A Narrative Study of Nurses’ Interactions
When Using Health Information Technology

by

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ABSTRACT

Nurses are using health information technology during patient care activities in acute care at an unprecedented rate. Previous literature has presented nurses’ response to technology obstacles as a work-around, a negative behavior. Using a narrative inquiry in one hospital unit, this dissertation examines nurses’ interactions when they encounter technology obstacles from a complexity science perspective. In this alternative view, outcomes are understood to emerge from tensions in the environment through nonlinear and self-organizing interactions. Innovation is a process of changing interaction patterns to bring about transformation in practices or products that have the potential to contribute to social wellbeing, such as better care. Innovation was found when nurses responded to health information technology obstacles with self-organizing interactions, sensitivity to initial conditions, multidirectionality, and their actions were influenced by a plethora of sets of rules. Nurses self-organized with co-workers to find a better way to deliver care to patients when using technology. Nurses rarely told others outside their work-group of the obstacles that occurred in their everyday interactions, including hospital-wide process improvement committees. Managers were infrequently consulted when nurses encountered technology obstacles, and often nurses did not find solutions to their obstacles when they contacted the Help Desk. Opportunities exist to facilitate interactions among nurses and other members of the organization to realize better use of health information technology that improves quality and safety while decreasing cost in the patient experience.
This work is dedicated to my nieces and nephews, and future generations.

It is in your interactions with those around you that the world will become a better place.

Rebecca, Elizabeth, Abigail, Natalie, Hannah, and Timothy, this is for you.
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<td>ARRA</td>
<td>American Recovery and Reinvestment Act of 2009</td>
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<td>BCMA</td>
<td>Barcode medication administration</td>
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<td>CAS</td>
<td>Complex adaptive system</td>
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<td>CMS</td>
<td>Centers for Medicare &amp; Medicaid Services</td>
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<tr>
<td>CRP</td>
<td>Complex responsive processes of relating</td>
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<tr>
<td>ED</td>
<td>Emergency department</td>
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<td>EHR</td>
<td>Electronic health record</td>
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<td>HIT</td>
<td>Health information technology</td>
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<td>HITECH</td>
<td>Health information technology for Economic and Clinical Health Act</td>
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<td>HUC</td>
<td>Health unit coordinator</td>
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<td>IS</td>
<td>Information systems</td>
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Chapter 1

INTRODUCTION

Background and Significance

Nurses encounter many organizational challenges in their daily interactions with patients in hospitals. Their practice, using the nursing process, is built upon a modified linear scientific method, moving from one task to the next, including assessment, diagnosis, planning, implementation, and evaluation (Benner, Sutphen, Leonard, & Day, 2010). The work of nursing also includes coordinating and integrating care and services from multiple providers, moving the work from a linear model to one that is increasingly complex and unpredictable (Institute of Medicine, 2010). According to nursing scholars, nurses are trained to use the scientific method in assessing situations, planning action, and evaluating outcomes. But trying to fit the complex phenomenon that nursing studies, the mutual human-environment process, into a simple linear model of cause and effect (determinism) does not work well. (Davidson & Topolski, 2011, p. 62)

Nurses are constantly challenged by changes in patients’ conditions because they present the greatest puzzles and sources of ambiguity; thus nurses must continually recognize, interpret, forecast, and respond to these transitions (Benner, Kyriakidis, & Stannard, 2011). When nurses encounter obstacles in this work, such as when a patient identification band does not scan using barcode medication administration (BCMA) technology, they are challenged to work around the obstacle to meet patient needs and desires, end the current task or patient care process, or wait for someone to remove the obstacle in the workflow. Work-arounds have been described as a nonstandard approach of nurses to solving a problem while using health information technology (HIT) when delivering care to patients (Halbesleben, Wakefield, & Wakefield, 2008; Varpio, Schryer,
& Lingard, 2009). Most recently, work-arounds have been described as “situations where one experiences a block in workflow and, rather than complete the work processes as intended, creates an idiosyncratic solution to get around the block” (Halbesleben, Rathert, & Bennett, 2013, p. 50). Vestal (2008) noted that nurses have artfully turned working around obstacles into a way of work life. This study aims to better understand and describe nurses’ use of HIT and ways they work around HIT obstacles using an emerging theoretical framework and cutting-edge analysis technique.

Most nurses work in complex hospital organization environments with many interdependent professionals, staff, vendors, and services organized for quality patient care. In addition to interacting with many people and organizations in the course of offering patient care, nurses also interact with HIT as they engage in patient care, adding to the complex context of care. The hospital environment is considered complex since interactions among the components of the system and the interaction between the system and its environment cannot be fully understood as a whole simply by analyzing its components (Uhl-Bien, Marion, & McKelvey, 2008). The operations of a hospital cannot be fully understood by analyzing nurses’ activities with patients. The diverse interdependent professionals and complex environment are assumed to be in concert to bring about quality outcomes for patients; yet this is not always the case.

Significant concern about patient care quality in these complex healthcare organizations has been identified. In several reports and studies, the prevalence of healthcare errors are well documented. The Institute of Medicine (IOM) report To Err is Human (Kohn, Corrigan, & Donaldson, 2000) revealed disturbing quality of care issues. The report states that up to 98,000 people die each year as a result of medical errors in
American hospitals. The report asserts that most medical errors result from system and process issues, rather than clinician misconduct or negligence. In another report, *Crossing the Quality Chasm* (2001), the IOM recommended making changes to American health care at four embedded levels: Level A, the experience of patients; Level B, the functioning of small units of care delivery or micro-systems; Level C, the functioning of organizations that house or otherwise support micro-systems; and Level D, the environment of policy, payment, regulation, accreditation, and other such factors (Berwick, 2002). The 2001 report asserts that the quality of actions at levels B, C, and D ought to be defined as the effects of those actions at Level A, the patient experience, and in no other way (Berwick, 2002). This assertion draws attention to the fact that the interdependent interactions among and between the multiple levels of health care delivery must operate together to achieve quality patient outcomes. The Aims for Improvement within the 2001 IOM report focus on this local notion and identify six aims to be embraced: safety, effectiveness, patient-centeredness, timeliness, efficiency, and equity (Berwick, 2002). In a 2005 interview, Berwick stated, “The pace and improvement of care itself are still very disappointing” (as cited in Galvin, 2005, p. W 5-1). Leadership in complex healthcare organizations can significantly influence patient care processes and resulting quality by identifying and understanding the interactions nurses participate in when they encounter HIT obstacles and ways in which they work around them. Understanding and describing nurses’ behavior may lead to more comprehensive insights into what and who influences work-arounds.

Leadership at the national, organizational, and unit levels influences how care is delivered to patients at the point of service. According to Berwick (2002), leadership at
the local level is best positioned to improve quality and safety of healthcare delivery. Thus, there is an opportunity to re-examine current leadership practices and HIT implementation practices in which nurses are involved. The value of re-examining leadership and technology implementation practices lies in the opportunity to improve quality outcomes for patients.

In an attempt to accomplish the national goals as well as improve systems and processes, leaders have utilized standardized care designs when implementing change. These standardized designs may overlook the unique nurse-patient interactions upon which nursing is grounded (Davidson, Ray, & Turkel, 2011). In creating standardized care activities, an abstractness results and significant individual interactions are overlooked (Scott, 1998). Leaders at the organization and unit levels have created standardized change plans using a project management framework in an attempt to control activities at the point of service, believing they can predict a future state (outcome). In reality, the future cannot be known given that people are always changing patterns based on local influences that have diverse outcomes (Stacey, 2001). In order to have an impact on the safety, effectiveness, patient-centeredness, timeliness, efficiency, and equity of the patient experience, national policies and standardized processes are being filtered through organizational and then unit leadership to be implemented at the point of service. Currently, implementation of HIT, electronic health records (EHR) specifically, has received much national attention in policies and standards that affect nursing practice.

HIT is being implemented at unprecedented rates to improve quality and efficiency, and to decrease healthcare costs. In 2009 President Obama signed legislation
to spur the use of HIT in healthcare, linking meaningful use to reimbursement for services with federal dollars. Unfortunately, these goals have not been realized with current implementation strategies (DesRoches et al., 2010; Himmelstein, Wright, & Woodhandler, 2010; Nebeker, Hoffman, Weir, Bennett, & Hurdle, 2005) that have been directed by project managers (Bove, 2009) using hierarchical, top-down, standardized blueprints.

The complex nature of nursing practice necessitates complex and sophisticated integration of nursing practice along with HIT implementation that accounts for its multidirectional nature and for the dynamic interdependencies of human caring, given that the future is unknowable. Rather than trying to isolate causative factors of nurses working around HIT, this research aims to explore dynamic human interactions of nursing practice in order to illuminate and describe the complex social context in which nursing care is lived out every day.

The conceptual model guiding this study incorporates dynamic movement of four constructs that produce either continuity or transformation in the everyday interactions of nurses. The four constructs that bring about continuity or transformation in everyday interactions are self-organization, sensitivity to initial conditions, multidirectional interactions, and the influence of a plethora of sets of rules. Within all interactions, these four constructs have the capacity to generate continuation of the same or new patterns. When an HIT obstacle is encountered by nurses in their work, the dynamic movement of these constructs has the potential to produce transformation, either destruction or innovation. It is in local human interaction that is self-organizing, sensitive to initial conditions, multidirectional, and influenced by a plethora of sets of rules that
improvements to care can be found. This study was guided by the conceptual model in an effort to understand and describe nurses’ interactions when they use HIT and work around HIT obstacles that provide the potential for innovation to emerge.

**Problem Statement**

Health information technology was designed to improve the quality and efficiency of the patient experience, as well as to reduce cost of healthcare (DesRoches et al., 2010; Himmelstein et al., 2010; Nebeker et al., 2005). Leaders within hospitals have devised linear project plans to guide nurses during the implementation of HIT in their organizations; however, these implementation plans have not yet realized improved quality or efficiency, or decrease in cost. These linear plans have been created using a positivist, or scientific method perspective, in which outcomes are predicted using control and certainty in an environment that is unpredictable; a complicating factor is that nursing practice seldom plays out as a linear process when in caring relationships with patients (Benner, Tanner, & Chesla, 2009; Davidson et al., 2011; Watson, 1985). Thus, incongruence results between the designed work and the actual work that is carried out within an environment in which nurses work. In the IOM report (2010), *The Future of Nursing* calls for collaboration among healthcare professionals to improve the health care system, which includes the use of HIT. To describe how nurses make meaning in their work with patients and HIT, this study seeks to understand the interactions nurses engage in when they create new approaches to workflow when using HIT. Nurses address obstacles as urgent issues to be resolved in workflow with creativity, insight, and expectations for success (Benner et al., 2009; Davidson et al, 2011; Watson, 1985). Unfortunately, these creative approaches are often seen as short-sighted and deviant;
further, they are considered violations of standardized processes (Koppel, Wetterneck, Telles, & Karsh, 2008; Tucker & Edmondson, 2002).

**Statement of Purpose and Research Questions**

The purpose of this study, conducted using complex responsive processes (CRP), a cutting-edge analysis technique, was to describe and understand the day-to-day human interaction experiences of nurses when obstacles are encountered. This study also provides information about implementation strategies so that creative ideas generated by nurses, technology designers, and organizational leaders may be recognized and used to deliver efficient, safe, effective, timely, patient-centered care. This study describes interactions between nurses and patients, as well as between nurses and the healthcare team, when HIT obstacles are encountered. In addition, this study investigates the potential for nurse interactions to reduce the occurrence of errors and increase quality through collaboration when faced with HIT obstacles (IOM, 2010).

The goal of this research was to inform valuable and needed perspectives that may improve quality of care by implementing HIT while addressing the larger perspective of organizational leadership in planned change. The conceptual model and research method of this study provide a unique perspective of meaning being made in human interaction, and this is where outcomes emerge. Understanding the dynamics of the nurse-patient relationship has important implications for leadership and organizational development, as do the dynamics of interactions among nurses and the rest of the healthcare team. Framing human interactions as central to nursing practice and use of HIT in the daily work activities within a hospital context allows attention to be given to the experiences and relationships of nurses, with the potential to improve quality.
The research method, complex responsive processes (CRP), places a focus on human interaction within the organization, since this is where change occurs, rather than on the function of the system that brings about change (Stacey, Griffin, & Shaw, 2000). An exploration of the interactions of nurses with other members of the healthcare team may provide insight into the way that HIT as currently implemented is limiting flexibility of nursing care in the patient experience. My anticipation was that, through a better understanding of nursing practice as emergent, self-organizing, sensitive to initial conditions, multidirectional, and influenced by a plethora of sets of rules, HIT implementation strategies can be improved. To shed light on the problem, the overarching research question guiding this inquiry is “How do human interactions among and between nurses guide their use of HIT when in caring relationships with patients?” The four subquestions for this inquiry are:

1) What narrative themes characterize the experience of nurses using HIT?
2) What interactions do nurses participate in when they encounter an HIT obstacle?
3) What are the norms and values (ideology) associated with the experience of nurses using HIT?
4) What are the power relations associated with the experience of nurses using HIT?

**Researcher’s Assumptions**

I have experience as a direct care nurse during HIT implementation, as the one who trained nurses to use HIT and modified the HIT to better match the nurses’ workflow. I also have experience as a unit manager within a hospital. This background was drawn upon to help understand and describe the human interactions of nursing practice and HIT implementation, including work-arounds.
Based on my experience and background in a hospital during implementation of HIT, I made four assumptions regarding this study. First, the majority of nursing practice is characterized by self-organizing interactions that are sensitive to initial conditions as well as multidirectional and influenced by a plethora of sets of rules from which outcomes emerge. These assumptions are based on insights from complexity science that describe diversity and interconnectedness in the human experience. It is also important to note that nursing practice can be linear rather than complexity driven. An example is in the enforcement of regulatory requirements such as hand washing or infection control precautions. At times, nurses may follow linear processes such as bureaucratic regulatory policies, thereby giving the nurse-patient relationship secondary placement. Second, HIT is not the driver of care processes; it is a tool to assist in providing quality patient care. This assumption is premised on the development of EHRs and other HIT add-ins that have been engineered to aid in communication and coordination of care. Third, because HIT has been developed to aid in communication and coordination of care, approaches to care may need to surpass concrete linear thinking and create an environment of interdependent human interactions that will deliver the most effective patient-centered care by allowing for flexibility in patient situations. Nursing practice is based on human relationships and values the choices patients make for their care and healing. Fourth and finally, an assumption made in conducting this study was that knowledge is co-constructed in human interactions. This assumption was based upon the premise that human experience informs morals and values that guide human action and knowledge creation.
Review of the Literature

An ongoing and selective review of relevant literature was conducted to inform this study. The impetus of the literature search was to identify links between nurses working around HIT and patient care activities. The focus of the review was on gaining a better understanding of HIT implementation in hospitals in terms of its impact on innovation in leadership and nursing practice. Seven major areas were explored: work-arounds, the theoretical underpinnings of nurse practice, the history and role of HIT, HIT implementation outcomes, innovation, organizational culture, and theories of leadership. The review of leadership models focused on control, motivation of workers, ideas of stability, and capacity for innovation. Interactions of nurses, managers, and project managers had not been previously explored as a way to understand work-arounds when using HIT. Leadership is understood as a process that influences patterns to achieve a common goal (Hatch, 2004; Northouse, 2010). Throughout this review, efforts were made to point out important gaps and omissions in particular segments of the literature when they became apparent. In addition, relevant contested areas or issues were identified and discussed. The interpretive summary that concludes the chapter illustrates how the literature informed my understanding of the interdependent interactions among healthcare providers that contributes to my description and understanding of work-arounds.

Work-Arounds. The term work-around started to appear in nursing literature in 2004 in the context of using technology. Anderson (2004) found that in highly technical areas such as cardiology, nurses can promote quality of care by keeping patients as their primary focus and working around technology. Work-arounds are artfully developed,
clever, alternative approaches that allow nurses to live with a broken system (Ash, Berg, & Coiera, 2004). Consistent with other studies (Koppel et al., 2008; Tucker, 2004; Tucker, 2007; Tucker & Edmondson, 2002; Tucker et al., 2002), Vogelsmeier, Halbesleben, and Scott-Cawiezell (2008) found that nurses engage in problem solving behaviors, or work-arounds, to overcome workflow obstacles. A review of literature revealed five sources of obstacles encountered by healthcare professionals: policies/laws/regulations, protocols, process/design/flow, technology, and people (Halbesleben et al., 2008). Poorly designed processes, often related to staffing, have been found to be the most common source of work-arounds (Halbesleben, 2008), and work-arounds were likely to take place during the implementation of new technology (Halbesleben et al., 2008). Work-arounds can be differentiated from similar constructs such as errors, mistakes, or deviance; they are nonstandard approaches to solve blocks in order to get the work done (Halbesleben et al., 2008).

Several studies have explored the antecedents and consequences of obstacles, or operational failures, nurses encounter in their workflow and how nurses overcome these obstacles to deliver care to their patients. Tucker (2004, 2007) and colleagues (Tucker & Edmondson, 2002; Tucker et al., 2002; Tucker & Spear, 2006) have investigated the problem solving behaviors of nurses when they encounter an obstacle in their daily activities with patients. Halbesleben and colleagues (Halbesleben et al., 2008; Vogelsmeier, Halbesleben, and Scott-Cawiezell, 2008) have also studied work-arounds by nurses as problem solving behaviors, from a perspective of worker wellbeing and organizational processes to be improved.
In their daily workflow, nurses encounter problem solving behavior stemming from failures in hospital operations, including implementation of HIT. “The work design of hospital nurses,” observed Tucker and Edmondson (2002), “leads them to respond to exceptions through first-order problem solving, addressing only immediate symptoms without attempting to alter underlying causes” (p. 87). Exceptions to workflow are failures “in the design or execution of the work system” (p. 89), and they occur so frequently as to be considered almost routine. The reality of nursing workflow in hospitals is different from that in manufacturing, where most problem solving techniques were developed (Tucker & Edmondson, 2002). Although frustrated by them, nurses seem resigned to the daily obstacles that are inevitably present in providing individualized care and healing (Tucker, 2004). According to Tucker (2004), there is a paradox in nurses’ work processes: Both managers and nurses expressed the belief that given the high degree of uncertainty and task interdependence, work system failures are unavoidable when providing care to patients; however, nursing work was designed as if these failures never occurred. Operational failures such as designed processes have been recognized as antecedents to hospital nurses’ use of first-order problem solving behavior.

Antecedents to nurses’ obstacles come from activities throughout the hospital, including nurses’ own work activity, their nursing unit’s activities, and activities of groups outside of their nursing unit (Tucker, 2004). Most operational failures have been identified with breakdowns in the supply of material/information across organizational boundaries (Tucker, 2004). Tucker (2004) completed her study prior to the unprecedented implementation of HIT in patient care, so her examples did not include use of HIT; her work explored exceptions in nurses’ daily routines. Examples of these
frequent exceptions in nurses’ activities include a shortage of supplies and equipment, short staffing, preparation of a patient for transfer and the subsequent discovery that the transfer has been canceled, and preparation of a medication for administration only to find out it has been discontinued (Tucker, 2004). Breakdowns in the supply of materials or information across organizational boundaries arise predominately during preparation for care delivery (Tucker, 2004). Often, first-order problem solving behavior has allowed nurses to complete patient care activities, as they are centrally concerned with the need to continue with patient care when faced with exceptions (Tucker & Edmondson, 2002). Surprisingly, managers were aware of operational failures only 4% of the time (Tucker, 2004). Further, Tucker (2004) identified organizational conditions such as lack of control over the design of workflow creates failures they encounter. Consistent with Tucker’s findings, breakdowns in supplies were identified by Halbesleben, Savage, Wakefield, and Wakefield (2010), Koppel, Wetterneck, Telles, and Karsh (2008), Tucker (2007), and Tucker and Spear (2006) as daily organizational obstacles nurses face. After experiencing first-order problem solving behaviors, nurses may seek resolution through second-order problem solving behaviors.

Second-order problem solving behaviors are attempts to make changes to the system so that the problems do not reappear, in addition to remedying the immediate failure (Tucker & Edmondson, 2002). Second-order problem solving behavior includes communicating about exceptions to people in a position to address underlying causes, removing root causes, and experimenting in a structured fashion (Tucker & Edmondson, 2002). Tucker et al. (2002) noted that the reasons nurses participate in first-order rather than second-order problem solving behaviors are the lack of time to analyze root causes
and the failure of physicians and managers to provide necessary information or attention to address nurses’ concerns. These behaviors usually require collaboration, either within the nurse’s unit or outside the nursing unit, to remove the obstacle. Tucker and Edmondson (2002) found that second-order problem solving was hindered when the nurse manager or a designated resource person was not physically present to provide guidance and support to nurses in order to address exceptions. Antecedents to problem solving behavior are multifaceted and multidirectional, creating challenges for nurses and consequences for patients and the organization.

First-order and second-order problem solving behaviors may have consequences. Tucker (2004) noted, “In general, failures were simple to work around and appeared to individually have minimal consequences for nurses and patients” (p. 159). A consequence of first-order problem solving is nurses’ short-sighted contribution to the persistence of organizational failures (Tucker et al., 2002), as well as possible negative impact on patient safety (Tucker & Edmondson, 2002). Environmental conditions, including the lack of communication that spans department boundaries, internal supply failures, and designed top-down process improvement activities, contribute to nurses’ choosing first-order problem solving.

HIT obstacles have been explored as a source of nurses’ work-arounds. Halbesleben investigated work-arounds with the goal of understanding worker wellbeing; he recognized that innovative solutions can come from work process failures and lead to greater productivity, yet they have potential safety issues (J. R. B. Halbesleben, personal communication, October 31, 2011). Vogelsmeier et al. (2008) identified antecedents to work-arounds as being categorized by two distinct patterns: those found to be related to
workflow obstacles introduced by HIT (either intentional or unintentional), and those associated with organizational processes not re-engineered to integrate effectively with the new HIT. Consequences of work-arounds have been identified as hassles, negative impact on employee satisfaction, and a potential for medical errors (Halbesleben et al., 2008; Koppel et al., 2008; Tucker, 2004; Tucker, 2007; Vogelsmeier et al., 2008). Little attempt has been made to quantify the risk to patients from work-arounds, and little empirical validation that harm has resulted has been documented (Halbesleben et al., 2008).

An alternative perspective on work-arounds comes from organizational leadership literature, informed by complexity science that describes adjustment to environmental tensions as work-arounds, learning, and innovation. Uhl-Bien, Marion, and McKelvey (2008) noted work-arounds are “adaptive responses to environmental problems” (p. 194). In work-arounds, implemented at the intersection of environmental tensions, self-organizing networks of people increase their complexity, enhance their ability to process data, solve problems, learn, and change creatively (Uhl-Bien et al., 2008). From this perspective, interdependent nurses have the capacity to diversify their behaviors or strategies. Work-arounds, learning, and new knowledge are seen in nurses’ adaptive responses to environmental pressures, such as using HIT during care and healing activities.

Work-arounds have been investigated in several studies. The common perspective in the healthcare literature (Tucker, 2004; Tucker, 2007, Tucker & Edmondson, 2002; Tucker et al., 2002; Tucker & Spear, 2006) reflects a “quality engineering in manufacturing setting” (Tucker, 2004, p. 154) viewpoint, suggesting that healthcare
organizations optimally operate like a well-designed machine, assuming well-designed operations produce predictable outcomes. The research on nurses’ first-order problem solving behaviors and work-arounds has been conducted from a perspective that assumes these behaviors deviate from planned change orchestrated by organizational leaders. The potential for patient harm has been identified as a consequence when nurses do not carry out activities as designed. Nurses are challenged by the obstacles in their daily patient care activities (Ash et al., 2004; Halbesleben, 2008; Halbesleben et al., 2008; Koppel et al., 2008; Tucker, 2004; Tucker, 2007, Tucker & Edmondson, 2002; Tucker et al., 2002; Tucker & Spear, 2006; Vogelsmeier et al., 2008). An alternative perspective on work-arounds encourages leaders to influence interactions of people at points of organizational tension to facilitate adaptation, learning, and knowledge creation. Studies conducted by healthcare researchers have examined organizational-level variables to describe the daily obstacles in nurses’ workflow in order to predict operations of a smooth-running machine, but few have explored explicitly daily interactions of nurses as an explanatory variable in accounting for work-arounds.

**Nursing Practice.** It is important to understand the theoretical perspective on nursing practice to illuminate work-arounds as nurses encounter HIT obstacles as they engage in patient care activities. Nursing practice takes place in the context of human interactions in complex environments. When operating in an environment of care and healing, nurses have been directed to use HIT in the assumption that doing so will improve quality and safety while decreasing costs. Nursing practice is multidirectional, as nurses coordinate care with other clinicians and patients in a complex environment that holds both stable and unstable outcomes. This is evident as nurses incorporate caring
activities in the context of the environment, which includes time and space, in such a manner that past and potential futures meet in the present experience (Kuhn, 2007; Watson, 2008). Watson’s (2008) philosophy illuminated caring science as the essence of nursing (Davidson et al., 2011). Watson noted that nursing practice lies in the dynamic transpersonal relationship between nurse and patient that involves ethical choice and action within the present moment (past, future, and present all at once), which manifests the potential for harmony of body, mind, and soul. Nurses engage in caring relationships that include patients, self, and other healthcare professionals, as well as their organization’s bureaucracies and culture environments. Nursing is about forming caring relationships for healing and well-being within a complex environment.

