accessed through this area.

The third area, located directly behind the reception area, was accessible through either the critical or intermediary care areas. This six-bed section was for the “feed and grow” babies whose status had stabilized, but who were not yet ready for discharge. This section also had its own medication and nourishment station and scale. The bedside areas in this section were filled with personal belongings of these babies who had been in the ICN for a longer term. There were colorful blankets, pictures of families, and drawings from siblings. In all three areas, it was generally quiet with soft lighting, unless there was an admission or emergency.

General Patient Care Activities

The ICN was busy during the day. Every type of care provider and technician came and went around the clock. It quieted after the peak activity of 7 PM shift change. Physicians, nurse practitioners, and respiratory therapists were available and made rounds at various points throughout the evening and night. Rushes of activity occurred when there was an admission or if a baby’s condition suddenly deteriorated. New admissions arrived through the birthing center or from outside the hospital via the transport team. Parents were present on the unit at all hours of the day and night.

Although activity levels peaked at various times around the clock throughout the unit, the reception area remained the hub, except during rounds which occurred each morning. Rounds included an interdisciplinary cadre of clinicians involved in the babies’ care, which moved with laptop computer through the nursery from isolette to isolette. The diverse care team that participated in rounds included attending physicians, fellows, residents, interns, medical students, advanced registered nurse practitioners, a clinical nurse specialist,

pharmacists, dietician, respiratory therapists, and staff and travel nurses.

Description of the Participants

In addition to SNs, ICN nursing staff members included one unit leader (UL), one clinical nurse specialist (CNS), nine advance registered nurse practitioners (ARNPs), and two nurse educators. Each member of the nursing staff was invited to participate in this investigation. Participants included nurse leaders, staff nurses, and travel nurses. The following sections provide descriptions of each of these participant groups. Table 8 shows the distribution of participants across study phases.

Table 8

Participants by Position and Phase of Study (N = 18)

Phase	TNs (n = 4)	SNs (n = 5)	NLs (n = 9)	Totals[a]
1 PO	3	7	-	10
2 Interviews	2	3	4	9
3 Focus Group	-	-	5	5

Note. Dashes indicate that no participants participated in the specific phase of the study.
[a]Totals do not add up because 1 SN and 1 TN each participated in both Phases 1 and 2, and 4 NLs participated in both Phase 2 and Phase 3.

Travel Nurses

Four nurses (Aleyna, Betsy, Corinne, and Donna) comprised the TN participant group (Table 9). Aleyna, Betsy, and Donna were involved in Phase 1. Corinne and Donna also participated in interviews during Phase 2. There were more differences than commonalities among members of the TN participant group.

Commonalities Among and Differences Between TNs

All of the TNs were Caucasian women. None of them reported a professional certification. With the exception of Corinne, this was the first assignment at this medical

center for each TN. Two reported membership in the National Association of Neonatal Nurses (NANN).

Aleyna had worked for only two years as a TN. Until this assignment, she had practiced only in the southeastern US. Betsy was a new nurse, having practiced for only three years, and only in one setting prior to this TN assignment. This was Betsy's first TN assignment. Her prior worksite had been an urban medical center in the northeast US.

Corinne was completing an extended period of repeated non-consecutive travel assignments at this site. She had filled TN assignments on the east coast and the west coast over 14 years of traveling. Donna was completing her first 13-week contract at this setting. She had worked only as a traveler in her six years of nursing. She had worked in several hospitals on the west coast and in the southwestern U.S.

Table 9

Demographics of Travel Nurses (N = 4)

TN	Age in Years	Education	Years as RN	Years in Current Position
1 Aleyna	54	Diploma	34	2
2 Betsy	23	ADN	3	0.25
3 Corinne[a]	53	ADN	19	14
4 Donna[a]	26	BSN	5.5	5.5
Mean (SD)	39 (16.8)	----	13.4 (14.3)	5.2 (6.1)
Range	23 - 54	----	3 - 34	0.25 - 14

Note. Dashes indicate no data in this cell. [a]Phase 2 participants..

Staff Nurses

SNs participated in both Phase 1 and Phase 2. Table 10 provides demographic data. As with the TNs, there were more differences than commonalities among SNs.

Table 10

Demographics of Staff Nurses (N = 9)

SNs	Age in Years	Education	Years as RN	Years in Current Position
1 Amy[a]	37	Diploma	13	13
2 Bonnie[a]	41	Diploma	12	4.75
3 Carol[a]	42	ADN	22	17
4 Devon[a]	47	BSN	26.5	24
5 Erika[a]	47	BSN	22	17
6 Fran[b]	40	BSN	17	0.5
7 Georgia[b]	47	BSN	24	12
8 Helen[b]	59	BSN	37	28.5
9 Ingrid	28	BSN	5.5	0
Mean (SD)	43.11 (8.5)	---	19.8 (9.3)	12.3 (8.6)
Range	28-59	---	5.5 –37	0-28.5

Note. Dashes indicate no values for this cell. [a]Preceptor. [b]Phase 2 participant.

Commonalities Among and Differences Between SNs

The SN group included eight females and one male. All SNs were Caucasian. Seventy-eight percent reported a professional certification or membership in a professional organization (Appendix C). SNs were represented in three subgroups: 1) preceptors, 2) orientees, and 3) interviewees. Table 11 shows SN demographics by subgroup.

Table 11

Demographics by Type of SN (N = 9)

Demographic	Measure	Preceptors (n = 5)	Orientees (n = 2)	Interviewees (n = 3)
Education Level	Diploma	2	--	--
	ADN	1	--	--
	BSN	2	2	3
Age in Years	Mean (SD)	42.8 (4.3)	34 (8.5)	49 (9.6)
	Range	37 - 47	28 - 40	40 - 59
Years as RN	Mean (SD)	19 (6.2)	11.25 (8.3)	26 (10.1)
	Range	12 - 26	5.5 - 17	17 - 37
Years in Position	Mean (SD)	14 (8.7)	0	14 (14.6)
	Range	4.75 - 24	0	0.5 - 29

Note. Dashes indicate no data for this cell.

Nurse Leaders

The group of NLs, which included five nurses, was the most homogenous of the three participant groups. Demographic data are shown in Table 12. Four NLs (Alice, Barbara, Caroline, and Deborah) participated in Phase 2 and Phase 3. Emily participated in Phase 3 only.

Commonalities Among and Differences Between NLs

All NLs were Caucasian women. The ages of NLs fell into a narrow range. NLs had all practiced nursing for over 20 years, and had worked together in various roles for many of those years. Four of the five members of this group held professional certifications and membership in a professional organization (Appendix C).

Table 12

Demographics of Nurse Leaders(N = 5)

NL	Age	Education	Years as RN	Years in Current Position
1 Alice[a]	45	BSN	23	3
2 Barbara[a]	43	Diploma	21	12.25
3 Caroline[a]	47	Master's	25	14.5
4 Deborah[a]	47	Master's	27	17
5 Emily	44	Master's	21	14
Mean (SD)	45.2 (1.8)	--	23.4 (2.6)	12.2 (5.4)
Range	43 - 47	--	21 - 27	3 - 17

Note. Dashes indicate no values. [a]Phase 2 participants.

Summary

Table 13 compares demographics across participant groups. TNs and SNs share a wide age range among members of their groups, and both were younger as a group than NLs. Some members in each group belonged to at least one professional organization (Appendix C). Predominant education levels were distinct between participant groups. NLs were the oldest of the three groups, with a smaller span in years than either TNs or SNs. Most of the SNs and NLs held a professional certification. None of the TNs held a professional certification.

Table 13

Comparison of Demographics Across Participant Groups

Demographic	TN (n = 4)	SN (n = 9)	NL (n = 5)
Predominant Education Level	ADN	BSN	Master's
Age range in years	23 - 54	28 - 59	43 - 47
Mean (SD)	39 (16.8)	43 (8.5)	45 (1.8)
Range of Years as RN	3 - 34	6 - 37	21 - 27
Mean (SD)	13.4 (14.3)	19.8 (9.3)	23.4 (2.6)
Range of Years Current Position	0.25 - 14	0 - 29	3 - 17
Mean (SD)	5.2 (6.1)	12.3 (8.6)	12.2 (5.4)
Certification (%)	0	6 (67%)	4 (80%)
Member of Professional Organization (%)	2 (50%)	4 (44%)	4 (80%)

The Orientation Process

The orientation process for new staff and travel nurses included three components: 1) a general orientation (GO) to the medical center,2) an ICN-level didactic session, and 3) precepted shifts. PO was comprised of 101 hours of observation that included all three orientation components.

General Orientation to the Medical Center

The day-long GO to the medical center, which occurred on Mondays, was required for all new employees, including TNs (Appendix D). Orientees received an extensive packet containing general medical center policies.

The GO introduced the culture of the organization beginning with a videotaped overview describing the rich history of the medical center. Emphasis was placed on the

mission of the organization: “To provide high quality health care and comfort to the ill, to prevent illness among the well, and to advance health care through education, research, community service and the improvement of clinical practice.” (Medical Center, 2001, p. 1). Also emphasized was the organization’s commitment to environmentally sound practices, for which the medical center had received a number of national awards. New employees were introduced to the service excellence expectation that they “… be aware of and concerned about how his or her actions affect patients and their families, fellow employees, and the medical staff” (Medical Center, 2001, p. 1). Specific behavioral expectations included demonstrating cooperation, respect, and a focus toward meeting customers’ needs.

The GO day ended for nurses with an introduction to the computer information system. This session prepared the newly hired nurse to participate in the medical center process of moving to an electronic medical record. Regarding the GO, one TN stated, “I have never worked anywhere where there was such an interest in the staff understanding the culture of the organization.” Newly hired ICN nurses returned to the hospital on Wednesday for orientation to the ICN.

ICN-based Orientations

ICN-based orientation included didactic and precepted shift experiences. The purpose of the ICN-based orientation was to prepare nurses for a specific role within the ICN (Appendix E). Differences in ICN-based orientations reflected orientees’ individual experiences and expectations.

Didactic Component of ICN-based Orientation

Each nurse new to the ICN participated in the six-hour ICN-specific orientation. This structured orientation component did not differ for TNs and SNs. Learning activities included discussion, a tour and scavenger search, competency testing, and hands-on practice and

demonstration of competencies. Each of the two nurse educators was involved in coordinating and providing the orientations. A binder that included clinical standards, policies and procedures, and documentation (see Appendix Ffor an overview of the ICN-based orientation binder contents) supported this process.

Distinctions between unit level orientations depended upon the questions and comments of the orientees. Experienced SNs orienting to new permanent positions offered the majority of comments during this part of the orientation. Most of their comments were comparisons between policies at this ICN and facilities where they had worked before. Common topics of comparison included types of equipment and supplies, documentation methods, and infection control practices.

The didactic component of ICN unit-specific orientation focused mainly on structural elements. This component of orientation provided information about current policies, and their relevance to the new nurse.

Precepted Shift Component of ICN-Based Orientation

Precepted shifts occurred on both day and night 12-hour shifts. Shift orientations informed orientees of the “hows and whys” of unit function. Precepted shift experiences for TNs and SNs provided synergistic learning experiences that centered on application of policy in everyday practice. Precepted shift experiences also served to socialize newly hired nurses to the unit and their role. In addition, these experiences socialized newly hired nurses to the embedded nature of evidence-based practice in the cultural context, and the provision of family-centered care (FCC). Table 14 displays the distribution of investigator-observed precepted shifts by stakeholder participant.

Table 14

Frequency of Participant Observation of Precepted Shifts by Participant

Shift	Aleyna	Betsy	Donna	Fran	Ingrid
7AM-7PM	--	--	1	1	1
7PM-7AM	1	2	--	--	--

Note. Dashes indicate no observation occurred for the selected participant and shift.

Application of policy in everyday practice.

Comparisons between unit policies and procedures of this ICN and others were frequent. Comparisons were just as often an answer to a specific question about "how it is done" other places, as freely offered by the newly hired nurse. Comparisons covered a wide range of topics including managing families, staffing practices, documentation policies, and physical plant layout. The more experienced orientees asked more questions than the less experienced. Preceptors frequently spoke of policies in the context of patient safety. They consistently and strongly encouraged newly hired nurses to ask questions of anyone at any time. Preceptors appeared to be committed to bringing new staff members through a smooth transition into the operation of the ICN.

Socialization.

Interactions between nurses and other staff members were easy, respectful, and sometimes friendly. Between the intense work of caring for very sick and fragile babies, the investigator witnessed playful teasing between members of the care team. The party table generally displayed food, and attracted nurses to mingle during free moments. Preceptors emphasized the interdisciplinarity of the care team and the unique contributions of various members. The importance of mutual respect was consistently emphasized.

The preceptors introduced newly hired nurses to other care team members, and care team members also spontaneously approached and welcomed them. Care team members

seemed eager to share information about the unit and their functions within it, as well as how the team worked together. For example, after introducing an orienting nurse to a couple of respiratory therapists (RTs) on their rounds, a preceptor commented, “The RTs are all over the place, and on top of everything that is going on in the unit.”

Embedding evidence-based practice in cultural context.

Staff members’ commitment to evidence-based practice (EBP) and QI was consistently reinforced. Nurses routinely shared with new employees not only how certain things were done on the unit, but also, how it came to be that they were done that way. Many of the policies, such as those related to infection control (IC), medication administration, and documentation were shared in the context of their development. This approach underscored the stated commitment of the unit to EBP. Staff nurses and nurse leaders spoke of the ICN’s participation in the Vermont Oxford Network, an international QI collaborative.

Another example of the embedded culture of EBP occurred during the course of the investigation. The medical center had implemented new guidelines for nasogastric tube feedings which applied to all patients. A new policy was implemented within the ICN that required nurses to check and document aspirates for placement on all nasogastric tubes before feeding. The purpose of this new policy was to provide evidence that the ICN policy can safely differ from the policy on the adult units, with the goal of implementing an evidence-based ICN-specific policy.

Family-centered care.

The ICN commitment to FCC was evidenced by the structures and processes in place to support nurses in providing FCC. Nurses mentioned FCC in a wide range of contexts. For example, one preceptor explained that one of the benefits of the nurses working 12-hour shift was that it “was good for continuity of care, and parents had to only go through two shifts a

day instead of three." Orientees learned of a range of services and supports available to families. For example, one support was the availability of a "parent house" which made meals available to parents of babies in the ICN regardless of whether the parents were staying at the house.

Developmental care plans were posted over babies' beds. Commitment to developmental interventions was evident in nurses' efforts to foster family involvement in all aspects of the babies' care. This element of ICN function was regularly tied back to the mission of the unit, and often included an historical description of its evolution, beginning as an initiative of the QI collaborative.

The commitment to FCC was also evident in the interactions between nurses and the babies for whom they cared. This was observed of staff and travel nurses, regardless of length of time nursing. Nurses talked and sang to the babies as they provided their care, their voices low, reassuring, and comforting. They talked softly about almost anything from their families, to telling them the sequencing of their care, to describing how they reminded them of other babies, or noting their progress in comparison to caring for them on prior shifts.

The Orientation Process Through the Leadership Lens

Leadership perspectives on the orientation process were derived from the contributions of nurse leaders during orientations, interviews, and from the focus group discussion. Regarding the GO and ICN-based didactic orientation components, Emily stated, "We have so many mandatory regulatory things that we have to cover, that we are really cramming all of this into a day and a half … you are so focused on making sure the requirements are met."

Regarding the precepted shifts, Alice stated, "All knowledge is downloaded during

the precepted shift," to which Deborah added, "not quite a v-chip, but almost …" Caroline referred to the precepted shift as "the critical connection." Alice emphasized, "… you have several levels of things to learn," distinguishing between the task-focused education of formal orientation and the informal learning of the environment in context. Alice stated that once the tasks were understood orientees can "… sort of relax a little bit and start seeing … the patient, everything about the patient, and [their] vision starts to expand, and [they] put [their] head[s] up and can start to see the unit and its culture …"

Although the orientation agenda did not differ for TNs and SNs, NLs distinguished between what they thought nurses in the two groups received through the process. They spoke in terms of the TNs getting "the essentials … mainly processes, protocols, guidelines, that sort of thing." Alice referred to the TN orientation as "… the orientation express lane …"

Alternatively, NLs felt that SNs "… not only … get the essentials, but they also get the 'nice to know'… which includes all the culture …" NLs recognized that this aspect did not just come with the formal orientation, but that "it takes time, you have to be in the environment for a while to pick it up …"

Summary

The orientation process reinforced the concept of the ICN as part of a nested hierarchy. Each level focused on the shared values of the organization and the unit, and the ways that they complemented each other. One of the staff members stated, "All the same cultural aspects that are part of the organization also apply to the ICN. We are a learning organization." Orientation to the ICN of newly hired experienced nurses was a structured and developed process that reflected organization and coordinated effort. Although no explicit

differences were noted in the data between TN and SN orientations, NLs noted that members of the two groups may take different learning experiences from the orientation process.

Regardless of status, a newly hired experienced nurse orienting to the ICN received messages from many sources suggesting that the organization values its nurses. Although the didactic component of the ICN-based orientation was driven by regulatory mandates, the precepted shifts provided opportunities for communicating how the ICN worked. TNs were proactive in pursuing the specifics that they perceived as the essentials for doing their job. An emergent theme was the shared values of teaching and learning among ICN nurses. Examining the orientation process through the leadership lens revealed that NLs recognized the limitations of the short orientation period, and perceived learning as an ongoing process that continued beyond orientation.

Research Question 1: What Components of Systems Knowledge are Needed by Nurses in Order to Function Within a Clinical Microsystem?

For research question one, categories were based on investigator observation or explicit mentions during orientation sessions, individual interviews, or the focus group session. Categories were identified as they emerged through coding of field notes from organizational, unit-level and precepted shift orientations, documents, interview transcripts, and the focus group session. Through constant comparison analysis, three dynamic and interdependent themes of systems knowledge components emerged: 1) structural, 2) operational, and 3) relational.

Structural components were described as "the conditions under which care is provided, including material resources, human resources, and organizational characteristics" (Donabedian, 1966, 2003). Material resources included the built environment, equipment, supplies, and technology. Human resources included people and roles. Organizational characteristics included common values and shared meaning of mission.

Structural elements of systems knowledge answered the questions: Who are we? Why are we here? What do we care about? What are the resources that allow us to do our jobs? Processes such as QI, educational programs, and social networking were embedded in the structure of the ICN. Descriptions and examples of each category of the structural systems knowledge components are noted in Table 15.

Table 15

Categories, Descriptions, and Content of Structural Systems Knowledge

Categories	Descriptions	Examples of Content
People and Roles	Those with whom the nurse engaged, or who engaged with her patients	SNs, TNs, ULs, CNSs, ARNPs, support staff members, attending physicians, medical students, dieticians, discharge planners, lactation consultants
Resources	Assets available and anticipated for operations	Peer colleagues, safe environment, equipment and supplies, standards of clinical practice (e.g., "Back to Sleep"), policies and procedures, regulatory requirements (HIPAA, OSHA, TJC)
Mission and Philosophy	Purpose of the unit	Best practice, FCC
Physical Environment	Spatial arrangements, floor plan, geography important to nurses' work	Built environment, unit arrangement, atmosphere (low lighting, quiet)
Culture	Shared values, shared meaning of mission	Learning, change, FCC, teamwork, safety
Processes	Routine processes embedded in the structure	QI, education, social networking, shared governance

Operational components of systems knowledge answered the question: How does the work get done? Operational components of systems knowledge included mechanisms for ensuring adequate emergency and staffing protocols, and communications. Categories, descriptions, and examples of operational systems knowledge components are noted in Table 16.

Table 16

Categories, Descriptions, and Content of Operational Systems Knowledge

Categories	Descriptions	Examples of Content
Staffing protocols	Mechanisms ensuring that the unit was adequately staffed for safe practice	On call, holidays, floating policies, breaks, scheduling
Emergency protocols	Mechanisms in place to mobilize the appropriate resources in emergencies	Code Pink, Code Black, emergency transport
Communications	Mechanisms for ensuring adequate and accurate oral and written exchange of patient-related information	Intershift report, charting, flow sheets, bedside charts, electronic records, handoffs and handovers

Structural and operational elements were adjusted through processes embedded in the structure. For example, through their involvement in the shared governance process embedded in the structure of the ICN, parents effected a change in the renaming of the "Resuscitation Room" to the "Panda Room." One SN described the implications of this change "… same function, but easier for families to live with." From an operational perspective, the emergency transport process was under study to improve readiness during this investigation. Documentation processes were in continual states of development based on internal or external needs of the ICN.

Minute to minute activities throughout a shift, or across shifts, were more or less smooth depending upon the nature of personal connections. Personal connections among ICN staff members were supported through existing social networking structures.

Relational components of systems knowledge referred to "… an aspect or quality that connects two or more things or parts as being or belonging or the specific way in which [the players] work and interact together …" (Gallant, Beaulieu, & Carnevale, 2002, p. 153; Merriam-Webster, 2005). Relational components that must be understood by newly hired

nurses answer the question: How do nurses on the unit relate to their patients, their colleagues, their community, each other, and the unit itself? Descriptions and examples of each category of relational components of systems knowledge are noted in Table 17.

Table 17

Categories, Descriptions, and Content of Relational Systems Knowledge

Categories	Descriptions	Content Included
Relating to the unit	How nurses identified with the unit, including their place within the system, and their contributions to the operation and outcomes	Cohesiveness, shared mission, "part of something bigger," negotiated meaning
Relating to each other	Evidence of how staff members cared about and treated each other	Supportiveness, respect, social networking
Relating to new staff members	How staff members cared about and treated new employees and TNs	Open, inclusive, available, welcoming
Relating to patients and families	The nature of relationships between staff members and babies and families	Inclusive, caring
Relating to the community	Place of ICN within the greater organization, and the role of the unit with other units within and outside of the organization	Unit as part of the children's hospital, the medical center; relationships with community hospitals, pediatricians

The following sections describe the emergence of these three systems knowledge components by participant group, beginning with TNs. Explicit participant emphasis was a factor in ranking elements. Frequencies of references provided a measure for ranking elements of systems knowledge components. The numbers of words dedicated to particular elements also provided a ranking measure. Participants' descriptions of important knowledge components are provided below to reveal how questions were answered by participant group

members during individual interviews. Comparisons were made within and across groups.

Travel Nurses

The question posed to TNs to elicit this information was, “Can you describe what a good orientation includes? What is essential?” Probes used to encourage comments included “Do you have any ‘need to know information’ to be ready to jump into new assignments or jobs? What was missing from your orientation? What did you learn the hard way?”

Corinne.

Corinne drew upon her experiences during the interview, frequently comparing this ICN to others where she had worked. In all her comparisons, however, she was quick to point out that things change, sometimes even over the duration of a particular assignment. Her initial response emphasized structural systems knowledge components. Her main points clearly fell into the categories of people and roles, and policies and procedures, “… it’s very much policies and procedures that are a key thing for me … and then people involved in the care, and those that I may need to seek out for questions … and the documentation ….”

Corinne mentioned her need to understand expectations, “Well, I need to know the expectations--‘what do you expect of me as a traveler?’ and a lot of it goes back to tasks ….” She specifically mentioned understanding expectations of the TN role regarding floating to other units, attendance at deliveries, and involvement in discharges, which she explained varied by practice setting. Corinne offered several examples of tasks, which reflected application of clinical standards, such as responsibility for measuring abdominal girths.

Corinne focused on “the different ways that different hospitals do the same things.” She cited keeping time sheets or clocking in and out, and policies related to breaks, “… where can I find it, who can I ask? ... [which] varies hospital to hospital and unit to unit, and it all goes back to policies and procedures …” The importance of understanding structural

and operational components of systems knowledge was exemplified in Corinne's example of essentials when working with unstable babies, "… who do I report to, and who is the doc who I need to run to if I have a problem with a baby? Who is my respiratory therapist that I am working with tonight--they are very important to me, especially if I have a vented baby …"

Corinne also emphasized the importance of understanding the nature of relationships among staff members and between staff members and travelers. The importance she placed on this element was revealed in how she contrasted this ICN and other units where she has worked, "… not all hospitals … or staff are friendly to travelers … it takes me by surprise that someone would snub me, or not include me, or think lesser of me because I am a traveler." Regarding the staff members of this ICN, she stated, "… a lot of the staff people here are social outside the unit with each other ... They care about each other and they take care of each other …." She went on to explain how this extends to TNs, "This is a very close unit … what is so nice is that they scoop up the new people, too, and welcome them, and make them feel comfortable."

In summary, Corinne clearly identified her information needs. Corinne described a good orientation as one that provided the information she needed to manage her patient assignment. Her answers were focused and her needs concrete.

Donna.

Donna was just a few days short of completing her first 13-week assignment at the medical center, and would be going to a new assignment in another part of the country. Her initial response to the posed question emphasized the kind of support she hoped for at a new assignment. For Donna, the essential element to a good orientation was being paired with a knowledgeable and accessible preceptor:

> I think a good orientation [comes from] somebody that's … up to date on policies and procedures,… lets you know when you are doing things wrong … in a way to sort of let you know so that you can correct yourself, and doesn't do it in front of everybody. And sits down with you so that you can ask questions, has patience …

Similar to Corinne, Donna explicitly mentioned structural elements of systems knowledge such as policies and procedures and the physical environment. In particular, she emphasized the importance of understanding documentation systems, and where to find necessary equipment and supplies, "… policies and procedures are different everywhere, so that's something you definitely have to hit, and where you find things and the charting."

Donna also sought contextual information on the unit before she arrived at her assignment. She liked to know whether "… the unit has been newly renovated, or what kind of equipment they have … Also, how many births per year, so you know how busy the unit is … nurse:patient ratio is [also] important."

Donna made an explicit distinction between clinical and systems knowledge when, following her discussion of needs for structural systems information, she stated:

> For the travel nurse … we already know the basic care, so we don't really need to know about that **…** So, that's mainly what you focus on as a traveler, because you have already been trained in those other areas.

Similar to Corinne, Donna emphasized the importance of understanding the "morale" of the unit:

> I like to watch the rounds … to see how the docs interact with the nurses--Like, do they ignore them like they are not even there, or do they actually ask them "what do you think? Is there anything you can add to this--any concerns you have?" That right there is really important … and just seeing how the teamwork is between the nurses … and the morale of the unit--just getting the feel of the morale.

In summary, a good orientation for Donna prepared her for her responsibilities in managing her patient assignment. In Donna's case, good communication with a considerate preceptor was essential. Donna's goal was to be able to function independently upon

completing orientation. She emphasized, however, the social element of working with other nurses, and sharing clinical knowledge with one another.

Commonalities among and differences between TNs.

Commonalities were resources, including policies and procedures, and people and roles. Within operational knowledge, they both emphasized clinical protocols and documentation. Within relational systems knowledge components, they identified a commitment to teamwork and collaboration. Differences were in emphases on identified items. Corinne emphasized relational components more heavily. Donna focused on the physical environment.

Summary.

TNs emphasized the structurally-centered aspects that impacted their individual practice experiences. The TN focus was on the components of systems knowledge that enabled their smooth transition into the function of the unit. Despite differences in professional experience, both Corinne and Donna distinguished between a need to understand specific functions of a particular unit and clinical care of neonates.

Staff Nurses

So as to stimulate a discussion of the essential components of systems knowledge needed by nurses to function within a CMS, SNs were asked to think about their experiences of being new to the ICN. The questions posed to SNs to elicit essential components of systems knowledge were, “What was your orientation like? What was valuable about it? What did you wish you had learned that was missed? What did you learn the hard way?”

Fran.

Fran identified structural components of systems knowledge with the greatest frequency. Within structural components, she most frequently mentioned knowledge of

resources. Using frequency of references as ranking measure, knowledge of resources was followed by knowledge of shared values, processes, people and roles, and mission and philosophy.

Fran mentioned each category of shared values, but emphasized the importance of understanding change as a shared value among ICN staff members. She identified QI, learning, and implementing best practices as important processes to understand to function effectively within this ICN, "We are definitely dedicated to best practice. And not every place has that slant … everything we do is geared towards best practice--that we provide the very best care for the very best outcomes."

Fran placed a heavy emphasis on the shared values of improvement, learning, and change, citing the ICN's active involvement in the QI learning collaborative, "… not only do we contribute data to their database, but we also as a unit have taken on doing some of the active participation in benchmarking and best practice." Fran's perspective on the shared values of using best practices and commitment to QI was tied to her perspective on ICN staff members' relationship to the unit. This was highlighted in her description of the hospital where she worked prior to working at this ICN:

> … it was a job to a lot of people where they didn't question why we did what we did or how we did it …. You clocked in and you clocked out at the end of the shift…not that people didn't care, but they just weren't in that mode of thinking about why do we do what we do … and there wasn't a lot of research-based practice--between the doctors or the nurses.

Fran provided an example that highlighted her systems perspective. She linked the relational aspects of ICN staff members to the ICN, each other, patients, and hospital to values of improvement and commitment to change in comparing two hospitals:

> … our attendings work for the hospital, they don't work for themselves in another practice. And so, they're vested in bettering the practice because the outcomes directly reflect on them. Whereas in the community hospital, those docs have their

> own practices, and they just have admitting privileges and…our c-section rates and infection rates were kept by the hospital … it wasn't really reflective on a particular doctor. So, I had a real hard time making change there.

In summary, Fran discussed the interdependence between structural, operational, and relational components of systems knowledge, and highlighted their interdependence. She emphasized the shared values of change, QI, learning, and best practices. Fran mentioned the importance of understanding mission and philosophy and she explicitly linked elements of hospital structure to patient outcomes.

Georgia.

Georgia mentioned structural systems knowledge in terms of shared values, resources, people and roles, and processes. Also mentioned, but with less frequency, were the physical environment, and the mission and philosophy of the ICN. Regarding shared values, Georgia's main emphasis focused on teamwork, with the shared value of embracing change among ICN staff members following closely behind. Georgia's comments centered on the processes of learning, QI, and shared governance.

Georgia emphasized clinical protocols as operational components of systems knowledge. Georgia also mentioned operational systems regarding management of "unpredictable work flow" in the context of supporting the range of activities and expectations of the SNs in the ICN, "… a delivery will happen, or transport will happen, people will have to pick up call …"

More than any of the other participants, Georgia focused on the importance of process in understanding how the unit functions. Her personal commitment to the linked processes of learning, QI, and shared governance was evident:

> Well, it was very exciting … I have been part of shared governance since I started on the unit. And … even before shared governance, I join[ed] the … the neonatal group that became the clinical practice group.

Georgia's detailed discussions of a range of relational issues provided evidence of her perception of their importance to ICN functioning. She pointed out that the longevity of nurses on the ICN indicated a level of commitment to the unit and to each other, "… we are strongly weighted to experienced nurses: … there are some nurses working in the ICN that were there when it was instituted … they really care, and I think that people tend to stay for a long time." She further emphasized, "… for the most part, I think that is one of the nice things about our unit--it is a very large unit, but people are very committed to the babies."

Georgia's comments blended structural, operational, and relational components. Georgia linked the shared values of teaching and learning with QI. In her comments about precepting, Georgia related a lighthearted perspective:

> … there are a lot of people that I have precepted. One of my nurses that I precepted, she always called me her Mom. And she has since precepted people … [who have] … referred to me as her grandmom. And the other day I was working, and basically the whole pod was full of people who I had either precepted, or they had been precepted by people I had precepted … So, my children, my grandchildren were all around me …

In summary, Georgia's comments reflected the interdependence of structural, operational, and relational components of systems knowledge. Georgia identified the shared values of change and teamwork with the mission of the ICN. She also focused on staff members' relationships with the unit through participation in shared governance and development of clinical policies.

Helen.

Structural components of essential systems knowledge mentioned by Helen related to shared values, resources, processes, people and roles, and mission and philosophy. Structural and relational components merged in Helen's descriptions of the FCC mission and philosophy of the ICN. She emphasized the importance of understanding shared values such

as teaching and learning, patient safety, and providing FCC, "… we really are family-centered, family focused … you won't be able to live here if you think that you are going to do it without the families …"

Helen spoke in depth about learning processes as part of the unit culture. Helen identified structural elements of the unit that promoted and supported teaching and learning values and activities. She also emphasized the interdisciplinary nature of the teaching and learning environment of the ICN through participation in journal clubs and unit-based committees. For example, as part of a QI collaborative initiative, ICN staff members were encouraged to participate in a work group focused on safety issues. Members of this group introduced relevant best practices to peer staff nurses in the clinical setting.

Helen frequently mentioned clinical protocols, often in terms of guidelines for patient safety. For example, Helen highlighted the importance of adequate staffing, "When you are hired it is expected that you will work every other weekend, and we need this so our staffing will be balanced."

Helen also mentioned peers as supportive resources. She viewed the teaching and learning environment as a means to communicate safety issues, concerns, and practices. Helen's emphasis on safety extended to include elements of relational systems knowledge. When asked to expound on what trusting newly hired nurses or TNs meant, Helen stated, "… that they are going to deliver safe care … they can do it their way, just so long as it's safe and it's family-centered." Her relationship to the ICN and her coworkers emerged through discussion of her personal involvement in the safety group. As a member of this group her role included communication of safety issues and new knowledge to nursing staff members.

Helen's commitment to her own learning, change, and improvement was also evident. She stated, "I can remember feeding bottles to babies that were going to breastfeed and not thinking there was any issue, but now I spend a lot of time protecting my primary babies from being given bottles before it's time …" Helen stressed the importance of newly hired nurses understanding that the ICN offers a supportive peer-to-peer environment. Helen remembered a very supportive and comprehensive orientation many years earlier.

In summary, Helen emphasized the importance of safety and teaching and learning as elements of the ICN culture, and identified processes that supported those elements. In her descriptions of what is needed in a good orientation, Helen integrated structural, operational, and relational components of systems knowledge.

Commonalities among and differences between SNs.

Commonalities were shared values, people and roles, and resources. Each of the SNs mentioned shared values of change, teaching and learning, FCC, teamwork, and safety. Regarding operational components, all three SNs emphasized the importance of clinical protocols. SNs mentioned structural, relational, and operational components of systems knowledge, in that order. Differences were on the emphasis of the shared values of change and teamwork.

Summary.

In considering what was valuable in their own orientations, SNs emphasized how things work within the ICN, and provided contextual examples. Emphases on processes and operational components suggested SN concern with facilitating the smooth function of the ICN.

Nurse Leaders

Nurse leaders were asked the question, "When you think about what you are trying to accomplish on this unit, what is important for nurses to understand about how the unit works?"

Alice.

In her direct response to the posed question, Alice immediately identified the shared values and practices of teamwork and FCC as important for new nurses to understand about the ICN. She stated, "They need to understand that we work together as a team … and that we practice FCC. A critical component of what we do here is involving the families … and making them a part of pretty much every aspect of care."

Alice described a shared commitment to QI as key to ICN function. "We are always … trying to make improvement … it's just something that is embedded in our culture--whether it's research or QI … it's what we are used to, what we live with all the time." Alice's citing a culture of change suggested an internalization of this shared value.

Alice also emphasized the importance of the nurses' relationships to each other in understanding how the unit worked. Alice provided many examples of how it is that the ICN works so well as a unit. She drew upon her experience of engagement in the planning and implementation of moving the ICN from its site at the former hospital to the new medical center. This experience provided context for her descriptions of the long-standing social connections between ICN nurses. In the following excerpts Alice recognized the role of the environment in affecting interpersonal relationships:

> … if you go back quite a ways to the old hospital--we had two little rooms that housed 16 babies, and quite literally the babies were stacked … quite literally we stood shoulder to shoulder sometimes, taking care of babies. … When you have to work together like that, you have to work together … and as a small group of people you start to form a lot of relationships, and a lot of social networking …

And also, "… we did a lot of physical preparation, like this is where we'll put stuff … how we'll get around the unit, but we also did a lot of emotional preparation … because we were leaving a place that was 100 years old."

The three systems knowledge components merged in Alice's descriptions of the interaction between nurses' relationships with one another, the structure of the built environment, and operations in terms of staffing and breaks. Alice's perceptions emphasized the positive force of relationships on unit function.

> … when we were going to make the move to this hospital, we were concerned … about losing that camaraderie and that social network .... So, figured out ways to make sure that we still worked together even though we worked farther apart, if that makes sense … we didn't just put it into the warehouse--we brought it with us.

The essence of relationships between nurses and families also emerged. Alice's description of the values-driven mission and philosophy provided another example of the nature of interplay between structure, operations, and relationships, "… we consider the family to be a part of the team … we care for the family, not just the baby, and … we help them take care of their babies while they're acutely ill …"

This commitment to FCC exemplified integrated relational and structural systems components in the context of nursing care. Alice pointed out that FCC is so deeply valued that any policy shift, such as moving away from the open door policy to a locked unit, would present "… a huge cultural change …." She described a high level of commitment to patients and families exemplified by a recent incident involving a baby dying at home. She also mentioned nurses' recognizing and supporting each others' commitment as another example of shared values and congruence between the stated philosophy and mission and nursing practice in the ICN.

Alice emphasized the importance of relationships across the interdisciplinary care team in the effective function of the unit, “I think the other thing that works really well, is the relationships between the different roles--there’s respiratory, nursing, ARNPs, students, and you don’t really see people working in their own little circles.” Alice also mentioned relationships beyond the boundaries of the ICN, those connecting the ICN with its external community:

> The unit is well recognized in the community … we have these relationships with all the hospitals, pediatricians, and even nursing staff, because of all the transports we do, the frequency that we visit them, the follow up that we do with them, [and] the outreach program.

In summary, Alice identified understanding issues of unit culture as the most essential knowledge component. She focused on the shared values of learning, change, FCC, and teamwork as elements of the unit culture most important for a new nurse to understand about the way the ICN works. Alice also identified an understanding of the mission and philosophy of the unit, available resources, and people and roles as essential systems components for effective functioning within the ICN. She also reinforced the relational component of systems knowledge and the interdependence among the three systems knowledge components.

Barbara.

The second nurse leader, Barbara, had worked for approximately half as long as Alice in the ICN. Her role entailed direct and sustained engagement in the process of transitioning incoming new staff members to independent professional practice on the unit. When asked, “When you think about what you are trying to accomplish on this unit, what is important for nurses to understand about how the unit works?” she immediately identified several knowledge needs that included all three components:

> Well, it runs the gamut from things as simple as who people are in the unit, where things are in the unit, socialization needs, systems--how things work, equipment: how to use the monitor to an IV pump, to the telephone--there's a laundry list of equipment, where things are, policies, procedures …

Barbara further described essential operational systems knowledge, "When is it okay to call an NP? ... What is the system for getting what I feel I need? … Things that … we just do automatically that people need to know in order to make it happen."

She also made reference to the nested relationship between the unit and the hospital by identifying essential operational knowledge:

> … other things systems-wise that we need to make sure people know … is some of the workings of the hospital--like policies and procedures--how to respond to a code pink, how to respond to a code black--those kinds of safety and overall hospital things …

At a later point in the interview Barbara also mentioned values shared by the unit and the hospital, "… improving the quality of care that people are providing … is the overall, overarching goal for the institution as well as the unit."

Barbara placed a great deal of emphasis on the value of teamwork within the ICN. She associated newly realized knowledge about the behavior of teamwork with the recent influx of travel nurses and new staff members:

> … we've recently discovered with all the influx of new staff [is] … that teamwork doesn't just happen--it's a learned behavior …[especially] if it's not a group that is regularly cohesive--or even if it is a group that's regularly cohesive--that there is a lot of breakdown with our communication …

In summary, Barbara mentioned shared values vis-à-vis unit culture with the greatest frequency, and her emphases focused on the shared values of learning, change, and teamwork. She identified the need to be aware of available resources and understand how to access them. She identified peer colleagues as resources, and mentioned the physical environment with the least frequency.

Caroline.

Caroline was the third nurse leader interviewed. In addition to her clinical role, Caroline served as part-time editor for a professional journal specializing in her area of clinical expertise. This evidenced a high level of commitment to learning and professional development. Similar to Alice, Caroline had worked on the unit for nearly 20 years. When asked, "When you think about what you are trying to accomplish on this unit, what is important for nurses to understand about how the unit works?" Caroline identified two major points, "'Who's our patient and primary area of concern?'--That being defined as the family--and, 'What are we here to do? What is our mission? What are we about?'... that sense of purpose …"

The major emphasis of Caroline's discussion centered on people and roles, and how they fit into the big picture, that is, individuals' relationships to the unit, "… They need to know who the players are, and the hierarchy .... If something is going on with their patient--what is the chain of command, and roles and responsibilities, and who I can count on for help …"

Caroline mentioned resources less frequently than people and roles, but spoke about resources at greater length. Similarly to Alice and Barbara, Caroline recognized staff members as invaluable resources to each other. She cited the way that the clinical nurse specialist (CNS) served the interest of safety, support, and learning in her routine work, "I watch our CNS go around every morning, to every nurse, and it's like a set of vital signs on the nurse--How's your baby? What's happening? Any problems? Anything I can help you with?"

Caroline also emphasized the importance of understanding the mission and philosophy of the unit, stating "… there has always been a big investment philosophically in

interdisciplinary care and trust, and that being the basis for good care in all respects." She mentioned several times her own efforts to support and fulfill the mission, which focused on fostering relationships between staff members and patient: "… Hopefully the 'baby is in the room' in every conversation. Whenever I go to a meeting … there is always going to be the baby in the room--that person we're serving--that baby has to be really present …"

Caroline mentioned the culture of safety with greater frequency and in greater detail than the other nurse leaders. She linked safety to relational system components in terms of the ways that people on the unit relate to each other, "They need to know that it's safe to practice … that it's safe to approach people … it's safe to ask questions ... they need to know that we respect and trust each other."

Caroline also identified another aspect of the unit culture. She described the essence of the relational component of system function in terms of staff members supporting each other through the shared challenges of practicing within the ICN. She explained, "… People really care about each other …--that's another part of the culture. … They invite each other into their homes ... they know what's important, and what's happening in each other's lives."

In summary, Caroline's major focus was on relational components of systems knowledge, which she tied directly to the mission of the ICN. Caroline associated relational aspects to the culture of safety as it related to ICN staff members' trusting one another. Caroline also focused on people and roles, and the importance of understanding the big picture.

Deborah.

Similar to Alice and Caroline, Deborah had a long history with the ICN, employed for more than 20 years in various roles. Deborah's initial response to the posed question was, "I think what's most important is for people to realize that we're here to give expert, high-

quality, evidence-based care to neonates and their families. And everything else falls under that--that's the overarching goal of our unit." She articulated the relationship between expectations of new staff members and the mission of the unit stating, "They should know our mission and vision of the unit … our expectations derive from that vision and mission." Deborah stated, "It's alive ... the mission is alive."

Deborah's comments emphasized the relational component of systems, and she mentioned several of the same issues that were mentioned by the others before her. For example, as her colleague Alice did, Deborah described the effects of relationships on the work of the unit:

> I've seen highs and lows in our unit. I've seen how people are really burnt out and they can't deal with one more thing, and it feels like people are constantly coming down on you for things ... I've seen people get really excited about something and all band together ... and feed off each other and do fantastic things ...

Similar to Alice, Deborah made several points in the context of the move from the old hospital to the new unit. She spoke of "… being part of something bigger," and mentioned individuals' "ownership of the unit" as an important factor in the way the unit functions, clearly--though implicitly--communicating her own relationship with the unit in terms of ownership and pride.