Watson (2008) noted that the art and science of nursing lies in developing caring relationships in which the individual cannot be separated from others and nature. Nurses are educated and enculturated to the relationship of caring within a mutual human-environment health experience. Nurses may focus more on creating an environment of care and healing than on the bureaucracies of technology implementation, economics, politics, and the legal constraints of the organizational system (Davidson et al., 2011). Caring is humanistic and spiritual; it is an ethical phenomenon as well, as it integrates knowledge of the socio-cultural environment, including technological, economic, political, and legal dimensions into its meaning structure and conceptual foundation (Ray, Turkel, & Cohn, 2011). Nursing is rooted in caring actions within the human-environment relationship, as described by Nightingale (1859/1969), who “is widely credited as being the first nurse to study and reach an understanding of the interactive effects of environment, hygiene, nutrition, and nursing actions on health and survival.”
Nursing practice is caring for individuals and families that are in a dynamic dance with others and their environment throughout the course of their life.

Nursing, like other health disciplines, is guided by evidence-based practice. Evidence-based practice is the “conscientious use of current best evidence in making decisions about patient care” (Melnyk & Fineout-Overholt, 2005, p. 6). This is a problem solving approach to clinical practice that integrates a systematic search for and critical appraisal of the most relevant evidence to answer clinical questions incorporating the nurse’s own clinical expertise and the patient’s preferences and values (Melnyk & Fineout-Overholt, 2005). Evidence-based practice has moved clinical decision making from a linear, mechanistic perspective to one that incorporates environmental tensions. In other words, this clinical practice problem solving approach is not a linear standardization of care processes, but rather uses a perspective of interdependency, multidirectionality, and unpredictability by integrating the most relevant evidence along with dynamic relational interactions into decisions regarding care.

Nurses are challenged by using HIT in hospitals, possibly because of the linear nature of HIT implementation and the multidirectional nature of care activities. Benner (2001) noted that nursing practice is socially organized and is an embedded form of knowledge and ethics. Clinical knowledge is composed of experience in practice situations based on propositions, hypotheses, and principle-based expectations (theory-based scientific investigations) (Benner, 2001). Based on unique patient situations in clinical practice, nurses have been schooled in clinical reasoning by using cognitive capacities to think in relation to the particular demands of the clinical situation (Benner et
Clinical reasoning-in-transition is a form of practical reasoning necessary for nurses when they are caring for unique patients (Benner et al., 2010). Nurses rely on the ability to exercise clinical reasoning through nonstandardized approaches when using HIT tools in the delivery of patient-centered care. Therefore, nurses domesticate or work around designed work practices to balance technological and regulatory demands with the need to provide patient-centered care in an efficient and a cost-effective manner (Halbesleben et al., 2008).

The use of HIT has changed the landscape of nursing practice (Benner et al., 2010). Adapting the use of HIT in patient care requires clinical reasoning, understanding of the patient’s condition, and the proper training. Using HIT in clinical care also requires knowledge of regulatory requirements, the ability to make decisions based upon the best evidence, and fluid communication. In the next section, a review of literature on the history and role of HIT in healthcare will describe how the unprecedented volume of HIT implementation in hospitals has changed the landscape of nursing practice.

**History and Role of HIT.** Describing the history and role of HIT in nursing practice sheds light on why HIT has been implemented in healthcare with expectations of improving safety and quality of care. The use of HIT, such as the electronic health record, is fairly new in healthcare. HIT has been described as using computers, software, Internet connection, and telemedicine as a means to improve the quality of health care, the health of the populations, and the efficiency of health care systems (Blumenthal, 2009). The aim of health information systems since the 1960s has been to contribute to high quality, efficient, patient-centered care, including the administrative and management tasks needed to support such care (Haux, 2006).
The first article on computerized medical records, by Davis, was published in 1970; it projected a prototype for future computerized medical records (Wen, Ho, Jian, Li, & Hsu, 2007). Informaticians recognized that a strategy for allowing clinical and researcher-oriented users direct access to a computerized medical record was essential in terms of storing medical data, as such a strategy would make available information about the current and all previous patient visits (Davis, 1970). Between the 1960s and the 1980s, healthcare informaticians were mostly focused on small applications in special departments of a hospital, such as the laboratory, radiology, or administration units dealing with departmental information systems (Haux, 2006). Davis recognized the need for a file structure that encompassed accessible data within various medical applications for receiving, storing, and retrieving medical data for patients of the Kaiser-Permanente health care system. From 1970 to the 1990s, informaticians broadened their views on computer-supported information systems, considering information processing throughout a hospital as a whole (Haux, 2006). Most of the efforts from the 1960s to the 1990s were focused on computer-supported information systems’ technical problems, and then there was a shift to recognition of organizational problems, as well as relevant social issues and change management elements that are relevant when using information systems (Haux, 2006). From the 1990s to 2005, informaticians broadly explored patient-centered information processing in health information systems (Haux, 2006). Consistent with the literature of nursing practice using HIT, Haux (2006) identified in the 21st century that nontechnological issues have become dominant in the field of health information systems.
To improve the quality of health care offered to individuals and groups while reducing cost, a variety of electronic methods were implemented to reduce errors, manage health information, and facilitate communication (Robert Wood Johnson Foundation, 2006). The adoption and use of HIT is at the forefront of healthcare reform in America. The U.S. Department of Health & Human Services (2008) stated, “A transformation in health care is being enabled by health IT [information technology], and the potential for information technology to have an impact on health care safety, cost, and quality is great” (p. 7). As HIT initiatives gain momentum, practitioners increasingly understand that HIT can: a) improve the coordination of care through increased sharing of health information among clinicians, elevating the standard of care for everyone; b) provide individuals with electronic access to their own health and wellness information; and c) improve the health of the community using aggregated health data for research (U.S. Department of Health & Human Services, 2008). The EHR has been described as a portion of HIT that holds the health-related information of an individual and conforms to nationally recognized interoperability standards, allowing authorized clinicians and staff across more than one health care organization to create and manage data, thereby facilitating collaborative care (U.S. Department of Health & Human Services, 2008). Embedded within EHRs are other HIT applications to support care-related activities, either directly or indirectly, via interfaces such as barcode medication administration, clinical decision support, and computer provider order entry (Wears & Berg, 2005). The EHR “automates and streamlines the clinician’s workflow” (HIMSS, n.d., (paragraph 1).

The use of information technology in healthcare has been lagging compared to other industries; therefore, to stimulate the implementation of HIT, a series of major
policy initiatives was launched in 2004 with the purpose of advancing the adoption of HIT (DesRoches et al., 2010). To support the implementation of the HIT, President Obama signed the American Recovery and Reinvestment Act of 2009 (ARRA), which houses the Health Information Technology Economic and Clinical Health (HITECH) plans and guidelines. Healthcare organizations, hospitals specifically, are at different stages of implementing HIT such as EHRs; a 2008 survey of US hospitals found 1.5% have implemented a comprehensive EHR across all major clinical units, and an additional 7.6% had a basic EHR that included physician and nursing notes that are available in at least one clinical unit (Jha et al., 2009). These statistics confirm the notion that more than 90% of hospitals are, or soon will be, implementing new technologies. Health care organizations have been developing the broad use of HIT since the 1960s in an attempt to improve the quality while decreasing the cost of healthcare, yet most providers are not using these tools in their daily practice. Realizing the national HIT goals will require the coordination of efforts to achieve those goals.

**Leadership influence on use of HIT.** Organizational leaders influence the implementation strategy of HIT. In many organizations, HIT implementation is designed by nonclinicians as planned change for nurses to carry out to achieve predetermined outcomes. Transactional, transformational, and complexity models of leadership guide leaders’ behavior in leading change within a hospital organization, regarding locus of control, certainty, and predictability (Uhl-Bien & Marion, 2008). Work-arounds have previously been studied as unplanned change shifting the locus of control from leaders to nurses who are using HIT. Successful implementation of HIT is strongly influenced by organizational leadership. Whittaker, Aufdenkamp, and Tinley (2009) identified that
leaders could manage the obstacles when implementing an EHR system to facilitate the change process for nurses, for example by having clearly communicated expectations of direct care nurses, having applications that are complete before training begins so that content is stable throughout the training period, and facilitating information sharing among the technology designers and nurses. As the largest group of health care providers, nurses play a pivotal role in the adoption and use of HIT in hospitals (Dunton, Gajewski, Klaus, & Pierson, 2007). In healthcare organizations, strong predictors of successful implementation of HIT are related to organizational environments and communication, as well as to change management processes (Brender, Ammenwerth, Nykanen, & Talmon, 2006). Organizational leaders can facilitate communication among all agents involved in change projects to influence successful implementation and use of HIT in hospitals.

Leaders may be able to facilitate communication and innovation in their organization to achieve successful implementation and use of HIT; however, the literature suggests this shift is difficult to accomplish. Wears and Berg (2005) noted that approximately 75% of all large HIT projects fail for a variety of reasons. Failures in EHR implementation have many contributing factors such as failure to technically complete an appropriate system, failure by end users to accept the system, and failure to integrate the culture of the organization (Brender et al., 2006). DesRoches et al. (2010) noted that if implementation of HIT projects is to be successful, clinicians’ activities must be appropriately supported.

*Nurses’ use of HIT*. Exploring nurses’ use of HIT illuminates how nursing practice has changed as a result of HIT. The changes brought about by HIT have challenged nurses’ ability to provide patient-centered, quality care when faced with HIT
obstacles. Sweeping technological changes have altered the context and substance of nurses’ work since the 1970s (Benner et al., 2010). Documentation of patient assessment and nursing interventions are moving toward more and broader use of EHRs. The EHR contains flow sheets and free text boxes as a repository for data, as well as a communication tool to post laboratory and diagnostic test results so that all clinicians have access to the results as soon as they are available. Provider order entry software has changed how nurses receive orders for patients by directly receiving them on the computer. Other applications of EHRs are also used as a source of data to determine the quality, efficiency, and cost of health care for individuals and populations by researchers. HIT are being used in conjunction with EHRs for the delivery of patient care measures such as barcode medication administration, medication dispensing machines, and devices to gather data and document bedside monitoring, for example blood glucose monitoring. Nurses encounter many components of HIT in their daily activities with patients.

Nurses can experience numerous challenges in the use of HIT as well as in their daily activities. Interestingly, prior to the technology boom, Tucker and Spear (2006) found that nurses experienced an average of 8.4 operational failures in work processes per 8-hour shift. Operational failures were defined as “the inability of the work system to reliably provide information, services, and supplies when, where and to whom needed” (p. 646). Research leaders in the field of work-around, Koppel et al. (2008), Halbesleben et al. (2008), Halbesleben and Rathert (2008), Halbesleben et al. (2010), Tucker and Edmondson (2002), Tucker, Edmondson, and Spear (2002), Tucker (2004), Tucker and Spear (2006), Tucker (2007), and Vogelsmeier et al. (2008) investigated organizational and process antecedents to and consequences of workflow obstacles for nurses. These
researchers identified how breakdowns in the flow of information, namely in organizational processes and structures, create obstacles for nurses using HIT in patient care activities.

In summary, the use of HIT in hospitals has increased since the 1970s. These products have been implemented to contribute to high quality, efficient patient care. Starting with small applications in specialty departments of a hospital, HIT has broadened and now has the potential to encompass most patient care areas and billing services. Yet hospitals are at different stages of using HIT. As HIT has advanced, informaticians have noted that nontechnological issues have become dominant in healthcare organizations related to the purchase and use of HIT (Haux, 2006). Nurses have become more comfortable with HIT use, and they have also become creative in working around technology obstacles as they care for patients (Vestal, 2008). Not only is a technologically sound system necessary to impact healthcare quality, safety, and cost, but sound implementation strategies are also required (Brender et al., 2006; DesRoches et al., 2010; Himmelstein et al., 2010; Nebeker et al., 2005). Hospital leaders can manage the obstacles to HIT implementation through communication, management of change processes, implementation of technically appropriate systems, and recognition that HIT must be integrated into the organization’s cultures, including the nursing unit’s culture. When HIT applications are implemented without addressing these obstacles, nurses transform how they use the HIT to take care of patients in a way that could bring about destruction or novelty. These obstacles stem from breakdowns in information flowing throughout the hospital or interruptions in services and supplies. HIT implementation offers an opportunity to enhance human interactions across the hospital by nurses, project
managers, and leaders sharing creative ideas about how to use the technology so that quality and safety are improved while healthcare costs are reduced.

**Implementation and Outcomes of HIT.** Implementation of HIT in United States hospitals has been met with many challenges. The literature on HIT implementations points out that current implementation strategies have not met projected HIT outcomes. The implementation challenges include cost and adoption by nurses, as well as supportive technological and organizational infrastructures. At the national level, policy makers are encouraging the implementation and use of HIT. Strategies for implementing HIT have been left to the discretion of hospital leaders, as these leaders have been challenged to influence how HIT is accepted and used by end-users and to implement a technically appropriate system, which will alter the organization’s culture (Brender et al., 2006).

In order to measure HIT adoption and use of HIT, the Centers for Medicare and Medicaid Services has defined a set of criteria to meet “meaningful use” standards (CMS.gov, n.d.). As of 2010, there were 25 different measures of meaningful use in such areas as care coordination, privacy and security, quality, and safety (DesRoches et al., 2010). United States policymakers have been pushing for increased use of HIT for the purpose of improving health care quality, reducing medical errors, and reducing health care costs (American Recovery and Reinvestment Act of 2009, §3001). Yet, given the current implementation strategies, the system’s value may be decreased for society, resulting in unmet expectations (McCullough, Casey, Moscovice, & Prasad, 2010). For example, one HIT that has been interfaced with the EHR is BCMA, which has been found to be challenging for nurses to use as designed to improve medication administration safety.
**Barcode Medication Administration Challenges.** The literature on barcode medication administration technology describes the obstacles encountered by nurses during the medication administration process, where upon nurses have created work-arounds. BCMA is an example of HIT being implemented in hospitals that has changed how medications are delivered by nurses to patients. Koppel et al. (2008) found that nurses face numerous obstacles when using BCMA, such as having medications that cannot be scanned or receiving only partial medication doses from the hospital pharmacy. BCMA has been implemented to decrease medication administration errors; it has been expected to improve inpatient medication safety by automating processes of medication checking (Hook, Pearlstein, Samarth, & Cusack, 2008). Koppel et al. noted that some users vary from written BCMA protocols, resulting in deviations, violations, or work-arounds that are “staff actions that do not follow explicit or implicit rules, assumptions, workflow regulations, or intentions of system designers” (p. 409). The same authors noted that nurses use work-arounds so frequently in the context of BCMA that a typology has been developed that identified 15 types of BCMA-related work-arounds with 31 types of causes (Koppel et al., 2008). They noted that work-arounds have the potential to create patient harm, although consequences to patients from work-arounds were not explored in this study (Koppel et al., 2008). BCMA technology has created intentional and unintentional obstacles in nurses’ workflow, and nurses have created work-arounds to respond to immediate patient needs (Koppel et al., 2008).

According to Koppel et al. (2008), antecedents to BCMA work-arounds have come from organizational-related and technology-related obstacles in nurses’ workflow and have been associated with all 15 types of work-arounds. The work-arounds generally
involve organizational policies that are “incompatible with safety” (Koppel et al., p. 419). Examples of antecedents include patient medications brought from home that did not contain a barcode, medications coming from hospital pharmacies with barcodes that were covered with a label reminding users to scan the barcode, and partial doses sent by the pharmacy (Koppel et al., p. 419). BCMA work-arounds have also been identified with inadequate training, inadequate staffing, and “misunderstanding by staff of BCMA’s role in patient safety” (Koppel et al., p. 419). Koppel et al. suggested that reminding nurses of existing rules or creating more rules may not reduce the incidence of work-arounds since work-arounds have many organizational antecedents. However, the authors recommend that multidisciplinary teams, including the actual users, repeatedly examine and modify the technology to facilitate efficient and safe patient care with BCMA technology (Koppel et al., p. 420).

To summarize, HIT has been implemented in healthcare organizations at an unprecedented rate. To spur the adoption and use of HIT, national goals have been set, along with reimbursement schedules based upon HIT use. BCMA has been presented as an HIT implemented to improve patient safety, yet it has been met with many challenges, including nurses working around designed plans. In the next section, innovation literature is reviewed to facilitate an understanding of how planned and unplanned change can bring about innovation in nurses’ use of HIT in hospitals.

**Innovation.** Innovation literature will be explored in terms of how innovation has the potential to emerge in human interaction, and a proposed definition of innovation will be presented. DesRoches et al. (2010), Himmelstein et al. (2010), and Nebeker et al. (2005) asserted the importance of new ways of implementing HIT; innovation is needed
to realize improved quality and safety while decreasing healthcare costs. The implementation and use of HIT to achieve national goals requires innovation or new ways of operating. Innovation is an important partner with change and is the wellspring of social and economic progress that is both a product and the lifeblood of progress (Poole & Van de Ven, 2004). Institutional policy formation regarding HIT implementation and use is facilitated by an understanding of the multifaceted role of the hospital’s culture in the innovative process (King et al., 1994). The rapid diffusion of HIT is spurred by government policies, but these policies lack clear direction regarding how to achieve the stated objectives, leaving implementation plans up to those in hospital organizations while changing the culture at the same time (King et al., 1994). Hospitals are challenged to innovatively implement HIT, including EHRs, to deliver patient care more efficiently and to improve quality while decreasing cost.

Describing and measuring innovation is a challenge; there is no single agreed-upon definition. Innovation has been defined as the power to redefine the industry through discipline, learning, and practice (Drucker, 1985); by *Merriam-Webster Dictionary* as the introduction of something new; as a process of bringing any new problem solving idea into use (Kanter, 1983); as an idea, practice, or object that is perceived as new by someone or a unit of adoption (Rogers, 2003); as a tool to transform the entire culture of organizations (Kelley, 2005); and as something new or perceived as new by the population experiencing it that has the potential to drive change and/or social potential (Weberg, 2009). Innovation accompanies change, is new to someone, and holds the potential to transform positively. Often innovation is thought of as a product; innovation is also an organizational process in which workers are provided with support
and encouragement to take initiative and explore new approaches (Sarros, Cooper, & Santora, 2008). **Innovation is a process of changing interaction patterns to bring about transformation in practices or products that have the potential to contribute to social wellbeing.** Innovation as an organizational process may facilitate nurses’ exploration of learning and adapting to the tensions in workflow brought about by HIT implementation.

The current study focused on innovation as the organizational context, where problem solving ideas have the potential to surface through self-organizing interactions, thereby transforming the organizational positively. Using an innovative approach to the implementation of HIT in hospitals may allow health care professionals to reach national goals if nurses are provided with support and encouragement to explore new approaches in the adaptation of HIT. The perspective that nurses bring to HIT implementation concerns how it is used to support unique patient situations. Innovative HIT implementation strategies that have the potential to transform care delivered to patients can also improve the function of hospitals. Innovative implementation strategies intended to improve patient outcomes may be employed by leaders who facilitate interactions at the point of service in response to obstacles, thereby creating a change in the organization’s culture. The next section reviews the literature specific to organizational culture and nurses’ interactions that hold the potential for innovation to emerge.

**Organizational culture.** Culture forms the foundation of group identity through shared thoughts, beliefs, and feelings; one of the most decisive and important functions of leaders is the creation and management of their organization’s culture (Christensen, 2006). Schein (2010) presented three elements of culture as a progression from artifacts to beliefs and values and ending in basic assumptions. Artifacts are what a person sees,
hears, and feels when he or she encounters a new group with an unfamiliar culture; they are the visible products of the group, such as using smart pumps to achieve improved patient safety in intravenous medication administration (Schein). Espoused beliefs and values are the group’s learning regarding what ought to be, distinctive from what is (Schein). A nursing group may value the use of smart pumps for safe intravenous medication administration because these pumps are effective in averting a patient mis-dose. Schein stated that when a solution to a problem works repeatedly, it becomes taken for granted, is engrained in the social order, and is a basic assumption that remains static until proven otherwise. A nursing group may have witnessed improved safety while using smart pumps, leading to the assumption that smart pumps provide a safe way to deliver intravenous medications to patients. Nurses may make this assumption, but if implementation is completed in a static, linear, standardized way, it could have negative effects on the culture as nurses are unable to adopt the technology to their way of thinking or ability to deliver quality care. For example, in a linear model, if the pump malfunctions, the expectation is that the relevant party will replace the pump or reset it, leaving no room for local adaptation. Behaviors of the leader or other members of the organization can have negative effects on the organizational culture, such as when services are provided that subtly work against the organization’s stated goals, thereby reinforcing negative beliefs about the organization (Porter-O’Grady & Malloch, 2011).

Hatch (1993) built upon Schein’s linear model of organizational culture by including symbols as an element of culture and assessing the dynamic relationships among the four elements of organizational change. Hatch’s reformulated model focuses on relationships between artifacts, symbols, values, and assumptions; it includes a shift
from static to dynamic conceptions of culture by looking at interactions between key elements rather than at the elements themselves. The model assumes that both stability and change exist in the same process (Hatch, p. 661). Hatch (2004) recognized that anyone within an organization, not only the defined leader, can act as a lightning rod for change by influencing patterns in the interactions among artifacts, symbols, values, and assumptions. Through relationships, beliefs about work and how to work in organizations emerge (Ray & Turkel, 2010).

Describing and understanding the hospital’s culture informs nurses’ behavior when they encounter an HIT obstacle. Organizational culture is the socially constructed way to think and rules of behavior in a work group. Cameron and Quinn (2006) noted that organizational change, such as HIT implementation, can fail when the culture does not adapt to the needs of an organization in terms of, for example, values, ways of thinking, managerial styles, paradigms, and approaches. Innovative HIT implementation strategies may have the opportunity to emerge when the hospital’s culture integrates both stability and change into processes and recognizes that anyone can influence workflow patterns with quality and safe outcomes. HIT implementation strategies that include the relationship linking artifacts, symbols, values, and assumptions among nurses could be the interaction needed to realize the national goals of decreased cost, decreased errors, and improved quality of care for patients. Hospital leadership can use implementation strategies that integrate the dynamic relationship between artifacts, symbols, values, and basic assumptions in nurses’ workflow, thereby altering the organization’s culture to one of innovation.
Leadership. Inclusion of leadership in this review of the literature describes leaders’ theoretical perspectives on design, control, and outcomes in nursing practice. Traditionally, leaders in hospitals have attempted to control change and innovation during the implementation of HIT through defined processes. Change occurs that is both planned and unplanned. Planned change is consciously conceived of and implemented by knowledgeable actors; it is scripted or controlled and leaves little opportunity for innovation (Poole, 2004). In planned change, the potential for adaptation and modification is limited since a normative cast is applied to improve the situation with a stated reference point (Poole, 2004). Unplanned change implies that change to some degree is a force in its own right and is not susceptible to control or management (Poole, 2004). Often with planned change, unplanned “domestication,” or innovation, occurs at the local level (Poole, 2004). Poole (2004) cautioned managers and change agents, suggesting that they “should realize how difficult change and innovation are to script and manage, as these processes constantly move in unexpected directions and are driven by dynamics that are either too powerful to control or too subtle to understand” (p. 5). The leadership model a person uses to view planned change informs that individual’s understanding of innovation and dynamics of the unexpected. Models of leadership provide insight into how to implement planned change, such as HIT, when domestication is likely to occur as point-of-service nurses continue with patient care activities. An overview of three leadership models is presented and the models are compared in terms of their capacity to implement planned change while facilitating innovation in hospitals.

Project management, as a function of hospital leadership, informs this study by describing the theoretical perspective of HIT implementation in hospitals. HIT
implementation in hospitals is often driven by a project management framework (Bove, 2009). The principles of project management originated from the world of manufacturing, in which the focus was on improving production by reducing planned change to structured sequences (Koskela & Howell, 2002). To successfully complete a project, the project management framework uses a five-phase approach consisting of initiating, planning, executing, controlling, and closing (Project Management Institute, n.d.). The HIT implementation is evaluated after the project has reached its closing phase (Bove, 2009). Expectations that the project manager and the organizational leader have of nurses in this linear, planned-change model are that nurses will conform to the designed processes to receive extrinsic rewards, thereby bringing about organizational stability and avoiding uncertainty. However, as previously demonstrated, nursing practice is relationship based, self-organizing, and unpredictable. Project management comes from a transactional leadership model.

**Transactional leadership.** Transactional leadership has been the dominant paradigm since the early 1900s and continues to be used in many organizations today (Northouse, 2010). In 1911, Taylor, an engineer, introduced scientific management in the United States based upon a scientific method paradigm (Stacey et al., 2000). He was concerned with organizations’ achieving their purpose through efficient performance of physical activities. Taylor used his understanding of Newtonian physics to design management structures that focused on predictability and control. His influence on scientific management was the inclusion of reductionism, determinism, and control (Stacey et al., 2000). These central concepts were used by an organization’s leader to ensure that people knew exactly what to do and when to do it. A Taylor-influenced leader
is seen as a person who makes plans, organizes, leads, implements, controls, and evaluates (Porter-O’Grady & Malloch, 2011). The leader is the central focus of this theory, and workers carry out the leader’s plan in exchange for extrinsic rewards such as money or promotion (Bass, 2008). The worker’s activity, rather than patient care activities, is planned and directed by the leader. Change is viewed as episodic, with a defined end point. Planned change in this leadership model is viewed as a life-cycle in which the process of change in a hospital moves through a necessary sequence of stages that are prescribed and regulated; the leader expects compliant adaptation (Poole, 2004). The leader attempts to achieve harmony and stability in the organization, and for that reason attempts to eliminate conflict and disorder, as these phenomena are seen as negatively impacting organizational function (Plowman & Duchon, 2008). Innovation at the point of service in this leadership model is perceived as deviance from the designed plan. A transactional leader devises a plan to implement HIT and delegates specific plan formation to the Information Systems (IS) department in hospitals to complete the transaction (Bove, 2009). The IS department, which exists within the engineering function of the hospital, regulates the planned change (Dooley, 2004). A problem with this leadership model is that regulated change in hospitals is often resisted, sabotaged, or responded to with mere compliance with mandates (Poole & Van de Ven, 2004) rather than with efforts to seek improvement. Transactional leaders have the perspective that outcomes can be predicted with planned and controlled designs and that workers will follow the plan, while communication between the leader and worker is not necessary to achieve desired outcomes.
**Transformational leadership.** Transformational leadership describes an emerging leadership model in nursing practice. This model of leadership recognizes the value of relationships in achieving organizational goals and holds the ability to modify practice when obstacles are encountered. Transformational leadership “is a process that changes and transforms people” (Northouse, 2010, p. 171). *Transformational leadership* first was coined in 1973 as a model different from transactional leadership and has been the focus of much research since the early 1980s (Bass, 2008). The leader builds trust with the team, is emotionally involved with workers, and sets the tone for positive change (Northouse, 2010). Being attentive to the needs of workers, the leader motivates followers through intrinsic rewards such as workers’ ability to reach their full potential (Northouse, 2010). Transformational leadership is currently in vogue in nursing because it “is an effective method for managing a diverse nursing workforce” (Heuston & Wolf, 2011, p. 248). Change is constructive and, like transactional leadership, has an envisioned end state. Transformational leadership uses a teleological theory of change and innovation and views change, such as implementation of HIT, as a cycle of goal formulation, implementation, evaluation, and modification of actions or goals based on what was learned (Van de Ven & Poole, 1995). Characteristics of the teleological theory of change are purposeful enactment, social construction, and consensus; in this theory, planned change has no predetermined developmental path—it emerges (Poole & Van de Ven, 2004). Transformational leaders recognize that leadership is a process in which organizational learning is communicated in relationships. A transformational leader socially constructs plans to implement HIT in the hospital, delegates the specific implementation plans to the IS department, and solicits feedback from workers on how
best to achieve implementation goals. The transformational leader generates organizational goals (predicting a future state of the organization) for workers to carry out, and, as in transactional leadership, is the central focus of the leadership model. Transformational leaders strive for organizational stability of work processes, bringing out the best in employees while achieving organizational goals through relationships.

*Complexity leadership.* The third leadership model is complexity leadership. Complexity leadership is a developing model of leadership (Uhl-Bien et al., 2008). Leadership models based in complexity science assume leadership is a process and a role (Uhl-Bien et al., 2008). Leadership is a complex interactive dynamic facilitating learning, innovation, and adaptability at the point of service (Uhl-Bien et al., 2008). Organizational leadership theories informed by complexity science have three mechanisms of action: Complexity dynamics are capable of spontaneously generating new structure without inputs from external agents; they create order by dissipating energy rather than accumulating it; and they generate largely unpredictable outcomes driven by random behaviors and complex interactions (Marion, 2008). A complexity perspective in healthcare places the patient experience at the center of the organization’s activities. As Porter-O’Grady and Malloch (2011) explained, “In a system, everything operates from the center out” (p. 50), placing the focus of care and healing services at the center of a healthcare organization in local interactions. To understand how organizational change and innovation operates from the center out, a brief overview of complexity-informed leadership theories is presented. More detailed comparison is presented in Chapter 2.

Complexity leadership theories recognize that change is continuous. Change and innovation are viewed as having an evolutionary or dialectic motor, including
characteristics of pluralism (diversity), confrontation, and conflict (Poole, 2004). Time is understood as emergent since the future is under perpetual construction and unknowable (Stacey, 2001). From a complexity leadership perspective, anyone within the hospital can change patterns of interactions. During the implementation of HIT, meaning is made in interactions of diverse agents. Agents with expertise in bringing about organizational change are relied upon to create plans, seek input, and initiate the plan, knowing it will be domesticated along the way based upon interactions of pluralism and conflict. There is no defined end state regarding what the HIT will look like; it will evolve. Complexity leadership models assume a leader can no longer keep up with all the demands necessary to plan and control for effective HIT implementation. The problems of HIT implementation and use are too complex to be addressed with top-down bureaucratic directives (Uhl-Bien et al., 2008).

Three models of leadership, transactional, transformational, and complexity, identify assumptions about control, expectations of workers, ideas of stability, and innovation. In hospitals, leaders may declare what ought to be, but if any variation occurs in the process, it may not come to be. Transactional and transformational leadership models focus on the leader as the one who initiates change and on workers as the ones who carry out the intentions of the leader, receiving either extrinsic or intrinsic rewards to achieve stability. Transactional leaders expect workers to carry out plans as prescribed to receive extrinsic rewards, whereas transformational leaders seek relationships with workers to facilitate social construction and consensus. Many leadership theories have been “developed around the idea that goals are rationally conceived and that managerial practices should be structured to achieve these goals” (Uhl-Bien et al., 2008, p. 191). In
the complexity models, change and innovation originate at the point of service where workers create knowledge from tensions, enhancing the organization’s capacity for adaptation. The complexity models focus on leadership in the context of dynamically changing relationships of informally interacting agents creating knowledge (Uhl-Bien et al., 2008). These leaders recognize that those closest to the work have the best understanding of how to make meaning and generate knowledge to solve organizational problems such as using HIT. Complexity informed leadership may find that nurses adapt and innovate using HIT that improves quality and safety for patients. Complexity leadership models facilitate innovation, whereas transactional and transformational leadership limit it.

Leadership models that facilitate interactions among nurses that allow nurses to adapt HIT at the point of service to improve quality and safety for patients free leaders from having to feel as if they must have all the answers. These leaders place those most aware of the local tensions in a position to respond with knowledge and innovation. The traditional command and control, hierarchical model of leadership in which the leader is expected to have all the answers is not effective in this age of knowledge creation (Marion, 2008). The leadership paradigm informs how a leader views the behaviors of workers and their domestication of planned change. Nurses working in hospitals operate in a complex environment with an unknowable future and uncertain outcomes when caring for patients. Most nurses work in hospitals wherein the dominant leadership model is transactional, which can create challenges to their practice. No leadership studies have been identified that explored human interactions when implementing HIT in hospitals to describe how local adaptation occurs; this study fills that gap.
Leadership models view work-arounds and first-order problem solving behaviors quite differently. The view hospital leadership adopts either attempts to limit nurses’ adaptation or innovation behavior, or facilitates interactions of people at the points of tension to create new meaning (Lord, 2008; Uhl-Bien & Marion, 2008; Uhl-Bien et al., 2008).

Summary

Seven topics of literature were identified to describe and understand nurses’ use of work-arounds as they care for patients: work-arounds, nursing practice, the history and role of HIT, implementation and outcomes of HIT, innovation, organizational culture, and leadership theories. Implementation of HIT has not realized the goals of improved quality and cost healthcare while decreasing cost. Many leaders using the dominant transactional leadership model in hospitals today have designed linear HIT implementation plans, expecting compliant adaptation from nurses to achieve organizational stability. There is little room for innovation at the point of service in this leadership model. The focus of the review was to gain a better understanding of HIT implementation in terms of its impact on innovation in leadership and nursing practice.

Overview of This Dissertation

In Chapter 2, I discuss the theoretical frame for this study. I present the literature for the theoretical framework, complexity science, and explain how it impacted my conceptual framework for this study. Chapter 3 contains a discussion of the methodology used in this study, a rationale for a narrative method design, and a description of the analysis approach. Considerations for validation are presented.
Chapter 4 presents the data and findings using reflection on data collected in observations and interviews (Stacey & Griffin, 2005). A discussion of the findings they relate to the research questions and relevant literature is found in Chapter 5. In this final chapter, a discussion of conclusions, recommendations and implications are presented.
Chapter 2

THEORETICAL PERSPECTIVE

Introduction

The purpose of this chapter is to describe how complexity science informs my understanding of the human interactions nurses engage in to guide their use of HIT when in caring relationships with patients. This chapter provides an overview of complexity science and its appropriateness for studying social phenomena; two theories generated from complexity science to understand and describe organizations will be presented, including complex responsive processes. I describe nursing practice from a complexity perspective, and I present a model including the four constructs of this study used to understand and describe nurses’ interactions that guide their use of HIT when in caring relationships with patients.

Complexity science has emerged as a scientific method that can be used to understand and describe dynamic interconnectedness, multiple inputs such as energy and materials, and emergence in nature. Living entities, from cells to solar systems, have been understood and described as constantly interacting and changing to fit within their environment in ways that are unpredictable. Humans have the capacity and need for connectedness and variety to form new patterns and fit into their social arrangements in which outcomes are not predictable (Stacey, 2001). Complexity science has challenged assumptions in Western thought regarding causality, such as the value of being linearly organized and predictable. Since pre-Socratic times, philosophers have speculated about the nature of reality, with Parmenides (c. 450 BC) arguing that reality is stable without change, whereas Heraclitus (c. 500 BC) argued that reality is in flux and changes (Stacey
et al., 2000). Complexity science renews this discussion in the Western world. This study assumes that reality is constantly in flux and that knowing is a continuous process that takes place through human interaction. The science and art of nursing practice lies in dynamic human interaction with diversity of health, history, and choice, and in which meaning emerges in patterns of relationships. In order to interact with patients during caregiving and the healing process, nurses interact with multiple patients, healthcare providers, and technologies; nursing practice is lived out in these relationships. For these reasons, complexity science has been selected for this study to explore dynamic patterns of nurses’ interactions when making sense of their experiences while using HIT when in caring relationships with patients. This study assumes a complexity science perspective in which nursing practice will be explored as self-organizing interactions that are sensitive to initial conditions, multidirectional, and influenced by a plethora of sets of rules.

Nursing practice takes place in the context of relationships with patients while nurses use HIT to improve quality and safety in the delivery of care for patients.

In nursing practice, nurses engage in dynamic interactions as they respond to patients’ conditions and contend with environmental tensions. Nursing takes place in the context of in transpersonal caring relationships to help care for and heal patients (Watson, 2008); in the course of these relationships, nurses must be open to changing patient conditions and must respond with clinical reasoning (Benner, Hooper-Kyriakidis, & Stannard, 1999) within a culture that holds multiple meanings of caring in hospital organizations (Ray, 1989). In caring relationships, nurses self-organize with patients, families, and clinicians without a blueprint, forming identity through patterns of interaction. Human interaction patterns are sensitive to the relevant history of
interactions. Patterns of interaction are multidirectional since patients’ conditions change and the environment of care changes, creating patterns of stability and instability. Nurses’ patterns of interaction, in caring relationships are influenced by a plethora of sets of rules that form and sustain all human relating–ideology and power relations. Understood from a complexity perspective, nursing practice is self-organizing, sensitive to initial conditions, multidirectional, and influenced by a plethora of sets of rules.

**Complexity Science**

Complexity science has evolved from many schools of thought. Complexity science comes from the major fields of systems thinking, theoretical biology, nonlinear dynamical systems theory, graph theory, phase transitions, and complex adaptive systems theory (Goldstein, 2008). It is the study of dynamic behaviors of many complexly interacting, interdependent, and adaptive agents responding to conditions of internal and external pressure (Marion, 2008). Complexity provides a lens through which to see “things” as relationally organized, while diversity is understood to create the potential for innovation to emerge. A complexity science perspective does not explain the way the world operates, but it provides a lens that might develop the best explanation given to the nature of the living organism (Richardson & Cilliers, 2001).

To assist in generating an understanding of life in organizations, complexity science provides metaphors pertaining to the systemic and dynamic interactions of humans within a hospital organization (Dooley, 2004). The metaphors used in complexity science, such as self-organizing, nonlinear, and emergence, come from the natural sciences. These metaphors demonstrate how living organisms are able to sustain life and emerge in new forms in response to environmental tensions.
Kuhn (2007) noted that complexity science provides an effective way to study social phenomena, such as nurses’ work-arounds, because “in the language of complexity, human cultural settings and productions are always complex and dynamic” (p. 163). From a complexity science perspective, social phenomena can be described and understood as “self-organizing, nonlinear, sensitive to initial conditions, and influenced by a plethora of sets of rules” (Kuhn, 2007, p. 163). These practice behaviors of self-organizing, sensitivity to initial conditions, multi-directionality, and the influence of a plethora of sets of rules serve as a theoretical construct in this study from which to examine and analyze the behaviors of nurses when they encounter HIT obstacles. A research perspective with a focus on local human interactions provided insight into nurses’ behavior when they are in caring relationships with patients and using HIT. Complexity science has informed other studies of human interactions in complex healthcare organizations.

Complexity science has been used as the theoretical perspective in many studies; four studies are summarized as examples. Anderson et al. (2005) used a complexity science perspective to describe the quality of relationships among members in nursing homes in an effort to ensure quality of care. To develop a model of relationship-centered care, Suchman (2006) used a complexity science perspective. Singhal and Greiner (2007) used a complexity science perspective to implement a program to decrease the rate of hospital infections in one health system by removing system boundaries and facilitating human interactions among all members of the healthcare team. Davidson (2011) used a complexity science perspective to investigate the day-to-day lived experiences of new nursing faculty in order to understand the dynamics of the nursing faculty shortage.
Therefore, consistent with complexity informed studies, this study explored the human interactions of nurses when they make meaning of their experiences while using HIT when in caring relationships with patients. Many current organizational leadership theories do not recognize dynamic human interactions as the source of innovation. Many of our common, taken-for-granted ways of thinking about science applied to organizational leadership have been linearly organized and knowable from an objective perspective that was developed during the 17th century, especially as associated with Newton, Descartes, and Galileo, and continuing on through the positivist era (Kuhn, 2007). Organizations can no longer be described or understood solely in terms of a linear, predictable, control-based paradigm (Davidson et al., 2011; Dooley & Lichtenstein, 2008; Eoyang, 1997; Goldstein, 2008; Kuhn, 2007; Lindberg, Nash, & Lindberg, 2008; Marion, 2008; Porter-O’Grady & Malloch, 2011; Stacey, 2001; Stacey et al., 2000; Uhl-Bien & Marion, 2008; Wheatley, 2006). These scholars have asserted that human organizations such as hospitals have emergent outcomes and are made up of self-organizing interactions that are sensitive to initial conditions, multidirectional, and influenced by a plethora of sets of rules so that control lies with anyone capable of changing patterns. In this paradigm, leadership that nurses participate in is both a role and a process. The complexity paradigm provides language to describe and understand leadership of nurses through dynamic interactions when the nurses seek meaning from tensions that arise in patient care activities and respond to tensions in the environment with work-arounds. The vocabulary of nursing practice as complex, relational, and emergent in caring relationships underscores the need for a complexity perspective when investigating the social phenomena of nursing practice. This study will describe the behavior of nurses as
new patterns of meaning making that emerges in dynamic human interactions. To situate this study in the previous work of complexity science, a brief review of organizational theories is presented.

**Organizational leadership theories.** Two theories have been generated from complexity science in an attempt to understand and describe organizations: complex adaptive systems (CAS) and complex responsive processes (CRP). The theory of complex adaptive systems assumes organizations are a living system composed of subsystems that combine, interact, and co-evolve to provide the capabilities of an adaptive enterprise (Bennet & Bennet, 2004). CAS is a theory used to study the evolution of complex entities with multiple, diverse, and interconnected elements. The level of analysis in complex adaptive systems is the CAS itself. The CAS perspective applies metaphors from the natural and physical sciences to a system as a living organism. CRP is also an evolutionary organizational change theory. Rather than looking at the organization as a system of interdependent subsystems, CRP looks to human interactions as the source of organizational change. The level of analysis for CRP is human interaction. In this section, a fuller description of the theoretical perspectives and comparisons between the two are offered.

**Complex adaptive systems theory.** CAS is a leadership theory used to study the evolution of complex systems with multiple, diverse, interconnected elements. A researcher using a CAS model must define the system’s boundaries, such as what is inside versus what is outside (Dooley, 2004). Much of the research in healthcare from a complexity perspective has been based on the CAS theory (Begun & Luke, 2001; Begun & White, 1999; Campling, Ray, & Lopez-Devine, 2011; Davidson & Topolski, 2011;
Dooley & Plsek, 2001; Glouberman & Mintzberg, 2001; Lindberg et al., 2008; Marion & Bacon, 1999; Plsek & Wilson, 2001; Ray et al., 2011; Tan, Wen, & Awad, 2005). A CAS is composed of a set of interdependent or connected agents that may include a person, a molecule, a species, or an organization (Begun, Zimmerman, & Dooley, 2003). These agents act in a way that is based upon local or surrounding knowledge and conditions. Organizational scholars have become interested in applying the theory of CAS to organizational change and development research to describe how organizations change and how they can be changed (Begun et al., 2003). From this perspective, a system can be influenced to change by the intentional direction and control of a system designer. To research a CAS, a researcher explores embedded relationships among organizational agents and environmental entities since the domain of interest is to analyze relationships across levels of systems (Begun et al., 2003). A criticism of CAS simulations is the lack of incorporating discourse in the function of social systems (Dooley, 2004). Stacey (2000) recognized that a lack of discourse in CAS models made them inappropriate for human organizations and suggested the development of complex responsive processes (Dooley, 2004). Stacey and Griffin (2005) noted that “unlike the agents in complex adaptive system simulations, human agents are conscious, self-conscious, reflexive, often spontaneous and capable of making choices” (p. 13). Since this study explored the discourse and interactions of nurses using HIT, CRP was a more appropriate complexity theory to guide this study.

**Complex responsive processes theory.** Complex responsive processes (CRP), another complexity informed leadership model, assumes the reason for organization is purposeful joint action required for human living and sustained by individual and group
identity with the potential to transform it (Stacey, 2001). CRP facilitates understanding of
how apparently paradoxical perspectives can be embraced in the living organism of a
hospital through human interaction. For nurses, the paradox is forming identity and
difference through interactions when, for example, HIT obstacles are present. The theory
of CRP draws attention to the nonlinear nature of human interaction and accounts for the
emergence of self-organizing patterns in meaning making. From the CRP perspective,
organizations are understood to be ongoing iterated processes of cooperative and
competitive relating between people; “it is in the simultaneously cooperative-consensual
and conflictual-competitive relating between people that everything organizational
happens” (Stacey & Griffin, 2005, p. 3). Fonseca (2002) noted that CRP facilitated an
understanding of complexity in organizations in which innovation was shown to be a new
patterning of experiences of being together and new meaning emerged from ordinary,
everyday work communications. In this narrative study, the CRP theory of organizational
transformation described local interactions in the living present and facilitated
understanding of nursing practice, leadership, and HIT implementation. CRP is used to
understand and describe what people are doing in human organizations. This theory
recognizes that organizational change or movement is simultaneously the continuity and
transformation of individual and collective identity and difference (Stacey et al., 2000).
Through many different experiences, nurses evolve through interactions with their
environments, including other people, based upon internally driven responses (Kuhn,
2009; Watson, 2008).

**Complexity Science and Nursing Practice.** Nursing practice is self-organizing,
sensitive to initial conditions, multidirectional, and influenced by a plethora of sets of
rules in caring relationships. The interactions in which nursing practice occurs are complex and constantly changing, and outcomes may appear in newly adapted patterns. In nursing practice, numerous dynamic interactions occur in the delivery of quality care and healing to patients.

Watson (2008) noted that nursing practice lies in dynamic caring relationships between nurse and patient and involves ethical choice and action within the present moment. In the transpersonal relationship with patients, nurses are formed by and forming identity. Watson (1985) noted that nursing occurs in human-to-human transactions of caring. In human transactions of caring, nurses self-organize, interacting with patients, families, and other members of the hospital organization with ethical choice. The statement that transpersonal relationships involve ethical choice indicates that nurses do not work within a linear framework; they have choices.

Benner et al. (1999) noted that a nurse’s clinical judgment requires clinical reasoning and wise ethical judgment, characteristics necessary if the nurse is to stay in relationships with patients, families, and others in the hospital organization. Nurses choose one desire or action over another in transpersonal caring relationships, and the interaction involves dynamic movement between stability and instability; the outcome cannot be known. In interactions, nurses are formed by and are forming identity with patients, families, and other members of the organization to effect care and healing. Nurses’ ethical choices in interactions that are formed by and forming identity are sensitive to the initial conditions, the history of human interaction. The initial conditions or history of interactions affect the current situation, creating expectations for the future. For example, if a nurse asks a co-worker for ideas about how to continue to provide
patient care activities when faced with an HIT obstacle and in the interaction the nurses together find an effective solution, the nurse may be more inclined to return to the same person when he or she encounters the next obstacle. Often nurses have other resources available to them, such as a Help Desk, a manager, nurses in other units, and a pharmacist, to assist with problem solving regarding an HIT obstacle. Interactions in a hospital organization can go in multiple directions.

Ray (1989) identified that there are multiple meanings of caring within a hospital organization that may appear diverse and disordered; yet these diverse views can reappear, unifying patterns of interaction in a hospital. Ray observed that in the multiple meanings of caring, different desires and actions are taken depending on the member’s position in the hospital (p. 35). An example is that non-nurse administrators described caring as “maintaining the organization economically and politically” (p. 35), whereas nurses on medical-surgical units described caring as “involvement” (p. 38) with patients and families. In the multiple meanings of caring, each member of the organization makes choices in interactions that bring about stability or instability. Yet it is not as though nurses and others can do whatever they want in caring relationships; interactions are influenced by numerous sets of rules.

Many sets of rules influence nurses’ choices. In order to stay in relationship with patients and other members of the hospital organization, nurses negotiate with others. This negotiation is based on the relative need the nurse has for the other. As nurses form identity with patients and members of the organization, their actions are influenced by socially constructed norms. This perspective provides language for and insight into what happens when nurses self-organize around using HIT and when they encounter HIT
obstacles. When nurses encounter HIT obstacles, they respond to environmental tensions with self-organizing interactions that are sensitive to initial conditions, multidirectional, and influenced by a plethora of sets of rules. These are the four constructs of this study that are used in efforts to understand and describe nurses’ actions.

**Theoretical Constructs of This Study**

The theories guiding this inquiry come from complexity science. The theoretical perspective employed in this study is a combination of two theories used to understand and describe how change occurs among nurses in an organization as a social phenomenon. Kuhn (2007) provided abstract constructs by which to understand and describe the social phenomena of self-organizing interaction, sensitivity to initial conditions, multidirectionality, and influence exerted by a plethora of sets of rules. Stacey and colleagues’ (2000, 2001, 2005) theory of complex responsive processes of relating provides a mid-range theory to use as a lens in an attempt to understand and describe change in an organization by exploring human interactions that hold the potential for transformation. These two theories have been used to develop the model to guide this study in an attempt to understand and describe how interactions among and between nurses guide their use of HIT when in caring relationships with patient. Each of the four constructs is further described in the following sections.

**Self-organization.** The first construct used for this study is self-organization. Stacy and Griffin (2005) asserted that self-organization means that people interact with each other on the basis of their own local organizing principles, and in such local interaction widespread coherence emerges without any program, plan, or blueprint (p. 7). The emergent coherence comes from co-creating patterns of meaning. Here I will take a
moment to describe “meaning” before proceeding. Meaning comes from interaction between at least two people in their gesture-response. Meaning, according to Stacey (2001), is not located in the gesture alone or in the response alone. Meaning becomes a property of interaction in the social act as a whole. Meaning is perpetually created in interaction; it is not attached to an object or stored (Stacey, p. 6). It emerges in social acts in the present, acting on the past (gesture) while creating a future (response) (Stacey, p. 79). According to the theory of complex responsive processes, meaning, also called knowledge, emerges in the social act of gesture-response (Stacey, p. 79). Meaning making arises through the social act of gesture-response in the context of the situation through self-organizing interactions. Self-organization is in the dynamic movement of individual and collective identity being formed and forming in all interactions (Stacey, p. 171). It is in micro interactions that variation arises from diversity of interactions within the organization; this is where the potential for innovation occurs (Stacey et al., 2000). According to Stacey and Griffin (2005), the cooperative social process of self-organization is both enabled and constrained by rules of power relations, such as norms, values, and accounting to one another; these will be described in the section on sets of rules.

To situate self-organization in nursing practice, a discussion of the theoretical underpinnings that guide nursing practice is necessary. The theory of human caring (Watson, 2008) provides a framework that describes transpersonal relationships between nurses, as well as between nurses and patients, as self-organizing by trusting one another in such a way as to transcend the past, present, and potential future in order to make sense of the current experience. Antecedents to work-arounds are obstacles that arise after the
implementation of HIT; thus, it is important to explore interactions among nurses and those involved or affected by HIT implementation to understand and describe nurses’ actions when they seek to continue with patient care activities when faced with HIT obstacles.

Watson (1985, 2008) and Benner and colleagues (1999, 2009, 2010) describe the nurse-patient relationship that functions based on local organizing principles. The nurse-patient relationship includes activities of caring for and healing the mind, body, and spirit. The disciplinary focus of nursing is patient centered and includes working independently and collaboratively with diverse clinicians. Clinical nursing knowledge draws on science and technology and is also socially embedded within the practice of nursing. Benner et al. (2009) noted that clinical knowledge is an interactive social activity that requires community and arises in dialogue and relationship with others. Nursing practice takes place in transpersonal caring relationships between the nurse and patient, taking into account the patient’s mind, body, and spirit. Nursing practice occurs within a mutual human-environment field (Rogers, 1970; Watson, 1985) that is made up of self-organizing interactions and emergent meaning making. Every patient is unique, and nurses collaborate with the patient as well as with other clinicians to co-create a patient-focused plan of care that is not linear, but involves multidirectional interactions across time and space. In the nurse-patient interaction, the potential for coherence without any program, plan, or blueprint emerges. Obstacles may arise with linear-designed processes, such as using HIT in offering patients care, creating the conditions for nurses to self-organize around the environmental tension. In nurses’ self-organizing interactions,
transformation, either destruction or innovation, has the potential to emerge. Whether it will emerge is to some extent dependent on nurses’ response to initial conditions.