Deborah also identified broad engagement in QI projects as a context in which people identified not only where they fit within the system, but also that what they did mattered:

> … There was a core group that worked together at the start of the project, but then … there were offshoots to it, and everybody could find what they liked within those offshoots. And so it all had to come together at the end, but everyone was invested in their little piece, and making it fit into the big one. So, that was a really good thing.

In summary, Deborah clearly articulated her commitment to and the importance of understanding the mission and philosophy of the ICN. Deborah also emphasized the sense of

"being part of something bigger" that fosters a sense of ownership in the unit. She tied these elements to the shared value of improvement.

Focus group.

The focus group, which was comprised of five nurse leaders, provided support to the findings that emerged through observation and interviews. Additional viewpoints included a focus on the emphasis on interdisciplinary collaboration. Deborah mentioned the "…physician silo, the nursing silo, the NP silo…" but added that there is "cross-pollination" between them. ... There is a real give and take amongst the nursing staff themselves, but also between nursing staff and the entire team."

A shared sense of pride among the ICN staff was evident throughout observation experiences and interviews, but only explicit in the focus group discussion. Emily also noted that the ICN is "… a very proud unit. There is a lot of pride among the staff of the care that is given, and for the most part I think that pride is very well earned and deserved…"

NLs discussed ICN staff members' propensity for celebration at length and in detail. In describing what a new nurse should understand about how the ICN functions, Emily stated, "… we like to celebrate, and we do it with food, but there is a celebration with personal things--when people get engaged, and there are more work-related types of celebrations. We pretty much like to have an excuse for a celebration …!" To underline this point, Corinne stated, "… a birthday cake for every single person's birthday … is a message … that you are important, and we're happy you were born …" Corinne also mentioned a newly identified role, "… we have social directors …. informal social leaders in the unit …[who] are critical to making things work…"

Specific descriptions exemplified the shared pleasure in celebration that characterized the ICN, and extended to include the babies and their families, "… for the holidays, … one

nurse will start making a special card and picture or footprints, and the next nurse will follow suit: 'Well, I'm gonna do that too! I'm gonna make that for my baby, too!' And it's all around the unit in no time! …"

In summary, the focus group discussion reinforced previous findings. In addition, the focus group discussion broadened and enriched the shared values of interdisciplinary collaboration, pride, and celebration

Commonalities among and differences between NLs.

Each of the NLs identified structural, operational, and relational components of systems knowledge. Each highlighted the importance of recognizing and understanding staff members' relationships with each other and with families, staff members' relationship with the unit, and unit relationship with the community.

Differences were in emphases on unit mission and philosophy of the unit, people and roles. These differences may reflect some significance to the length of time each has been a part of the ICN.

Summary

All NLs identified elements of each of the three systems knowledge components. Each placed special emphasis on the relational component. Commonalities and differences existed and were described.

Comparisons Across Participant Groups

Commonalities were that each participant group identified the importance of understanding structural, operational, and relational components of systems knowledge. Although SNs and TNs did not focus explicitly on the mission and philosophy of the ICN, each group indicated commitment to the shared values of FCC, teamwork, best practices, improvement, and change.

Differences were in the emphasis of each group. TNs focused more heavily on the structurally-centered aspects that impacted their individual practice experiences. TNs were not specifically interested in facilitating the smooth function of the ICN, per se. The TN focus was on the components of systems knowledge that enabled their smooth transition into the function of the unit. TNs identified relational aspects as essential components of systems knowledge as they related to understanding the morale of ICN staff members. For TNs, understanding relational components, particularly the relationships among ICN staff members, and between staff members and the unit, was essential to their smooth transition into the function of the unit.

SNs focused more pragmatically on aspects of systems knowledge that enabled their concerted efforts toward the mission of FCC and best practices. SN focus centered on systems knowledge that promoted the smooth function of the ICN. SNs emphasized operational components of systems knowledge, while NLs viewed the essential knowledge components from a philosophical perspective, focusing on relational components of systems knowledge,

Summary of Findings for Research Question 1

Members of each participant group mentioned various elements of structural, operational, and relational components of systems knowledge. While each participant group mentioned elements of each systems knowledge component, emphases varied across groups with regard to structural and operational components. Elements of relational systems knowledge were emphasized consistently across individuals and groups. Also common across each group was the interdependence between the three components of systems knowledge.

Research Question 2: How Does Nurse-to-Nurse Systems Information Exchange Occur Within a Clinical Microsystem?

As with research question one, categories for research question two were based on investigator observation of orientation sessions, or explicit references during individual interviews, and the focus group session. Categories emerged through coding of field notes from organizational, unit-level and precepted shift orientations, documents, and interview and focus group transcripts. The following sections describe these processes, or mechanisms, of nurse-to-nurse systems information exchange by participant group, beginning with travel nurses. Participants' descriptions of mechanisms of nurse-to-nurse systems information exchange are provided below. Comparisons were made within and across groups.

Constant comparision analysis revealed two overarching themes describing that nurse-to-nurse systems information exchange: direct and indirect processes. Two subthemes emerged from within the category of direct processes: 1) direct formal processes, and 2) direct informal processes. Direct formal processes included orientation, prehire interviews, and formal feedback mechanisms. Direct informal processes included peer teaching, modeling behaviors, observation, questioning, and problem solving.

Indirect processes of nurse-to-nurse systems information exchange were also identified. The built environment and stress reduction emerged as indirect means of facilitating nurse-to-nurse systems information exchange. The pervasive role of relational factors was common across participant groups. The examples provided in the following sections demonstrate the integral nature of interpersonal elements, particularly within direct informal and indirect categories of systems information exchange mechanisms. Table 18 provides a description of each of these categories.

Table 18

Categories, Descriptions, and Examples of Systems Information Exchange Mechanisms

Process	Description		Examples
Direct Formal	Orientation	Structured process employing a range of methods to prepare the nurse for a specific role; has a defined purpose and objectives	Includes didactic and precepted shifts
	Prehire Interviews	Interviews with TNs prior to contracting to the ICN	With UL or travel agency
	Formal Feedback	Mechanisms designed to elicit specific feedback about a process	Includes QI surveys, employee exit interviews, orientation evaluation
Direct Informal	Peer Teaching	Includes a range of activities including sharing information and conventions specific to a particular unit	Sharing policies, "nursing tricks," negotiating the facility, scheduling, breaks
	Modeling Behaviors	Demonstrating expected or preferred behaviors	ICN processes, interdisciplinary communication, professional behaviors
	Observation	Sensing, assimilating into framework of existing ideas or knowledge	Witnessing other nurses' responses, behaviors, or management of a situation
	Questioning	Explicitly asking for information regarding clinical, administrative, or social elements of working in the ICN	"Picking their brain"
	Problem Solving	Applying experience and expertise to a particular situation; sharing information and learning in action	Developing innovative solutions to real problems; "importers of solutions"
Indirect	Built Environment	Refers to the human built physical environment (e.g., space, infrastructure, functional qualities of the setting that support the work of nurses and promote exchange of information)	Open pods, bulletin boards, linoleum on acute care section of ICN, carpeting on intermediate and chronic care section.
	Stress Reduction	Efforts or strategies to reduce the anxiety of entering a new work environment	Providing detailed first week schedule so newly hired nurse knows what to expect

Systems information exchange mechanisms are displayed by rank in the following section. This method of data analysis and display enabled comparison across groups. Rankings were based on explicit participant emphasis, frequency of references, and number of words dedicated to discussion of a particular mechanism. Aggregate rankings of these nurse-to-nurse systems information exchange processes are reflected in Table 19.

Table 19

Aggregate Ranking of Nurse-to-Nurse Systems Information Exchange Mechanisms (N = 10)

Processes	Categories	Rank
Direct Formal	Orientation	1
	Prehire Interview	9
	Formal Feedback	7
Direct Informal	Peer Teaching	2
	Modeling Behaviors	5
	Observation	8
	Questioning	3
	Problem Solving	4
Indirect	Built Environment	6
	Stress Reduction	7

Note. Dashes indicate no data. Participants included TNs, SNs, and NLs.

Travel Nurses

A cluster of questions was developed to stimulate a discussion about how systems information is exchanged between nurses. TNs were asked, “What can you tell me about how a unit functions that is not part of the formal education or orientation? Since it is not part of

the formal process, how do you learn about it?" Aggregate ranked order of TN perceptions of systems information exchange processes are noted in Table 20.

Corinne.

Corinne mentioned orientation with the greatest frequency and at the greatest length, but also focused on informal processes of nurse-to-nurse systems information exchange. Corinne focused on peer teaching through observing and questioning her peers within the ICN stating, "How I learn … is basically I ask, or I observe how they are doing it …"

Table 20

Aggregate Rankings of Systems Information Exchange Mechanism by TN References (N = 2)

Categories	Rank
Orientation	2
Prehire Interview	5
Formal Feedback	5
Peer Teaching	1
Modeling Behaviors	5
Observation	3
Questioning	2
Problem Solving	4
Built Environment	3
Stress Reduction	--

Note. Dashes indicate no data.

Corinne emphasized the role of relationships in sharing information. This emerged in her observations of the closeness among ICN staff members within this particular unit, "…

their interaction with each other, the tone of their exchanges … a lot of the staff people here are social outside … they know each other's kids, families, what they are doing this weekend …. This is a very close unit." She also related experiences that reflected negative relational influences on nurse-to-nurse systems information exchange:

> You know, they might be a little snotty to me, like "You should know that …," because many of the questions may seem very simple, but if they have never worked in another hospital then they may not realize that there are other ways to do things …

In summary, Corinne described orientation with the greatest frequency and at the greatest length. She also mentioned questioning, peer teaching, modeling behavior, and observation as mechanisms of nurse-to-nurse systems information exchange.

Donna.

In contrast to Corinne, Donna mentioned the prehire interview as a source of information, "… Usually they tell you in advance how big the unit is, what kind of babies do they have here, do they do surgeries … what the patient population is, how big the unit is, how busy it is. …" Donna also mentioned the travel agency as a source of information, as well as her TN peers. She stated, "If you have a question, if you are going somewhere you haven't been before, you can go online and ask if anybody had been there before, and what they have to say about it."

Donna also mentioned the role of the preceptor during orientation, "For the travel nurse, you only get a couple of shifts … the precepted shift is an essential part." She described how the formal orientation process can be inadequate, "… some places, they will give you like a half a shift and throw [you] in there--like to the wolves." Donna stressed that she pursued the information she needed through observation or questioning, "… you just see people do certain things--so, just kind of watching--'Oh, okay, that's how you do it …' So,

just … observing other people." She also stated, "… I ask a lot of questions. 'Where is this? How do you do this again?' I always ask … if I am not sure about something, I ask."

Similar to Corinne, Donna also mentioned negative responses to her questions, but emphasized her focus on patient care, "… some people get annoyed … you do what you have to do. It's all about the babies … they come first ..." She emphasized, "… I just jump in and do what I have to do. Patients are patients … if I can't find something, I will just yell out 'Hey, where is such and such?' I just ask."

Donna mentioned problem solving as a way that nurse-to-nurse systems information exchange occurs:

> It's always good to get two or three heads in together to make a decision--that's really important. Because you might know one little piece of something, and someone else might know one other little piece, and so you can put those together and make the right decision …

She also recognized problem solving as a mutually beneficial process:

> … you just kind of throw in your experiences in there, and just kind of show each other, and then you have one more trick up your sleeve. So, I think you bring … all the experiences that you've had. You just bring it, and let people know … and it's kind of a learning experience for them, and you are learning from them … so just kind of sharing.

Donna's comments suggested that the built environment played an important role in systems information exchange. She made several comparisons between this ICN and other units in terms of the built environment. She mentioned one particular unit that fostered learning and functionality, "… the layout of the unit … was just amazing--it was freshly renovated, all private rooms with centralized monitoring … the design was just so functional for the nurses … a lot of privacy for the parents, it just worked so well."

In summary, Donna's perspective included sources outside of the ICN with a role in systems information exchange, specifically the travel agency and other travel nurses. She

also mentioned the prehire interview. Donna emphasized problem solving, as well as her use of observation and questioning as means of nurse-to-nurse systems information exchange.

Commonalities among and differences between TNs.

Commonalities included orientation, peer teaching, observation, questioning, and formal feedback mechanisms as processes of nurse-to-nurse systems information exchange. Both nurses mentioned that asking questions sometimes resulted in ICN staff members becoming “annoyed” or “snotty.” Differences were in the emphases on modeling behaviors, problem solving, built environment, prehire interview, and travel agency as a mechanism for systems information exchange.

Summary.

TNS identified specific mechanisms of systems information exchange. Commonalities and differences existed and were described.

Staff nurses

SNs were asked to consider their experiences orienting or working with orienting nurses. To address the second research question, SNs were asked, “How do you explain ‘how things work around here’ that is not included in the formal orientation process?” If needed, SNs were prompted by asking, “What about THIS unit is different, and important for a new nurse to know?” Table 21 provides the aggregate ranked order of SN perceptions of systems information exchange mechanisms.

Table 21

Aggregate Rankings of Systems Information Exchange Mechanisms by SN References (N = 3)

Categories	Rank
Orientation	1
Prehire Interview	7
Formal Feedback	4
Peer Teaching	2
Modeling Behaviors	5
Observation	--
Questioning	3
Problem Solving	7
Built Environment	6
Stress Reduction	--

Note. Dashes indicate no data.

Fran.

Fran provided a unique perspective as a newly hired experienced staff nurse. Fran emphasized the importance of questioning as an informal process of nurse-to-nurse systems information exchange. She offered this comment based on advice she received after her orientation, "… I tell people who are new to 'Ask away!' … just spread your questions around to people. Because if you seek out the same person they may get tired … plus, you get a different view from other people."

Fran discussed orientation at the greatest length of all categories. Her comments reflected positive and negative perceptions on the orientation process. From the positive perspective, Fran emphasized the importance of the precepted shift:

> …. we went right into the unit and started orienting with our preceptor. That part was probably the most useful--for me to learn how things were … done. Also, … I had a

> great preceptor, [who] just let me go, let me do … didn't start too basic … just let me take a baby, and when I started having questions that's when I started asking.

Fran also addressed what she thought was missing from her orientation. Regarding the general orientation process she stated, "I thought it was very unusual that we did not meet the director of nursing. I would like to have met her and find out what her cultural beliefs and goals for the hospital are … what her perspective is …" In addition, Fran mentioned aspects of her orientation experience that she found unhelpful. For example:

> …somebody needs to tease out those pieces that are pertinent to ICN nurses and leave the rest. But some of it was interesting even though I won't use it in the ICN, like the diabetes … we don't deal with that in the nursery. We get the end result, like with diabetic mothers, but we don't have babies with Type II diabetes.

She also described the online modules that were part of the didactic component of her orientation as unhelpful. Fran communicated this feedback through mechanism the orientation evaluation process:

> … it was exceedingly tedious to sit at a computer and read the material … so I just quit doing that after a while, and started just taking the test to just get through it. And questions on the test … were wrong … So that was frustrating … or, it wasn't the way we do it here. And so, they would be looking for an answer that went along with their material, but it really wasn't the way we practice here. There's more than one way to do things … so, I let them know that I didn't think that was a valuable tool.

Fran offered several examples of problem solving as a means of nurse-to-nurse systems information exchange. In describing her experience as a resource to a newly hired nurse, she explained, "We have certain resources… I went and got the charge nurse, and talked with her and we tried to troubleshoot it from there…."

In summary, Fran's perspective clearly reflected the commitment to QI that was evident in her responses to the first research question. Her comments centered on the orientation process, questioning, and problem solving. She recognized both effective and ineffective aspects of orientation. Consistent with her expressed interest in improvement in

her practice, she provided feedback and made suggestions for improvement in the orientation process.

Georgia.

Georgia recognized questioning and peer teaching as processes of nurse-to-nurse systems information exchange:

> I always encourage the new nurses to ask their co-workers … don't try to stumble through--we don't expect you to come out of orientation fully dressed and armed for battle. … You know, you have the tools, but you won't always have the knowledge.

Georgia also mentioned that she models those behaviors, as well, "I will still check things out with people, and get a second opinion, and we expect you to do that, too." Georgia's perspective reflects recognition of the dynamic and emergent character of the ICN. Georgia specifically mentioned the prehire interview as a means of introducing new staff to the processes of the ICN.

Georgia described her experience with the shared governance process as a mechanism for nurse-to-nurse systems information exchange:

> One of the reasons I joined the group in the first place was because I felt that some decisions were being made that affected nurses and nurses had no input. Or decisions were made to look at systems, but the people who were making the decisions did not really have any idea as to what was involved … how it actually plays out … When they say, "OK, now we have to do this…" Well, do you realize that we do this … and it's boom, boom, boom, boom … that leads up to it … and [that] these are all the issues?"

In summary, Georgia's responses emphasized peer teaching and questioning within the context of a supportive environment. She also mentioned formal processes of orientation, the prehire interview, and the shared governance process as formal feedback mechanisms.

Helen.

Helen's responses also centered on direct formal and informal processes of nurse-to-nurse systems information exchange. She mentioned the direct formal processes of ICN-level

orientation, “They spend a little time with all the people during orientation … devoted to … the ground rules about how the schedule is made, and what you can expect to be able to manipulate, and what is kind of a given.” She also mentioned the precepted shift, “Well, the travelers get, I think it’s a three-day orientation, usually with one staff person. So that is the formal piece, and it’s one and one.”

Helen also mentioned informal processes of systems information exchange. She emphasized peer teaching and modeling behavior as mechanisms of nurse-to-nurse systems information exchange. Helen related an example illustrating how she might have benefitted from a tip that she had not received:

> There was one particular attending that didn’t like to have a nurse tell a family information before she had … And I [told a family their baby would be discharged soon] and had stepped over the line. And she went from being a very friendly person to where she wouldn’t talk to me for quite a while. …Now she’s very friendly--you know, after a few years it passes … it’s probably something that everybody else knew, but didn’t talk about it … I didn’t realize I was doing a wrong thing at the time …

She also described sharing opportunities to gain exposure to or experience with particular clinical experiences as a peer teaching strategy. Helen provided an example specific to her own practice, “… if you haven’t done this would you like to do mine? I’ve got one here to do … Have you had these experiences?” Helen also mentioned more generally, “… it’s within the pod, and how people, both the travel and the staff nurse, interact to how much sharing goes on ….”

Helen also recognized role modeling behavior as an informal mechanism of nurse-to-nurse systems information exchange. She stated, “… when people are orienting, I tell them ‘this is the right way … the most important thing is to understand for yourself why you are doing each thing, and to try to do it the best, safest way you know how.’ …” Helen clearly

viewed herself as an instrument of systems information exchange, "… when we have a situation where that is an important thing, I do try to demonstrate."

Helen also raised her involvement in unit-based activities safety and nutrition committees, and her role in "sharing information that comes up" during committee meetings. Helen recognized the environmental influence on systems information exchange, as well. She pointed out the bulletin boards situated at various locations within the unit as a source of information.

In summary, Helen mentioned orientation, peer teaching, and modeling behaviors as mechanisms of nurse-to-nurse systems information exchange. She provided positive and negative examples. She also recognized the indirect influence of the environment. Similar to Fran, Helen's responses were consistent with her focus on safety that she emphasized for the first research question.

Commonalities among and differences between SNs.

Three processes of nurse-to-nurse systems information were mentioned by each staff nurse: 1) orientation, 2) peer teaching, and 3) questioning. Orientation was discussed with the greatest frequency among this group, and in the greatest depth. Peer teaching was mentioned with the greatest frequency after orientation among members of this group. Differences were found in the emphases on built environment, role modeling, formal feedback, and prehire interviews as mechanisms of systems information exchange.

Summary.

SNs identified specific mechanisms of systems information exchange. Commonalities and differences existed and were described.

Nurse Leaders

To stimulate discussion on how nurse-to-nurse systems information exchange occurs, NLs were asked, "How is systems knowledge communicated to other leaders and staff members?" NLs mentioned each of the ten categories. Table 22 provides the aggregate ranked order of NL perceptions of systems information exchange mechanisms.

Table 22

Aggregate Rankings of Systems Information Exchange Mechanisms by NL References (N = 5)

Categories	Rank
Orientation	1
Prehire Interview	7
Formal Feedback	8
Peer Teaching	3
Modeling Behaviors	3
Observation	6
Questioning	5
Problem Solving	2
Built Environment	3
Stress Reduction	4

Note. Includes focus group data.

Alice.

Alice mentioned each of the ten categories of nurse-to-nurse systems information exchange. Alice mentioned clearly communicating expectations as a way of explaining "how things work around here." She framed this as part of the culture of the ICN, and discussed it in the context of orientation, "… I know one of the things that we … drill into them in orientation is that they should never be hesitant to ask for help ..."

Alice mentioned prehire interviews as a mechanism that provides information about the prospective employee or TN, "… It's one of the things we try to tease out in the interviews--peoples' perspective about FCC. Sometimes we ask a question about 'what do you think are the advantages, and maybe some disadvantages of FCC?'" Alice also mentioned the prehire interview as a process that "… sets the stage for a relationship with that person that you are interviewing with and gives you a little snapshot of the culture of that organization …" Alice also suggested that TNs "… probably get a bit of the flavor from the [travel] agency."

Alice mentioned QI surveys as a formal mechanism that facilitated sharing of systems information. Specifically, she mentioned TNs and their willingness to participate, "… if we are sending out a survey about something … something as simple as 'We're looking at figuring out a different system for how we get the breast milk labels for the breast milk,' they participate." At another point during the interview, Alice described another way that problem solving facilitates systems information exchange:

> … if we are having a problem with something, someone might come and say "Well, one of the hospitals I was at, we used to use this … or that …" So that's been really helpful--it's almost like a little resource for us.