**Sensitivity to initial conditions.** The second construct for this study is sensitivity to initial conditions. Sensitivity to initial conditions influences nurses’ ability to self-organize based on the history of interactions that shapes the present conversations. The history of human interactions has many levels of analysis, or multiple sets of initial conditions (Kuhn, 2009). For example, whether the initial conditions that are necessary for a nurse to self-organize with someone in the technology department are present is dependent on the nurse’s knowing that person or how to contact him or her. The initial conditions necessary for a nurse to self-organize with someone are sensitive to the nurse’s ability to speak the same language as the person he or she is trying to communicate with. Initial conditions for nurses to self-organize are also based upon norms of the work-group and values of the nurse. A nurse’s ability to self-organize is also sensitive to previous interactions with a particular person or group; if there is a history of interaction that created inclusion or exclusion for the nurse, the interaction will be affected. The significant influences that shape the overall emergence of human interaction in gesture-response are history and experience. The initial conditions are the past, a person’s history, both immediate history and extended history, that influences current interactions. For example, Loy (1997) explained that a board with nails driven in it positioned on a slanted surface will influence how a marble will roll, bouncing off a nail and momentarily stopping, before falling to one side or the other. Small changes in the marble’s trajectory will create a big change in its final trajectory. Human interaction is highly dependent on initial conditions, such as how a person responds in the immediate
past (gesture) interaction that is formed by and forming the immediate future (response). Just as the initial conditions of how the board is positioned influences how the marble moves, history creates the conditions for nurses to participate in self-organizing interactions. The initial conditions of self-organization are based upon the nurses’ ability to interact with others (Axelrod & Cohen, 1999).

Nurses’ self-organizing interactions are sensitive to the initial conditions of history in interactions with individuals within their workgroup as well as to the history of interactions beyond the workgroup. Nurses’ self-organizing interactions are sensitive to initial conditions such as such as access to technology experts either from knowing how to contact them or from someone’s facilitation of that communication. For example, when a nurse encounters an obstacle when using HIT, his or her history of interaction with those who can remove the obstacle will influence the current situation. If the nurse does not know whom to contact to remove the obstacle, the nurse may work around the obstacle. Or if the nurse has previously contacted someone to ask that person to remove the obstacle and did not receive assistance, he or she may self-organize with someone else to problem solve. Nurses’ self-organization builds upon a history of interaction with others. When those in the interaction are not strangers, the history of their relating and the histories of the groups they are part of also become relevant in relating (Stacey, 2001). Previous conversations with peers, patients, project managers, and leaders will influence a current interaction when a nurse encounters an HIT obstacle in his or her workflow. The history of interaction includes prior experience with the others as well as a prior experience that gives rise to expectations (Stacey & Griffin, 2005). Nurses’ self-
organizing interactions are based on a history of interactions and offer expectations for future interactions. The future interactions are multidirectional.

**Multidirectional interactions.** The third construct for this study is multidirectional interactions. Multidirectionality (nonlinearity) is one of the key characteristics of complexity science. The term *nonlinear interactions* comes from the study of nonlinear dynamics revealing behaviors between variables that are unstable (Kiel & Elliott, 1996). The behaviors between variables are unstable because they are diverse; variables interact differently. In the Newtonian view, the world was thought of as mechanistic and predictable through the same linear processes. Nonlinear dynamical systems theory, also known as chaos theory, revealed that “instability and disorder are not only widespread in nature, but also essential to the evolution of complexity in the universe” (Kiel & Elliott, 1996, p. 2). When interactions are nonlinear (multidirectional), the variables have diverse patterns and the future is unpredictable. This unpredictability is important in human interaction and life, including nursing practice.

Instability and disorder are necessary in human relating. According to Stacey and Griffin (2005), healthy, creative, ordinarily effective interaction is always complex and uncertain. Stacy and Griffin asserted that patterns of human relating that lose the dynamic movement of stability and instability become highly repetitive and rapidly inappropriate for dealing with the fluidity of ordinary life (p. 7). Dooley (2004) noted that if nothing changed in an organization and everything was at equilibrium, the organization would be dead, literally, as life entails constant interplay. The evolution of relating emerges in spontaneous choices of nurses and the amplification of small differences in the iteration of interaction from one moment to another. Difference and conflict are essential to
evolution, in that patterns of movement that are both predictable and unpredictable occur at the same time. Without variety to human interaction, repetitive patterns develop that lose the capacity for transformation. With multidirectional interactions, diversity has the potential to change patterns. Consequences of multidirectional interactions are that “small changes may result in very different patterns, and there is limited predictability” (Davidson & Topolski, 2011, p. 60). The limited predictability holds the potential to improve interactions in ways unimagined. In nurses’ interactions, both gradual and dramatic change holds the potential for transformation. It is in the capacity for spontaneous individual human responses and the amplification of small differences that new patterns form. All human interactions are “inevitably ‘people-context-dependent’ and therefore susceptible to the amplifications arising from the micro-diversity inherent in human interaction” (Sarra, 2005, p. 183).

Many of the technologies nurses use in caring for patients are relatively new to nursing practice, and not all variations are fully understood. Nurses’ clinical practice is socially embedded and very often involves encountering underdetermined and open-ended situations in which certainty often is not possible (Benner et al., 2009). Benner et al. (2009) described nursing practice as “underdetermined,” meaning it is open to variations not accounted for by science and that good clinical reasoning is required to select and use the most relevant approach, such as when a patient’s identification band will not scan with BCMA. Certitude is often sought in nursing practice; it is seldom achieved (Benner et al., 2011). Expert nurses are accustomed to communicating with others and to uncertainty in interactions with patients, and they use clinical reasoning to determine what course of action to take specific to the situation. Clinical reasoning
changes nurses’ interactions and activities; the changes are dictated by what is taking place with equipment, policy, HIT, and scheduling, as well as by patient and family concerns (Benner et al., 2010). In these multidirectional interactions, the future is unpredictable and nurses hold the potential for innovation or destruction.

Nurses working in a hospital setting participate in multidirectional interactions. In the gesture-response interaction, meaning is perpetually created; thus the outcome is not known ahead of time; it is unpredictable. For example, when a nurse gestures to a co-worker when the nurse has encountered an HIT obstacle, meaning is made in the response, in the social act that may bring about stability or instability. Multidirectional interactions have the dynamic of stability and instability; small changes may result in a disproportionate effect, such as the emergence of different patterns. The multidirectional self-organizing interactions that nurses engage in are influenced by principles, or sets of rules, the same principles that guide all human interactions.

**Influenced by a plethora of sets of rules.** The fourth construct for this study is a plethora of sets of rules. In everyday, local acts of communication, nurses engage in interactions with patients and others, and they are guided by numerous rules specific to social interaction. The plethora of sets of rules used to describe and understand the social interactions of nurses when they encounter an HIT obstacle consist of the same elements that guide all human interaction: a) fluid and diverse acts of communication; b) the interplay between choices arising in acts of evaluation, which is ideology; and c) relations of power. The socially constructed rules for communication among and between nurses are the basis for all forms of human joint action, and in these interactions identity and difference emerge (Stacey, 2001).
The plethora of sets of rules that guide nurses’ interactions are in the interaction; there are no forces over and above the local interaction. From a CRP perspective, nurses are formed by and forming identity and difference within local interactions. For example, the choices nurses make when they encounter an HIT obstacle are formed by and forming their identity both as an individual and as part of the workgroup. Evolution of the local workgroup emerges in the interplay between a variety of intentions and plans of individual nurses in which no one can design or control the interplay (Stacey & Griffin, 2005). Forces of interaction are found in the interaction itself.

The organizing principles governing fluid human interactions are formed by and form power relations and ideology. Ideology is the evaluative criterion of choices composed of norms and values. Norms are “evaluative criteria taking the form of obligatory restrictions which have emerged as generalizations and become habitual in a history of social interaction” (Stacey & Griffin, 2005, p. 6). According to Stacey and Griffin (2005), values are “individually felt voluntary compulsions to choose one desire, action or norm over another” (p. 6); they arise in social acts. Nurses’ action, as is true of all human action, is always evaluated either consciously or unconsciously. When nurses are using HIT or working around HIT obstacles as they care for patients, their actions are evaluated by norms and their own values. A stabilizing feature of human interaction is a process in which people account to each other and negotiate with each other in a collaborative process in order to work together (Stacey, 2001). In processes of social evolution, such as a nurse’s workgroup, values, and norms are the evaluative criteria of actions and sustain patterns of power relations.
Power relations are ongoing processes nurses participate in as they negotiate with each other regarding what they do or do not do. In these processes, some nurses may find that by using language that is persuasive they are “in,” accepted, while others may find themselves “out” and not accepted. It is in processes of accounting to one another on the basis of ideology and power relations that nurses’ individual and collective identity is formed, and so is difference. For example, when a nurse encounters an HIT obstacle, he or she will make a choice regarding how to meet the needs and desires of the patient; the nurse’s choice will be evaluated by self and by the group as acceptable, or not. The evaluation is negotiated between the nurse and others from the group either consciously or unconsciously. If the choice is evaluated as unacceptable according to unit norms, the nurse may find himself or herself not part of the collective identity. Communication acts are continuous processes of negotiating with one another forming and formed by ideology and power relations.

Watson (2008) noted this circular negotiation pattern when she discussed the transpersonal caring relationship between a nurse and a patient. Watson noted that nursing practice is the ability to form and sustain transpersonal relationships with patients and families. The caring relationship between nurse and patient involves ethical choice and action within the present moment. Communication acts are the central activity of organizing for care and healing. Ideology is composed of norms and values that are the rules that are formed by and form nurses’ communication acts.

Power relations and ideology are rules of behavior in self-organizing interactions. The self-organizing collaborative process is enabled and constrained by rules of power relations. Rules that govern communication are located at a local level (Stacey, 2001). In
dominant views of organizations, power is assumed to be an aspect of hierarchical structure and thus, external to communication (Stacey, p. 179). According to Stacey (2006) power is not something anyone possesses, but is a characteristic of all human relating. It is not that a nurse can do whatever he or she wants. In order to form and stay in a relationship with someone, the nurse enters into negotiations with others. Power relations are processes of negotiation. When a nurse enters a relationship, he or she is constrained by and constrains others, as well as enabled by and enabling others. In human interaction, “Power is this enabling-constraining relationship where the power balance is tilted in favor of some and against others, depending on the relative need they have for each other” (p. 134). Nurses who self-organize around an HIT obstacle are enabled by norms of the group they are interacting with as well as by their own evaluative choices, and they are constrained by these same norms and values to an extent that depends on the relative need they have to identify with the group.

Patterns of communication in everyday interactions can bring about continuity, innovation, or destruction (Stacey et al., 2000). In diverse acts of communication innovation, changing interaction patterns that bring about transformation can emerge. In the same way, destruction can emerge through interaction patterns. A shift in patterns of inclusion and exclusion is how organizational change occurs, in the patterning processes of communication and power relating. Multidirectional human interaction is an evolutionary process and is possible only when the dynamics of communicative interaction are fluid enough in terms of diversity, tension, and conflict to have the potential for innovation (Stacey, 2001).
A critical degree of diversity is necessary in self-organizing interaction if spontaneous innovation is to arise. The potential for innovation takes place in a context of diversity and conflict as much as it does in one of harmony and cooperation (Stacey, 2001). In human interaction, each act of interpretation in the present reconstructs the past, potentially changing its meaning in contradictory ways. Conflict arises from tensions in self-organizing interactions; in tension, innovation has the potential to emerge. In ordinary work activities, tensions of fluid interaction patterns among leaders, technology designers, and nurses form and are formed by individual and collective identity and difference. This perspective focuses attention on accounting to one another in dynamic, local, internal interactions in everyday conversations. Within self-organizing interactions of human relating, innovation, or meaning making, has the potential to emerge through joint action that is enabled and constrained by power relations and ideology.

Summary

Complexity science served as the theoretical orientation for this narrative study. In this chapter a complexity science theoretical perspective has been presented as an appropriate lens through which to understand and describe nurses’ complex interactions when using HIT. The scientific background of complexity science was presented along with two organizational theories generated from complexity science. Nursing practice was described as being complex in dynamic transpersonal caring relationships in which nurses interact with multiple patients, providers, and technologies. Two theories from complexity science were combined to create a model to guide this study. Kuhn’s (2007) four constructs that guided this study were presented and described. They are self-organization, sensitivity to initial conditions, multidirectionality, and influence by a
plethora of sets of rules. Human cultural settings and productions are always complex and
dynamic; complexity science supplies language with which to understand and describe
social phenomena that nurses participate in, such as when they encounter an HIT
obstacle. Complex responsive processes is both an organizational leadership theory and a
method used to study organizational change.
Chapter 3

METHODOLOGY

Introduction

The purpose of this study was to describe and facilitate understanding of the human interaction experiences of registered nurses in a hospital unit using HIT, to inform implementation and leadership strategies designed to deliver safe, quality care to patients. The study addressed the primary research question: “How do interactions among and between nurses guide their use of HIT when in caring relationships with patients?” Four secondary questions were addressed: a) What narrative themes characterize the experience of nurses using HIT? b) What interactions do nurses participate in when they encounter an HIT obstacle? c) What are the norms and values (ideology) associated with the experience of nurses using HIT? d) What are the power relations associated with the experience of nurses using HIT?

Chapter 3 presents the narrative research methodology used in this study and includes discussion of the following areas: a) self-disclosure of beliefs and values inherent to the investigator as instrument in research (Creswell & Miller, 2000), b) the research design, c) the research site and sample, d) ethical considerations for this study and IRB approvals, e) data collection, f) resources and data management, g) data analysis, h) validation of findings, and i) delimitations and limitations of the methods used.

Self-Disclosure

It is important in regard to the trustworthiness of a qualitative narrative study that I disclose my beliefs and values to inform you, the reader, of my viewpoint (Creswell &
Miller, 2000). This research method is subjective in that the insights and findings arise in my reflections on the micro detail of my experience of interaction with others (Stacey & Griffin, 2005, p. 9). I have constructed reflexive narratives that include reflections of my life history and how this history shaped the manner in which I reflected upon my experience with participants in this study (Stacey & Griffin, p. 23). Reflexivity is the process in which I engaged in explicit self-awareness analysis of my role in the research (Holloway & Wheeler, 2010; Riessman, 2008; Stake, 2010). As in all interactions, I brought my past experience that formed my values and beliefs to interactions with participants and in the representation of these experiences. This narrative study is my interpretation of my interactions with nurses as they use HIT. The stories of my experience interacting with nurses when they used HIT during patient care activities were mediated experiences, as there was no way to express or learn of another’s experience unmediated; thus my narrative was also mediated by my experience, interpretation, beliefs, and values (Riessman, 2008).

I believe nurses’ interactions are best understood from a complexity science perspective, which includes the capacity to self-organize, multiple ways of knowing, and meaning that emerges in interactions. My beliefs relate to the significant potential of HIT to enhance the patient experience. I value development of nurses’ clinical wisdom through self-organizing interactions that may enhance the patient’s experience of care and healing. My values have been formed by and forming in interactions with nurses and patients throughout my career. Specifically, my beliefs and values reflect my 23 years as a nurse, during which the first 10 years of my nursing career were spent in labor and delivery units using paper flow sheets to document patient assessments and paper lab
slips to process blood tests. It was during the time of working in labor and delivery that I become interested in nurses’ use of technology as they cared for patients. My experiences with the implementation of technology have influenced my work as a nurse and my recognition of the self-organizing capacities of nurses, the complex and uncertain nature of healthcare, and the reality of emergence.

I have witnessed an increased use of technology in nurses’ workflow since the beginning of my nursing career. I have always used electronic fetal monitors for laboring women and have had central monitoring in the nurses’ station of each patient’s fetal heart rate tracing for all in the area to view. In the late 1990s we started using keyboards to type assessment and intervention data directly on the fetal monitor printout. In 2000 I moved to a hospital that used electronic fetal monitor displays; as well, they were using an electronic health records system for all nursing documentation, dietary and procedure orders, and lab results. In 2004 this hospital moved to an enterprise, Windows-based electronic health record.

I was involved in training nurses and physicians to use this new EHR throughout the hospital. At the same time in the labor and delivery unit, the post-partum unit, and the newborn nursery, a mother/baby electronic documentation system was implemented that was to supplement the new hospital-wide system for this patient population; I worked closely with the IT department to teach clinicians and the support staff to use the new system. Once the mother/baby record was implemented, I was the point of contact between the vendor and the hospital staff; I modified screens based upon user feedback and generated quality reports based upon the data in the electronic record, such as birth statistics. From these experiences I learned that technology held the potential to improve
quality, safety, and efficiency in care for patients if it was designed and implemented in a way that supported nurses’ workflow. I wondered if there was a better way to introduce HIT to nurses so that the tools could be used to improve the patient experience.

I then became the clinical manager of the mother/baby unit, where I continued to develop beliefs regarding the oversight of nurses and facilitating their use of technology. In this position, one of my accountabilities was to monitor and facilitate nurses’ use of the new EHRs; I often provided remedial training to teach nurses to use the two systems as designed. Nurses frequently told me how the applications within the EHR did not meet their expectations of efficiency and quality for patient care. For example, nurses working in the postpartum and newborn nursery units used an EHR specific to perinatal services. They did not understand why patient allergies, height, and weight had to be entered into the hospital EHR when nurses and physicians did not use that record to enter findings; they thought that since they entered their assessment data into the perinatal record, additionally entering the same data into the hospital-wide EHR was a waste of their time. I believed my role as manager was to remove barriers in nurses’ workflow to facilitate quality patient care, but I did not know how to do so with standardized HIT processes. In my nursing career, I have seen increased use of HIT as patient care activities are being conducted. This research is presented through my subjective interpretations of nurses’ action in the context they deliver care to patients (Creswell, 2007; Stake, 2010).

**Beliefs.** As a result of my experience as a direct care nurse, as a liaison between clinicians and technicians, and as a clinical manager, I believe that nurses’ interactions are best understood from a complexity science perspective. As noted previously, interactions with nurses were self-organizing, emergent, and often uncertain. It is through
dynamic interactions that nurses expand their network to respond to tensions in their local environment (Uhl-Bien & Marion, 2008). For example, when I experienced an obstacle with a fetal monitor when caring for a laboring mother, I asked an available nurse for assistance; together we responded to the obstacle by responding to both the equipment and the patient’s position to overcome the obstacle in monitoring the fetus’ heart rate. My belief is that through self-organizing interactions, nurses can deliver quality and safe care to patients.

Pointing to the self-organizing capacity of nurses, Benner (2001) noted, “Nursing is a socially embedded and collectively held practice” (p. xii). My beliefs about nursing practice are consistent with Benner’s (2001): that nursing expertise develops through testing and refining propositions, hypotheses, and principle-based expectations in actual practice situations by comparing judgments with other nurses in actual patient care situations. I believe that from dynamic human interactions clinical nursing wisdom emerges that expands local networks and builds upon testing and refining propositions, hypotheses, and principle-based expectations in the context of a situation. For example, nurses’ wisdom emerges from interactions such as when a nurse encounters an obstacle with BCMA and he or she asks others both inside and outside the workgroup how to use the HIT. In the interaction, nurses discuss testing and refining propositions, hypotheses, and principle-based expectations. The way in which nurses continue with patient care activities when confronted with an HIT obstacle is socially constructed in interactions.

I recognize that there are multiple ways of knowing and that through interaction nurses construct their social reality (Stacey et al., 2000). I believe that so-called social reality is a product of social processes; it is tied and relative to context, time, and culture;
human beings construct their own realities (Holloway & Wheeler, 2010). Based upon the work of Mead (1934), I understand that nurses make meaning in gesture-response; it is not in the gesture alone that meaning is made, but in the gesture in combination with the other’s response. In the interaction of gesture-response, nurses’ self-organizing actions have a history of interacting with the other (sensitivity to initial conditions) such that amplification of small differences changes future interaction (multidirectional), and they have a plethora of sets of rules that make up the interaction. For nurses, I believe in the complex and uncertain nature of healthcare, meaning that it is constructed by multiple ways of knowing in their gesture-response interactions.

With the phrase “make meaning” I suggest that nurses are constantly seeking to understand the world around them through interactions in the context of the situation (Kurzman, 2008). I believe meaning emerges in interactions. For example, when I reported a patient’s data, such as a blood pressure to a physician or another clinician, meaning was not made in the numbers themselves; but in the gesture-response social act of placing the number in the context of the patient’s situation, “meaning arises in the responsive interaction between actors” (Stacey, 2001, p. 79). Stacey (2001) noted that humans have an intense, intrinsic need for relationships and attachment to others and are shaped by those relationships in addition to shaping relationships. Stacey built upon the work of Mead (1934), identifying that humans evolve together through cooperative and competitive interaction. When nurses encounter HIT obstacles when in caring relationships with patients, meaning emerges in their cooperative and competitive interactions. Consistent with Kuhn (2007), my beliefs have been formed by and have formed my values.
**Values.** I value diverse self-organizing human interaction that makes up clinical wisdom. Multiple perspectives must be offered if a nurse is to choose quality actions or the best course of clinical care in the situation when using HIT. According to Stacey (2001), meaning arises in interactions; it is not attached to an object or stored, but is in gesture-response social acts of individuals. When a nurse encounters an obstacle using BCMA, it is through interactions with others who have different perspectives that clinical wisdom can be advanced. When people differ from each other in terms of their perspective, education, experience, norms, and values, their interactions have the potential to allow meaning to emerge (Stacey & Griffin, 2005).

Meaning that emerges from self-organizing interactions could be novelty, destruction, or continuity. I value novel HIT solutions, innovation, and patient care activities that hold the potential to contribute to the well-being of patients by changing interaction patterns. Through interactions, nurses must be able to question why HIT is being used for patient care activities, and they must question how HIT is being used with the potential to improve quality and safety for patients. Diverse interactions have the potential to change patterns in nurses’ use of HIT so that innovation can emerge. Pattern changes can be spontaneous or gradual; in either case, through evolving interactions, innovation has the potential to emerge.

I value empirical research, such as the use of HIT, for its potential to advance the emergent capacity of nursing practice to provide efficient and quality patient care. Benner and colleagues (2011) noted that clinical wisdom is required for nurses “to judiciously decide on interventions with the particularity of the patient in mind and judiciously and critically evaluate scientific evidence” (p. xiv). I value the clinical wisdom of nurses that,
in complex and uncertain situations, embeds the clinical practice of nurses and ethical and clinical reasoning; expert nursing practice does not follow linearly decontextualized designed procedures, such as with BCMA; rather, it is the integration of these procedures. For example, I value the empirical research demonstrating that BCMA can be used as a safety tool to verify the five rights of medication administration (Wideman, Whittler, & Anderson, 2005). I also value nurses’ choices in particular situations when using BCMA in performing patient care activities. According to Stacey and Griffin (2005), values are individually felt compulsions to choose one desire or action over another. Consistent with Stacy and Griffin’s view of social constructionism, “values arise in social processes of self-formation—they are fundamental aspects of self, giving meaning to life, opening up opportunities for action” (p. 6). I have found value in using empirical research to guide nursing practice. Empirical research is a combination of science and theory about well-established standards of good nursing practice that appears in clinical reasoning (Benner et al., 2011). In nurses’ complex and uncertain interactions with patients, clinical reasoning emerges in the situation at hand.

I value the use of HIT tools in patient care activities when those tools enhance the patient experience. These tools are only as valuable to the patient experience as they are useable for nurses. HIT cannot be a distraction from patient care activities. Nurses, who are front-line users of HIT, “must be in active dialogue with engineers and technicians about the impact of technology on the nurse’s overall vigilance and grasp of the patient’s needs and clinical status” (Benner et al., 2011, p. 301).

My experiences with the implementation of technology have influenced my work as a nurse. My beliefs and values have influenced the data and results. I value the
potential of HIT to enhance the patient’s experience, nurses’ ability to self-organize, and nurses’ capacity to create new meaning in interactions. I have constructed narratives through reflexivity from participant data in my interpretation of nurses’ interactions. My beliefs and values are important to this research since I reflected upon the data collected through observations, interviews, and organizational documents to construct the findings and results. Specifically, my beliefs about nurses’ ability to self-organize, multiple ways of knowing, and the emergence of meaning in interactions, as well as my values regarding self-organizing nurses’ capacity to adapt HIT to improve the patient experience, impacted this narrative study.

**Research Design Overview**

This section presents an overview of narrative qualitative research methodology and the lens of CRP to facilitate understanding of human interactions as the source of transformation in an organization. The study explored nurses’ interactions when they used HIT and encountered an obstacle using HIT in order to provide a detailed understanding of the interactions and the context in which the interactions occurred (Creswell, 2007). These qualitative data “are a source of well-grounded, rich descriptions and explanations of processes in identifiable local contexts” (Miles & Huberman, 1994, p. 1). Stake (2010) noted that qualitative inquiry focuses on how things work and varies with the situation, characterizing professional knowledge. Findings from this research are presented with rich descriptions developing contextual understanding by explicating interactions nurses participate in when they use HIT and obstacles arise.

**A narrative approach.** This study describes nurses’ interactions by recounting the events into the temporal order and meaning of everyday experiences (Sandelowski,
1991). Narrative inquiry is the study of experience in the stories that a person tells about their interactions in relation with participants (Clandinin, 2007). This research is a story about my interactions with nurses using HIT in a hospital.

Narrative researchers describe the research process as an exploration of the experiences of people within the context of the social; meaning always arises in a social context (Benner et al., 2011; Clandinin & Connelly, 2000; Riessman, 2008; Stacey & Griffin, 2005). Clandinin and Connelly (2000) have used narrative inquiry to describe, through their reflections, individuals’ life experiences of learning in education programs “enacted in storied moments of time and space, and reflected upon” (p. 17). Clandinin and Connelly did not discuss a cooperative and competitive relating in people’s experience of learning; they described individuals’ life experiences of learning. Clandinin and Connelly used narrative inquiry to describe change (learning) in individuals and groups, whereas Stacey and Griffin (2005) have used narrative inquiry to describe change that occurs in organizations through interactions of individuals and groups. Common to narrative inquiry, social phenomena such as learning (Benner et al., 2011; Clandinin & Connelly, 2000) or organizational interaction (Stacey & Griffin, 2005) is not decontextualized as an independent event, but is part of the continuum of time: past, present, and future. Clandinin and Connelly have explored people’s experiences to find meaning in learning, Benner and colleagues (2011) have explored nurses’ experiences to find meaning as the nurses developed clinical wisdom, and Stacey and colleagues (2000, 2001, 2005) have explored human interaction to find meaning in organizational change.

**CRP of relating as a research method.** The theory of CRP of relating has been used in two ways: as a theory and as a method to understand and describe organizational
change (Stacey & Griffin, 2005). In this study, CRP as a theory was used to facilitate understanding of and describe dynamics within a hospital unit. According to CRP of relating, dynamics of change occur in local communication (such as nurses talking with other nurses or support staff), building upon past interactions, participating in interactions that bring about change—either stability or instability; and these local communications are influenced by sets of rules. CRP of relating as a theory explores interactions that form and are formed by unit norms and individual values as well as the relative need nurses have for one another in their daily work activities. Appendix A presents the CRP of relating theoretical concepts and behaviors I observed or experienced in interactions with nurses.

Narrative analysis using CRP of relating is similar to other forms of narrative analysis (Benner et al., 2011; Clandinin & Connelly, 2000) in that the researcher is present in the data, describing the social phenomena, the social context of change, and time as a continuum. CRP as a methodology is different from other narrative inquiries in that CRP of relating has a specific focus on how change occurs in organizations. The value of CRP of relating to narrative is that it provides a filter that helps a researcher to understand and describe how one unit in one organization can be transformed through the everyday interactions of nurses in caring relationships with patients. CRP of relating as a research method explores self-organizing interactions that are sensitive to initial conditions (history), are multidirectional (future), and are influenced by rules of ideology and power relations that hold the potential for innovation to emerge. Reflective narratives were the raw material from which propositional themes emerged for further reflection (Stacey & Griffin, 2005).
CRP of relating as a method provided the structure for the analysis of narrative data in an effort to describe and understand nurses’ action in a hospital organization that led to organizational knowledge (Stacey, 2001). Research using CRP of relating methodology is subjective; the researcher chronicles movement of thought generated in experience of local interactions (Stacey & Griffin, 2005). “Experience is the experience of local interaction,” wrote Stacey and Griffin (2005), “and this immediately suggests that organizations need to be understood in terms of the experience of their members and others with whom those members interact” (p. 22). When organizations are understood as being composed of local interactions in the absence of any plan or blueprint, it becomes apparent that they can best be understood from within the local interaction (Stacey & Griffin, 2005). In the course of my observations I noticed that many local interactions did not follow a linear plan. For example, when the automatic medication dispensing device was running low on a particular medication, several nurses (Carol, Denise, Ellen) entered a number to notify the pharmacy to restock if fewer than five doses of the medication remained; Gail called the pharmacist when she removed the last dose of medication in the dispensing device. I understood that these interactions occurred without a blueprint and were understandable to those in the interaction. Since interaction between nurses is patterned primarily as narrative themes, CRP of relating was the narrative method selected for giving an account, telling the story, of what I thought and felt or how I responded when in these interactions with nurses in particular contexts over particular periods.

According to Stacey and Griffin (2005), research using the CRP of relating approach comprises both the narratives of experience and propositional themes that
emerge in the narratives. In this approach, the appropriate research method was “essentially reflexive in two senses” (p. 10). First, I reflected upon my own life history and how this history has shaped the manner in which I reflected upon experience; second, a social form of reflexivity required me to locate my ways of making sense of experience in the wider traditions of thought that have evolved in the history of human interaction. For example, when I noticed Brandi quickly answered “yes” to the automatic dispensing device question of the number of medications that remained in the bin, I wrote a reflection of my experience using this device and realized that when I was a direct care nurse I responded to the question in the same way and became aware of how this experience shaped my understanding of nurse participants’ practice with this device. Then I wrote a reflection on how the pharmacist, Lee, stated during the interview, that he expected nurses to count remaining non-controlled medications in the dispensing device in order to keep an accurate par level for each medication. Both reflections informed my interpretation of nurse participants’ behavior and my assumption that nurses have talked about how to advance past this screen. This research was participative since I interacted with nurses through observations in their natural setting, conducted interviews and then wrote reflections on my experience. I identified and explored the nurses’ interactions when using HIT through the filter of complex responsive processes of relating in which meaning occurs in self-organizing interactions that are sensitive to initial conditions, are multidirectional, and are influenced by ideology and power relations.

In addition, understanding and describing nurses’ interactions when using HIT in patient care activities involves knowledge of clinical practice and clinical judgment (Benner et al., 2011). Using a narrative analysis approach enhances evidentiary value to
the theoretical propositions of the study, as outlined by Kuhn (2007), to describe social phenomena: self-organizing behaviors, sensitivity to initial conditions, multidirectional interactions, and behaviors that are influenced by sets of rules that are to some degree transferable from close observation of one group of nurses (Riessman, 2008). Evidentiary value is enhanced with the narrative analysis of one group by providing details to the context of the situation, narrative analysis can uncover taken for granted social practices, and analysis of one group can provide important insights of one-sided, complex, and occasionally conflicting stories of participants (Riessman).

Examples of CRP of relating as a research method. CRP of relating has been used as a research method since 2000 by members of the Complexity and Management Centre at the Business School of the University of Hertfordshire (Stacey & Griffin, 2005). The Centre has been conducting a research program on organizational change using CRP of relating; this method has been used internationally (Shaw & Stacey, 2006). Examples of sense-making reflexive narratives guided by CRP of relating have been published by colleagues from the Master of Arts/Doctor of Management program at the Business School of the University of Hertfordshire (Shaw & Stacey, 2006) and by researchers not associated with the University of Hertfordshire. A discussion of previous research will support the use of CRP of relating in this study.

Narratives from four industries demonstrate how CRP of relating provides a lens from which to make sense of complex, self-organizing, and evolving interaction. The theory of CRP of relating has been used to identify products of innovation, sense making in leadership roles, sense making within a government-run healthcare facility, and how
interactions were enabled and constrained by power relations in the experiences of novice nursing faculty (Davidson, 2011; Fonseca, 2002; Sarra, 2005; Williams, 2005).

Fonseca (2002) found that through engaging in reflexive narratives about his everyday interactions, innovation emerged in these interactions. In talking with people throughout a city in Portugal, Fonseca noted, he experienced self-organizing processes of communication that held diversity. Through these diverse conversations, knowledge changed among individuals regarding how to build new concrete pipes to improve the city’s sewage system that had been damaged by severe flooding during the previous winter. Fonseca identified through reflexive narratives of his experience that innovation occurs in human interaction.

Using reflective narratives, Williams (2005) explored his role as chief executive at a college in London, in an attempt to make sense of what happens when people take on leadership roles in organizations. From his reflexive practice, he identified the effects of arbitrary power applications on colleagues, mass shaming, and sustained orchestrated threats as means that ensured compliance and conformity yet lacked human relating. Through his narratives, he modified his leadership approach in such a way as to place himself as a participant in the complex social interactions with those with whom he worked rather than as a distant outsider, thereby allowing novelty to emerge in interactions (Williams, 2005).

In his role as consultant, Sarra (2005) used CRP of relating when making sense of staff’s and patients’ experiences in a National Health Service Trust facility in the United Kingdom. By exploring meaning in everyday activities of communication and power relations among and between staff and patients, Sarra discovered that people influence
the emergent organizational process through interactions with others. The organization explored in the inquiry was subject to many politically motivated performance improvement mandates with predetermined objective outcome measures, leading to feelings among the staff and patients of hopelessness, isolation, and powerlessness (Sarra, 2005). Sarra identified that authority structures were misused and departments were operating in silos. Through facilitation of interactions among the staff and patients at the facility, novel patterns of communication emerged that created conversation and built trust, resulting in improved experiences for patients and staff.

Davidson (2011) explored the experiences of novice nursing faculty using CRP of relating in an attempt to impact recruitment and retention rates. Through engaging in reflective narratives of her everyday experiences as a novice faculty and reflecting upon the experience of other novice faculty, she better understood the themes and power relationships that contributed to the shortage of faculty. She found that by reframing novice nurse faculty members’ experience of relating, the potential for novelty to emerge in patterns of interactions and these patterns of interaction held the potential to transform nursing academia. CRP of relating has been used as a research methodology in many studies to reframe the experiences of people so that novelty has the potential to transform processes and human interactions, as demonstrated in the four examples.

**Study Site and Sample**

In this section, the research site and the study participants are described. The study sample was limited to those who were able to inform the study’s research questions as they were embedded in a single social setting (a hospital unit) and studied in-depth
Data for reflective narratives were collected through observations, interviews, and review of selected organizational documents.

**Research site.** Denzin and Lincoln (1998) stated, “Qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them” (p. 3). To allow me to participate with nurses in observations of and interviews regarding everyday experiences, this study was conducted in a unit of a hospital. It was important for me to observe interactions when nurses encountered an HIT obstacle and explored ways to continue to provide patient care. This study took place at an acute care Magnet hospital in the southwestern United States that is part of a larger health system. Understanding and describing the interactions of nurses in a Magnet Recognized hospital was important for this study, as Magnet Recognition is a sign of nursing excellence. Thus, workflow processes would be set in place through collaboration with empowered nurses, leaders, and technology designers. The Magnet Recognition Program (American Nurses Credentialing Center, 2013) recognizes healthcare organizations for quality patient care, innovations in professional nursing practice, and nursing excellence.

This hospital opened in 2007 and has 92 medical/surgical/telemetry/ICU beds with service lines in oncology, heart and vascular, orthopedics and spine, and women’s health. The hospital provides supportive clinical services in diabetes care, emergency services, general surgery, and Imaging/Diagnostics. The top five services provided at this hospital were spinal fusions/revisions, total knee replacement, total hip replacement, surgical gynecological oncology, and chest pain ruling out myocardial infarction. The average daily census is 60 patients with an average length of stay of 3.33 days. The two
medical/surgical/telemetry units had a 1:4-5 registered nurse-to-patient ratio; the intensive care unit had a 1:1-2 registered nurse-to-patient ratio.

This hospital used a commercially available EHR that had been modified by their health system. They had implemented suites of clinical applications within the EHR, such as admission history; clinical documentation; medication administration, including BCMA; and electronic medication records (Morgan, Interview). This facility used an automated medication dispensing system in all the nursing units and “Smart” intravenous pumps. I anticipated that nurses in this organization worked around technology obstacles since they use BCMA and smart pumps, both associated with nurses creating nonstandard approaches during use (Kirkbride & Vermace, 2011; Koppel et al., 2008).

The staffing model for this unit included Patient Care Technicians (PCT) for direct patient care activities. The PCT-to-patient ratio was 1:8-10. PCTs provided direct patient care services under the supervision of a licensed caregiver with responsibilities in performing nursing functions such as taking vital signs, bathing, feeding patients, assisting with the application of equipment and assistive devices, phlebotomy, telemetry, and completing physician’s orders by transcribing or inputting data (Organizational Document, PCT Job Description).

Nurses from one unit at the hospital, a 28-bed medical surgical telemetry unit, were recruited to participate in observations and interviews. This unit was selected by the Chief Nurse Executive as a unit that used HIT; the leadership team and staff were receptive to the notion of participating in a research study.

The clinical leadership model included a dyad of an Advanced Practice Clinical Nurse Leader and a Clinical Manager. The Advanced Practice Clinical Nurse Leader
assumed responsibility and accountability for all aspects of the clinical unit, including the role of lateral integrator, by coordinating and facilitating care provided by multiple services and disciplines across the care continuum (Organizational Document, Clinical Nurse Leader Job Description). The nurse in this role managed operational and clinical performance in partnership with the Clinical Manager. The Advanced Practice Clinical Nurse Leader demonstrated strong clinical knowledge and leadership skills to perform as a mentor, an educator, and a researcher, with the ability to coordinate, manage, and evaluate care for patients in a complex health system. The Clinical Manager worked to ensure that patient care was evidence based by supporting an environment that encouraged the use of research in practice and filled a key role in improving quality outcome performance. The Clinical Manager provided leadership and coordination of care with responsibility to ensure the high quality of staff development, physician relationships, quality initiatives, and nursing care; this nurse was expected to periodically provide direct care to patients according to the needs of the unit (Organizational Document, Clinical Manager Job Description). Both nurse leaders assumed their positions within the 6 months prior to the commencement of the study (Julie).

**Research participants.** In this section, I describe how participants were recruited for the study, the two groups of participants, and my agreement with participants. The two groups of participants were direct care nurses and support staff. Participants and the study site were selected based upon a focused, purposeful sampling strategy as defined by Creswell (2007); individuals and site are selected for study “because they can purposefully inform an understanding of the research problem and central phenomenon in the study” (p. 125). Participants included direct care nurses with at least 6 months’
experience who were frequent users of BCMA, medication dispensing devices, smart pumps, and other HIT. Support staff were also included as participants because they held knowledge of the HIT nurses used and were selected to extend and clarify the contextual infrastructure specific to BCMA, medication dispensing devices, smart pumps, and other HIT.

**Direct care nurses.** Nine direct patient care registered nurses met the inclusion criteria and agreed to participate in the study. Direct care nurses were recruited who used HIT in everyday patient care activities, had a variety of years of experience, and were involved in unit and organizational committees; both nurses who were good with HIT and those who struggled with HIT were included. All the nurses approached to participate in the study agreed to do so. Observations and interviews with direct care nurses were completed until redundancy was identified in the data and no new occurrences of HIT obstacles were identified; nine observations and interviews were completed. With the last four observations of direct care nurses, I noticed no new interaction patterns among nurses when using HIT or encountering obstacles.

**Support Staff.** Four support staff that had interactions with nurses including when they encountered HIT obstacles contributed to the study with individual interviews. The support staff contributed to the study by clarifying the context and the designed processes of HIT used by nurses. The nurse manager, Julie, was recruited for this study because she was able to provide insight into the human interactions that take place during HIT use; the interactions of nurses when they encounter HIT obstacles; and the unit infrastructure, culture, and activity. Other support staff included the project manager (Morgan), pharmacist (Lee), and quality officer (Chris) assigned to the unit, who provided insight
into the human interactions that arose during HIT implementation/use and the interactions of nurses when they encountered HIT obstacles. The names and telephone numbers of Chris and Morgan were obtained from the nurse executive for possible inclusion in the study; the nurse manager introduced me to Lee. I contacted these support staff either face-to-face when I was at the hospital or via telephone to inform them about the study and invite them to participate. An interview date, time, and location were agreed upon. All the interviews with support staff were conducted after observations and interviews with direct care nurses.

**Consent to participate.** Participants in this study included direct care nurses and support staff who interacted with nurses. All participants were offered the right to decline participation and were granted the opportunity to withdraw from participation at any time. Nurses were asked to allow me to observe them for a shift. Participants were given and signed an informed consent form prior to the commencement of observations and interviews. I observed nurses on the hospital unit; however, I did not participate in any patient care activities such as administering medications, offering treatments, or providing nursing counsel to patients or their families. No participants declined to answer any of my questions or asked to end observations or interviews prematurely.

I conducted all interviews. All participants agreed to have the interview recorded. Then the digitally recorded interview was transcribed for further analysis. As I received the transcriptions, I read through them for accuracy and edited words, such as names of people and places, and replaced them with pseudonyms. The gender of two support staff members was changed in this report to protect their identity.
How I met participants. I had several conversations with the clinical manager before I arrived on the unit to recruit study participants. In these conversations I spoke of the purpose of the study, the sampling strategy, the number of nurse observations and interviews I anticipated conducting, and my desire to be available during both day and night shifts on a variety of days of the week to facilitate my understanding of the interactions of nurses. I was invited to come to the unit at any time and on any day but Tuesday, since Tuesday is commonly a high volume day with much activity and nurses were unlikely to be as available for me to observe. I honored this request. Prior to each shift, I introduced myself to the shift supervisor and collaborated with her to recruit potential nurse participants. The shift supervisor provided the names of nurses she thought would provide a “good observation experience,” because each would be working with BCMA, smart pumps, and other HIT, and had varied experience and comfort with the HIT. Once that nurse arrived in the conference room where the shift change report was given, I introduced myself to the nurse and told her about the study and invited her to participate. Two nurses were not recruited through the shift supervisor, but through my talking with them when I was on the unit during my observation of another nurse.

After obtaining informed consent (Appendix B) from the direct care nurse, I assumed the role of observer-as-participant. I spoke with nurses about my research on investigating nurses’ use of HIT; I did not tell participants I was focused on their interactions when an HIT obstacle was encountered and worked around, to guard against biasing participants’ responses in observations and interviews.

I observed closely the nurses’ activities and interactions with HIT and their communication with other nurses. I observed patient care activities: locating and
preparing medications; administering medications; reviewing and documenting in the EHR at the bedside and at the nurses’ work area desk; communicating with other nurses, clinicians, and technology experts. There were no occasions of patient care that I was not allowed to observe. Toward the end of the shift, if the nurse was available, or after each observation experience, I conducted interviews with the nurse I observed to clarify, validate, and understand what I saw when the nurse used HIT or worked around HIT obstacles. I was able to observe nine nurses for approximately 79 hours over a 3-week period in September 2012. Observation times were selected that allowed me to interact with nurses on both shifts and on a variety of days of the week. I wanted to understand nurses’ experiences and interactions when using HIT, including at night and on weekends. A distribution of the hours of observation on days of the week is presented in Table 1.

Table 1. Observation Hours

<table>
<thead>
<tr>
<th></th>
<th>Sunday</th>
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<th>Wednesday</th>
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<tbody>
<tr>
<td>0700-1900</td>
<td>12.5</td>
<td>13.75</td>
<td>18</td>
<td>8</td>
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<tr>
<td>1900-0700</td>
<td>4</td>
<td>12.5</td>
<td>11</td>
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Ethical Issues

Informed consent was obtained prior to engaging in observations and interviews. There was no deception regarding the purpose of this study; it was important to build trusting relationships with members of the organization. The research was conducted consistent with CRP of relating, which means acting ethically, enabled and constrained by moral requirements to be responsible and accountable for my behavior.
Narrative inquiry is a profoundly relational form of inquiry since researcher and participants are always in the midst of living and telling their stories (Clandinin, 2007). The use of CRP of relating as the narratives of personal experience from interviews and observer-as-participant observations with others raises several ethical considerations. These include relations of power; acting ethically, enabled and constrained by moral requirements to be responsible; and accountability to the research participants, the research site, and the scholarly community for my behavior. I describe each of these in further detail in the following paragraphs.

During this study, I was aware of the power relations between participants and me in that participants may have perceived me as looking for faults or substandard practice to “correct” or report to authorities their behavior. I entered into relationships with participants to understand how they interact with others in the organization when they use HIT. Stacey (2001) noted that the essence of CRP is a social iterative process of cooperative and competitive relating. Participants in this study had a choice to interact with me or not, tipping the balance of power in their favor. Possibly they were willing to contribute to science in a way that could make their work experiences better, demonstrating their trust in me that I would act ethically as I included their experiences in the retelling of my experience with them.

Acting ethically means taking responsibility for my actions and being accountable to the participants, myself, the research community, and the reader for what I am doing (Stacey, 2001). For me, this means telling a story of my experience of nurses and support staff who use HIT and how they interacted when they encountered an obstacle. The story comes from my experience of interacting with participants; I am motivated by principles
of ethical choice such as beneficence (maximizing good outcomes for science), respect (protecting the autonomy of persons), and justice (ensuring nonexploitative and carefully considered procedures are carried out) (Miles & Huberman, 1994).

In being accountable for my behavior, I made sure that the participants and all persons I interacted with during this research process were treated with respect, courtesy, and justice. I did so not to avoid consequences of unethical behavior, but because I believe my identity as an individual and a member of the nursing scholarly community is formed by these interactions. I have taken to heart the theory of CRP that assumes human choice arises in present moment-to-moment interactions guided by values and morals. In local interactions, ethical and unethical themes arise and “accountability and responsibility do not mean achieving targeted consequences, they mean the ethical, moral requirement to take responsibility for one’s actions and account to one’s fellows for what one is doing” (Stacey, 2001, p. 230). I held myself accountable for my behavior and am held accountable by the research participants and by the scholarly community in this research report.

The ethical considerations for gaining entry to the hospital included possible risk to the hospital or employees of the hospital if nurses’ actions were portrayed as irrational, risk-taking behaviors. Antecedents and consequences of work-arounds were not the focus of the study; the focus was on the narrative themes rising from nurses’ interactions and experiences of obstacles when using HIT, with a focus on self-organizing interactions, power relations, and ideology. The study hospital and the participants were assured of confidentiality, which included my removing names from documents and using pseudonyms.
IRB Approval

Institutional Review Board approval was gained from Arizona State University and the participating health system to complete this study. Approval letters giving permission to conduct the study are found in Appendix C.

Data Collection

In this section I provide rationale and supporting literature regarding data collection methods used and describe the data collection procedures used in this study. Observations and interviews were the main sources of collected data, along with selected documents. Examples of documents obtained include the organization’s policy on medication administration, job descriptions, and quality reports. I wrote reflective narratives after each observation and interview that constituted data for analysis.

Observations. Observation serves as the foundational source of human knowledge (Adler & Adler, 1998). Adler and Adler (1998) noted that observation necessitates having direct contact with the participants in their everyday natural setting. Observations allowed me to draw closer to nurses’ experience of using HIT and their interactions when an obstacle was encountered, whereupon I witnessed connections, patterns, and styles of behavior. For example, I noticed that several nurses (Abby, Brandi, Denise, Ellen, Gail, Helen, and Irene) did not scan the patient’s identification band when using BCMA technology. Through observation I was able to witness these patterns and ask the nurses about the context, including the history, of this behavior. Participant observation is common when researchers want to gather data from their participants while interacting with them (Adler & Adler, 1998). Adler and Adler presented Gold’s (1958) typology of naturalistic research roles, through which observers may gather data
by participating to varying degrees as the complete participant, the participant-as-
observer, the observer-as-participant, or the complete observer. I took the role of
observer-as-participant since I participated in interactions with nurses as I was observing
them.

Although observational methods have certain strengths, they have some
limitations. The limitations include the threat to validity when inferring meaning (Adler
& Adler, 1998). In this study, data collected from observations were compared and
contrasted for similarities and differences within and between nurses, as well as
compared with the literature. The narrative has been written with thick description of the
context of nurses’ experiences so that the reader can place himself or herself in the story
to make his or her own meaning of nurses’ experiences.

During observations I focused on nurses’ interactions when they used HIT and
when they encountered an HIT obstacle. When a nurse encountered an HIT obstacle, I
noted the context and the nurse’s actions in my field notes for later reflection. I also
followed up in the interview when I observed an HIT obstacle. I was aware that my
presence may have changed patterns of using HIT; thus some of the episodes described in
the report may have occurred because I was present. I was also aware that my presence
might have a negative impact on the nurses I observed by interfering with their ability to
move quickly as they performed patient care activities. I stated early in observations that
if a nurse wanted me to step away I would do so, and I was flexible by providing distance
for the nurse as needed, although no nurse asked that I back away during my observation
experiences.
**Observation process.** A common feature of observational studies is to document what people actually do, rather than what they say they do (O’Leary, 2005). I observed nurses’ interactions in their everyday experiences of caring for patients, noted them and then attempted to make sense of them. Neither Creswell (2007) nor Riessman (2008) identified a predetermined number of encounters needed for narrative research, but both noted that considerable time is needed to collect stories and experiences. Throughout my observations, I recorded field notes about nurses providing patient care and their interactions when they encountered HIT obstacles; after the observation I wrote reflective narratives on my experience, to locate my way of making sense in the wider tradition of thought. For example, I reflected on Benner et al. (2011) to make sense of nurses’ interactions when they encountered an HIT obstacle during the provision of patient care activities, understanding that the choices they made to continue caring for patients was based on their clinical judgment and wisdom. When reflecting upon participants’ interactions when they used BCMA, I reviewed the work of Koppel and colleagues (2008) who noted that obstacles arise with the medication administration HIT, and are not rare or secret. This study guided my reflection that participants could interact more frequently with others in the organization to change patterns of using the HIT to improve safety and quality of care for patients. The work of Stacey and colleagues (2000, 2001, 2005) also informed my reflections on how organizations change through local self-organizing interactions. I reflected upon my observations that nurses interacted with their co-workers more than others in the organization when they encountered an obstacle with BCMA in a way to improve the quality and safety of medication administration for
patients. After conducting observations and interviews, I wrote reflections on nurses’ interactions that brought about continuity, innovation, or destruction.

During observations, artifacts such as posted organizational documents and announcements were noted. These artifacts included announcements in the conference/gathering room, messages on computer screen savers, and notes taped to the nurses’ work area. For example, I recorded messages from posted documents such as Team Norms and Living our Vision, and announcements on the computer screen saver such as “HCHAPS measures the patient experience,” and “Core Measures measure quality” in my field notes to reflect upon after the observation. I did not ask participants specifically about the posted messages; in my reflections I focused on the meaning I understood in the messages of the organization that reminded nurses of the mission and values of the organization.

During observations, I also paid attention to human interactions, the complexity of nurses’ work, power relations, ideology, and the problem solving skills of nurses when an HIT obstacle was encountered and worked around. For example, during an observation with Carol, I noticed she had difficulty logging onto a desk computer; by talking with the nurse next to her, she brainstormed several approaches to log into the computer. This evidence of problem solving was used to demonstrate how nurses talked with other nurses sitting next to them when an obstacle was encountered.

Observations and reflections constituted an ongoing and iterative process over the course of the study. For example, after observing and reflecting upon Brandi’s use of BCMA and her comment, “We are supposed to scan the ID band. But not all the time does it work,” I was more attentive during BCMA with the subsequent observations to
understand the context of Brandi’s comment. I observed Carol’s use of BCMA where she
did scan the patient’s ID band. Then when I observed Denise, I found she did not
routinely scan the patient’s identification band, causing me to be more focused with
future observations. After the fifth observation experience, no new experience of an HIT
obstacle was witnessed.