Alice also identified observation and role modeling as key mechanisms of nurse-to-nurse systems information exchange. She stated, "… observation of relationships … role modeling, I think, is a huge way … someone watching you work with someone and seeing you change your tact when your approach isn't working … very informal … very little of it is explicit …" Alice recognized the role of the built environment in facilitating observation and modeling behaviors:

> … one of the things that really helps … are the open beds and bays … a baby crashes, a parent comes in … you hear the nurse talking them through that, and helping them through that. Or you hear them doing the discharge teaching, or you learn a lot

> informally, and so in some respects, I think that although our design isn't always optimal for babies it is really useful for nurses

In summary, Alice's responses were diverse, including each category. Alice's perspectives regarding how nurse-to-nurse systems information exchange occurred was consistent with the philosophical stance noted in her responses to the first research question.

Barbara.

Barbara mentioned orientation with the greatest frequency and at the greatest length. She identified various goals of orientation, "… the way of the unit, the culture of the unit, who people are, who am I working with, who are my resources …" Barbara also discussed the objectives of orientation in terms of socialization. She discussed socialization as essential to survival, "… We know that people need to have those tools in order to really survive … to not do that while someone is going through orientation is tantamount to failure … you can lose somebody because they just didn't get socialized."

Barbara also mentioned the roles of peer teaching, stress reduction, and the built environment in nurse-to-nurse systems information exchange. Barbara's responses reflected a perspective of the emergent nature of systems. In addition, she also mentioned mechanisms that included keeping current with ongoing changes within the system:

> … there's a fair amount of "peer teaching"--you know, the resource nurses mentoring people who have been here for less time--the educators, both mentoring and actively teaching--the CNS, the UL, it's not just at the leadership level. There's a lot of teaching that goes on, just peer to peer…

Barbara mentioned other educational opportunities that she perceived contributed to nurse-to-nurse systems information exchange. Opportunities included regularly scheduled "skills days," and "inservices whenever we bring in new equipment." In addition, Barbara recognized other professionals such as the lactation consultant, and unit- and organization-

level teaching and learning activities and opportunities. Barbara also mentioned email and online teaching modules as mechanisms for communicating systems information.

Barbara referred to the built environment vis-à-vis the bulletin boards located throughout the ICN. Many of the bulletin board displays focused on systems issues. Barbara perceived that these bulletin board displays were well-utilized means of nurse-to-nurse systems information exchange. Barbara pointed out that, "… one is managed by the administrative assistant for the neonatologists--she keeps up to date with the nosocomial sepsis rate … the YIN [Your Ideal Nursery] … bulletin boards are usually managed by various groups--whatever projects they are working on." She remarked that "… especially if it's new … [Posting] things in the bathrooms are always good ways to capture people."

In summary, Barbara's perspectives regarding nurse-to-nurse systems information exchange processes were consistent with her responses to the first research question. Barbara provided pragmatic, detailed, and concrete responses.

Caroline.

Caroline shared during her interview that as an ARNP she was not as involved in the formal orientation process. She pointed out, however, her perception that the orientation process is effective:

> I'm not really sure how they figure it out, but it seems like they are up to speed ... I know that our new educators do a unit orientation … they seem to have a structure and a process, and an outcome that they expect.

Caroline offered a detailed perspective on the important role of the preceptor stating, "… the precepted shift is … the critical connection." She also shared her own experience, "… [My preceptor] gave me probably ten tips in the cafeteria over lunch that were forever embedded in my head." Caroline further emphasized the role of relationships in nurse-to-

nurse systems information exchange, "… what you get may depend upon the relationships [of] the preceptor with … the attendings, etc. …."

Caroline recognized the influence of interpersonal styles of preceptors, as well, "… peoples' relationships, and their own personal styles … some people are sort of the consummate professionals, and others are more … casual … so it's very individual." Caroline also recognized the value of prehire interviews, "I see one of the things that … the leadership team has done--is really hire for attitude … which I think sets us up for success …."

Caroline focused more heavily on informal direct processes of nurse-to-nurse systems information exchange such as peer teaching and modeling behaviors. She mentioned the value of problem solving:

> When they see us having a problem, or issue ... they can say "You know I was just at a place that solved the same problem, and here's what they did ...." and they are sort of an importer of solutions, and that can be very useful.

She recognized the role of the built environment as enabling observation, "… you learn a lot by observation … informally, by overhearing conversations, watching interactions, just all the little osmosis-y spongy things that happen. That's my sense."

Caroline related an incident that involved her observation of a TN who was not providing appropriate developmentally-centered care. In response to this situation, she described a collaborative process of nurse-to-nurse information exchange. Regarding the TN, she stated:

> … she's is completely not tuned in, oblivious of all what she is doing and how it is impacting the baby … it was developmentally a real challenge for this baby … so I mentioned it to the charge nurse who went over and got a little bit involved, and did a little bit of coaching.

In summary, Caroline mentioned formal and informal direct processes as well as indirect mechanisms. She focused on interpersonal mechanisms of nurse-to-nurse systems information exchange. Her interpersonal focus was consistent with her emphasis on the relational aspects of systems knowledge that emerged in response to the first research question.

Deborah.

Similar to Caroline, Deborah also had little personal involvement with formal nurse-to-nurse systems information exchange processes. Deborah emphasized the integral role of the formal processes of the prehire interview and orientation in communicating ICN mission and philosophy, "… it's addressed in the interviewing process, but just to reiterate it once they get here … All the teaching in the orientation is surrounding that ..."

She also noted a distinction between orientation of TNs and SNs, "… the orientation of travelers is very different from the orientation of new nurses … they could both have 12 years of experience, and the new nurse … [has] three months of orientation, and the traveler … [has] three days …". Deborah reinforced this perspective in the focus group discussion, "… when you are hired for the long term, you know you have time to ramp up. But travelers probably do have the sense that they are going from 0-60 in 48 hours … they hit the ground running …."

Deborah also recognized the role of the built environment in systems information exchange. She noted that the open nature of the pods allows for "… a lot of observation of relationships…. Preceptors certainly give some information to their orientees, role modeling, I think, is a huge way … someone watching you work with someone and seeing you change your tact when your approach isn't working …"

Deborah referred to peer teaching when she stated, "…they take away from us, too. When they go someplace else--'you know, one of the places I worked, this worked really well'--looking at for instance, our line for sepsis…"

In summary, Deborah mentioned formal and informal direct processes of systems information exchange. She distinguished between SN and TN orientations. Deborah also identified the role of the built environment in facilitating nurse-to-nurse systems information exchange.

Focus group.

The focus group discussion reinforced the findings for research question two. In addition, stress reduction emerged from the focus group discussion as a new category of indirect mechanisms of systems information exchange. NLs discussed the stress inherent in starting a new job, particularly for TNs arriving at a new setting. Alice referred to "the [TN] orientation express lane …" and Emily described it as "… really intense for them."

NLs identified the positive effects of reducing stress to allow systems information exchange to occur. Alice mentioned the positive power of stress reduction in relation to a particular TN who called and asked specifically for some outline of her first week. Alice related that the TN shared what a difference it made to her to have the plan laid out for her. Similarly, Emily and Barbara added:

> one of the other things that we do, when travelers come … [we] go straight to the [general medical center] orientation…to meet them personally, just to say hi, here's who I am, here's what today will be like, and tomorrow, and whatnot … and I never thought much about it until a few years ago we had a husband and wife team … and when they left they both said that one of the most striking things was that it was so nice for someone from the unit to come down and introduce ourselves. And they said that had such an impact …

As Caroline pointed out, "… there are a lot of unwritten rules, and it takes a while to pick them up."

Commonalities among and differences between NLs.

Commonalities were orientation, peer teaching, and stress reduction, and the built environment as mechanisms of nurse-to-nurse systems information exchange. Each NL emphasized orientation over the other mechanisms of nurse-to-nurse systems information exchange. Differences were in emphases on modeling behaviors, questioning, problem solving, observation, and the prehire interview.

Summary.

At least one of the NLs mentioned each of the ten identified categories. Orientation was mentioned with the greatest frequency, followed by problem solving. The focus group discussion reflected the content of the individual NL interviews. Commonalities and differences existed and were described.

Comparisons across Participant Groups

Each participant within each of the three participant groups mentioned orientation and peer teaching. Orientation was the most commonly mentioned mechanism of nurse-to-nurse systems information exchange. Table 23 reflects aggregated ranked order of nurse-to-nurse systems information exchange mechanisms by frequency of references.

NLs were the only group that included all categories. SNs discussed peer teaching in greater depth than either TNs or NLs. Commonalities and differences in references of nurse-to-nurse systems information exchange mechanisms by participant group are shown in Figure 5. NLs and SNs mentioned questioning as something they encourage, while TNs mentioned questioning as something they routinely do.

Table 23

Aggregate Rankings of Systems Information Exchange Mechanisms by Frequency of References (N = 10)

Exchange Mechanism	References
Orientation	45
Peer Teaching	31
Questioning	24
Problem Solving	16
Modeling Behaviors	16
Built Environment	15
Formal Feedback	10
Stress Reduction	10
Observing	7
Prehire Interview	6

Note. Includes focus group data.

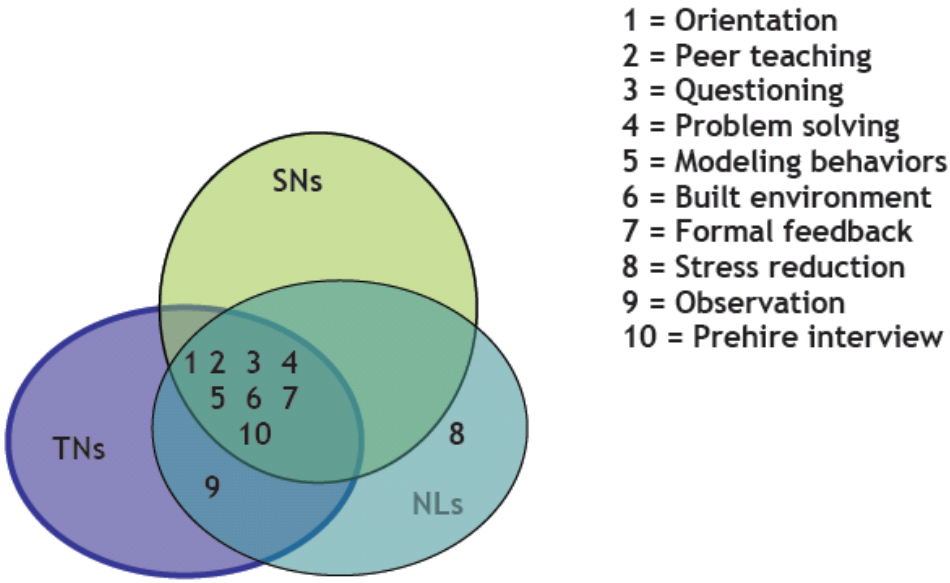

Figure 5. Ranked order of nurse-to-nurse systems information exchange mechanisms across participant groups.

Summary of Findings for Research Question 2

Findings for the second research question reflect consistency within and between groups, and across sources of data (PO, interviews, and focus groups). Nurse-to-nurse systems information exchange occurred through direct as well as indirect processes.

Research Question 3: What Systems Information is Exchanged Between Staff and Travel Nurses in a Clinical Microsystem?

As with research questions one and two, categories for research question three were based on investigator observation of orientation sessions, or explicit references during individual interviews, and the focus group session. Categories were identified as they emerged through coding of field notes from organizational, unit-level and precepted shift orientations, documents, and interview and focus group transcripts.

Constant comparision analysis revealed four broad themes of systems information exchanged between staff and travel nurses: 1) practice patterns; 2) staffing roles and patterns; 4) “tips, tricks, tidbits, and techniques;” and 4) environmental elements. Data were obtained through direct questioning of participants, as described in each of the following questions, but also included examples that existed throughout orientation observations and participant comments.

The following sections describe the emergence of these four themes. Data for each participant group are presented in the following sections beginning with TNs. Within each participant group, themes identified by individual participants are presented in ranked order of references, beginning with the most frequently mentioned theme. Table 24 provides descriptions and examples of these themes. Across participant groups, participants consistently mentioned the insularity of the unit in reference to the value of systems information exchange to the ICN.

Table 24

Themes, Descriptions and Examples of Systems Information Exchanged Between SNs and TNS

Themes	Descriptions	Examples
Practice Patterns	FCC, developmental interventions, interdisciplinary collaboration, primary nursing care, clinical policies included	Checking the breast milk
		Caring for a "premie"
		Skin care, "Back to Sleep" and "Scrub the Hub" initiatives
		Continuum of FCC
Staffing Roles and Patterns	Roles, use of staff nurses and travel nurses to meet unit needs	Floating to other units, admissions, deliveries, discharges, coverage for breaks, meetings, vacations
	"Who does what?"	Getting involved with families or unit projects
		Transport team configuration
Tips, Tricks, Tidbits and Techniques	Conventions, "Nice to Know"	Taping IVs, obtaining lab specimens, "timesaver techniques," where to eat
Environmental Elements	Space, equipment/technology	"When we are looking at new equipment for the unit"
		"Layout of the unit"
		Cardiac monitors
		"There should be a clock visible from anywhere you conduct an assessment. All telephones have cords that reach across the room"

Travel Nurses

To generate descriptions of the kinds of systems knowledge exchanged between TNs and SNs, travel nurses were asked a cluster of questions. Travel nurses responded to the following, "There is a necessary emphasis on your learning about a new unit. I would like to take a different angle: What contributions do you bring with your experience as a travel nurse? How does the unit benefit (or not benefit) from your knowledge?" Probing questions

used to encourage comments included, “How comfortable are you sharing suggestions of other settings--what worked or did not work? Or comparing settings? How often do you share this information? Do nurses ask, or do you volunteer?” TNs mentioned each of the four identified themes. Table 25 displays the aggregate ranked order of systems information themes by frequency of TN references.

Table 25

Aggregate Ranking of Systems Information Themes by Frequency of TN References

Theme	Frequency of References
Practice Patterns	28
Tips, Tricks, Tidbits, and Techniques	16
Staffing Roles and Patterns	11
Environmental Elements	2

Corinne.

Corinne‘s comments reflected practice patterns and tips, tricks, tidbits, and techniques with the greatest frequency among the four themes. She identified the value of introducing “… different procedures, different ways of doing things … different ways to prick the heel to get it to bleed better--just little tidbits, little hints that we might have learned at another hospital … just to come in and share …”

Corinne indicated that contributing helpful information was a source of gratification for her, “There are … times when we have a method of doing something that [a] particular unit has never seen, known, or heard of ... and so you demonstrate it and it works, and that is cool.”

In addition to her direct responses to the questions posed to her, Corinne also described contrasting staffing patterns and roles between this ICN and others where she had worked. Staffing roles and patterns communicated information about the how the values of

the ICN informed its operations. Numerous and extensive discussions about variations in staffing patterns, particularly the use of TNs, were observed during participant observation in Phase 1. These discussions served to place various staffing patterns in context. Corinne described several patterns of TN utilization across various hospitals, which included TNs floating to other units, attending deliveries, and admitting or discharging new babies. "Typically, when you go to a hospital, if the census is down, and somebody has to float … travelers float first." She also mentioned variations in TN involvement in deliveries, "… most hospitals … want their own people to go to deliveries, especially the new grads in training--they want them to get the experience …"

Corinne also experienced varying levels of developmental awareness among staff and ICNs. She related an incident that highlighted her style in demonstrating her skills in providing appropriate developmentally-centered care, "

> There are some hospitals [where] babies are just laying like this [flailing arms and legs] on an open table … and they are fussy and they are flailing. I'll say, "why don't we just put a little blanket around him … just … give them a little bit of confinement, and see them just totally relax."

In summary, Corinne's comments included practice patterns, staffing roles and patterns, and tricks, tips, tidbits and techniques. The main practice patterns included FCC and developmental interventions. With regard to tips, tricks, tidbits, and techniques, Corinne specifically mentioned methods for collecting laboratory specimens and developmentally-focused interventions. Corinne mentioned sharing tips and techniques as a source of personal gratification.

Donna.

Donna's responses focused on practice patterns with the greatest frequency. Donna spoke of variations in "… the care of the small baby--if they are going to do an intubation, if

they are going to give survana, the steps that they take for resuscitations that they do…" She mentioned one hospital where she had recently worked:

> … they saved a lot of really small kids that I have never seen other units do before…so they think about it differently … if the neonatologists go to a certain conference, they hear about different research, they'll practice some things in their unit that may be different than other units, depending upon what they've heard, what they've learned, what they believe in …

Donna also mentioned other specifics regarding practice patterns, "… not leaving them intubated for as long, doing CPAP sooner, some units don't use survana that much, some use it all the time, it … depends on where the neonatologists is at and what he believes is the right thing…"

Donna mentioned tips, tricks, tidbits, and techniques with the next greatest frequency. She described "taping an IV" as an example, "… you just kind of throw your experiences in there, and … show each other, and then you have one more trick up your sleeve." She provided a concise example of the sharing of "techniques:"

> I went somewhere where they didn't have heel-warmers … so, they were showing me to put water inside a small little diaper and wrap it around their heel, and that will warm their heel up. Okay, so then I go back to a different unit and they have heel warmers there, but they ran out that night…and I was able to tell them this other way, and so, it's all little things--little techniques, ways of doing stuff--

Donna recognized mutual benefits of the TN experience to herself and the settings where she worked. She remarked, "… it's kind of a learning experience for them, and you are learning from them--how they do things in their unit, so just kind of sharing …" With regard to her contributions, Donna stated that she shared what she sees in other hospitals, "… the set up, and how things were, … doctor: nurse relationships …, because you need to know … this isn't the only NICU in the world, and they are all a little bit different." She also recognized the value of some of the more experienced nurses "who still do everything old school," and the mutual benefit of give and take:

> They are experienced, so you still learn from then because they have been doing it for so long. So, [for] the basic baby care, they are more experienced than you. You might have more tricks, and different ways of doing things … so you kind of just share …you learn from each other …

Donna emphasized that she benefitted from her wide exposure to various practices, "I see different methods of doing different things in different places. Everywhere I go I always feel like I learn a new way to do something." She emphasized her point by exclaiming, "Oh, that's a good way of doing that--I never thought of that!"

Donna stated she felt comfortable sharing experiences from other settings, and making suggestions based on them, "… I try not to be overbearing. …" When asked if she found herself sharing information with SNs about other ICNs, she stated, ":… Oh, yeah, definitely, … I try not to be annoying about it…I would hope somebody would tell me if I was."

In summary, Donna focused on variations in practice patterns across settings. Practice pattern variations included use of medications and procedures in the care of small babies, and decision-making regarding resuscitation of small babies. Donna shared systems information vis-à-vis the physical layout of the unit. She mentioned tricks and techniques, particularly in the context of the mutual benefits of two-way systems information exchange.

Commonalities among and differences between TNs.

Commonalities were in practice patterns, staffing roles and patterns, and tips, tricks, tidbits, and techniques. Differences were in the built environment, and emphases on their contributions in terms of systems information exchange, as well as the benefits they gained from those experiences.

Summary.

TNs identified specific mechanisms of systems information exchange. Commonalities and differences existed and were described.

Staff Nurses

To stimulate a discussion of the types of systems information exchanged between SNs and TNs, staff nurses were asked, "What opportunities are available for sharing information and experiences between travel nurses and staff nurses on the ICN? How might the way travel nurses are utilized on your unit be improved?" If probes were needed, SNs were asked whether they saw any missed opportunities for sharing information and experiences between TNs and SNs within the ICN. Each of the SNs mentioned the insular nature of the ICN. Table 26 displays the aggregate ranked order of systems information themes by frequency of SN references.

Table 26

Aggregate Ranking of Systems Information Themes by Frequency of SN References (N = 3)

Theme	Frequency of References
Practice Patterns	11
Staffing Roles and Patterns	11
Tips, Tricks, Tidbits, and Techniques	5
Environmental Elements	1

Fran.

Fran focused on the themes of practice patterns and staffing roles and patterns. Fran described two sources of systems information regarding practice patterns. At a small community hospital where she had worked before coming to this ICN, "… every time we had a sick baby transport and the team would come, we would just pick their brains about what they were doing in [the other ICNs] … because you don't know if you don't go anywhere."

Fran felt that TNs also provided a valuable perspective on practice patterns employed in other ICNs. She described the TNs as valuable sources of information about how other ICNs function:

> I can ask them where they've been, and where's the best place, and their least favorite place, how it worked, what their outcomes were like … did they have a lot of sick babies, or chronic babies on vents that we seem to have here that other NICUs don't seem to have. How it is--do they let a lot of babies go in the beginning that we are not letting go, and we keep everything going?

In summary, Fran's comments focused on practice and staffing patterns, particularly from the perspective of outside sources of systems information. She recognized TNs as outsiders and the information they brought, as having particular value for an insular unit. She recognized hers as an insular unit based on the longevity of most of the staff nurses.

Georgia.

Georgia was the only SN who mentioned environmental elements. She emphasized the physical layout of the ICN as one unit with three levels of care, and explained how the physical environment reflected that delineation. The layout also provided a source of orientation to place for the TN or newly hired nurse, as well as for family members. In addition, it demonstrated further commitment to FCC, providing information to TNs about the ICN: "… for parents whose kids are progressing, they can see that… parents joke about getting over to the "carpet side" because the critical side doesn't have carpet---only linoleum, and that's exciting to them, a sign that things are getting better."

Georgia also acknowledged the role of the TN bringing new ideas into the ICN, as having potential for changing practice patterns:

> You know, "this is what we did at our hospital," … and … "maybe we need to look at that…because there has to be a better way of doing this"…. When you're working in one place the whole time [you] do get stagnant.

In summary, Georgia described the structure of the environment. Specifically, she

identified the physical elements that differentiated the various leveled areas of care, and how those delineations communicated the ICN's mission. As Fran did, Georgia also recognized the valuable role of TNs in bringing new ideas and ways of doing things to a unit that may otherwise tend to be "stagnant."

Helen.

Helen comments did not contributed to answering research question 3.

Commonalities Among and Differences between SNs.