**Interviews.** Interviews are the most commonly used method in qualitative inquiry
(Creswell, 2007; Fontana & Frey, 1998; Riessman, 2008). Face-to-face interviews were
selected as a method for data collection in this research. The interview method was
appropriate for the study since it has the potential to elicit rich, thick descriptions.
Interviews gave me an opportunity to clarify statements and probe for additional
information. Creswell (2007) and Fontana and Frey (1998) stated that a benefit of
collecting data through individual, in-depth interviews is that such interviews offer the
potential to capture a person’s perspective on an event or experience. I made attempts to
establish a trusting environment with participants, to ask questions that facilitated in-
depth responses, and to keep the conversation flowing (O’Leary, 2005). To keep the
interview flowing, I used prompts to give the participants some ideas that might jog a
response, e.g. “Tell me more,” “Really,” or “Why?” I interviewed direct care nurses and
support staff in an effort to understand the context of the nurses’ interactions and clarify
my experience.

During interviews I tried to understand the context of the nurse’s experiences so
that when I reflected upon my experience of the interview I could retell the story the
participant wanted me to hear (Riessman, 2008). Through interviews, I heard the stories
of participants and the meaning of their experience. Using interviews as a data collection
tool was a legitimate way to generate data by interacting with people and capturing the meaning of their experience in their own words.

Although interviews have strengths, they also have limitations. First, not all people are equally cooperative, articulate, and perceptive. Second, interviews require researcher skill to elicit from participants information that will inform the study (Fontana & Frey, 1998). Third, interviews are not neutral tools of data gathering; they are the result of the interaction between the interviewer and the participant, as well as of the context in which that interaction took place (Creswell, 2007; Fontana & Frey, 1998; Riessman, 2008). Recognizing these limitations, I made attempts to establish a safe, collaborative environment for the interviews. I found the participants to be cooperative in answering the interview questions and willing to share with me their perspective of interactions when using HIT. I found that with some participants I had to rephrase questions to elicit information that would inform the study. For example, during the interview with Helen, I had to clarify and restate questions in several ways. For example, when I asked her, “Do you feel you can influence how HIT is used in your workflow?” she asked, “What does that mean?” I restated the question, saying, “Do you think you could change something if you wanted to, or could talk to someone about changing how you use HIT?” After I had restated the question, Helen replied, “Oh, if I thought it wasn’t right or I didn’t like it?” From this response I assessed that Helen understood my question. Interviews with direct care nurses were conducted after several hours of observations so that we had the opportunity to begin a relationship. I found the nurses were eager to tell me of their experiences and interactions when using HIT. In the interviews with support staff, I felt I had to build their trust early in the interview, which I attempted to do by being on time,
being prepared to answer their questions regarding the study, and being genuinely interested in their perspective on nurses’ interactions when they used HIT to facilitate patient care activities.

Interview questions were created to give nurses an opportunity to reflect upon and discuss their interactions when they used HIT during caring relationships with patients. To assist in keeping the interviews focused on answering the research questions, I crafted a matrix. The matrix mapped interview questions devised in light of Kuhn’s (2007) constructs. Appendix D lists the interview questions along with the study constructs expected to be addressed by the questions. The list of interview questions can be found in Appendix E. Participants’ accounts were further explored by posing clarifying open-ended questions.

Many interviews with direct care nurses were conducted in the empty conference room that was quiet and private. Two interviews with direct care nurses were conducted in a quiet part of the nurses’ work area per the nurses’ request. These nurses stated that they wanted to remain in the patient care area available to patients. Nurses kept their unit-distributed mobile phone with them throughout their shift and through shift change report with the next shift; thus interruptions did occur during a few of the interviews. When the nurse’s mobile phone rang, I asked if she wanted to answer it. Each time the nurse said yes; I then stopped the recorder. When she had completed the call, I restarted the recorder and refocused the conversation to where we were in the interview. The phone calls lasted less than a minute. Some interviews were completed without interruptions, whereas others had as many as three interruptions. With each interruption, I patiently waited for the nurse to be available to continue the interview.
During the time of the interview, nurses were asked to complete a short demographic questionnaire that identified how long they had worked in the study unit, how long they had held an RN license, their highest level of education, and their gender. These data were used to describe the aggregate study participants. The demographic questionnaire can be found in Appendix F. At the end of the interview, nurses were asked whether there was anything else they would like to contribute or clarify. I thanked them for their contribution and their time, and asked if I could contact them again with any further questions or need to clarify any points. These interviews lasted between 20 and 40 minutes.

Interviews with support staff were conducted after all observations and interviews with direct care nurses were completed. The interview questions used with nurse participants were slightly modified to elicit the support staff’s perspective on nurses’ interactions when they used HIT in caring for patients. Individual interviews were completed with the nurse manager, project manager, pharmacist, and quality officer using a script that was modified from the one used for interviews with direct care nurses. For example, I started the interview with the support staff by asking whether he or she had interactions with direct care nurses after they had experienced an HIT obstacle; then I asked the participant to recount that experience. During interviews with the support staff, I asked them to clarify policies and practices I had learned from the direct care nurses. For example, Ellen commented during the observation that Lantus was not stocked in the unit’s medication dispensing device. During interviews with Lee, I clarified that the medication was not in the unit’s dispensing device and learned why the organization had
made the decision not to stock it. These interviews were designed to generate an understanding of the context and culture within the organization.

Ray (1989) found that different understandings of caring existed within a hospital organization. I wanted to hear from the support staff regarding their understanding of nurses’ use of HIT and working around obstacles as they engaged in patient care activities. The quality nurse, pharmacist, and IT nurse all spoke of HIT obstacles in nurses’ workflow; when I asked them if they knew of any occasions when direct care nurses identified a better way to complete a patient care activity than was designed using HIT, they provided examples demonstrating how nurses interact with others to change workflow patterns. By interviewing other members of the organization I was able to learn about communication between nurses and support staff when nurses experienced HIT obstacles, as well as to elicit their understanding of nurses’ use of HIT and working around HIT obstacles during caring activities. Chris noted that the outcome of nurses’ working around HIT obstacles determines how leaders respond to these obstacles. For example, Chris stated,

> It all depends on what’s made it become discovered. So, if it’s discovered because some nurse tells everybody, “Oh, I figured out a way where we can do this where we can do it in 15 less steps,” the nurse could be a hero. If it’s found out because the patient had a big med error and ended up needing a higher level of care or dying, suffered some long-term effect, then the nurse is going to be disciplined for it. So, I think it depends on how that’s discovered.”

The support staff contributed to the study by clarifying the context and designed processes of HIT used by nurses and providing their perspective on nurses’ use of HIT.

At the end of the interview, support staff were asked if there was anything else they would like to contribute or clarify. I thanked them for their contribution and their
time, and asked whether I could contact them again with any further questions or to clarify any points. I asked them to complete a short demographic questionnaire that identified how long they had worked in their unit, how long they had held a professional license, their highest level of education, and their gender. With each participant’s agreement, all interviews were digitally recorded and transcribed. Interviews lasted approximately 40-60 minutes each.

**Reflections on gathered data.** After each observation experience and interview with participants (direct care nurse and support staff), I wrote narrative reflections on the experience. Guided by Stacey and Griffin (2005), I wrote narrative reflections on my observation and interview experiences in an attempt to understand nurses’ experiences using HIT through local interactions. The distinguishing feature of CRP as a research method rather than a literary story is the explicitly reflective nature of the narrative (Stacey & Griffin, 2005).

The field notes I wrote were used to help me recall experiences from observations, such as nurses’ interactions when they encountered an HIT obstacle, whom nurses contacted when they experienced an obstacle with HIT, and nurses making choices in their HIT workflow, which included observations of power relations and ideology. I used the field notes to write reflections on my experiences. During my reflexivity, I explored literature, broadening my way of thinking with research, including that of Benner and colleagues (2001, 1999, 2009, 2010, 2011), Ray (1989), Stacey and colleagues (2000, 2001, 2005), and Tucker and colleagues (2002, 2004, 2006, 2007). For example, I noticed a unit norm of nurses was to walk away from their open EHR at their desk, demonstrating a generalized pattern of individually felt voluntary compulsions to
choose one action over another (Stacey & Griffin, 2005), such as not to follow national privacy rules regarding health information privacy standards in favor of trusting their co-workers not to enter information on their electronic signature. With this generalized habitual behavior of nurses on this unit, I recognized interactions containing relations of power as the nurses chose to walk away from the open EHR to demonstrate their trust and need for co-workers, while at the same time they experienced no negative consequences from those who held authority to enforce organizational policies. Stacey and Griffin (2005) described relations of power as being present within interactions:

Power is this enabling-constraining relationship where the power balance is tilted in favor of some and against others depending on the relative need they have for each other . . . the power balance is tilted in favor of some groupings and against others. These groupings establish powerful feelings of belonging which constitute each individual’s “we” identity. These “we” identities, derived from the groups to which we belong, are inseparable from each of our “I” identities. (p. 8)

I understand the nurses’ behavior of walking away from the open EHR at the desk as nurses forming their “we” identity with those they work with separate from the authority outside of the interaction. Reflections were written with a focus on nurses’ interactions when using HIT and situated within the wider traditions of thought.

Reflections were also written about the organizational documents obtained. Examples of organizational documents reflected upon include wall posters I noticed in the conference room that had the slogans “Team Norms” and “Living our Vision.” I recorded in my field notes messages that were on the computer screen savers, such as “HCHAPS Measures the Patient Experience” and “Core Measures Measure Quality.” For example, I wrote a reflection on the “Team Norms” posted in the conference room that listed seven characteristics: confidentiality, complete honesty, commitment to complete
the work, consider all ideas, everyone participates, no personal attacks, and no
defensiveness. In my reflection upon these norms I explored the word “confidentiality”
using my history of training clinicians to use the EHR and how it was impressed upon me
to teach clinicians to log off from any computer that contained patient data for fear of
exposing protected health information. I included in my teaching about using the EHR
the expectation that nurses would log off the computer when they walked away. I also
reflected upon my behavior when I was in labor and delivery attending a birth and upon
actions I took to keep the computer from signing off after 10 minutes of inactivity while I
remained in the room caring for the patients. I located my ways of making sense of the
open, unattended EHR in the wider traditions of thought, such as the Health Insurance
Portability and Accountability Act (HIPAA) of 1996 that carries serious civil penalties
for organizations found to be in noncompliance, which can include steep fines (intronis,
2012). In locating my ways of making sense of nurses’ leaving EHRs open and
unattended at the desk, I considered Benner et al.’s (2011) study on nurses’ being vigilant
regarding patients’ needs and clinical status, and therefore not focused on signing out of
the EHR when moving to other patient tasks. Restricted organizational documents such
as job descriptions, the medication administration policy, and hospital quality reports
were reflected upon in comparison with data collected from participants. Organizational
documents were obtained during data collection and were included in my reflections.

**Resources and Data Management**

In this section I describe resources used in data management: software products
and analysis. The main issues in data management are access to high quality data,
documentation of analyses, and retention of data and associated analyses after the study is
completed (Miles & Huberman, 1994). Three computer software products were used in this study to organize and store data: Microsoft Word, Mindjet Mindmap, and Dedoose. According to Miles and Huberman (1994), data management is a challenge in completing a qualitative study. The interview data were transcribed into Microsoft Word documents, and my reflections on data were written on Word documents.

To assist in data analysis, two software products were used: Mindmap and Dedoose. Mindmap (MindJet, San Francisco, California) was used to organize data according to the four constructs of the study (self-organization, sensitivity to initial conditions, multidirectional interactions, and influence by a plethora of sets of rules) using participants’ words and actions found during observations and interviews to identify common themes of interactions and obstacles. Also a topic was created for data that did not fit a construct for further reflection and analysis. In the Mindmap, examples confirming or disconfirming one of the constructs was added to a topic and color coded according to the source of data. For example, data coming from Abby, either from observation or interview, were added to the map with an ivory color background. During the interview when I asked Abby whom she consults with, if anyone, when she is having a problem with technology, she stated, “You just kind of bounce it off whoever is around you.” This comment was placed in the category of self-organization as an example of this nurse first talking with others around her when she encounters an obstacle. An image of the Mindmap can be found in Appendix G. Much of the content has been removed from this image to demonstrate how the Mindmap aided in organizing the data in a visual manner according to the study’s constructs. The actual Mindmap used to collect and analyze data contained multiple examples of nurses’ self-organization, sensitivity to...
initial conditions, multidirectional interactions, and rules that influenced action. MindMaps were created and stored on a password-protected computer with organizational identifiers removed.

Dedoose, an electronic application used to analyze qualitative research (SocioCultural Research Consultants, LLC, Los Angeles, California), was used to code, organize, and store data. Data were also coded in Dedoose according to the four constructs of the study. Word documents containing data from participant interviews and my reflections on observations and interviews were uploaded into Dedoose for coding.

I managed the study data by storing transcribed interviews as Word documents, electronically writing narrative reflections using Word, and coding data using Dedoose and a Mindmap. I recorded the coding schemes for each phase of data coding in a Word document, and backups of data were made on a separate, encrypted virtual drive to ensure no data were lost and to facilitate retrieval of records. Word documents were organized using a filing system that contained the date of the interview or narrative reflection and the title of the narrative. Also, a handwritten log was kept containing decisions and inferences made during the course of the research project (Riessman, 2008). Documents generated by Dedoose were also encrypted and stored. This process of data management allows for data verification and facilitates replication of analysis and study findings (Miles & Huberman, 1994).

**Data Analysis**

This section presents how data were analyzed according to the narrative CRP of relating methodology. This method is similar to other narrative methods, yet is different in that it applies the theory of CPR to facilitate understanding of interactions among
participants. The process of coding data using two approaches is also presented. Consistent with Creswell (2007), data analysis included preparing and organizing the data for analysis, then reducing the data into themes through a process of coding and condensing the codes, and finally representing the data as findings statements in a discussion. The challenge during data collection and analysis was to make sense of the large amounts of data, reduce the volume of information, and identify patterns.

**Data analyzed using CRP of relating.** According to CRP methodology, global organizational patterns can only be understood from within local interactions; thus the analysis is based on my reflection on the micro detail of my experience of interaction with direct care nurses and support staff (Stacey & Griffin, 2005). Common to narrative inquiry is the process wherein the researcher engages an audience in their experience and findings are interpreted (Benner et al., 2011; Riessman, 2008; Stacey & Griffin, 2005). In this study, I was the narrator of nurses’ interactions on a hospital unit when they used HIT to conduct patient care activities; these interactions hold the potential for innovation to emerge. Research using the theory of CRP of relating uses a narrative perspective of interactions in an organization that are understood to be ongoing, iterated processes of cooperative and competitive relating between people (Stacey & Griffin, 2005). Stacey and Griffin (2005) asserted, “Organizations have to be understood in terms of one’s own personal experience of participating with others in the co-creation of the patterns of interactions that are the organization” (p. 2).

The analysis of data for this narrative study explores self-organizing interactions of nurses using HIT in caring relationships. These interactions are sensitive to initial conditions, multidirectional, and influenced by rules; they have the potential to change
patterns in the organization. Clandinin and Connelly (2000) in their book *Narrative Inquiry* did not offer prescriptions to help the reader understand the experience of learning in these constructs. Benner and colleagues (2011) presented a narrative of nurses’ development of clinical knowledge in particular patient situations that occurs through interactions, building clinical wisdom. Narrative inquiry is used to understand change through interactions; CRP of relating is a narrative method used to understand change through self-organizing interactions in an organization.

The analysis is my experience patterned primarily as narratives of relating between me and others. In my interactions with participants, I sought to understand the interactions of nurses using HIT when in caring relationships with patients. I observed for four behaviors: self-organizing interactions when they used HIT that were sensitive to initial conditions, multidirectional, and influenced by sets of rules. The research questions that guided interviews were crafted to stimulate discussion with participants of these constructs to understand their meaning making in interactions that have the potential to change patterns in the hospital organization.

Data analysis was an iterative process. To become familiar with the data before constructing my reflective narrative, I read through field notes, reflections on observations, interview transcripts, and reflective narratives on interviews a minimum of three times. In the margins of these documents I wrote memos consisting of short phrases, ideas, or key concepts before writing reflections exploring nurses’ self-organizing interactions, the initial conditions, the nurses’ multidirectional interactions, and how actions were influenced by rules of ideology and power relations.
All data from my field notes, reflections on observations, and interviews were coded according to the four constructs of the study: self-organization, sensitivity to initial conditions, multidirectional interactions, and influence by a plethora of sets of rules. Self-organization is understood as nurses’ interacting with each other on the basis of their local organizing principles, and in such local interaction widespread coherence has the potential to emerge without any program, plan, or blueprint. Sensitivity to initial conditions consists of the history of interaction and the ability to interact with others that shapes the present conversation. Multidirectional interactions are diverse interactions that have unpredictable futures. The plethora of sets of rules includes the enabling and constraining forces of ideology and power relations within local interactions. Creswell (2007) noted,

Prefigured codes or categories from a theoretical model are popular in the health sciences, but can serve to limit the analysis to the ‘prefigured’ codes rather than opening up the codes to reflect the views of participants in a traditional qualitative way. (p. 185)

In contrast, Sandelowski and Barroso (2003) noted that the use of theoretical frameworks can enhance “the evidentiary value of qualitative research” (p. 909). Such frameworks provide a reasonable way to group data and may also serve to extend the original theoretical or intellectual tradition and illuminate an experience (Sandelowski & Barroso, p. 913). During data coding I looked for evidence of data that did not fit into one of the coding categories to enhance the evidentiary value of this research; however, no additional categories were identified.

All data were coded using two approaches. First, data were coded as reflecting the four theoretical constructs guiding the study. The second approach to coding categorized
data according to HIT obstacles nurses encountered to make apparent patterns of nurses’ self-organizing interactions.

**Coding according to constructs of the study.** The data analysis steps involved preparing an organizing data, reducing data into themes through coding and condensing codes, and representing data as finding statements. The reflective narratives that were written after each observation and interview were saved as Word documents. Each of the Word documents were uploaded into Dedoose for coding according to the four constructs of the study. All data were coded into one of the categories of self-organization, sensitivity to initial conditions, multidirectional, or sets of rules.

Data were coded according to the constructs of the study. In the category of self-organization, four sub-categories were created from the data: “collaborate” with one someone (another nurse or someone in another department) when they experienced an HIT obstacle, “saw someone” respond to an HIT obstacle, “told someone” (another nurse or someone in another department) of an HIT obstacle and nurses participated in hospital-wide committees. In the category of sensitivity to initial conditions three sub-categories were created from the data: nurses talked about a “previous positive interaction” (with a nurse or someone in another department), nurses talked about a “previous negative” interaction with someone (with a nurse or someone in another department), and examples when nurses did not talk about a previous interaction, but there was evidence it occurred. In the category of multidirectional interactions, two sub-categories were created from the data: interactions in which nurses obtained new information to respond to an HIT obstacle and interactions when nurses did not receive new information to respond to an HIT obstacle. In the category of sets of rules, three sub-categories were created: norms,
values, and relations of power. Within these sub-categories data were coded as a “value” when nurses described how they chose one action based upon their individually felt compulsions over another and discussed their motivation in choosing one action over another. In the sub-category of “norm” data were included when nurses had similar patterns of responding to an HIT obstacle that appeared to be accepted by the group. In the sub-category of power relations, data were coded by nurses explaining their actions to another, nurses asking others for ideas to respond to an HIT obstacle to find a way that was acceptable to another, and nurses choosing an action that was accepted by the group to remain in relationship with others. During the coding process I looked for data that did not fit one of the four categories to create a new category in order extend the constructs of the study. I also looked for a category that was not supported by data to remove it. Data did fit into one of the coding categories and no other categories were added. Data did support the constructs of the study. After all data were coded I reflected upon data in each coding category and sub-category.

After data were coded according to categories, I printed out the data coded by categories. When reviewing data in the categories, I wrote memos in the margins consisting of short phrases, ideas or key concepts before I wrote reflections of data in categories. For example, when reflecting upon the data in the category of sets of rules, I wrote memos in the margins of nurses forming individual and collective identity through their choices when they encountered an HIT obstacle. These memos and short phrases included references of empirical literature for me to locate my way of thinking of the data. In this example of nurses choosing actions formed by and forming identity, I recorded key concepts from Stacey and Griffin (2005) of cooperative and competitive
interactions in organizations. I also recorded key concepts from Benner et al. (2011)
related to expert nurses cooperating with others in under-determined situations. From
these memos I wrote reflections of the data coded by categories to reduce data into
themes.

Themes emerged from the coded data by category. For example, after reflecting
upon the category of self-organization, I noted nurses had asked other nurses for ideas to
respond to an obstacle with BCMA. Gail was the exception; she said she called the Help
Desk when she first encountered an obstacle with BCMA. Data of nurses in sub-
categories of collaborating with one someone, saw someone do…, and told someone
about an HIT obstacle were condensed into a theme of local interactions. Another theme
emerged from the coded data that nurses participated in hospital-wide committees. All
data in the other three categories were reflected upon in this same manner where themes
emerged.

The themes that emerged from my reflection upon the data were presented as
finding statements in the discussion. The finding statements are supported with the data
that were coded, categorized, and reflected upon. Attempts were made to present words
of participants in the finding statements to provide validation of the findings.

My reflections on the data were also aided by a Mindmap that was created. By
visualizing all the data in a Mindmap according to the constructs of the study, I was able
to see common and specific interaction patterns in participants’ words and actions. Based
on this visual picture of the data, I wrote reflections of nurses’ self-organizing
interactions that were sensitive to initial conditions, multidirectional, and influenced by a
plethora of sets of rules when the nurses were in caring relationships with patients. After
all data were coded using this first coding scheme, all data were again uploaded into Dedoose.

Coding according to HIT obstacles. Data were coded according to nurse interactions when HIT obstacles were encountered. This coding structure provided a way for me to group data around episodes of HIT obstacles to look for patterns in nurses’ self-organizing interactions. Since the primary research question asked “How do human interactions among and between nurses guide their use of HIT?,” it was important for the study findings to look at nurses’ interactions when they used HIT. For example, data were coded in a category of BCMA technology. With this coding I saw common episodes of HIT obstacles and nurses interacting to work around those obstacles in similar patterns. From the nurses’ words I amalgamated participants’ history with the obstacle and how they chose their next action. In reflecting upon these coded data, I noticed that during observation Brandi did not scan the patient’s identification band during medication administration. Ellen said in the interview, “I used to scan it [the barcode on the patient’s identification band] all the time . . . it seems like it’s hit or miss . . . I’ve just stopped . . . I just pull the patient [medication profile] up.” Chris stated,

There’s a lot of workarounds with the whole barcoding stuff . . . I don’t even know them all but there’s a lot of things . . . [a] lot of ways to do work-arounds on barcodes . . . I think they [nurses] all sit and teach other, each other work-arounds all the time. As a matter of fact, I think you’re kind of rewarded for finding [a] work-around because then you’re the smart nurse to have figured out how not to have to do all the stuff.

By coding these data in this way, I was able to hear the multiple voices, interactions, and actions of nurses using BCMA technology. For example, Carol and Denise routinely scanned the barcode on the patient’s identification band, whereas the other seven nurse
participants did not. By coding data according to episodes of HIT obstacle, I was able to explore nurses’ interactions in response to the obstacle.

**Validation of findings**

Validation of narrative inquiry is to build reader’s confidence in the proposed knowledge claims (Polkinghorne, 2007). There are no accepted rules or standardized procedures to assess validity of inquiry-guided research (Mishler, 1990). Validation criteria of narrative inquiries according to Clandinin and Connelly (2000) “continue to be developed” (p. 185). Riessman (2008) noted, “Good narrative research persuades readers” (p. 191). Sandelowski (1991) noted that narrative truth “is distinguished from other kinds of formal science truths by its emphasis on the life-like, intelligible and plausible story” (p. 164). According to Stacey and Griffin (2005), with narrative inquiry, “there can be no objective validity for the obvious reason that the research is an interpretation, a subjective reflection on personal experience” (p. 27). With this subjective research method, the insights and findings arise in my reflections on the micro detail of my experience of interaction with others.

In order gain reader’s confidence in these data and findings I described how data was gathered for analysis. I developed relationships with nurses by talking with them when I was on the unit and I spent prolonged time on the unit (Clandinin & Connelly, 2000). During observations I recorded field notes of my experience that included what I saw, felt, and perceived to be occurring (Clandinin & Connelly, 2000). These field notes were used when I wrote reflections after every observation and interview experience (Clandinin & Connelly, 2000; Stacey & Griffin, 2005). Data including observations, interviews, organizational documents, field notes, and my reflective narratives were
compared and contrasted to understand nurses’ interactions when they used HIT during patient care activities.

Clandinin and Connelly (2000) suggest that narrative inquirers identify which criteria they want to be used for judging their work. To build confidence in the evidence presented in this narrative study, efforts were made to a) ensure findings make sense to others, b) resonate with the experience of others, and c) are persuasive or at least plausible to them (Stacey & Griffin, 2005, p. 27). These three criteria to judge the confidence in the evidence presented in this study will be further explained.

To ensure findings make sense to others, methods were employed to gather feedback from participants, the dissertation committee, and a nurse researcher. After I had observed and interviewed Brandi, I gave her the transcribed data for review, feedback, and edits. After she had the opportunity to review the Word document she stated that I understood what she did and said and had no edits. Following data collection, meetings and discussions were held every 2 weeks with an expert PhD mentor to aid data analysis and the interpretative process; other meetings were also held with members of the dissertation committee (Holloway & Wheeler, 2010). Interpretation of data during analysis was reviewed by a nurse researcher with experience as a consultant during HIT implementation. The validation of interpretations was supported in that she found the narrative believable and credible. It was important to the credibility of this study to interact with others as I reflected upon the micro detail of my experience with nurses using HIT to represent the lived experiences of these nurses.

The narratives have been presented in a way so that they resonate with the experience of other nurses and the support staff who interact with nurses in a hospital.
Details are presented of the context of nurses’ interactions when using HIT in caring relationships with patients. The context includes the personal and social interactions as well as the situation that the nurses’ interactions occurred (Clandinin & Connelly, 2000). Narratives describe the temporal nature of experience where past, present, and future enter into all interactions (Clandinin & Connelly, 2000; Stacey & Griffin, 2005). To enhance the narratives so that they resonate with the experience of others, experiences of nurses are presented from the stories of more than one nurse. Unique experiences of nurses were not included in this report.

Persuasive narratives are presented with details of my experience with nurses and support staff that were analyzed with the theory of complex responsive processes of relating. Polkinghorne (2007) noted “persuasive arguments lead readers through a progression of evidence” (p. 477). A progression of evidence is found throughout the narratives from my experience with participants and analysis of the data. Readers are led through data collection and analysis to see how experiences of nurses bring about organizational change.

Narrative inquiry currently has no set criteria for validation. Findings from my experience with nurses are presented so that they make sense to others, resonate with the experience of others, and are persuasive or at least plausible to them. Readers including the academy, nurse scholars, direct care nurses, and healthcare leaders will be the judge if the evidence and argument presented are convincing.

**Delimitations and Limitations**

There are delimitations and limitations of this study. This study focused on the interactions of nurses using HIT while in caring relationships with patients.
Delimitations, or defined boundaries, of this study included what was not specifically explored: patient outcomes resulting from nurses’ use of HIT, disciplinary action taken against nurses who work-around HIT obstacles, obstacles in nurses’ workflow that were not related to HIT use, training procedures used prior to HIT implementation, procedures of HIT implementation, and the selection process of HIT.

The results of the study are limited to the interactions and experiences of those who were observed and interviewed and who participated in the study. The focus of this study was on nurses’ interactions when using HIT in conducting patient care activities. Nurses’ interactions in meetings, such as staff meetings, hospital-wide committees, or trainings to use HIT, were not observed. This leaves potential holes or gaps regarding nurses’ self-organizing interactions that are sensitive to initial conditions, multidirectional, and influenced by rules related to HIT that were not observed or discussed in interviews.

**Summary**

In summary, this chapter provided an overview of the research study methodology as well as a detailed description, including my beliefs and values, of my position as the key research instrument. This description was followed by an overview of the research design and a discussion of why a narrative qualitative approach using a CRP of relating method is appropriate for describing nurses’ interactions when they encounter HIT-related obstacles. In this chapter I also presented the research site and participants by describing nurses whom I observed and interviewed. The ethical considerations of this study were explicated, which included relations of power, my behavior of acting ethically, and my accountability for my behavior. I described how data were collected.
and analyzed, including how empirical claims were built from the data. The resource and data management plan was presented. Finally the study’s delimitations and limitations were presented. In Chapter 4, data are presented in the form of a narrative of nurses that reflects how interactions among and between nurses guide nurses’ use of HIT when the nurses are in caring relationships with patients.
Chapter 4

FINDINGS

Introduction

This chapter presents a narrative account of interactions among and between nurses that guide their use of HIT when in caring relationship with patients. Data were collected from nine direct care nurse observations and interviews, as well as from four interviews with support staff. The study addressed the primary research question: How do interactions among and between nurses guide their use of HIT when in caring relationships with patients? Four secondary questions were addressed: a) What narrative themes characterize the experience of nurses using HIT? b) What interactions do nurses participate in when they encounter an HIT obstacle? c) What are the norms and values (ideology) associated with the experience of nurses using HIT? d) What are the power relations associated with the experience of nurses using HIT?

This chapter provides narratives of nurses’ interactions when they used HIT in the course of conducting patient care activities. I introduce the participants, describe the physical layout of the hospital unit, describe the HIT nurses used, and then respond to the study’s secondary research questions.

Participants

All nurse participants provided direct care to patients on the medical/surgical/telemetry unit at one hospital. They worked either a 12-hour day shift or a 12-hour night shift. Demographic data of the study participants, including directed care nurses and support staff who interact with direct care nurses, are described. Direct care
nurse participants had worked on the unit for an average of 2.53 years with a minimum of 7 months and a maximum of 5 years; held a nursing license an average of 8.92 years with a minimum of 1 year and a maximum of 32 years. The highest level of education of five direct care nurses was an associate’s degree (AD); four had earned a bachelor’s degree in nursing (BSN). The direct care nurse participants were all female. The support staff had worked on their unit for an average of 3.5 years and held a professional license for an average of 25 years; one participant held a bachelor’s degree while three held master’s degrees; three were female, one male. Table 2 is a summary of the demographics of the participants. In this narrative account, the gender of two of the support staff has been altered to protect the identity of the participants.

Table 2.

Sample Demographics (N=13)

<table>
<thead>
<tr>
<th></th>
<th>Direct Care Nurses (N=9)</th>
<th>Support Staff (N=4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Length of Time (yrs) working on Unit</td>
<td>2.53, SD=1.34</td>
<td>3.5, SD=4.36</td>
</tr>
<tr>
<td>Mean Length of Time (yrs) of Holding License</td>
<td>8.92, SD=11.58</td>
<td>25.0, SD=10.61</td>
</tr>
<tr>
<td>Highest Level of Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AD</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>BSN</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>MS</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Male</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

**Abby** - Abby has been a nurse for more than 10 years and has worked on the unit for more than 4 years. She stated that she participates in one of the several hospital-wide
committees to discuss interdisciplinary flow and process issues. She has “become involved in technology implementation to stay on top of new technology and to avoid looking like an idiot.” She stated that she is comfortable moving around the EHR and had been a super-user trainer for the previous 5 years when new applications were added (Abby, Observation). Abby routinely worked on the day shift.

**Brandi** - Brandi had worked on the unit for 1 year and had been a nurse for more than 2 years. Brandi was the only participant in this study who asked to see the transcript after our interview. I gave it to her within a week. I told her I looked forward to her feedback about what I captured. She expressed gratitude for the transcript and then commented later in the shift how much she stuttered; she said had no comments about the interview content; asked if she wanted to edit or modify anything, she said, “It looks good.” Brandi routinely worked on the day shift.

**Carol** – Carol had been a nurse for more than 2 years and had worked on the unit for almost a year. I learned during the observation that nursing was a second career for her. She stated that people often assume she had more experience as a nurse than she actually did because of her age. Carol routinely worked on the day shift.

**Denise** - Denise had held a nursing license for more than 5 years and had worked in the unit more than 2 years. Denise routinely worked on the night shift.

**Ellen** - Ellen had held a nursing license for more than four years and had worked on the unit for more than 2 years. She recently had taken on the role of relief shift supervisor. She was not the supervisor on the shift I observed but was assigned to care for four patients. Ellen routinely worked on the night shift.
Felicia - I started observing Felicia midway through her shift. I had met her during a previous observation experience and she offered to participate in the study next time I was on the unit. We made arrangements for the date and time. Felicia had been a nurse for more than 2 years and had worked on the unit for 5 years. Felicia said she had worked with the education department for the previous 6 years teaching staff how to use the EHR. Felicia routinely worked on the day shift.

Gail - Gail had held a nursing license for a little more than 1 year. She had worked on the unit for more than 2 years. Gail worked on the night shift.

Helen - Helen had held a nursing license for more than 15 years and had worked on this unit for more than 4 years. I met Helen in a previous observation experience. I had explained the study and told her I would be completing several observations and interviews. She offered to participate in the study. We arranged for me to observe her on a date when she would be working on the unit. Helen routinely worked on the day shift.

Irene – Irene had held a nursing license for almost 2 years and had worked on the unit for more than 2 years. Irene routinely worked on the night shift.

Julie - Julie was one of the nurse managers on the medical/surgical/telemetry unit. We had mutually agreed upon a date and time to meet. The interview was conducted in her office on the unit.

Chris - Chris worked in the Quality Department at the hospital. A mutually agreed upon date and time had been arranged. I met him in his office in administration to conduct the interview.
Lee - Lee was one of several pharmacists working at the hospital. I met Lee while I was completing an observation with Carol. I went to the pharmacy to meet Lee, told him about my study, and invited him to participate. He agreed. We set a mutually agreed upon date and time. I met him in the pharmacy to conduct the interview. The interview was completed at his desk while he remained available to clinicians in the hospital via phone or computer.

Morgan - Morgan was a nurse and a project manager who worked in the Information Technology (IT) Department. The Nurse Executive suggested I contact him and invite him to participate in the study. I sent an email to Morgan describing the study and asking if he would like to participate. He agreed. A mutually agreed upon date and time were arranged. I met Morgan in the IT department, and we went to an unoccupied training room to conduct the interview.

The Physical Layout

The unit was shaped as a large square with patient rooms on the outside perimeter so that each patient room had a view of the outdoors with magnificent views of mountains and the desert landscape. The halls outside the patient rooms were wide and had large photographs of nature scenes; they were long and straight, providing the patients with an area to walk for exercise and nurses with access to move directly from patient room to patient room. According to Creswell and Miller (2000), a procedure for establishing credibility in a study is to describe the setting in rich detail so that readers can feel that they have experienced, or could experience, the events being described. This physical layout orientation has been provided to give readers a visual picture of the key
areas in which nurses spent their time on unit; a sketch of the unit can be found in Appendix H. This sketch is not an exact architect’s drawing of the unit but rather my representation of nurses’ movements throughout the unit, and it does not include the two snack and ice areas, dirty supply rooms, or public restrooms. The inner core of the unit is where many of the nurse’s interactions with other clinicians took place, as well as where they obtained medication and equipment for patients. A room of supplies including gloves, intravenous (IV) start kits, IV tubing, bedpans, water pitchers, wound dressings, walkers, and the like was located in the middle hall across from patient room 10. The conference room where shift change report started was located across from patient room 12, beside a desk where nurses frequently gathered. Behind this desk was a door to the inner core of the unit that held an automatic medication dispensing device, a medication preparation area, and desks with computers for nurses, nurse case managers, and social workers to use. There was another clinician’s workspace in the front section of the inner core that held the pneumatic tube system where medications and supplies were delivered from different areas of the hospital, another medication dispensing device, a medication preparation area, the physician’s dictation room, a monitoring room displaying the cardiac rhythm of those patients wearing a portable cardiac monitor, and the health unit coordinator’s (HUC) desk at the visitor’s entry to the unit. The nurses’ locker room and time clock were located outside this square unit.

**Computers located around the unit.** On this unit there were computers for nurses and other clinicians to use. There was a computer at each patient bedside; desks with computers were located in the halls between patient rooms; and desks with two to
three computers were located in the back hall and midway through the unit. When a nurse was at one of these desks, that nurse was visually accessible to patients and visitors. There were also computers on desks behind doors in the inner core of the unit for nurses, physicians, social workers, and other staff to use. Abby stated that since their new managers had arrived two months previously, they had gotten more computer workstations. She said, “There used to be a problem with everyone getting to a computer; this is no longer the case” (Abby, Observation). Clinicians were not seen waiting for a computer to become available at the many desks around the unit.

Medication dispensing devices. Two medication dispensing devices were located within the inner core of the unit separated by a hall that split the unit into two equal halves. These devices dispensed medications for nurses to administer; on each nursing unit throughout the hospital there was at least one medication dispensing device. A picture of a medication dispensing device is found in Appendix I. On this unit this device not only stored and dispensed medications, but also stored bags of IV solution, saline flushes, and prescription pads in the cabinet. Medications were accessible and dispensed by patient name and medical record number after review of the provider’s orders and approval by a pharmacist. A patient’s medications were located in only one of the dispensing devices. For example, medications for patients occupying rooms 1-10 and rooms 25-28 were in the dispensing device closest to the front desk, while medications for patients occupying rooms 11-24 were in the medication dispensing device in the back half of the inner core.
The narratives that follow describe my experience of interacting with nurses, with focused attention on ways nurses made sense of their experience of using HIT through relating with others that included nurses, support staff, and patients. The HIT nurses used in their activities with patients are described, followed by reflective narratives addressing study research questions. The episodes of nurses using HIT described are the context for my reflections of the four constructs of the study: nurses’ self-organizing interactions, sensitivity to initial conditions, multidirectionality, and influence by a plethora of sets of rules when in caring relationships with patients.

Nurses’ Interactions on a Medical/Surgical/Telemetry Unit

Data are presented from the perspective of 24 hours of nurse work. This perspective allowed me to tell a story of nurses interacting with others when they used HIT in caring relationships with patients. The two coding approaches of exploring data based upon HIT nurses used provided a way for me to group data around episodes of HIT obstacles and to look for patterns in nurses’ self-organizing interactions that were sensitive to initial conditions, multidirectional, and influenced by a plethora of sets of rules.

On the first shift, seven direct care nurses, including Abby, Brandi, Carol, Felicia, and Helen, were at the conference table, ready to start the shift. As they arrived in the conference room, each of them looked through the pile of papers on the table, locating the packet with her name on it. In this packet of papers were printouts of patient summaries generated from the EHR for her assigned patients for the shift. These pieces of paper would become the nurses’ guide, memory, and personal notepad for the next 12
hours. They also received the mobile phone assigned to them. The shift supervisor had assigned each nurse and PCT a phone and recorded the phone number to post for others to use as needed. After the announcements, there was idle chatter as the staff went out to the floor to start receiving reports from the off-going nurses.

Particular and common patterns engaged in by the nurses after they received shift report, in addition to the HIT they used, are presented along with reports on any obstacles they encountered and on the interactions nurses participated in when they encountered an HIT obstacle. Carol strolled out of the conference room, continuing a conversation with her friend, Carla, as she walked to a desk beside the conference room where she deposited her personal items. She sat down at the computer and signed into the network and EHR using her log-in identification and password. According to Morgan, nurses sign into the computer using their user identification and password the first time on the shift and then they can scan their employee badge to gain access to the network and the EHR. Carol reviewed her four patients’ diagnosis and treatment information and recent laboratory results and scribbled notes on the computer-generated patient summary sheets that she had received in the conference room. With her clipboard and notes, she was now ready to receive report from the nurses going off their shift.

Denise found Carol and said she could give Carol her report on two of her patients, while Irene said she would be right back to give Carol her report but needed to finish up with a patient first. Carol and Denise started the shift change report in the hall outside the patient’s room. As I looked down the hall, I saw several clusters of nurses talking outside patient rooms and at the desks. Denise provided a brief summary of the
man’s illness, his transfer from the intensive care unit three days previous, treatments he
had been receiving, the plan of care, the name of primary physician and the name of the
on-call physician for that group, and the names of specialists involved in his care
including a pulmonologist and nephrologists, while Carol scribbled a few notes to herself.
Denise also provided a brief summary of family members who had been in to visit the
patient. Denise included in her report the name of the nurse case manager, who was
working to coordinate the patient’s placement once he was well enough to be discharged
from the unit. Then they moved into the patient’s room, where Denise introduced Carol
to the patient. While Denise was still in the room, Carol looked at the patient’s IV site,
reviewed the IV solution hanging, and checked the set rate of the smart pump. Denise
asked the patient if he would like them to get anything for him. He said no, he was okay.
Then Carol promised she would be back to complete an assessment and check in with
him again after she had received reports on her other patients. The two nurses left the
patient’s room, moving on to the next patient’s room. After Carol had received the report
on her assigned patients, she returned to their rooms for assessments.

After receiving the report on her assigned patients and before she started moving
from room to room completing assessments and passing medications, Abby returned to
the desk in the back hall where she had earlier dropped off her personal items that marked
her spot for the shift. She signed on to the computer and EHR and then quickly reviewed
each of her patients’ previous assessment, recorded laboratory results that did not appear
on the patient summary sheet, looked to see if there were new orders entered for her
patients, and recorded the hour medications were due and the times of lab tests. Abby
then left the desk with the EHR open and said she was headed to pick up the medications before going to the patient’s room to complete an assessment.

There were common patterns identified among the nurses on both shifts. The shift change report started in the conference room where the nurses and PCTs gathered. Either the clinical manager or the shift supervisor led the meeting in the conference room. In the conference room, nurses received printed patient summary sheets regarding their assigned patients. Nurses and PCTs also received a mobile phone to use throughout the shift. After hearing announcements and general report on patients on the unit, nurses left the conference room, signed into a computer, compared summary sheet data against the electronic record, and wrote down times medications and other procedures were due. Once nurses had their patient summary sheets organized, they paired with the off-going nurse outside the patient room and then moved to the bedside to complete the shift change report. There were no differences noted between the nurses on each shift related to their self-organizing interactions, sensitivity to initial conditions, multidirectional, and influenced by a plethora of sets of rules. Neither were there differences in the patterns of HIT use between the nurses on the two shifts.

**Health information technology used by nurses.** To understand and describe how interactions among and between nurses guide their use of HIT when in caring relationships with patients, data collected included what components of HIT were observed. Nurses used many other technologies that do not link directly to the EHR thus not considered HIT, yet have been included to demonstrate nurses’ use of technology is not limited to HIT during patient activities.
**Medication dispensing devices and BCMA.** Much of nurses’ activity involved obtaining and administering medications to patients. Obtaining and administering medications occurred throughout the shift, with some hours being a time of administering many medications to several patients and other hours requiring the distribution of just a few medications. Medications included both pills and IV solutions. Nurses went to the medication device and administered medication with BCMA many times throughout the shift. The following paragraphs offer descriptions of medication administration experienced by Abby, Carol, Felicia, Helen, and Brandi. The particular medications administered and the nurse’s patterns are different. The commonalities in patterns are that nurses first go to the medication dispensing device to obtain medications, IV fluids, and saline flushes; then, with one patient’s medications in hand, nurses went to patient rooms to administer the ordered medications. When medications were to be delivered through an IV, nurses programmed the smart pump.

Abby first went to see the patient in room 17. This patient had four medications scheduled to be given within the next 30 minutes. Abby went to the medication dispensing device, signed in by entering her unique user identification, and scanned her right index fingerprint. She highlighted the name of the patient in room 17 by touching the screen and then scrolled through the list of available medications, highlighting the four she was to give at that time. A drawer in the dispensing device opened and then a lid over the bin flipped open for Abby to remove a pill. On the screen was a question: “Is there 44 remaining?” Buttons on the screen invited the user to push “Yes” or “No.” For the Lopresser 100mg pill, Abby quickly answered “Yes,” there were 44 remaining
without counting the pills in the bin, and she closed the drawer. Then the next drawer
opened, again asking “Is there 13 remaining?” “Yes” or “No.” Again Abby quickly
removed the pill without counting, answered yes, and closed the drawer. Abby also
entered that she was removing one 10ml saline flush from the dispensing device; yet
when the door opened she removed about 10 individually packaged flushes, placing two
in her scrub pocket and setting the remainder behind the screen of the dispensing device
that was hidden from view. Abby did not count the remaining saline flushes in the
cupboard but agreed in response to the question on the screen that there were 176
remaining before closing the door. She pushed the “Exit” button on the screen to log off.

Abby entered the patient’s room holding onto the four medications, greeting the
patient and family members. She systematically moved through her head-to-toe
assessment while talking with the patient. After the assessment was complete, Abby
signed into the bedside computer by scanning her employee badge and opened the
patient’s EHR. She opened the patient’s medication profile in the EHR, scanned the
barcode on the four packages, opened each medication, and handed them to the patient
one by one. The patient swallowed all four pills at once. Then Abby entered the
information that each of the medications had been given. Abby entered her findings from
the assessment and logged off the bedside computer.

When asked, Abby stated that she did not scan the patient’s identification band
when using BCMA. She said, “You find the thing that will save you the time the fastest,
that will get you where you want to be the fastest; with BCMA, that is just pulling up the
patient [medication profile].”
Carol went to the medication dispensing device to obtain the potassium. She logged in using her user identification and scanned her right index finger. She highlighted the patient’s name on the screen and noticed the potassium was not included in the medication list for this patient; thus it was not available in the medication dispensing device. While she was in the dispensing device, she said she would grab some saline flushes to have in her pocket. Carol highlighted “Saline Flush” in the list of medications; she entered “one” saline flush and removed five to seven. There was a question on the screen: Are there 157 remaining? Carol quickly answered “yes” and then she highlighted the “Exit” button to log off from the medication dispensing device. She next moved to the medication preparation area, opened the cupboard overhead, and looked in the patient’s medication bin for the potassium; it was not there. She then walked to the collection box next to the pneumatic tube system; the potassium was not there. She asked nurses in the medication preparation area if they had seen the potassium for the patient; no one knew about the medication. She reviewed the physician’s written order and medication orders in the computer. She found potassium had been ordered, but had not yet been processed by the pharmacist. She then called the pharmacist using her mobile phone, and the medication arrived quickly via the pneumatic tube. During this search Carol remarked, “There’s got to be a better way to get the medication for a patient.”

Carol returned to the patient’s bedside and signed onto the computer by scanning her badge. She then scanned the patient’s identification band barcode and scanned the barcode on the bag of potassium. She looked at the computer screen and noted that no alerts were present. She then started the IV drip by programming the smart pump and
selecting the medication and dose from the pump library and plugging the tubing into the mainline IV. The mobile phone rang as she was setting up the smart pump; she paused while programming the pump to tell the caller she would be in to see him or her in just a few minutes; she returned to programming the smart pump, and it was flowing. Carol assured the patient that she would be back in a little while to check on her and encouraged the patient to use the call light if she needed anything before Carol returned.

During one of her many checks on patients during her shift, Felicia noticed that a patient was about to run out of the IV solution dripping through the smart pump. She went to obtain the bag of NaCl from the dispensing device. She typed her user identification into the keyboard and then scanned her right index finger. She highlighted the name of her patient by touching the screen, then highlighted NaCl 1000ml in the list of available medications for this patient, and then highlighted “remove.” The medication dispensing cupboard door opened and Felicia removed the bag of fluid. On the screen was a message: “Are there 21 remaining?” “Yes” or “No.” Felicia quickly pushed “Yes” and closed the door. She pushed the button “Exit” to log off the device. She then returned to the patient’s room.

Once in the patient’s room, Felicia scanned her employee badge to open the computer. She used the mouse next to the keyboard to highlight the patient’s name in the EHR and opened the IV medication profile. She opened the bag of fluid and scanned the barcode on the bag. Felicia took down the almost empty bag of NaCl and inserted the tubing into the fresh bag. She reprogrammed the smart pump by entering 900ml of NaCl;
she continued the drip rate at 100ml an hour. After asking if the patient needed anything, Felicia left the room.

After several hours of the shift had passed, Helen went to the medication dispensing device to remove a medication that was due to be given to a patient. She entered her unique user identification and then entered a password into the medication dispensing device. Helen had worked with the pharmacist several years previously to be allowed to use a password instead of scanning her fingerprint to access the medication dispensing device, stating, “My hands are too dry to have a good fingerprint” (Helen, Observation). She highlighted first the patient’s name and then the medication that was due to be given. The drawer opened automatically, and a lid over the bin containing the Protonics flipped up, exposing the medications. The message on the screen asked if there were 23 pills remaining, yes or no. Helen quickly responded “yes” and then closed the drawer. She stated, “I don’t know why it asks you that, unless it is a controlled substance” (Helen, Interview). She left the medication preparation area and headed to the patient’s room.

Once in the patient’s room, Helen told the patient she had his Protonics. She logged on to the computer by scanning the barcode on her employee badge; then she opened the patient’s medication profile, addressed the patient by his last name, scanned the barcode on the medication package, looked at the computer screen, and handed him the pill. He swallowed it. Helen noted,

I usually pull up the medication list. You can scan it and it will do the same thing. But I think the proper way is that you’re to scan first and then the name pops up. I find it’s faster just to bring the patient up on the computer. I know who the patient is because the name tag and I know the patient as I’ve had report on him. To me, I
don’t think that makes a difference, not scanning them first, as long as you are scanning the med and it’s the right patient. It does not change any of the charting or anything; it’s still scanning once the patient comes up. Because if I scanned this Protonics and it really was on bed 4, it will say “wrong med, wrong patient,” it will alert me. (Helen, Interview)

In her words, I understand Helen that believed in BCMA as a tool to document medications administered rather than as a safety tool to verify the five rights of medication administration, including right patient, right drug, right route, right dose, and right time (Federico, 2011).

Brandi got up from the desk to check in with a patient who had just pressed the nurse call light; she was notified of the ringing call light through her mobile phone. The patient in room 16 said the pain in her abdomen was getting bad again and asked if she could have more pain medication. Brandi looked in her handwritten notes and found it had been more than 5 hours since the patient’s last dose of medication for this pain. The patient reported the pain was a 4 on a scale of 1 through 10. Brandi stated that she would get the medication for the patient and asked if there was anything else she could bring in for her. The patient said she would like more ice water. Brandi picked up the almost empty large cup with a lid and a straw, intending to refill it as she walked out of the room.

To obtain the two Percocet, Brandi typed in her user identification and scanned her right index finger. She highlighted the patient’s name and Percocet. She removed the two pain pills and counted the remaining pills in the bin. On the medication dispensing device screen, Brandi had to enter a number of Percocet remaining in the bin, as is the case with all controlled medications such as narcotics and mood-altering drugs. If the
number agreed with the invisible inventory number in the dispensing device, Brandi could close the drawer. If the number Brandi entered did not agree with the invisible inventory number, a discrepancy report would be generated and a message would appear on the screen. Brandi entered “29” remaining; no discrepancy report was generated. She returned to room 16 with the fresh ice water and pain medication.