Commonalities included staffing roles and patterns, and tips, tricks, tidbits and techniques. Differences were in emphases on environmental elements and practice patterns. Georgia was the only SN who mentioned all four themes. Georgia mentioned only staffing roles and patterns and tips, tricks, tidbits, and techniques.

Summary.

SNs identified specific mechanisms of systems information exchange. Commonalities and differences existed and were described.

Nurse Leaders

Nurse leaders answered the questions, "How would your unit be different if you didn't have travel nurses? How do travel nurses engage in unit functioning?" Probes used to encourage comments included, "Are there situations that promote or facilitate mutual learning among staff and travel nurses? How do travel nurses contribute to quality improvement of the ICN?" Table 27 displays the aggregate ranked order of systems information themes by frequency of SN references

Table 27

Aggregate Ranking of Systems Information Themes by Frequency of NL References (N = 5)

Theme	Frequency of References
Practice Patterns	31
Staffing Roles and Patterns	7
Tips, Tricks, Tidbits, and Techniques	6
Environmental Elements	9

Note. Includes focus group data.

Alice.

Alice mentioned practice patterns and environmental elements with the greatest frequency. She described a two-way process of systems information exchange. Alice described how she and other ICN nurse leaders and SNs seek out information about how other ICNs manage specific issues:

> … we have asked them about … how … they check the breast milk--what problems have they had at other facilities they've been to? .. And some would say there are places where two nurses have to do a check to ensure that what was on the label matched the patient's identification band. Some places the dietician prepared … and labeled it all…

Alice also mentioned instances when TNs came forward and offered information, "… Some of them have come to me and said 'Oh, we've been to some places where …'" Alice looked to TNs for information about how staff members were utilized in various settings, "[We have also] asked them about transport--what was the transport team configuration look like … Who does them? How does that work? …" Alice mentioned another benefit of TN utilization, "… people enjoy talking to them about other units, … From time to time we are able to glean some information from them –what are other units doing about these different things?"

Alice recognized TN participation in QI efforts, "they are always very willing to participate in surveys [about specific QI focus areas]…." Alice also described TNs as

resources, “like if we are having a problem with something, [they are] a resource for us, people bringing all kinds of information and we can sort of sit and pick their brains…”

Alice mentioned that many of the TNs working in the ICN have returned to work at this ICN several times. She described the unique role of TNs, particularly those who are returning for consecutive assignments, as messengers bringing positive feedback about the ICN to the ICN:

> You have people coming in and saying “You don’t know how good it is here-- … and what happens at other places.” And sometimes people are just shocked. So … it gives people a perspective about what’s going on at other places … not that we’re perfect, but …

In summary, Alice’s comments about how the unit would be different without TNs focused on their direct and indirect contributions to learning and QI through sharing practice patterns and experience with various types of equipment and supplies. Alice also recognized an important TN role in the functioning of the unit as messengers providing evidence-based feedback about the positive elements of this ICN as it compared to others.

Barbara.

Barbara related a recent discovery that she linked directly to TN utilization patterns. She stated, “…with all the influx of new staff that we have, that teamwork doesn’t just happen--it’s a learned behavior.” Barbara discussed this in the context of how teams that routinely work together over time have effective patterns of communication, but that “there is a lot of breakdown with our communication that we may not have had any awareness of, but that we are now realizing that are really important.”

She described a current QI initiative in collaboration with the Office for Patient Safety at the hospital. In the context of communication breakdown as the major contributor of sentinel events, she explained, “we are … team training around critical events … clearly

defining roles, and then working on communication , and eventually it will become very routine--the communication piece … we're fostering team work and at the same time working on communication …."

In summary, Barbara's comments centered on themes of practice patterns and staffing roles and patterns. She attributed the collaborative efforts between the ICN and the Office of Patient Safety to develop team building and communication skills to the pattern of TN utilization within the ICN.

Caroline.

Caroline's comments reflected three of the four themes. She mentioned practice patterns, staffing roles and patterns, and tips, tricks, tidbits, and techniques. Regarding practice patterns, Caroline highlighted how TNs benefitted the ICN, "When they see us having a problem or issue ... they can say, 'You know I was just at a place that solved the same problem, and here's what they did.' … They … bring us new ideas."

Caroline recognized a role of TNs in "bringing nursing tricks," and described them as "importers of solutions… they have a lot of things to teach us about nuts and bolts of clinical care, as well as how units function…" She went on to add, "… I see travelers sometimes bringing different things in terms of positioning, babies--developmental stuff--I'll see them doing something that is very different but kind of innovative with their babies."

Like several of the other participants, Caroline acknowledged the particular value of TNs to this ICN with regard to its insularity:

> … in some respects I think in terms of our longevity the travelers help us, because the negative part of the longevity is that we keep it kind of incestuous ... you know, we have sort of the same ideas, and [as new staff nurses and TNs come] … into the unit, it's like a breath of fresh air.

In summary, Caroline focused on the fresh perspectives of TNs within a setting that might otherwise be very static. She recognized the contributions of TNs related to practice patterns and tips, tricks, tidbits, and techniques.

Deborah.

Deborah mentioned a different use of TNs from any of the other participants. She stated that even though TNs are not required to participate in ICN committees, some of the do get involved with "… the families, or … in some of the projects that are going on." Her view of the valuable systems information contributions of TNs also extended to environmental elements. Deborah raised environmental factors in her description of how TNs influence ICN equipment selection, "… they can give us input--"Well, I used this when I worked such and such a place ... these are the good things, and these are some of the bad things about it" ... it makes some of our choices more informed."

In summary, Deborah's comments focused on practice patterns, staffing roles and patterns, and environmental elements. Her example of TN involvement in QI or family-centered projects provided a fresh perspective to the theme of staffing roles and patterns, and how TNs engaged in the function of the ICN.

Focus group.

With regard to research question three, the investigator posed the following questions to the focus group, "What do nurses teach each other about the way that microsystems work? Specifically, what do travel nurses teach you and the nursing staff?" All four categories emerged from the focus group discussion. As it did with several participants' interviews, the insular nature of the ICN provided the context for much of the focus group discussion.

Among the four themes, the most frequently mentioned was practice patterns. Focus group participants agreed that the ICN benefitted from having "… a fairly good group of

travelers that come with stories about other places. Alice provided an extensive list of the kinds of systems information that feeds back in to the ICN,

> … it might be staffing, they might go to a nursery and … have to care for 5 or 6 babies; scheduling, sometimes … it's whatever the schedule says … there is not a lot of collaboration with the schedule; nurse-physician relationships; the focus on QI that we have versus other places; peoples' commitment to safety, not afraid to report errors; the way we care for families …

NL focus group participants mentioned the practice of FCC by this ICN as a point of systems information that TNs receive as they transition to their roles. Deborah's comment that TNs, "Sometimes … have the hardest time with our family-centered care," was met with a cascade of playful, if facetious, rejoinders by other focus group participants.

Caroline: "Like, they not only can be at rounds, but we actually want them there….Sometimes they present their baby…"
Alice [from the perspective of the TN], "… 'Well, what about rounds--don't you ask them to leave?' and 'They're here at change of shift? Do you talk to them?'…"
Deborah: "They can hear report?"
Alice: "They can *give* report!"

Focus group participants mentioned "tips" in the context of learning about how the unit functioned. Caroline, particularly, focused on this theme, linking it to interdisciplinary practice patterns. She mentioned tips regarding preferences, peculiarities, and idiosyncrasies of particular providers within the ICN. Caroline also mentioned tips in relation to staffing roles and patterns, "… [my preceptor] told me really key things. She gave me probably ten tips in the caf over lunch that were forever embedded in my head."

The emphasis of the focus group discussion centered on practice patterns. A particular focus of this theme was the benefit gained by the ICN in that many of their TNs were respected and valued repeaters to this setting. The special value that focus group participants assigned to TNs, particularly those who were respected and valued repeaters to this setting, was the feedback they brought that illuminated the positive elements of this ICN.

NLs explicitly identified systems knowledge as a strength of TNs, which they discussed in some depth. Corinne initiated a discussion:

> I think the travelers bring some knowledge about how to work with systems. … They have the advantage of comparing and contrasting, which goes back to our unit being somewhat insular. So, the travelers definitely bring an advantage--It's a good thing on both ends.

And it proceeded from there:

Dorothy:	"You know, they'll see cracks in the wall that …"
Barbara:	"… that have been there for 20 years …"
Dorothy:	"You know, they'll look around and say "Why, for God's sake …?"
Barbara:	"… and they have ideas about how to work around …
Corinne:	"… Yeah, and that will come out of their mouth and you'll go--'You're absolutely right, that is ridiculous … why DO we do that?' And sometimes that will start the ball rolling… I think that they are actually pretty good at problem identification, especially if it's a safety issue …".

Corinne ended this strand of the discussion, "You know, I can think about a lot of down sides to having travelers, but that piece is probably the biggest upside--they look at things differently."

In summary, the focus group discussion emphasized contributions that NLs attributed to TNs exposure to various systems, and their general willingness to speak up when they have questions or concerns. This was discussed mainly in the context of practice patterns and tips, tricks, tidbits, and techniques.

Commonalities among and differences between NLs.

Commonalities were practice patterns and staffing roles and patterns. Practice patterns were mentioned with the greatest frequency during individual interviews with NLs, as well as during the focus group discussion. All mentioned the benefits of TNs bringing in new ideas. Differences were in environmental elements and tips, tricks, tidbits, and

techniques. All four themes were mentioned by Alice, Deborah, and during the focus group session.

Summary

NLs identified specific types of systems information exchanged between SNs and TNs. The focus group discussion revealed themes consistent with those that emerged from individual interviews with NLs. Commonalities and differences existed and were described.

Comparisons Across Participant Groups

All four themes emerged within the responses of each participant group (Table 28). Environmental elements were the least mentioned across groups. Each group mentioned practice patterns with the greatest frequency. TNs made the most mentions of staffing roles and patterns, and tips, tricks, tidbits, and techniques, even with the fewest participant group members.

Table 28

Systems Information Themes by Frequency of References Across Participant Groups

Theme	TNs	SNs	NLs	Aggregate
Practice Patterns	28	11	30	69
Staffing Roles and Patterns	11	11	6	28
Tips, Tricks, Tidbits, and Techniques	16	5	6	27
Environmental Elements	2	1	4	7

Summary of Findings for Research Question 3

Four themes emerged in response to questions about the nature of systems information exchanged between staff and travel nurses. The four themes were: 1) practice patterns, 2) staffing roles and patterns, 3) tips, tricks, tidbits, and techniques, and 4) environmental elements. The emergent themes reflected some overlap or blending. Tips, tricks, tidbits, and techniques referred sometimes specifically to practice patterns. Staffing

roles and patterns sometimes overlapped with practice patterns. For example, sharing the unique preferences and idiosyncrasies of individual providers on a particular unit addresses practice patterns in terms of interdisciplinary collaboration, but also reflects tips or tidbits.

Among the four themes, participants identified practice patterns with the greatest frequency within and across groups. In the aggregate, environmental elements were the least emphasized. Participants mentioned staffing roles and patterns, and tips, tricks, tidbits, and techniques with approximately equal frequency (Table 28).

Much of the discussion of systems information exchange occurred within the context of this ICN as an insular unit. This thread was consistent across participant groups. TNs and NLs explicitly mentioned the two-way flow of systems information exchange. TN comments referred more generally to the individual experience of the particular TN. NL comments referred to the value of the TNs experience on this particular ICN. The focus group discussion revealed themes consistent with those emerging from Phase 1 and Phase 2 data.

Summary of Findings

This investigation occurred within a 30-bed ICN within a large academic medical center. The history of the current ICN extends to the original hospital, and includes a physical move to the current site in 1991. Staff members participated actively in the development of the current ICU and the physical move from the former hospital. This history held significant importance to the several nursing staff members who were involved. Travel nurses, staff nurses, and nurse leaders participated in this investigation. Nurses of diverse ages, educational backgrounds, and experiences comprised each participant group. Most of the SNs had baccalaureate educations. SNs and NLs reported similar patterns of long employment within the ICN.

Orientation occurred through a series of processes, beginning with a general orientation to the organization, and proceeding to an ICN-specific orientation that occurred as didactic sessions and precepted shifts. Didactic orientation sessions focused on structural elements of the ICN, including policies and their relevance to the newly hired nurse. Precepted shifts provided synergistic learning experiences that focused on the "hows and whys" of unit function by centering on the application of policy in everyday practice. Precepted shift experiences served to socialize newly hired nurses to the environment and their roles within it. Precepted shift experiences also socialized newly hired nurses to the embedded nature of evidence-based practice in the cultural context, and the provision of FCC. The three research questions were addressed through constant comparison analysis of data from investigator observation, document review, individual interviews, and the focus group session. The themes that emerged for each research question are outlined in Table 29 and summarized in the following sections.

Three components of systems knowledge emerged from the data: 1) structural, 2) operational, and 3) relational. Emphases varied between participant groups. TNs emphasized structural and operational components of systems knowledge. TNs focused more on systems knowledge that informed their individual performance and ensured that they met the expectations. SNs emphasized operational components of systems knowledge that enabled the smooth operation of the ICN. NLs emphasized relational components that informed staff members' relationships with each other and with families, staff members' relationships with the ICN, and the relationship of the ICN to the external community. The interdependence of the three components of systems knowledge was evident in the responses of all three participant groups.

Table 29

Research Questions with Corresponding Identified Themes

Research Questions	Themes
What components of systems knowledge are needed by nurses in order to function within a CMS?	Structural Operational Relational
How does nurse-to-nurse systems information exchange occur within a CMS?	Direct mechanisms: formal and informal Indirect mechanisms
What systems information is exchanged between staff and travel nurses in a clinical microsystem?	Practice patterns Staffing patterns and roles Tips, tricks, tidbits, and techniques Environmental elements

Nurse-to-nurse exchange of systems information occurred through direct and indirect means. Direct means included formal and informal mechanisms. Direct formal mechanisms included orientation, prehire interviews, and formal feedback mechanisms. Direct informal mechanisms included peer teaching, modeling behaviors, observation, questioning, and problem solving.

Indirect processes that facilitated systems information exchange included the built environment and stress reduction. At least one member of each participant group discussed each of the categories, with the exception of stress reduction, which was mentioned only by NLs. All participants discussed orientation, and peer teaching. TNs and SNs referred to questioning. The integral role of interpersonal relations was evident throughout descriptions of nurse-to-nurse systems information exchange mechanisms across participant groups.

Four overarching themes reflected the systems information exchanged between travel and staff nurses: 1) practice patterns, 2) staffing roles and patterns, 3) tips, tricks, tidbits, and

techniques, and 4) environmental elements. The insular nature of the ICN provided context for each theme of systems information. Several participants identified the value of the new ideas brought into the ICN by TNs.

A discussion of these findings in relation to the professional literature follows in the next chapter. Also included are implications of this research to practice, research and theory, policy, and education.

CHAPTER 5: DISCUSSION

This investigation examined nurses' perspectives about the components of systems knowledge required by nurses. Furthermore, it addressed how nurse-to-nurse systems information exchange occurred within a specific clinical microsystem. Travel nurses provided contrasting perspectives based on their experiences with assignments across various systems. Little evidence exists on nurses' systems knowledge or nurse-to-nurse systems information exchange. This scarcity of published literature indicated the need for this inductive qualitative descriptive study.

Chapter 5 is organized in six sections. The first section discusses the findings in the context of the conceptual framework. The next section compares the findings of this study to extant literature. The third section addresses general discussion of related concepts, and is followed by a discussion of research implications and recommendations, limitations and final conclusions.

The ICN as a Complex Adaptive System

The findings of this investigation characterized this ICN as a complex adaptive system (CAS). The tiered orientation program reflected its nested hierarchical structure, beginning with the general orientation (GO) and moving through the ICN-level didactic and precepted shift components. Nurses knew what to expect from each other, and worked well together. They understood their roles within the ICN and the place of the ICN within the hospital. Furthermore, they demonstrated a keen awareness of the importance of these elements to the function of the ICN.

The common background of staff members in the ICN provided a shared perspective. The development of this CAS was evident in nurses' comments regarding the introduction

and integration of family-centered care (FCC) into the philosophy and practice of the ICN, the physical relocation and expansion of the ICN, and ongoing quality improvement (QI) initiatives. For participants, organizational support was evidenced by a variety of educational resources for nurses.

Participants attributed the vitality of the ICN to the longevity of SN and NL employment, and the resulting continuity. Sveiby and Simons (2002) found that workers with greater longevity perceived their work environment as more collaborative compared to those with less longevity. This suggests that longevity contributes to establishing effective social networks that facilitate collaboration. It could also indicate that individuals with greater longevity are simply better able to negotiate the politics.

In addition, longevity appeared to contribute to a security that allowed SNs and NLs to accept the TNs without concerns about competition. This openness appeared to enable TNs and new nurses to enter and introduce new ideas to the ICN, and to take ideas from the ICN when they left for other settings. The longevity that contributed to the unit's stability also contributed to its insularity, which magnified the value of TNs as "importers of solutions." TNs introduced essential diversity into this CAS. Deborah articulated an appreciation for this function when she stated, "There is probably a critical mass of travelers and permanent staff that makes things go smoothly …"

Nursing activities focused on establishing connections between persons and systems, and maintaining the smooth flow of information within this dynamic environment. These activities were consistent with the literature (Allen, 2004, 2007; Jacques, 1993; McGirr & Bakker, 2000; Reddy, Pratt, Dourish, & Shabot, 2002; Stewart, Stansfield, & Tapp, 2004). Participants' high level of investment this ICN was evidenced by their pride in individual and

collective contributions to its successful function and outcomes. This ICN was a patient- and staff-focused CMS, supported by the organization and committed to QI based on shared information (Nelson et al., 2002). Furthermore, this ICN presented as a high-functioning CMS (Donaldson & Mohr, 2000). Table 30 outlines the five Ps of this ICN.

Table 30

The Five Ps of the Intensive Care Nursery

5 Ps	Descriptions
Purpose	To provide a nurturing environment where the child is part of the family and the family is part of the care team
Patients	Neonates and their families
Professionals	Diverse multidisciplinary team
Processes	Teaching/learning, QI, shared governance
Patterns	Collaboration, evidence-based practice, FCC, commitment

The findings from this investigation are briefly reviewed in the following sections. Findings from each research questions are discussed in the context of the extant literature.

Discussion of Findings by Research Questions

Research Question 1: What Components of Systems Knowledge are Needed by Nurses in Order to Function Within a Clinical Microsystem?

Three components of systems knowledge emerged from the data: 1) structural, 2) operational, and 3) relational. Participants provided specific experience-based examples from various perspectives within and across systems. Each participant provided her own individual within system perspective of this CMS, and collectively provided perspectives from each of the three participant groups. Across systems perspectives, particularly those of TNs and newly hired SNs, enabled rich comparisons of this CMS to others. Nurses' perceptions aligned with many of the issues identified in the extant literature. Several themes consistent with the literature emerged through this investigation, suggesting that the common elements

represented factors that could shape or detract from high functioning CASs.

Systems Knowledge: Structural Components

Material resources included the built environment, equipment, supplies, and technology. Participants identified the ICN design as a material resource. The decentralized pod design of the care areas enabled access to essential equipment and supplies and one another. The centrally located party table, reception desk, and related administrative supports fostered communication and social interaction.

The literature described in Chapter 2 identified various challenges related to material resources. These included inaccessible or unavailable supplies or equipment (Ebright, Patterson, Chalko, & Render, 2003; Gurses & Carayon, 2007; Krichbaum et al., 2007; Tucker & Spear, 2006), and patient assignments spread across a wide geographic area (Ebright, Patterson, Chalko, & Render, 2003; Potter et al., 2004; Potter et al., 2005). Interestingly, only one participant referred to space and equipment challenges, and only obliquely in her description of priming a second pump at a baby's bedside. Georgia mentioned these points in the context of a tip that she shared with new nurses to prevent disruption in medication delivery to vulnerable neonates.

Regarding human resources, participants expressed the need for clearly defined roles for the orienting nurse as well as other members of the care team. Participants emphasized the unique roles of ARNPs, dieticians, and pharmacists within this CMS. Beyond the ICN setting, human resources included physician specialists and the lactation consultant. Human resource issues related to nursing work at the intersection of the patient and the health care system (NWI) included having adequate numbers of competent staff nurses who also knew what was expected of them (Benner, 1984; Currie & Watterson, 2007; Krichbaum et al.,

2007).

Examining nurses' perceptions of contributing factors to failures in patient safety, Currie and Watterson (2007) spoke with 75 nurses who were members of the Quality Improvement Network and the Clinical Leadership Programme in Great Britain. Among factors related to work environments, nurses emphasized concerns with appropriate matching of staff and skill mix with type of patients requiring care. They also suggested role clarity regarding expectations and boundaries would improve the safety of the work environment (Currie & Watterson, 2007).

Organizational characteristics related to structural systems knowledge within this CMS included an integrated cluster of shared values and purpose that included teamwork, FCC, and QI. Embedded processes such as QI, educational programs, and social networking, reflected areas of overlap between structural and operational systems components.

Systems Knowledge: Operational Components

Operational systems components gave action to the structure and answered the question: How does the work get done? Operational components of systems knowledge included staffing protocols, emergency protocols, and communications. Each of these categories appeared in the literature on NWI.

Staffing protocols referred to mechanisms that ensured adequate staffing for safe practice. Inadequate staffing systems contribute to nurses' experiences of complexity compression (Krichbaum et al., 2007), and include a complex range of factors (Benner, 1984; Ebright, Patterson, Chalko, & Render, 2003; Leppa, 1996; Potter et al., 2004; Potter et al., 2005). The participants in this investigation, however, discussed staffing issues from a different perspective.

In this setting, staffing protocols included on-call, holiday, and floating rotation coverage. SNs related positive aspects of working with TNs. They attributed a range of benefits to TN utilization, including reduced workloads, less off-unit floating, and coverage for vacations, unit meetings, and holidays. SNs and NLs felt that the recent expansion of the ICN depended upon the staffing flexibility made possible through TN utilization. These were consistent with strategies for managing challenges to NWI through contingency planning, prioritization, and anticipating and preventing extreme work overload (Benner, 1984).

TNs contrasted previous experiences in hostile work environments with their experiences working within this ICN. Within those hostile work environments, TNs experienced a lack of communication and trust. These descriptions were consistent with the experiences of agency nurses (Manias, Aitken, Peerson, Parker, & Wong, 2003a), and the literature related to work group disruptions (Krichbaum et al., 2007; Leppa, 1996). SNs suggested that the open pods supported visibility and that factor increased their comfort with working with TNs and new nurses. This physical layout supported an ability to monitor practices and determine congruence with unit policies. Another factor was the emphasis placed on encouraging questions. Georgia's example, "… we don't expect you to emerge from orientation fully armed…" illustrated this general attitude.

Communication, the third category of operational systems knowledge, referred to mechanisms ensuring adequate and accurate exchange of patient-related information. Participants identified several modes of communication, including shift reports, flow sheets, bedside charts, electronic medical records, "time outs," and multidisciplinary rounds. Inadequate communication is a documented challenge to patient safety (Ebright, Patterson, Chalko, & Render, 2003; Gurses & Carayon, 2007; Gurses & Xiao, 2006; Institute of

Medicine, 2000, 2001, 2004; Potter et al., 2004; Potter et al., 2005; The Joint Commission [TJC], 2006; The Joint Commission, 2007; Tucker & Spear, 2006). Strategies to manage communication challenges included interdisciplinary structured communication protocols and regular face-to-face debriefings (Gurses & Xiao, 2006; Haig, Sutton, & Whittington, 2006; Issel & Anderson, 2001; Leonard, Frankel, Simmonds, & Vega, 2004; Leonard, Graham, & Bonacum, 2004; Philibert & Leach, 2005; Rutherford, Lee, & Greiner, 2004; TJC, 2007). Communications improvement, as it relates to patient safety, has been a focus at the national level since the release of the 2000 IOM report *To Err is Human* (Agency for Healthcare Research and Quality, 2005; AACN,, 2007; IHI, 2007; Institute of Medicine, 2000; National Center for Patient Safety, 2007; National Institute of Nursing Research [NINR], 2007; National Patient Safety Foundation, 2008; TJC, 2007; World Health Organization, 2007). This attention has resulted in a sustained surge of concurrent knowledge development in this area.

The findings in this investigation diverged from the literature regarding communication related to patients' families. Family issues were characterized as distractions or disruptions in the literature (Gurses & Carayon, 2007; Tucker & Spear, 2006). Participants' consistent emphasis on their commitment to FCC was documented in Chapter 4. This divergence may reflect differences between working with babies' families in this ICN in contrast to working with adult patients' families on other units.

Systems Knowledge: Relational Components

Participants provided empirical support to existing theoretical and empirical literature through clear evidence of their connections to each other, the ICN, the hospital, and the community beyond the hospital. Concerted efforts to establish and maintain social

connections typify the ICN as "a relationship-based unit." Standing weekly dinners and high activity levels around the party table exemplified this dimension of social connection and support. These findings support the evidence in the literature that stress the centrality of social connection in nursing work (Allen, 2004, 2007; Benner, 1984; Hatcher et al., 2006; Jacques, 1993; Leppa, 1996; McGirr & Bakker, 2000; Stewart, Stansfield, & Tapp, 2004).

Establishing and maintaining essential connections hinged upon interpersonal skills and a practice milieu that encouraged inclusive participation. Bartz (1999) found that approachability and willingness to listen fostered questioning and sharing of information among nurses. Bartz'(1999) findings were particularly relevant to this investigation as she examined the learning needs of 10 newly hired, experienced RNs as they changed the context of their work. NLs and SNs viewed the ICN nurses as open and welcoming to newcomers. TNs supported these perceptions, particularly in contrast to other ICNs where they had worked.

Systems Knowledge: Interdependence of Components

The authenticity of their commitment to relations with families was evident in the integration of FCC with the structure (vis-à-vis the open unit) and operational systems (vis-à-vis communication patterns). The consistently expressed notion that, "… you won't be able to live here if you think that you are going to do it without the families …" stands in contrast to the characterization of family issues as distractions or disruptions in the literature (Gurses & Carayon, 2007; Tucker & Spear, 2006).

Responses of each participant group highlighted various aspects of interdependence among systems knowledge components. TNs, SNs, and NLs existed at respective points along a survival-maintenance-growth continuum. TNs emphasized structural and operational

components of systems knowledge. This may reflect efforts to transition into, and survive within, a new CMS. NLs reinforced this perspective in their discussion of strategies to reduce stress of incoming TNs. Examples included providing detailed information about their schedule prior to starting work and meeting them during GO to establish a connection.

SNs emphasized operational components of systems knowledge that enabled the smooth operation of the ICN. They stressed the important role of communication in facilitating and maintaining the smooth operation of the ICN. This finding was consistent with the notion of autonomy suggested by Stewart et al. (2004), and nurses' perceived roles in ensuring that "the unit ran smoothly" (McGirr & Bakker, 2000, p.8). Reddy, Pratt, Dourish, and Shabot (2002) used participant observation to examine the information needs of surgical intensive care unit (SICU) health care provider teams during multidisciplinary rounds. This SICU was comprised of two 10-bed units. They found that 17% of questions asked related to organizational issues, such as policies, procedures, resources, interdepartmental issues and team members' roles. Organizational information included answers to organizational questions and organizational features of clinical questions. Reddy et al. (2002) concluded that organizational information represented "… the 'glue' allowing team members to accomplish their work and keep the SICU functioning smoothly" (Reddy, Pratt, Dourish, & Shabot, 2002, p. 4). Reddy et al. (2002) described this organizational information as "… essential for the SICU team to function effectively" (p. 4).

Reddy and Spence (2006) examined the informational needs of a multidisciplinary team in a 25-bed emergency department within a regional hospital using a similar method. In this setting, organizational questions comprised 26% of information needs. This set of questions included coordination and capacity management issues. Reddy and Spence (2006)

suggested that the importance of clinical units' nestededness within a larger organizational framework drove the information needs of the team. Understanding interrelationships between clinical and organizational aspects of work was essential to the effective collaboration of this care team. Reddy and Spence (2006) identified overlap between clinical and organizational information, which they termed "orgo-clinical" (p. 653).

Using a 20-item five point Likert scale, Sveiby and Simons (2002) examined the responses of 8,277 managers, consultants, and employees to measure collaborative climate and determine what factors influence perceptions of a collaborative climate at work. The instrument measured four components of collaborative climate including employee attitude, organizational culture, immediate supervisor and work group support as they related to attitudes toward knowledge sharing (Cronbach's alpha coefficients were .81, .89, .85 , and .87, respectively). They found that older employees were more likely to view their work environment as collaborative [F (1, 2252) = 141.74, $p < .001$), as measured by willingness to share knowledge. This was also true for employees with greater longevity at work [F (16, 19152) = 6.47, $p < .001$).

These findings were consistent with the NL emphasis on relational components to systems knowledge emphasized by NLs. This perception may relate to the fact that NLs were older, or had worked there longer than the other two participant groups. Both of these factors were also linked to more favorable perceptions regarding the willingness to share knowledge (Sveiby & Simons, 2002). The next section focuses on how systems information exchange occurred among nurses.

Research Question 2: How Does Nurse-to-Nurse Systems Information Exchange Occur within a Clinical Microsystem?

Operational learning refers to learning "how to get things done around here"

(Hoffman & Donaldson, 2004, p. 449), and requires procedural knowledge as well as knowledge of socially constructed roles. Operational learning occurs through the development of expertise specific to practice contexts (Hoffman & Donaldson, 2004), and includes learning to navigate the health care system. Erdley (2005) identified exchangeability as an attribute of nursing information, where exchangeability was "giving, taking, or concurrent giving and taking of nursing information …" (Erdley, 2005, p. 97).

Direct Processes of Nurse-to-nurse Systems Information Exchange

Nurse-to-nurse exchange of systems information occurred through direct and indirect means. Direct formal mechanisms included orientation, prehire interviews, and formal feedback mechanisms. Direct informal mechanisms included peer teaching, modeling behaviors, observation, questioning, and problem solving.

Formal mechanisms.

The literature (Manias, Aitken, Peerson, Parker, & Wong, 2003a) supported reports by Corinne and Donna that each hospital differs in how they do things, as well as how well they share that information with new nurses. The complex process of orientation for the nurses in this study reflected those found in the literature (Bartz, 1999; Connelly & Hoffart, 1998). The orientation philosophy and format were similar to those described in the literature (Bartz, 1999; Boud & Middleton, 2003; Connelly & Hoffart, 1998; Thomason, 2006). Each included organizational and unit-level orientations that focused primarily on ensuring new nurses' clinical competencies.

The literature also emphasized affective aspects of orientation, such as socialization of newly hired nurses to the values and norms of the organization and the unit (Bartz, 1999; Connelly & Hoffart, 1998). This focus on welcoming new employees emerged across participant groups, and reflected the nursing orientation philosophy (Appendix E). It was also

consistent with participants' emphases on the relational component of systems knowledge.

Thomason (2006) cited an expectation that upon completion of orientation "… new nurses have demonstrated knowledge, skills, and attitudes to work successfully in the unit" (p. 243). This outcome reflected the Quality and Safety Education for Nurses (QSEN) framework (Cronenwett et al., 2007) that is based on the development of competencies in knowledge, skills, and attitudes (KSAs). QSEN, funded by the Robert Wood Johnson Foundation, was a collaborative of "thought leaders" (p. 124) in nursing and medicine (Cronenwett et al., 2007). This group developed nurse competencies based on the IOM competencies of patient-centered care, teamwork and collaboration, EBP, QI, safety, and informatics.

The literature suggested that investing in a good orientation can provide dividends in term of satisfaction and retention (Connelly & Hoffart, 1998; Thomason, 2006). Sveiby and Simons (2002), however, further suggested that the professional growth that results from collaboration and information sharing continues beyond new employee orientation. A multivariate analysis of variance reflected a significant effect for years of employment with the organization [F (16, 19152) = 6.47, $p < .001$). Short term employees (with less than six years of employment) were similar to long term employees (with greater than 20 years of employment). However, these two groups differed significantly from employees who had worked at the organization for the 6 to 20 year period on all four measures of employees' perceptions of collaborative climate at work.

Furthermore, univariate analysis revealed significant differences between groups for each of the four dimensions: organizational culture [F (4, 4788) = 4.86, $p < .001$], immediate supervisor [F (4, 4788) = 5.65, $p < .001$], employee attitude [F (4, 4788) = 6.52, $p < .001$],

and work group support [F (4, 4788) = 5.24, $p < .05$]. Sveiby and Simons (2002) suggested that higher ratings on these scales by short and long term employees may reflect newer employees' enthusiasm and long term employees' commitment to the organization. The lower ratings of the 6 to 20 year group may reflect the fact that they have lost the enthusiasm of new employees, and have not yet established the internal networks of the more experienced senior employees. Differences between the long term employees and the middle of the road group may also reflect the differences in status, ability to navigate internal politics, and perceived barriers to promotion that may characterize employees in the 6 to 12 year employment group (Sveiby & Simons, 2002). It may also reflect a lack of skills required to establish the social networks that support longevity.

These findings suggested that orientations may represent key windows of opportunity for maximizing investment of resources for employee development. However, supporting new employees in building relationships and finding their places in the social knowledge infrastructure would also reap benefits in terms of employee retention. This may be accomplished by fostering the development of skills that enable establishing and sustaining social connections, such as those identified by the IOM (2001, 2003b) and addressed by Cronenwett, et al. (2007).

Informal mechanisms.

The emphasis of TNs on informal processes such as questioning and observing, were also consistent with the literature (Bartz, 1999). Peer directed learning had a strong role in orienting a group of ten experienced, newly hired nurses (Bartz, 1999), which corresponded to the peer teaching described by the participants in this study. This was consistent with findings from a qualitative case study that examined prerequisites of workplace learning, how it evolves in different kinds of jobs, and the extent to which it is involved in workers'

personal identities (Heikkila & Makinen, 2001). A nursing home was one of four diverse settings in Finland where the research occurred. There were 21 participants across the four settings, but it was not clear how many participants were nurses. Using interviews, observation, and document review, Heikkula and Makinen (2001) found that for nurses working in a nursing home, learning at work occurred as social interaction, searching for information and ideas, problem solving, learning by doing/learning in action, organized training, or reflection.

Ellinger (2004) conducted a qualitative case study to identify contextual factors that shape and facilitate employees' informal learning in the workplace. A stratified purposeful sample of 15 employees included a range of roles across upper-, mid-, and lower-levels of employment. Using Critical Incident Technique and semi-structured interviews, Ellinger (2004) identified the influx of new technology and new processes within the organization as catalysts for informal learning. Strategies facilitating informal learning included observing, asking questions, problem solving, role modeling, and "focusing on the big picture" (Ellinger, 2004, p. 85).

Informal systems information exchange also occurred during shift reports. Although participants did not explicitly identify shift report as a systems information exchange mechanism, investigator observation supported this. Examples of systems information exchanged during report included providers on call and specifics related to collaboration with individual providers. In addition, clinical updates related to policy changes, ICN staff members, scheduling, equipment, supplies, and physical environment were also shared during shift report. "Learning the ropes" served as a key function of intershift report, and referred to information helpful in the enculturation of new nurses (Lally, 1999). Intershift

reports fostered social cohesion, providing an important role in integrating new nurses into the system (Hays, 2003; Hopkinson, 2002; Lally, 1999; Payne et al., 2000).

In addition to shift reports, other patient “handoffs” or “handovers” occurred between nurses and other members of the care team, which provided additional opportunities for exchange of systems information. The development of structured communication pattern, which are modeled on handoffs within other HROs, has been a focus of recent patient safety initiatives (Patterson, Roth, Woods, Chow, & Orlando, 2004; TJC, 2007; World Health Organization, 2007). One widely adopted structured communication strategy is the use of SBAR, which stands for situation, background or context, assessment, and recommendation (Leonard, Graham, & Bonacum, 2004). Although this strategy has been recommended by The Joint Commission (2007), and widely adopted (World Health Organization, 2007), little research exists on its effectiveness. Nonetheless, its structure offers the communication of systems information through the exchange of background or context.

Multidisciplinary rounds also provided a platform for information sharing, which was consistent with literature (Institute for Healthcare Improvement, 2007; Reddy, Pratt, Dourish, & Shabot, 2002; Rutherford, Lee, & Greiner, 2004). Reddy, et al (2002) used participant observation to examine the information needs of health care provider teams during multidisciplinary rounds in a surgical ICU. Seventeen percent of questions asked by SICU team members related to organizational information, which included policies, procedures, and bed management issues. Within the SICU setting, bed management has far-reaching implications and represents a key element of systems knowledge. The systems information exchanged during multidisciplinary rounds was embedded in the context of particular patient situations, and included available resources and how to access them. As a point of routine

interpersonal interaction, shift report and multidisciplinary rounds served as informal mechanisms for socialization and systems information exchange.

The consistent thread of relational elements was evident in comments regarding mechanisms of systems information exchange. Relational factors influenced the willingness of TNs to seek and share essential systems information. Bartz (1999) found that orienting nurses selected human resources based on the perceived approachability of the other person. This finding was reflected in Donna's statement that when she had questions she approached "the person that gets least annoyed first." Another factor that shaped informal learning was the formation of webs of relationships for learning, which were exemplified by the openness and accessibility of people (Ellinger, 2004).

Indirect Influences on Nurse-to-nurse Systems Information Exchange

Indirect influences that facilitated systems information exchange included the built environment and stress reduction. The built environment is linked to learning at as it relates to availability and proximity of peers and colleagues (Ellinger, 2004; White et al., 1998). According to participants, nurse-to-nurse systems information exchange was supported by environmental factors, such as the open pods and the partial wall dividers. Ellinger (2004) identified removing walls and opening up work spaces as contextual factors that facilitated learning at work.

The findings for the second research question fell along a continuum with TNs positioned at the pragmatic end, and leaders positioned at the conceptual end. This continuum parallels the survival-maintenance-growth continuum described in the previous section. Communication of systems information occurred through a nonlinear process that started before the interview and continued beyond orientation.

Research Question 3: What Systems Information is Exchanged between Staff and Travel Nurses in a Clinical Microsystem?

Four overarching themes reflected the systems information exchanged between travel and staff nurses: 1) practice patterns; 2) staffing roles and patterns; 4) "tips, tricks, tidbits, and techniques;" and 4) environmental elements. The insular nature of the ICN provided context for each theme of systems information. Several participants identified the value of the new ideas brought into the ICN by TNs as well as potential benefits when TNs take ideas from this ICN to future work settings. The nature of the information exchanged was consistent with the literature on strategies for management of NWI. Responses to research question three were similar, but distinct from those for research question one. Whereas research question one explicitly asked participants "what is important for a nurse to know about systems within a CMS?" the information that was actually exchanged was examined in question three. After a description of the types of information exchanged, an analysis comparing the findings of question one and question three is presented.

Practice Patterns

Systems information that was shared within the context of practice patterns generally reflected the roles of nurses as stewards of resources, advocates for patients and families, coordinators of evidence-based care, and mediators of actual or potential conflicts. The emphasis on FCC, which calls upon nurses to advocate for patients and families, provides an example. This example is particularly relevant for CMSs providing care for neonates.

Elements of nursing knowledge work that characterized practice patterns included bringing the babies and families into the organization (Allen, 2004), understanding and influencing the treatment plan (Stewart, Stansfield, & Tapp, 2004), and obtaining, interpreting, and communicating information (Allen, 2004). The focus on interdisciplinary

collaboration reflected the mediator and coordinator roles of nurses (Allen, 2004, 2007; Benner, 1984; Jacques, 1993; Stewart, Stansfield, & Tapp, 2004). The focus on evidence-based practice (EBP) reflected the role of nurses in ensuring quality of care (McGirr & Bakker, 2000), and the smooth operation of the unit (McGirr & Bakker, 2000; Stewart, Stansfield, & Tapp, 2004).

Staffing Roles and Patterns

The focus of information regarding staffing roles and patterns centered on roles of ICN staff members, and utilization of SNs and TNs to meet the unit needs. In the limited publications (Manias, Aitken, Peerson, Parker, & Wong, 2003a), and reports from TNs, patterns of TN deployment varied across clinical sites. Specific rationales for TN utilization patterns appeared to exist within each setting. Within this ICN, TNs did not participate in emergency births. The rationale for this policy was that those experiences were reserved for permanent staff nurses, especially new nurses, who need skill development.

Tips, Tricks, Tidbits, and Techniques

The elements that fell into the tips, tricks, tidbits, and techniques category generally reflected strategies on managing the challenges of NWI. This category included conventions that were observed on the unit that did not rise to the level of policy, such as “timesaver techniques.” These included such tips as where to eat, shortcuts around the facility, and information on the best place to park. In the case of one TN (Betsy), it included sharing a standard report tool that she uses at any assignment, an example of a memory aid to keep track of work (Ebright, Patterson, Chalko, & Render, 2003). These types of systems assisted in processes of tracking information (Ebright, Patterson, Chalko, & Render, 2003), reprioritizing (Tucker & Spear, 2006), and stacking (Ebright, Patterson, Chalko, & Render,

2003).

Other tips included working with the idiosyncrasies of fellow staff members (Stewart, Stansfield, & Tapp, 2004). Caroline referred to this kind of systems information when she described the tips her preceptor provided. Helen related her experience of "starting off badly" with a physician which provided an example of when sharing of systems knowledge is absent. Helen unknowingly "stepped over the line" when she mentioned to a father that his baby would be discharged soon, without knowing that the physician preferred to communicate that type of information with the family. The physician "went from being a very friendly person to…where [s]he wouldn't talk …" to Helen for "quite a while." This faux pas (as perceived by the physician), which resulted in disrupted communication patterns, could have been avoided if Helen had known this physician's preferences. Both of these exemplify tips that fostered the smooth operation of the unit (McGirr & Bakker, 2000; Stewart, Stansfield, & Tapp, 2004).

Environmental Elements

Environmental elements of systems knowledge shared between SNs and TNs related to the layout of the unit and equipment. SNs talked about the ICN layout, location of equipment and supplies, and issues regarding the open unit and security. Participants pointed to the party table as the center of the ICN, literally and figuratively. They also shared information about how to negotiate the facility, where to find who is on call, where the schedule was located, and where to eat. These issues aligned with the literature. Employees felt that they needed "to learn about the organization as a whole… [and an] introduction to the medical center: how it is set up…" (Bartz, 1999, p.5).

The actual layout of the ICN addressed some of the challenges identified in the

literature, such as organizing care by geographic area (Ebright, Patterson, Chalko, & Render, 2003; Porter & Teisberg, 2004; Potter et al., 2004). In this setting, however, the pod design supported nurses staying close to the babies and one another. Several participants expressed the benefits of the high visibility across pods that allowed nurses to support each other as needed.

Figure 6 displays a comparison of nursing systems knowledge components categories identified in research question one to themes of exchanged systems information identified in the responses to research question three. There are three obvious points of interest. First, this diagram depicts broad congruence between systems knowledge required and systems information exchanged. Second, there were three categories from the relational component that do not appear in the diagram, relating to: 1) the unit, 2) new staff members, and 3) the community. The data offer no explanation for this, unless these represent tacit knowledge that nurses can articulate when elicited, but that do not emerge in routine exchanges.

Figure 6. Comparison of essential knowledge component categories to systems information exchanged between SNs and TNs.

Note. *No information regarding these categories shared between SNs and TNs.

The third point is the placement of communication at the intersection of all four themes. This is consistent with the literature that identifies communication as a key factor in providing safe patient care with the growing body of literature on the culture of safety

(Currie & Watterson, 2007; Institute of Medicine, 2000, 2001, 2004; TJC, 2007) and knowledge work (Antrobus, 1997; Nonaka, 1991; Reddy, Pratt, Dourish, & Shabot, 2002; Reddy & Spence, 2006; Sorrells-Jones & Weaver, 1999; Sveiby & Simons, 2002; Weaver & Sorrells-Jones, 1999). It is also consistent with the central connecting role of the nurse (Allen, 2004, 2007; Curley, 2004; Ebright, Patterson, Chalko, & Render, 2003; Jacques, 1993; McGirr & Bakker, 2000; Reddy, Pratt, Dourish, & Shabot, 2002; Stewart, Stansfield, & Tapp, 2004). These findings support the characterization of communication as a component of operational systems knowledge that gives action to the structure, and thus answers the question: How does the work get done?

Discussion of Related Concepts

Knowledge Work and Knowledge Workers

Clinical knowledge and decision-making served as the general focus of the nursing knowledge literature. The nature of nursing work examined in this investigation was consistent with the concept of technology found in the management literature. Rogers (1995) defined technology as "… a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome" (p. 13). Technology in this sense included equipment, tools, supplies, techniques, processes, skills, and knowledge used to provide a service or operate equipment (Alexander & Kroposki, 2001).

In a longitudinal study, Alexander and Kropolski (2001) examined dimensions of nursing technology among 34 units within three hospitals between 1980 and 1990. They found significant changes in instability, variability, and uncertainty related to nursing work over this ten year period. Instability reflected the degree to which unpredictable fluctuation in work techniques or practices occurred ($t = 4.42$, $p = .0001$). Variability referred to the degree to which differences among patient needs required nurses' engagement in different tasks ($t =$

2.08, $p = .0001$). Uncertainty referred to the degree of complexity of the work performed ($t = 5.64$, $p = .001$).

In this context, nursing technology referred to nurses' work, and encompassed application of the nursing process, knowledge, and skills involved in changing the status of patients (Alexander & Kroposki, 2001, p. 778). This characterization of nursing work reflecting high degrees of instability, variability, and complexity was consistent with the literature (Ebright, Patterson, Chalko, & Render, 2003; Krichbaum et al., 2007; Potter et al., 2004; Potter et al., 2005; Tucker & Spear, 2006). Nursing technology within a clinical microsystem includes "…the nursing knowledge and nursing care processes used to change the status of a hospitalized patient into a discharged person" (Alexander & Kroposki, 2001, p. 778).

The findings of this investigation suggested that what is required of nurses within this CMS is a level of situation awareness (SA). SA is "knowing what is going on around you…knowing what is important" (Endsley, 2000, p. 2). This concept corresponds to proficient and expert levels of practice (Benner, 1984; Dreyfus, 1979; Dreyfus & Dreyfus, 1986), and higher ordered thinking that accounts for context and pattern recognition (Moody, 2004; Pesut, 2000a, 2000b; Quinn, Anderson, & Finkelstein, 1996).

Within this setting, nursing work depended upon awareness of one's own role, the environment, and the roles of others with whom the nurse worked. This was essential to the nursing roles of "information conduits" (Reddy, Pratt, Dourish, & Shabot, 2002, p. 4), "information brokers" (Allen, 2004, p. 276), connectors (Jacques, 1993), and "liaison[s] or coordinator[s] of care" (Stewart, Stansfield, & Tapp, 2004, p. 447). It was also evident in Barbara's discussion regarding their work with Office of Patient Safety at the hospital.

Knowledge workers take cues, understand them as significant, and apply them to evolving situations. SA requires a personal sense of how an individual fits in the overall structure of the system in which she is embedded, and her contributions to its outcomes (Autrey & Moss, 2006; Endsley, 2000). Mindfulness, an essential component of SA (Weick & Sutcliffe, 2003; Weick & Sutcliffe, 2001; Weick, Sutcliffe, & Obstfeld, 1999). refers to the conscious act of noticing one's environment, the interpretive work related to signals within the environment, and reframing of a situation. Mindfulness reflects the cognitive processes of adaptation, anticipation, accommodation and reaction that Ebright et al. (2003) used to describe NWI. Georgia conveyed this when she stated that new nurses are not expected to emerge from orientation "fully armed for battle …." Georgia emphasized the evolving learning process entailed in concurrently adapting to and functioning within a new environment. Alice also highlighted a trajectory of learning from tasks and concrete details to a state of SA by nurses new to the ICN:

> … it's almost like you have several levels of things to learn--the formal education of orientation, and once you can sort of get past that… Your tasks, and things soak in, then you can … relax a bit and start … seeing…like all of a sudden you can see the patient, everything about the patient, and your vision starts to expand, and you can put your head up and you can start to see the unit and its culture. It takes a while … you just have to be embedded in the unit for a while to see it …

Benner's (1984) conception of expert nursing knowledge transcending norms and standardized rules because of the constant evolution that results from experience and reflection characterize the state of SA. Evans and Donnelly (2006) described the synthesis of experiential knowledge and cognitive work entailed in nursing work. According to Evans and Donnelly (2006), nursing work "… includes anticipation, prevention of problems, instant recognition that a problem exists, and a constant unconscious form of evaluation and decision-making" (p. 152). The state of SA results from continuous scanning of the

environment, and integration of selected elements that result in an adjusted perception. This feedback process is similar at the level of the individual nurse to the diagram of the CMS infrastructure supporting information exchange in Figure 2 (p. 17*)*. As an attribute of technology, systems knowledge is a resource that contributes to an evolving knowledge base and further knowledge development through information exchange.

Knowledge work requires judgment regarding the relative importance and prioritization of increasingly complex information within a dynamic environment. These findings exemplify nurses as knowledge workers. Nurses' competence includes not only knowing what to do, but also knowing how to apply knowledge in unique and dynamic situations.

Travel Nurses

TNs served a unique function as disseminators of systems information between and among various CMSs. In this specific CMS, SNs and NLs recognized TNs as information sources and connections to other ICNs. These connections helped support new or different practice patterns. TNs delivered messages that reinforced the extraordinary quality of care and collaborative practice that characterized this ICN. This validation had substantial importance to these staff members who demonstrated such strong commitment to and identification with their mission, their work, the ICN, and each other. These benefits to TN utilization are consistent with recent findings that use of supplemental nurses may, in fact, have positive effects on patient outcomes (Aiken, Xue, Clarke, & Sloane, 2007; Newhouse, Johantgen, Pronovost, & Johnson, 2005).

Newhouse, Johantgen, Pronovost, and Johnson (2005) investigated the relationship between RN staffing factors in the operating room (OR) and surgical patient outcomes. Newhouse et al. (2005) analyzed data from two sources. The first source was discharge data

for patients (n = 1,894) who had undergone aortic aneurysm repair or aortic-iliac-femoral bypass surgeries. Survey results from corresponding perioperative directors or managers from 32 hospitals provided the second data source. Newhouse et al. (2005) found that the estimated odds of death decreased per 10% increase in agency RN utilization (odds ratio [OR] 0.77, 95% confidence interval [CI] 0.63, 0.94, $p < .05$).

Aiken, Xue, Clarke, & Sloane (2007) conducted another study examining outcomes of supplemental nurse staffing. Data were obtained through the 2000 National Sample Survey of Registered Nurses (NSSRN), a random sample survey of RNs in Pennsylvania in 1999, and data from the Staffing-Resource Adequacy subscale of the Practice Environment Scale of the Nursing Work Index. Taking Staffing-Resource Adequacy into account, nurses in hospitals with more nonpermanent nurses were no more likely to be dissatisfied with the their jobs than nurses with fewer nonpermanent nurses (OR 1.00, 95% CI 0.92, 1.09, $p = .94$). In addition, higher rates of nonpermanent nurse utilization corresponded to fewer incidents of negative outcomes for some factors. Aiken, et al. (2007) found that nurses were less likely to be burned out (OR 0.91, 95% CI 0.83, 0.99, $p = .03$), or to report medication errors (OR 0.82, 95% CI 0.74, 0.92, $p < .001$), family or patient complaints (OR 0.91, 95% CI 0.84, 0.99, $p = .04$), or verbal abuse (OR 0.90, 95% CI 0.82, 0.99, $p = .03$).

The process of this investigation raised a host of questions related to travel nurses that extended beyond the scope of this study. Through participant interviews, NL participants voiced curiosity about the nature of travel nurses. For example, who does travel nursing? Given the stressors, what are the benefits that would make a nurse choose to travel? What are the elements that make them stay somewhere? Other points of curiosity centered on SN, TN, and patient perceptions regarding how TNs and SNs differ from each other. What do TNs

take from their assignments when they go? There is much to learn about the use of supplemental nurses.

The necessary first step, however, lies in establishing clarity around this concept. The broad heterogeneous category of supplemental nurses includes a range of distinct sub-classifications. The literature included references to agency, per diem, bank, casual, contingent, travel, nonpermanent, and supplemental nurses. It stands to reason that great differences would exist between the travel nurse who chooses a destination and plans to relocate for a minimum block of 13 weeks, and the agency nurse called in at the last minute to cover one shift for a sick staff nurse. What differences exist in the information needs of different types of supplemental nurses, and how do their contributions differ? A full understanding of these differences and their implications remain unknown.

Research Implications

Implications for Research and Theory

The findings from this investigation provided an initial understanding of the dynamic and interactive components of nursing systems knowledge. The convergence of TN, SN, and NL perspectives suggested that these three themes captured the major components of nursing systems knowledge. Further research is needed to validate and refine nursing systems knowledge components and their constituent elements. These patterns may not be consistent with patterns in other practice environments. This investigation should be replicated in a variety of different settings, including those with a greater influx of staff members. The next step should be replication in other ICNs to determine whether these findings are supported.

Nurses' longevity appears to be an important factor in nursing systems information exchange. Research involving magnet hospitals has contributed to an expanding knowledge base linking nurse retention and job satisfaction to higher patient satisfaction and lower

patient mortality levels (Aiken, Clarke, & Sloane, 2002; Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Aiken, Sloan, & Lake, 1997; Aiken, Smith, & Lake, 1994; Aiken, Sochalski, & Lake, 1997; Brady-Schwartz, 2005; Clarke, Sloane, & Aiken, 2002; Schmalenberg & Kramer, 2008; Spence Laschinger, Almost, & Tuer-Hodes, 2003; Ulrich, Buerhaus, Donelan, Norman, & Dittus, 2007). Fostering nurse retention is clearly a priority for nurse administrators. A productive research direction may be to study the beneficial elements of longevity to determine how or if they can be otherwise cultivated or promoted. It would be helpful to know what commonalities and differences exist between nurses with longevity within the profession, and nurses with longevity within a particular CMS.

Hatcher et. al. (2006) examined the potential loss of organizational knowledge with the pending retirement of experienced nurses. Interviews with 25 experts in health care system design, leadership, patient-centered care, safety, and labor relations revealed a valuable resource in the experienced nurse. One area of potential that is unique to experienced nurses is that they are “mentor-ready” (p. 28). Mentor readiness meant that they “possessed the skills and knowledge to develop the novice nurse in the practical, technical, and analytical aspects of the nursing profession” (Hatcher et al., 2006, p. 28). Hatcher et al. (2006) identified a range of possible interventions to promote retention of older and more experienced nurses that included scheduling flexibility, expanding roles, advancing employee-employer relationships and developing new career paths. These suggestions are congruent with the notion of continual professional development as a means of fostering collaboration and knowledge sharing (Sveiby & Simons, 2002). Knowledge development related to older and more experienced nurses represents a rich are of research possibilities.

This investigation directly examined nurse-to-nurse systems information exchange at the CMS level. These findings add to the knowledge base by providing the beginnings of a possible framework for further study. Further examination of informal, indirect, and spontaneous processes of information exchange is warranted. These findings may also have application to any setting where temporary or contingent workers are employed and where quality is an expected outcome. One possible setting is academia where adjunct faculty are part of the infrastructure.

These findings provided only the nursing perspective of a multifaceted system. However, this framework offers a starting point for developing systems knowledge within other disciplines. Comparisons of nursing systems and medical or other constituent or stakeholder group perspectives would advance a wholistic system construction. Just as various nursing perspectives provided the evidence for this beginning understanding of nursing systems, combining the perspectives of other constituent groups will add depth of understanding and awareness of system gaps and overlapping junctures. Systems understanding provides a common perspective that can illuminate the unique needs of a specific CMS. Therefore, this knowledge has value in developing focused interventions aimed at maximizing systems' efficiencies. Further research is needed to better understand how various groups work together to meet the goals of a CMS. The emphasis on relationships suggests that these findings may contribute to our understanding of the power of social capital among nurses within a CMS.

Implications for Policy

Although the direction of health care is uncertain, shrinking resources and escalating demands are not. Insurers increasingly link payment for healthcare with quality of services provided. Sustainable systems will depend upon continuous improvement at the local level of

the CMS (Spear & Berwick, 2007). This has heightened importance with increasing transparency in reporting quality measures and insurers linking pay to performance (Davis & Guterman, 2007; Rosenthal & Dudley, 2007).

At the organizational level, nurse leaders need to tailor orientations to meet the needs of individual learners. Policies for care should be written so that they are clearly understood by both "natives" and "outsiders." From a health policy perspective, it may be more beneficial to mandate transitional programs that are contextually-relevant than to mandate universal staffing ratios.

The literature identified long-term benefits of a smooth transition of nurses to a new environment in staff retention and satisfaction (Connelly & Hoffart, 1998; Thomason, 2006; White et al., 1998). A welcoming and nurturing environment, especially in contrast to others, will have an advantage in attracting and retaining nurses. Particularly in the case of TNs, this shift would offer secondary gain by reducing system disruptions. Furthermore, advancing our knowledge of factors improving nurse satisfaction and retention will likely have larger consequences in terms of allocation of health care dollars.

Implications for Education

The nursing systems knowledge components identified in this investigation support the recent recommendations for systems-based competencies released by the QSEN (Cronenwett et al., 2007). These findings may be helpful to initiatives such as the collaborative *Nurse of the Future* work aimed at developing systems-focused nursing competencies (Massachusetts Board of Higher Education & Massachusetts Organization of Nurse Executives, 2006) beginning at the baccalaureate education level. Knowing what information to seek or to share with others depends upon the presence of a framework

otherwise built purely from experience. Such content could begin to establish a context for novice nurses to foster smoother and timelier assimilation into a CMS.

The interdependence of nursing systems knowledge components highlights the importance of weaving collaborative skills development into curricula for nursing and other disciplines. It has potential bearing in preparing nurses for the emerging systems-oriented Clinical Nurse Leader (CNL) and Doctor of Nursing Practice (DNP) roles (American Association of Colleges of Nursing [AACN], 2006). These findings may have particular value to the CNL, whose role will vary across settings (AACN, 2005).

These findings may also have value to nurse educators working at the intersection of nursing education and service. In this context, a framework for understanding and organizing nursing systems information may facilitate negotiation of scarce clinical placement settings. It may also have pedagogical value in clinical teaching by nursing faculty or clinical preceptors.

Implications for Practice

Interruptions are inevitable within a dynamic CMS. Application of knowledge that addresses the systems information needs, such as where things are, how thing work, and how to access available resources, will likely reduce uncertainty, stress, and unnecessary interruptions to nursing work. Implementation and continual improvement of processes that minimize unnecessary interruptions will result in a safer practice environment. These findings have implications regarding effective resource allocation for orientation, staff nurse development, nurse retention and re-entry programs, and design of information systems (Reddy, Pratt, Dourish, & Shabot, 2002; Reddy & Spence, 2006). Maximizing improvement lies in formalizing the beneficial elements of social connections revealed through this investigation.

The concept of SA has particular relevance in this context. Staff nurse development efforts should aim to heighten the awareness of staff nurses, including preceptors, of the context of care and their place and role within it. Perhaps a universal role of each nurse as a facilitator in the integration of new staff members into the unit should be explicit. The affinity of nurses for stewardship (Allen, 2004, 2007; Jacques, 1993; McGirr & Bakker, 2000; Stewart, Stansfield, & Tapp, 2004) indicates that acceptance of this role might be facilitated if it was presented in the context of the CMS and the nurses' roles within it.

All participants recognized the benefits of TN contributions. CMSs should maximize opportunities to benefit from the knowledge and experiences of TNs. CMS nurse leaders and nurse educators should attempt to capture and codify the knowledge shared between SNs and TNs. The information that falls into the category of tips, tricks, tidbits, and techniques may represent the least captured and possibly most helpful. It may also be helpful to consider the untapped and potentially valuable perspectives of TNs as part of the benefit that comes with the cost of a TN contract.

One strategy might be to maximize formal feedback mechanisms, such as exit interviews to capture the impressions of TNs. Another possibility is maximizing the short cycle of a TN contract as a built-in mechanism for rapid response cycle of QI. Additional strategies to strengthen orientation processes may include collaboration with travel agencies. Cultivating an environment conducive to informal and spontaneous learning to move from serendipitous to purposeful learning will maximize the benefits that TNs offer.

These findings indicate that maximizing opportunities for interpersonal interaction among and between nurses and other CMS members would be beneficial. Providing resources to enable formalized structures and operations can promote interactions and build

trust. Resources may include supporting a party table, or other social activities. Ensuring staffing levels that enable staff nurses to easily participate in unit activities, such as supporting involvement in shared governance committee work may be another strategy.

The participants in this investigation demonstrated high levels of engagement and strong senses of professional identity that appeared to translate into empowerment. These findings suggest that administrators and managers recognize the integral relational component of the infrastructure, and support development of structural and operational enablers to establish and cultivate relationships. It behooves nurse educators and leaders to maximize opportunities for engagement to reinforce and extend these existing links to the larger picture and the place and role of staff nurses within it. This should include consistent recognition of good work and positive outcomes at unit and organizational levels.

Understanding how nurses work with one another and with other members of the care team has increasing importance with the current emphasis on teamwork, collaboration, and patient safety. Supporting the assimilation of nurses into the CMS is essential. Explicating and codifying the systems knowledge that nurses need in order to function within a CMS could limit the level of inevitable uncertainty.

Study Limitations

Small sample size and single location limit the transferability of these findings. It should be noted that these findings represent the situation of this ICN at this point in its continuum of evolution in TN utilization. The experience of this ICN with TN utilization had evolved to the point of best case scenario, but had experienced growth, change, and adjustment all along the way. In addition, participants were self-selected, and therefore may not have included important informants who were on leave, vacation, or otherwise unavailable at the time of data collection.

Demographic data included nurses' length of time in practice and length of time in position. Although participants provided this information in the course of their interviews, demographic data did not reflect nurses' length of service within this ICN. These data would have provided interesting information regarding the longevity of nurses working in this ICN who may have been employed in different positions within the ICN over time.

Conclusions

Silva (1999) called for an approach to building nursing science that recognizes the synchronous, overlapping, overlaid, synthetic, and blended nature of nursing's relationship with other health-related professionals. Silva's view of the evolving nature of nursing science fits with the notion that good nursing science generates knowledge that is relevant to patient care and improving practice (Ramprogus, 2002; Silva, 1999; Wiedenbach, 1963). "Nursing theory and science past and present is prologue to nursing theory and science future" (Silva, 1999, p. 221). A focus on interdisciplinary research and practice is essential as nursing matures as a profession. This will entail shifting from an individual patient orientation to apply nursing knowledge and practice to systems and communities.

The findings from this investigation provided a glimpse into the landscape of that continuum in this particular setting from the perspectives of nurses working within it. This investigation generated a wide range of actual or possible implications with rich potential for development. Nurses in current practice can benefit by understanding where they fit in the larger context of the unit, and how the work that they do contributes to unit-level outcomes. SNs contributed the "what should you know about our unit" perspective, and TNs contributed a "what should you know about a unit." Several areas of overlap emerged that offer a basis for developing understanding of nurses' systems knowledge, the systems information exchanged between nurses, and how that exchange occurs. Further, these

findings add to the literature on CASs, CMSs, knowledge work, and TNs, all of which require further investigation.

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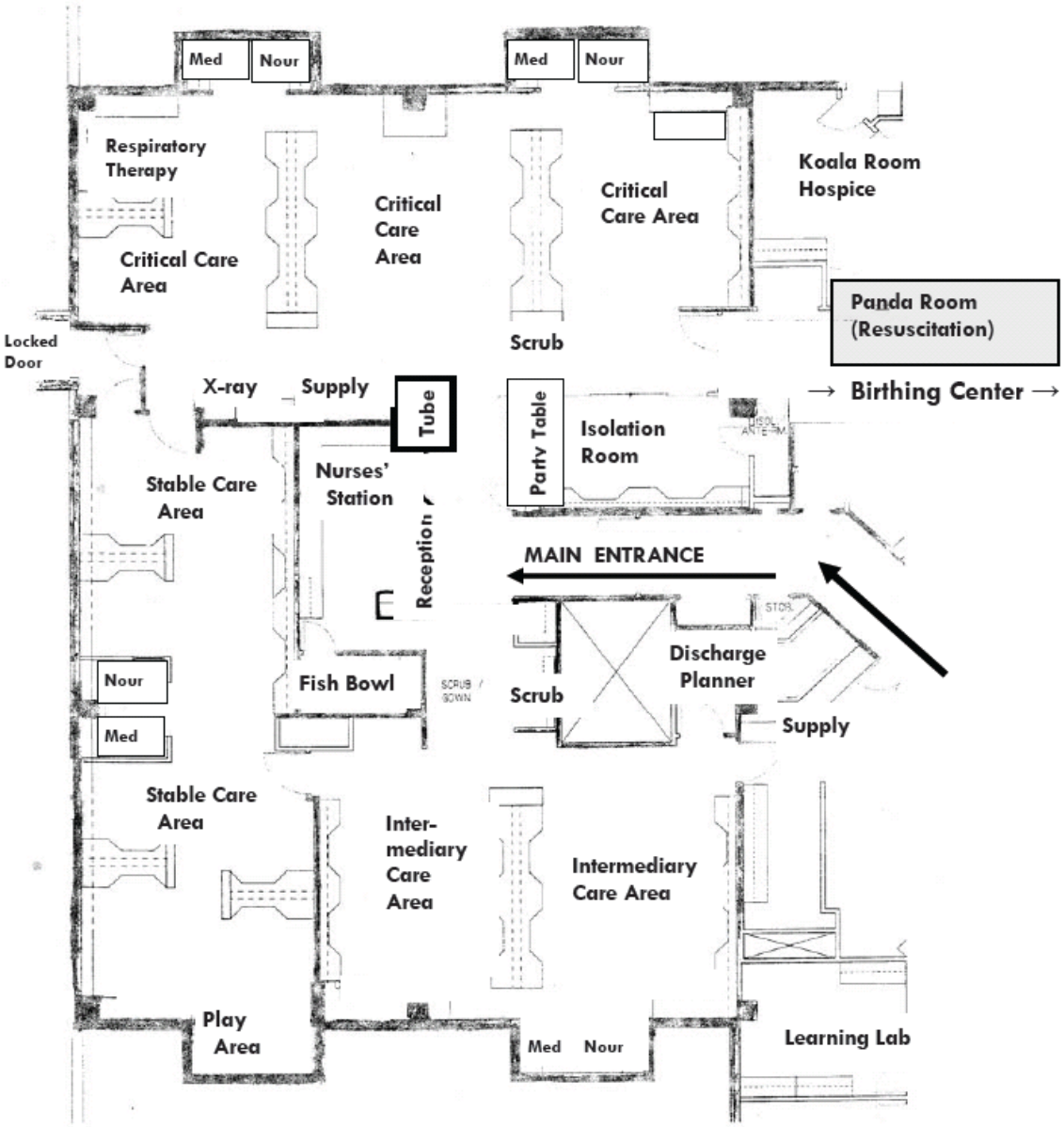
Appendix A

Intensive Care Nursery Floor Plan



Appendix B

Intensive Care Nursery Mission and Philosophy

We believe the parent-child relationship is *essential.*

We believe in providing a nurturing environment where the child is part of the family and the family is part of the care team.

Appendix C

Professional Certifications with Corresponding Professional Memberships by Participant Group

Participant Group	Professional Certification	Membership in Professional Organizations
Nurse Leaders	NNP	NANN, NeoNANN, STTI, ANA, NHNPA
	NNP, RNC	NANN, ANA, STTI, AWHONN
	RNC	--
	RNC	NANN
	--	--
Staff Nurses	RNC	NANN
	--	NANN
	--	--
	RNC	AWHONN
	RNC	--
	RNC	STTI
	--	--
	--	--
	RNC	--
Travel Nurses	--	--
	--	--
	--	NANN
	--	NANN

Note. Dashes indicate no data. Professional Certifications: RNC = RN certified in the area of Neonatal Intensive Care through the National Certification Corporation (NCC); NNP = Neonatal Nurse Practitioner certified through NCC. Professional Organizations: NANN = National Association of Neonatal Nurses; NeoNANN = New England Order of the NANN; STTI = Sigma Theta Tau, International; ANA = American Nurses Association; NHNPA = New Hampshire Nurse Practitioners Association; AWHONN = Association for Women's Health, Obstetric and Neonatal Nurses. All RNs held certifications for Basic Life Support, Pediatric Advanced Life Support, and Neonatal Resuscitation.

Appendix D

General Orientation Agenda

NEW EMPLOYEE and VOLUNTEER
GENERAL ORIENTATION PROGRAM

PLAN OF THE DAY

7:45 – 8:30	Registration, Photo ID Badge, Employment Data & Documentation, Parking Stickers, Computer Access
8:30 – 9:00	Payroll Data
9:00 – 9:35	Plan of the Day, Introductions/Warm-Up, Welcome Video
9:35 – 10:05	Medical Center Mission & Philosophy, Service Excellence
10:05 – 10:15	Break
10:15 – 10:55	Safety & The Environment of Care at the Medical Center
10:55 – 11:15	Control of Hazardous Materials
11:15 – 11:45	Infectious Diseases & Care for Care Givers
11:45 – 12:30	Lunch
12:30 – 12:55	Environmental Awareness, Waste Management, Recycling
12:55 – 1:25	Security, Parking, Building Design, Workplace Violence
1:25 – 2:20	“My Hometown” Tour
	(Photo ID Lab Open 1 – 2 p.m.)
2:20 – 2:30	Break
2:30 – 2:45	Computer Security and Policies
2:45 – 3:15	The Medical Center Culture, Compliance, Conduct
3:15 – 3:30	Wrap Up/Review, Program Evaluation

*REVISED 12/04

Appendix E

Philosophy of Nursing Education

MEDICAL CENTER

PHILOSOPHY OF ORIENTATION

In accordance with the mission of [The Medical Center] to provide high quality, cost-effective health care, to educate health care personnel, and to generate new knowledge, and the philosophy of Nursing Education to create and sustain an environment that supports the ongoing development of nurses and nursing personnel, the philosophy of orientation is:

Orientation should introduce the orientee to the philosophy, goals, policies, standards of care, safety principles, role expectations, physical facilities and special services at [The Medical Center].

Orientation has a defined purpose and objectives, utilizes varied methodologies, a cost-effective implementation plan, and an evaluation process.

Orientation is directed by the orientee, is competency-based, and recognizes individual learning needs and learning styles. Orientation has a beginning and an end.

The achievement of professional competence is facilitated by the Preceptor and other clinical resources, and is supported by Nursing leadership at [The Medical Center].

PURPOSE OF ORIENTATION

The purpose of orientation is to prepare the orientee for a specific role within the institution. It incorporates socialization, comprehension of philosophy, policies and procedures, and includes the acquisition of knowledge, skills and behaviors that maintain and improve the quality of patient care at[The Medical Center].

Written by: Clinical Resource Committee 1/93

[Update 5/99]

Appendix F

Overview of Intensive Care Nursery-based Orientation

Introduction	Philosophy of Orientation Philosophy of Care and Shared Values Security access Scavenger hunt
General Nursing Care Guidelines	Code of Professional Conduct Shared governance, peer review Primary nursing Unit resources (policies, medication reference materials) Systems (security, laboratory, medication/pharmacy, payroll, administrative support) Policies: unit routines, administrative, QI Clinical operations policies: policy statement, purpose, security measures, procedure steps, team member responsibilities, references
Standards	Individualized, age appropriate nursing care that supports functional health status, hemostatic regulation, psychological functioning and facilitates life style changes, the family unit, effective use of health care delivery system, and protection against harm
Self Learning Modules and Certifications	Clinical Alarms Policy/Competency Evaluation Assessment of Pain in Newborns Pharmacology Learning Module Point of Care Testing Recertification Safety Part of annual safety review
Documentation	Care plans, order sheets, assessment tools, flow sheets, transport worksheet
Professional Development and Staff Nurse Performance Expectations	Continuing Education/Conference Record Unit participation record (committee, task force/council participation, projects, preceptorship/orientation participation) ICN Staff Nurse Peer Review Worksheet RN Skills Assessment Inventory/Competency Evaluation Job description, performance evaluation, career ladder ICN Shared Governance Model

Appendix G

Notice of Business in the ICN and Contact Information

July 27, 2005

To: Members of the Intensive Care Nursery Care Team

Lea R. Ayers will be present in the Intensive Care Nursery over the next few weeks conducting research for her dissertation on how we share our knowledge about our professional practice environment with each other. She is working closely with [redacted], Director of Nursing Research at [The Medical Center].

Please feel free to contact Lea Ayers, [redacted] or James A. Fain with any questions, concerns, or comments about this project. Contact information is noted below.

Lea R. Ayers, MSN, RN
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55 Lake Avenue North
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[redacted]

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Dissertation Committee
Association Dean, University of Massachusetts/Worcester
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Appendix H

Letter of Introduction to Orienting Nurses

July 27, 2005

Dear Orienting Nurse,

I am a doctoral candidate at the UMASS Graduate School of Nursing, and am interested in the nursing perspective of the professional practice environment.

I hope to construct an description of nurses' perspectives of the professional practice environment by exploring what knowledge is essential for staff and travel nurses to know about a practice environment in order to function effectively, and how that knowledge is communicated. As an orientee your experience is especially valuable since you are becoming familiar with the systems that make up this organization.

I am recruiting volunteers from staff and travel nurses orienting to the Intensive Care Nursery. I have included in this packet a copy of the informed consent form, which includes more information. Specifically, I hope to shadow orienting nurses through their initial two shifts as they work with their preceptors to become familiar with the practice environment. Participants will receive a gift certificate to the Lebanon Food Coop worth $15.00 as a token of appreciation for their involvement in the study.

I will be available to meet you, provide more information, and seek your participation in this study when you attend your orientation to the Intensive Care Nursery. In the meantime, I wanted to make you aware of my project. I hope you will consider participating in it. Please contact me through the contact information provided below, or through [redacted], Director of Nursing Research at [The Medical Center]. I look forward to speaking with you.

Please contact me if I can answer any questions.

Thank you,

Lea R. Ayers, RN, MSN
Doctoral Candidate, UMASS/Worcester
Collaborative PhD in Nursing Program

lrayers@adelphia.net

Phone: 603.735.4010

Appendix I

Consent Form

CONSENT TO PARTICIPATE IN RESEARCH

[redacted]

Study title: **Nursing Practice as Knowledge Work within a Clinical Microsystem**

You are being asked to participate in a research study. Your participation is voluntary.
Your decision whether or not to participate will have no effect on your job status.
Please ask questions if there is anything you do not understand.

What is the purpose of this study ?

The purpose of this study is to describe the professional practice environment by exploring staff and travel nurses' views on what nurses need to know in order to work effectively within it, and how that knowledge is shared.

What does this study involve ?

This study will occur in three phases. You may be involved in up to two of the following three phases.

- Phase 1- During this phase, the researcher will be present on the unit, and will shadow you through two orientation shifts to the intensive care nursery.
- Phase 2- Individual interviews will be taped, and conducted using an interview guide. Interviews will take about an hour. Verbal consent will be included at the beginning of the taped interview. Private interviews will be conducted onsite at your convenience.
- Phase 3- This phase entails a focus group session, which will last 1.5-2.0 hours. The focus group session will be taped, including obtaining verbal consent at the beginning of the session.

The length of time of your participation in this study will vary depending upon the phase or phases in which you are involved, as noted above. Data collection will take place over 10-12 weeks. In addition to time spent actively involved in the specified phases of the study, you may also be asked to answer questions about your interview if needed. This procedure is to make sure that the researcher has accurately and completely understood what you said during the interview.

Are there any benefits from participating in this study?

There may be no benefit to you directly from participating in this study. However, this study will add to what is known about the role of nurses within their working environment. Findings from this study will shed light on how we work together, and how to improve our work patterns. You

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will have a chance to add to the growing knowledge base as well as shaping your own practice environment.

COSTS

The only costs to you for taking part in this study is the time involved in an individual interview and/or focus group session.

What are the risks involved with being enrolled in this study ?

Breach of confidentiality presents the only foreseeable risk of participation in this study. Several measures are included in the design of the study to protect your confidentiality, and the identity of your unit. Consent forms will be the only paper with your name on it, and will be kept separately from any data. Taped interviews will be transcribed, and the tapes destroyed immediately afterward. All data will be stored on computer under password protection. The findings will be reported in the aggregate, therefore no individual's data will be identifiable. The nature of the data collected should not be highly sensitive or identifiable. It is anticipated that the measures to ensure confidentiality as described above will be effective.

Other important items you should know:

- **Withdrawal from the study:**

You may choose to stop your participation in this study at any time. Your decision to stop your participation will have no effect on your job status.

- **Data gathered from this study will be maintained as required by federal or state regulations.**

- **Confidentiality:**

Your privacy matters to us. Your research records will be confidential to the extent possible. In all records, a code number will be assigned to you and only the researchers will know your name. Your name will not be used in any reports or publications of this study. Your workplace will not be identified in any reports of this study.

- **Number of participants:** We expect 12-15 participants to enroll in this study.

Will you be paid to participate in this study?

You will receive a gift certificate worth $15.00 for the [redacted] to thank you for your participation in the study. Refreshments will be provided at the focus group session.

Whom should you call with questions about this study?

Questions about this study or concerns about a research related injury may be directed to the researcher in charge of this study:

[redacted]
Director of Nursing Research
[redacted]

[redacted]

or Lea R. Ayers, RN, MSN
Doctoral Candidate, UMASS/Worcester
Collaborative PhD in Nursing Program

lrayers@adelphia.net
Phone: 603.735.4010

If you have general questions about your rights as a research participant you may call the Office of the Committee for the Protection of Human Subjects at [redacted]

CONSENT

I have read the above information about *Nursing Practice as Knowledge Work within a Clinical Microsystem* and have been given an opportunity to ask questions. I agree to participate in this study and I have been given a copy of this signed consent document for my own records.

_____
Participant's Signature and Date

[redacted] CPHS Approved
JUL 06 2006

Appendix J

Letter of Introduction to ICN Nurses

July 27, 2005

Dear Intensive Care Nursery Nurse,

I am a doctoral candidate at the UMASS Graduate School of Nursing, and am interested in the nursing perspective of the professional practice environment.

I hope to construct a description of nurses' perspectives of the professional practice environment by exploring staff and travel nurses' views on what knowledge is essential for nurses to know about your practice environment in order to function effectively within it, and how that knowledge is communicated. In particular, I hope to describe what knowledge of organizational systems is required in providing patient care, and how nurses acquire that knowledge.

The three-part study will entail observation of the orientation process, individual interviews of seasoned and orienting staff, and a focus group. I will be recruiting staff and travel nurse volunteers to participate in individual interviews over the next few weeks. Interviews should last for about an hour. Observation of orienting nurses, integral to this study, will also require the consent of the orientee's preceptor. However, a participating preceptor's obligation will be limited to allowing me to shadow the orientation processes of the preceptor's orientee. Participants will receive a gift certificate to the [redacted] worth $15.00 as a token of appreciation for their involvement in the study.

[Your Unit Leader] has agreed to allow me to speak with you at one of your regularly scheduled staff meetings, at which time I will provide more details. In the meantime, I wanted to make you aware of my project. I hope you will consider participating in it. I can be reached through the contact information provided below, or through [redacted], Director of Nursing Research or [redacted], Unit Leader, ICN at [redacted]. I look forward to speaking with you.

Thank you,

Lea R. Ayers, RN, MSN
Doctoral Candidate, UMASS/Worcester
Collaborative PhD in Nursing Program
lrayers@adelphia.net
Phone: 603.735.4010

Appendix K

Introductory Staff Meeting Agenda

1) Introduce myself
2) Purpose of attending meeting
3) Description of study:
   a) Purpose:
   b) What I need/level of commitment:
   c) Interviews
      i) Available and willing to clarify questions if needed
      ii) 3 to 4 staff nurses for about 1.0 hour
      iii) 3 to 4 TNs for about 1.0 hour
      iv) 3 to 4 ARNPs for about 1.0 hour
4) Focus group
   a) Once for 1.5-2.0 hours
   b) Verify accuracy of transcripts at end of session

5) Consent details
   a) Confidentiality will be maintained by the investigator
   b) Participation or nonparticipation will have no bearing on employment status
   c) Agreement for me to share findings through presentation or publication

6) Dates: Approximately May to June 2005
7) Benefits to participants
   a) Contribution to knowledge base
   b) Possible improved quality of the professional practice environment
   c) Quality of care
   d) Job satisfaction
   e) Food
   f) Copies of any articles submitted for publication

Contact info:

Lea R. Ayers, RN, MSN
Doctoral Student
UMASS Graduate School of Nursing
Phone 603-735-4010
Lrayers@adelphia.net

Thank you for your time.

Appendix L

Demographic Data Collection Tool

	Item	Code		Column numbers	
1	Participant ID#				1, 2
				Skip 1	3
2	Position	1	Unit Leader		4
		2	CNS		
		3	NP		
		4	Staff Nurse		
		5	Travel Nurse		
		6	Nurse Educator		
				Skip 1	5
3	Participation in phase of this study	1	Observation		6
		2	Interview		
		3	Focus group		
				Skip 1	7
4	Gender	1	Female		8
		2	Male		
				Skip 1	9
5	Race/Ethnicity	1	American Indian or Alaskan Native		10
		2	Asian		
		3	Black or African American		
		4	Hispanic or Latino		
		5	Native Hawaiian or Pacific Islander		
		6	White		
		7	Unknown		
				Skip 1	11
6	Age in Years				12, 13
				Skip 1	14
7	Level of Nursing Education	1	Diploma		15
		2	Associate Degree		
		3	Baccalaureate Degree		
		4	Master's Degree		
		5	None of the above		
		6	Other (please name_____)		
				Skip 1	16
9	Years working as RN				17, 18
				Skip1	19
10	Length of time in position	_____Years			20, 21, 22,
		_____Months			(months)
		_____Weeks			
		_____Other			
				Skip 1	263
11	Professional Organization Memberships	Please name			27 string
				Skip 1	28,
12	Professional Certification	Please name			29 string

Appendix M

Interview Guide for Nurse Leaders

Leadership	RQ1	RQ2	RQ3
1. When you think about what you are trying to accomplish on this unit, what is important for nurses to understand about how the unit works?	XX		
2. How is this knowledge communicated to other leaders and staff nurses? [Probes: What formal mechanisms are in place? How effective are they? How have they evolved?]		XX	
3. How would your unit be different if you didn't have travel nurses? How do staff and travel nurses share information with each other? How do travel nurses engage in unit functioning? [Probes: Are there situations that promote or facilitate mutual learning among staff and travel nurses? How do travel nurses contribute to quality improvement of the ICN?]			XX

4. Is there anything you think I should know that I have not asked you about?

5. Summarize, clarify, and verify.

6. Thank participant, ensure of confidentiality of responses, and remind of potential for follow-up interview.

Appendix N

Interview Guide for Staff Nurses

Staff Nurses	RQ1	RQ:	RQ3
1. First of all, I would like you to think about yourself as new to the ICN. What was your orientation like? What was valuable about it? What did you wish you had learned that was missed? What did you learn the hard way?	XX		
2. Now, I would like you to think about your experiences orienting (or working with) nurses new to the ICN. How do you explain "how things work around here" that isn't included in the formal orientation process? [Probe: What about THIS unit is different, and important for a new nurse to know? How does your level of commitment to the successful functioning of the ICN influence your approach?]		XX	
3. What opportunities are available for sharing information and experiences between travel nurses and staff nurses on the ICN? How might the way travel nurses are utilized on your unit be improved? [Probe: Do you see any missed opportunities?]			XX
4. Is there anything you think I should know that I have not asked you about?			
5. Summarize, clarify, and verify.			
6. Thank participant, ensure of confidentiality of responses, and remind of potential for follow-up interview.			

Appendix O

Interview Guide for Travel Nurses

Travel Nurses	RQ1	RQ2	RQ3
1. Can you describe what a good orientation includes? What is essential? [Probe: Do you have any "need to know" information to be ready to jump into a new assignment (traveler)/job (staff nurse)? In your experience, what was missing from your orientation? [Probe: What did you learn the hard way?]	XX		
2. What can you tell me about how a unit functions that isn't part of the formal education or orientation? Since it isn't part of the formal process, how do you learn about it? How can you tell about how involved staff nurses are in the smooth function of the ICN? [Probe: collaborating across disciplines, governance, commitment?]		XX	
3. There is a necessary emphasis on your learning about a new unit. I would like to take a different angle: What contributions do you bring with your experience as a travel nurse? How does the unit benefit (or not benefit) from your knowledge? [Probe: How comfortable are you sharing suggestions of other settings--what worked or did not work? Or comparing settings? How often do you share this information? Do nurses ask, or do you volunteer?]			XX
4. Is there anything else that you think I should know that I haven't asked about in this interview?			
5. Summarize, clarify, and verify.			
6. Thank participant, ensure of confidentiality of responses, and remind of potential for follow-up interview.			

Appendix P

Focus Group Discussion Guide

Tuesday January 9th 9:30- 11:30 AM
[The Medical Center] , Auditorium B
Present: Investigator, Research Assistant, 5 nursing leaders

1) Agenda (15')
   a) Welcome and thank you.
   b) Introduce Research Assistant
      i) Melissa will be helping me to make sure that I have captured the information that is set loose during this focus group.
      ii) I have my two tape recorders running (One for back-up), and Melissa will be taking some notes. I will also make notes if there is something that I want to make sure that we return to, or don't lose threads of our discussion.
      iii) We also have a flip chart to capture comments so that we can all see them.
   c) Overview of Purpose:
      i) To get more description of the components of systems knowledge about a microsystem needed by nurses working within it, and
      ii) To get more description of the ways that knowledge about systems is transferred between nurses.
   d) Consent forms and demographic data sheets.
   e) Ground Rules
      i) Speak one at a time
      ii) Speak loud enough for tape recorder to pick up
      iii) Everyone's comments are important
      iv) Session will last approximately 90 minutes.
      v) Please help yourself to refreshments
2) Questions:
   a) What are the critical elements of your unit culture that must be understood in order for nurses to practice effectively on your unit? (Research Q1) [20']
   b) What, if any differences exist between what information is essential for new staff nurses and what information is essential for travelers coming onto your unit to work? (Research Q's 1 & 3) [20']
   c) What do nurses teach each other about the way that microsystems work? (Research Q2) [30']
      i) What do you teach staff and travel nurses?
      ii) What do staff and travel nurses teach you?
      iii) What do travel nurses teach you and the direct care nursing staff? And how does this occur? (Research Q3)
      iv) What initiatives –formal or informal- are currently in place for sharing this information within the unit, and beyond?
   d) Is there anything else?