Returning to the room with the Percocet and fresh ice water, Brandi logged into the bedside computer using the barcode on her employee badge and opened the patient’s medication profile in the EHR. Brandi scanned each barcode on the medication packages, opened them, and handed them to the patient to swallow. She then clicked on the remark “given,” documented the patient’s pain level-4 in the patient assessment flow sheet within the EHR, and logged off the computer. When asked about not scanning the patient’s identification band, she stated,

We do . . . we are supposed to scan the ID band. But not all the time does it work. Not all the time does it pull up the patient and so I will verify in other ways. To make sure that it is the right patient is on all of our five rights. Since the very beginning it has had some problems, not always does it pull up the patient. Sometimes you just bypass it and confirm in other ways. (Brandi, Interview)

I told Brandi I had seen another nurse scanning the patient’s identification band during BCMA so that the patient’s medication profile came up on the screen. Later in the shift she said, “I just tried to pull up one patient’s medication profile by scanning the patient’s identification band and it did not work.” Our interaction occurred in a nurses’ work area next to the conference room where Carol and another nurse were present.

Brandi asked her co-workers if they pulled up the medication profiles by scanning the patient’s ID band. One nurse stated, “I scan the patient ID band just the first time of the day.” Carol stated that yes, she did scan the patient’s ID band every time she gave a
medication. Brandi asked the nurses how they were able to pull up patients’ medication profiles by scanning identification bands. In the conversation, Carol explained how she pulled up a patient’s medication profile by scanning his or her identification band. In this communication, Brandi identified that she had been missing a step in the process to pull up the patient’s medication profile. She stated that she would try what Carol had explained the next time she gave a medication.

Brandi reviewed her notes and noticed the patient in room 20 was due for medications. She went to the medication dispensing device; she signed on using her user identification and scanned her right index fingerprint. She highlighted the patient’s name and highlighted the medication scheduled to be given 15 minutes previous. The medication dispensing drawer opened, followed by the lid over the bin. Brandi removed one pill, quickly answered “yes” to the question on the screen about remaining medications in the bin, and closed the drawer. She logged off the medication dispensing device and walked away. When asked if she is expected to count the remaining medications in the bin for that medication, Brandi stated, “We are supposed to count them, but no one does” (Brandi, Observation).

Brandi then went to room 20 with the medication in hand. She logged on to the bedside computer by scanning her employee badge. She tried what Carol had described before scanning the patient’s identification band. She scanned the patient’s identification band and the patient’s medication profile appeared, she then scanned the barcode on the medication, opened the package, and handed the pill to the patient. Brandi stated that the BCMA was now working for her to scan a patient’s identification band to pull up his or
her medication profile in the EHR. Brandi learned from an interaction with Carol how to use BCMA to identify a patient.

Felicia went to the medication dispensing device, entered her user ID and fingerprint, and highlighted the name of the patient for whom Felicia was retrieving medication. She looked at the medication list and did not see the medication she was seeking. She logged off the device. Then she looked in the stack of medications next to the pneumatic tube system; it was not there. She called the pharmacist. The pharmacist told her the medication was in the other dispensing device on the unit. Felicia went to the other medication dispensing device that was located in the other half of the unit, signed in using her user ID and fingerprint and found the patient’s medication profile and this medication loaded in the machine. She reported, “This is the wrong [device] for this to be loaded into; this patient’s medications are to be loaded in the other [device]” (Felicia, Observation). She obtained the medication, went to the patient’s bedside, and logged into the computer, scanning her employee badge, and brought up the patient’s medication profile by highlighting the patient’s name. She scanned the barcode on the medication packaging, looked at the screen on the computer for an alert (there was none), and handed the pill to the patient. She then logged off the computer and left the patient’s room.

Abby noted that nurses are to meet monthly goals using BCMA. She explained that for those who were scanning,

There’s a percentage that you’re supposed to meet. So, you’re supposed to be at 90%. If you don’t hit 90%, you get talked to. But for the longest time it was kind of like, “Oh, you didn’t make it. You didn’t make it. You didn’t make it.” And there wasn’t a lot of accountability for it. Yeah, you’re supposed to do this but people didn’t and that was it.” (Abby, Interview)
When asked if she thought nurses were asked when they do not hit the 90% benchmark,

“Why are you not getting 90%,” she responded,

I don’t know because I never fell below the 90% because I taught that system and it doesn’t make sense to me that you’re not using it. I hope they would be asked, “Wait, why isn’t this working for you?” or “Why aren’t you doing this?” (Abby, Interview)

Julie spoke of nurses using BCMA and of measuring nurses’ use of BCMA from the perspective of scanning barcodes on medications—not measuring verification of the patient’s identity as part of the process. When asked about nurses’ use of BCMA, Julie replied that with BCMA there are situations in which a nurse just cannot scan the barcode on his or her employee badge, scan the patient’s identification band, or scan the medication when administering medications. She stated,

Well, there are situations where sometimes you can’t. Um, in a, a rapid situation, absolutely, you’re giving the meds and those kinds of things. You know, it’d be great to scan them during a code but it just doesn’t happen. That’s what you have people for, documentation; you know, a recorder. But, for the most part, I would say really, you know, the practice is, you should; unless there’s some unforeseen reason. Now every once in a great while, we will get sometimes that the med, the barcode just doesn’t read. Do I want the nurse to have to sit there for 10 minutes and figure out, you know, like, no. I wouldn’t expect that. My expectation would be for them to sit there and you know, try to... go get... and maybe, get a new med. But, really, is that what’s important at this moment? Do we know that that is the right med? Everything should be scanned unless, of course, by exception of emergency, urgency and you’re sitting there for 10 minutes and it’s broken, you know, you’ve waited for 20 minutes to get this med from pharmacy. Like, oh gosh, confirm it with somebody else and just move on. (Julie)

Julie spoke from the perspective of problems with scanning the barcode on the medication package more than problems with scanning the patient’s identification band.

Julie’s question “What’s important at this moment?” suggests that she thought the context of the situation was important to consider. She explained that she had talked with nurses
when the report reflected that they were scanning below 90% of medications given. Julie
stated,

We try to reach . . . you know, and, monthly, we get a report on barcode scanning
on our nurses. I would say that’s a percentage up; above 90% is our goal. I mean,
our goal is always 100%, but, you know, to have above 90% is good; if you’re
under that then we have to have a discussion. That’s when you say, “Hey, why
aren’t you scanning? What’s going on?” “What led this to this kind of thing?” and
as we get those, we kind of have a discussion with them. And, you’ll see the
things improve. A lot of times, it’s new people . . . I think they just don’t realize
the importance and impact of scanning. You know, maybe they’re from a system
that doesn’t do it. Um, but after a while, they kind of put it in their practice and I
do see a lot of the nurses, I wouldn’t say I have a really bad percent. We do when
the computers are down. That’s, you know, and that could be one day, and if it’s
one day and the computers are down or something’s not working properly, that’s
when I’ll notice that I’ll have like an 86%, so, there are those exceptions,
definitely. (Julie)

When asked if the monthly report was based upon medications scanned, Julie stated,

Yep . . . it actually gives us a number. Um, so we’ll see how many meds that
nurse actually gave that day, you know, under her number, and how many she
actually scanned in. Because, when you go into the computer, you can go in the
medication profile and click on “admin” [administered], and that says given . . .
Or you can scan it, which is what you should be doing. But, when you do
“admin,” you have to put a reason, like a broken barcode. (Julie)

When discussing measuring BCMA use by each nurse every month, Julie explained that
the report captured the medications scanned rather than the patient identification scanned.
She added that reports were run monthly to measure the percent of medications scanned
by nurses; reports were not run by percentage of patient identification bands scanned.

The manner in which Abby, Brandi, Helen, and Felicia had used BCMA was not
the same as that described by Morgan. Morgan described the designed process as follows:

Take your medication into the room, um, tap my badge, I would get in and up on
my top bar is my clinical application, which we’ve rebranded. I log in and, um,
you take your barcode scanner, you scan your patient’s wristband so that you can
ID them versus picking them from the census list and then, um, I would select my
medication administration screen, which would take me . . . whether I’m barcode
scanning a, you know, scheduled med or I’m going to document my IVs ‘cause there’s two different modules for documenting meds and IVs. So, if it’s just some tablets that I’m going to administer, then I would barcode scan that medication, once I’m in my screen and, um, depending on the time, of course, and any other alerts that are embedded, um, if I’m administering this too late, too early . . . there’s parameters in the system that set’s for 30 minutes before and after it’s scheduled. So, I would scan my medications and I can do it sequentially or one at a time, um, and it will stack ‘em on your screen and address any other alerts, um, that need to be addressed . . . they highlight in yellow. And, um, and then unpack them and give them to my patient and then, there’s two steps to say “OK” and then save. (Morgan)

After receiving reports on all three patients, Denise returned to a patient’s room to complete a head-to-toe assessment. While entering her findings into the EHR, she noticed that the patient was due for a medication. Denise left the patient’s room and went to the medication dispensing device to remove a stool softener that had been ordered for the patient. She signed into the device using her log-on and fingerprint. She highlighted the name of the patient whose medication she sought. She then highlighted the medication and the dose on the medication dispensing device screen. A drawer opened, and the bin opened. Denise removed one capsule, answering “yes” to the question about the number of remaining medications in the bin without obviously counting the remaining medications. While Denise was closing the drawer, I asked about that question about remaining medications in the bin. She stated, “Unless there are less than five, I do not count, but then I do notify pharmacy to restock” (Denise, Observation). She went to the patient’s room, logged in to the bedside computer using the barcode on her employee badge; she scanned the patient’s identification band on his wrist, scanned the barcode on the package of the medication, and gave the capsule to the patient. She logged off the computer and moved on to the next patient’s room.
At the desk, Ellen noted that one patient would soon be due to receive Lopressor; she said she would see this patient first. She went to the medication dispensing device. She entered her user identification and scanned her right index finger. She chose the name of the patient due to receive Lopressor, highlighting the medication and the dose; the drawer opened while the bin containing the desired medication flipped opened.

Denise removed one tablet and counted the 18 remaining tablets. She answered “yes” to the question on the screen, “Are there 18 remaining?”, and closed the drawer. Then she highlighted “saline flush” and indicated she would take one out. When the door opened, she took out several and then closed the door, placed the saline flushes in her scrub jacket pocket, and highlighted “Exit” to log out of the dispensing device. She headed to the patient’s room.

When Ellen was asked about removing several saline flushes at one time while recording that she had removed one, she stated,

They want you to account for each flush that you’re using for what patient. Which is really hard to do sometimes because you’re in a room and you need to flush the IV; you’re not just going to leave right there and say, “I’ll be back in a minute” and then go to the [medication dispensing device] and get a flush for that specific person, go back to the room, and then flush with the . . . you know . . . and so, I usually pull two or three out and put them in my pocket. And, it’ll ask “How many are you removing?” . . . I’m not going to charge that one person for two or three, so I just say one. But, now the count’s way off and I’m sure the pharmacy has issues with that. And I think everybody else . . . I’ve seen others, many others, do it too. (Ellen, Interview)

Ellen stated she was expected to count medications and flushes when she removed them from the dispensing device, although she did not always count. Ellen was observed counting sometimes and not counting other times. She responded,

<laughter> It depends on the medication usually . . . if it’s a narcotic, you’re required to count it. It’s not going to give you a number; you have to enter a
number in. Um, but like stool softeners—they go through them so quickly and it’s just . . . that’s something that’s kind of an over the counter drug. They don’t bother counting it until it gets down to five or six because it seems like a waste of my time. A lot of times, the count is off anyway and then you have to adjust it, and I used to count all of them . . . it just seemed like a waste of time though with, like, anything that’s, like, over the counter kind of drugs . . . and I don’t always, it just depends on how big of a rush I’m in, too. I should probably count ’em every time. Technically, we’re supposed to. (Ellen, Interview)

Ellen admitted she has multiple patterns concerning counting the remaining medications/supplies in the medication dispensing device. She stated that her pattern of counting remaining medications in the medication dispensing device depended on whether it was a narcotic. She noted that she was required to count narcotics and to enter a number before closing the drawer; she counted other medications when the supply was running low so she could notify the pharmacy to refill; and other times when she felt she had time to count, she did.

Ellen went to see the patient in Room 7, and she logged on to the bedside computer by scanning her employee badge. She opened the patient’s medication profile and scanned the barcode on the package of the Lopressor. Ellen told the patient that this was her second dose of Lopressor, her blood pressure medicine, for the day. The patient swallowed the tablet. Ellen logged off the bedside computer, asking the patient if she would like Ellen to do anything else while she was in the room or if Ellen could bring anything to her. Ellen pressed the button at the foot of the patient’s bed, setting the bed alarm. She told the patient she had set the alarm and that if she would like to get out of bed, she should “call us and we will come help you” (Ellen, Observation).

When asked how Ellen used BCMA by opening the patient’s medication profile without scanning the patient’s identification band, she commented,
I do pull it up . . . um, I used to scan it all the time. Recently, since they’ve done the upgrade with the computers, it seems like it’s hit or miss. Sometimes, you’ll scan and scan and scan and nothing will come up. Other times, you’ll scan it and the patient will come right up. So that, too, has become a waste of time for me, and I’m trying to save time because I don’t know if it’s a glitch in the computer or what’s going on, but I’ve just stopped. I just pull the patient up; I double check and make sure before I do anything, the name up there at the top along with what room I’m in . . . all that, you know . . . So, yes, technically we’re taught to scan the patient first and then the medication, but that’s a bad, it’s a habit I’ve gotten into; I should probably get back to scanning the patient again, but it just seems like such a waste of time because for a while there, it wasn’t working on anybody and now, once in a while, it does work. So, I think it’s a glitch in the system. But, if I’m not doing it, how am I going to know they worked it out? I can just click on it and it’s right there. So, I need to get back to trying it anyway . . . to see if they got the problem resolved.

I know that’s not how they want it. No, they want it, they even teach you, “This is how we want it done. We want you to scan the barcode on the patient first and then scan the medications,” you know what I mean? So, we’re taught that this is how we’re supposed to do it. But, I think I know that we’ve been doing it the other way because it wasn’t working and there was no other way to do it. So, they accepted that, but probably just temporarily because they wanted us to do [it] the way we were taught originally . . . the way the system was meant to work. And like I said, sometimes it would work on some patients and it would pop right up. Other times, you could scan and scan and scan and it would never come up. And you would say, “Uhh . . .” You know, and you would get frustrated because you’re on a time limit . . . You’ve got [only] so much time to pass the meds and you need to see this patient and the next patient and you’re running around crazy and you don’t have time to be standing there trying to get the thing to work.

(Ellen, Interview)

Ellen explained her reason for choosing not to scan patients’ identification band during BCMA. She that stated prior to the system upgrade she had scanned identification bands, but that since the upgrade she had experienced inconsistency in pulling up the medication profile by scanning the band. She had quit trying. Ellen stated that she pulled up the patient’s name in the computer, just as her co-workers did. This information told me that she had talked with her co-workers about how they use BCMA. Ellen thought there was a glitch in the system that she could not fix. I heard guilt or remorse in her words as she
admitted she should try to scan a patient’s band since the problem could have been fixed; but she did not try to use it. I also understand that Ellen felt the pressure to get medications to patients quickly and on schedule and that trying to use an application that was not working properly was a waste of her time.

Gail’s mobile phone rang, indicating a patient had pressed the nurse call light. Gail went to the patient in Room 25, who complained of pain at her surgical site and requested pain medication. Gail opened up her folded papers and noted that 4 hours had lapsed since the patient’s last dose, meaning she could have more pain medication. Gail started her physical assessment: She listened to the woman’s heart, bowel, and breath sounds, pressing her stethoscope gently on the patient’s abdomen.

Gail left the room and went to the medication dispensing device located in the back half of the unit to obtain the medication. She entered her user ID using the keyboard on top of the machine, and then scanned her right index finger. The patient’s name did not appear in the list. “Damn,” Gail said. She logged off and walked briskly to the other medication dispensing device in the front half of the unit. At the other medication dispensing device she logged in using her user ID and fingerprint. She highlighted the patient’s name and highlighted the ordered medication, Percocet. The drawer opened, and the bin containing Percocet opened. Gail entered that she was removing two tablets, counted the remaining tablets in the bin, entered 47, and closed the drawer. She headed to the patient’s room with the medication in hand.

Once back in the patient’s room, Gail logged into the bedside computer by scanning her employee badge, opened the patient’s medication profile, scanned each
barcode on the two tablet packages, checked the computer screen for an alert, opened the packages, and entered the information that the patient rated her pain at six out of 10. The patient swallowed the tablets. Gail completed the physical assessment and recorded notes on her patient summary sheet. Gail reviewed the smart pump settings and looked at the bag of fluid dripping. Before leaving the room, Gail set the bed alarm.

When she was asked about pulling up the patient’s medication profile in the EHR rather than scanning the identification band, Gail said,

Since I arrived on this floor, I cannot scan patient ID band to pull up the patient’s medication list; I pull up the patient’s med list and then scan the medication. Yeah, it seems to be more of a night shift thing. Um, ‘cause during the day, most of them seem to be able to scan a patient wristband and the med and I just gave up on trying to scan patient bands because so consistently, I couldn’t scan them and I’d call the Help Desk and I just developed a routine where I’d select the patient versus trying to scan them anymore ‘cause it just got . . . too annoying to hassle with it otherwise. From what I understand, it seems to be just a problem on this shift but I’ve only nursed on nights so . . . those are the people I refer to as well. (Gail, Interview)

Gail reported that she had called the Help Desk when she was unable to verify the patient’s identity by scanning the barcode on his or her identification band. When talking with the Help Desk technicians, who are not clinicians (Morgan), she did not receive guidance in how to use BCMA to identify the patient; she quit calling the technicians when she did not receive the assistance she was seeking. For reasons that were not obvious, Gail assumed the problem with scanning the identification bracelet is a problem on night shift. It was unclear why she thought this was the case or whether she had talked with nurses on the day shift about scanning.

Gail then went to see another patient in Room 21, to complete an assessment. While in the room, she reviewed her papers and noted that the patient was due to receive
an IV antibiotic and pills. Gail returned to the medication dispensing device in the front half of the unit, logged on, and realized the patient’s medication list was in the other medication dispensing device; she logged off the device. She went to the other medication preparation area and logged in to the medication dispensing device and then highlighted the patient’s name and highlighted the three medications that were due to be administered. One drawer opened, and a bin within the drawer opened. Gail removed one pill, quickly answered “yes” to the question about whether there were five remaining medications in the bin, and closed the drawer; then another drawer opened, followed by the bin opening. Again Gail removed one tablet, quickly answered “yes” to the question of whether 26 tablets remained in the bin, and closed the drawer. Another drawer and corresponding bin opened; Gail quickly answered “yes” to the question of whether four pills remained in the bin, although the pill was the last one in the bin. She removed the one remaining pill and closed the drawer. Gail pulled out her mobile phone from her pocket and called the pharmacy. She told the person who answered that she had just removed the last pill and provided the name of the medication and clarified which device she was referencing. Then she highlighted “saline flush”; the door opened, Gail answered “yes” to the question about whether 76 remained, and Gail removed six flushes and closed the door. She then went to the patient’s bin in a cupboard in the medication preparation area and found the bag of antibiotic with the patient’s name on the label. She returned to the patient’s room.

Gail logged on to the bedside computer by scanning her employee badge and opened the patient’s medication profile in the EHR. She scanned the barcodes on the
three pill packages, opened them, and told the patient what each pill was; the patient swallowed them all together. Then Gail scanned the barcode on the antibiotic bag. Her mobile phone rang while she was scanning the bag of antibiotic; she answered it and replied, “Okay, thanks. I will look at it in a little while” (Gail, Observation). She wiped the port on the IV catheter with rubbing alcohol, opened a saline flush, and injected the solution into the patient’s IV catheter. The fluid flowed into the patient’s vein without the patient complaining of pain or discomfort. Then Gail attached the bag of antibiotic, and programmed the smart pump by selecting the medication’s name and the volume. She logged off the bedside computer and set the bed alarm before leaving the room.

During medication administration, Irene’s pattern of using BCMA was the same as that of many other nurses on the unit. She pulled up the patient’s medication profile in the EHR and then scanned the medication prior to administering it. When asked about pulling up the patient’s medication profile, she said, “Scanning the patient’s ID band does not usually work, so I pull up the medication profile” (Irene, Interview). She gave the same reason for not scanning patient identification bands as Ellen and Gail. Three of the four nurses observed on the night shift did not scan the patient’s band to identify the patient when using BCMA. Although Denise was observed to scan patient bands during BCMA, she encountered obstacles obtaining and administering insulin to a patient.

*Obtaining insulin for a patient.* The patient Denise had been expecting from the Emergency Department (ED) had just arrived at Room 13 via stretcher. In the previous examples of nurses’ HIT use and obstacles they encountered, HIT itself or training to use HIT may have appeared to be an obstacle during nurses’ workflow; in this situation,
organizational policy became an obstacle in Denise’s workflow. Denise helped the transporter to get the patient settled in the room. She greeted the patient and his family. The transporter handed the notebook chart to Denise; she reviewed the physician progress note and orders. She saw that there was an order for the patient to receive his daily dose of insulin. Denise asked the patient and family if he had the insulin with him. They said no.

Denise had an order to give Lantus to the new patient. Denise knew this medication was not stored in the medication dispensing device on the unit. The hospital pharmacy had closed for the day; it would re-open in the morning. Denise stated that usually the ED had it stocked in the medication dispensing device. Denise called the shift supervisor using her mobile phone. The shift supervisor said she was in the ED and would send the medicine right up. A pneumatic tube arrived with unmarked clear liquid in a TB syringe (the supervisor stated that she could not find an insulin syringe). Denise noticed some of the liquid had leaked out, making it unsuitable to administer to the patient. She then called the shift supervisor again to let her know the insulin had arrived but was unsuitable to administer.

In the conversation, Denise stated that she would obtain the medication herself; she left the floor and went to the ED to draw up the medication. She took an insulin syringe with her. In the ED, Denise signed into the medication dispensing device using her user identification and then scanned her right index finger. She highlighted the patient’s name and then scrolled through the medication list; she saw the Lantus in the list, but it was not available for her to remove. She saw the multi-dose vial of Lantus in
the clear locked medication box secured to the wall over the device. Denise saw another medication in the clear locked box as well. She highlighted the name of this medication on the screen, and a drawer opened that held a key to the locked box. Denise obtained the key to unlock the box in order to gain access to the Lantus. Once the Lantus was drawn up in an insulin syringe, Denise canceled her request to remove the medication she did not need. She locked the box and returned the key to the bin in the medication dispensing device. Denise found no Lantus barcode labels for the syringe in the medication preparation area, so she did not label the syringe prior to returning to the unit to administer the medication. She administered the Lantus and documented the administration in the EHR after scanning the patient’s identification band; she did so without scanning the medication because it did not have a label. Later, Ellen pointed out that the nurses in the ED did not use BCMA, which may have been why Denise found no labels for Lantus with the correct barcode to label the syringe.

Discussing her options for obtaining the medication, Denise stated that she wanted to administer the medication to the patient efficiently and safely. Denise said she could have waited for the shift supervisor to redraw the medication and personally deliver it to the unit, she could have asked the family to return home to obtain the Lantus, and she could have waited for the pharmacy to open in the morning to administer the medication. I later learned from Lee that another option was to have the pharmacy at a sister hospital deliver the medication via a carrier. Denise chose to forego all of these options, deciding instead to make sure the patient received the needed medication as soon as possible.
When trying to understand how the nurses obtained patient medications that were not stocked in the medication dispensing device on the unit after the pharmacy closed nightly, I asked Denise, “When you were trying to locate the Lantus, did you know that she [shift supervisor] was down in the ED?” Denise responded,

I just called her to ask where she was ‘cause our supervisors, when we don’t have medication that is accessible to us, we have to call a supervisor to see if they can get it for us. And so I just asked her if she was down there and she happened to be down there but she was . . . watching those other patients for the other nurse, relieving her. (Denise, Interview)

The pharmacist clarified the background and the organizational process for obtaining Lantus when the pharmacy was closed. He stated,

Lantus we draw up down here. Um, I think they probably have one vial in ED; I’m not sure that the Admin Rep can get it. But, because of a safety issue, it was decided a few years ago that we would draw it up down here and send it up. Of course, [a sister hospital] is always open and they do our orders after we close. So if they run out of something, [a sister hospital] can make a special delivery and run it here. It does take about an hour and it’s like a $50-75 charge one way. It’s not an emergency delivery. (Lee)

Hearing Lee’s response, “for safety reasons,” I remembered insulin was on the Institute for Safe Medication Practices list of high-alert medications that require special safeguards to reduce the risk of errors (ISMP, 2012). Leaders in the organization may have made a decision to place this high-alert medication in an area of limited access, such as the ED.

This example of obtaining insulin for a patient demonstrates multiple operational failures as described by Tucker (2004). The medication was not stored on the unit, the pharmacy was closed, in the ED Denise was not able to directly access the insulin in the dispensing device, she had to “trick” the device to obtain the key to open the locked box, and she could not locate a barcode label to affix to the syringe during transport to the
patient. Denise used her resources to obtain the Lantus for the patient by contacting her shift supervisor. When she was unable to use the medication the shift supervisor sent in the pneumatic tube system, she went to the ED to obtain the medication. Lee stated that the Lantus was in a limited location for safety concerns. This nurse worked through many organizationally imposed obstacles to obtain the medication for the patient.

Medication administration was observed as a technical process. Nurses made meaning in their experience during medication administration by interacting with others and accounting for the context of the situation. For example, none of the nine nurses counted remaining noncontrolled medications, IV solutions, or saline flushes in the medication dispensing device bin, but responded “Yes” quickly to the question on the screen about whether they had done so. Through interactions or watching others, nurses co-created patterns of using the medication dispensing device. As a result of the interaction with Carol, Brandi changed her pattern of using BCMA so that it was aligned with the process described by Morgan. It was important to Carol and Brandi to follow the designed process of medication administration. Through interaction, Carol and Brandi made meaning in using BCMA. Abby, Felicia, Denise, Gail, and Irene may continue to believe the BCMA technology does not work until they have conversations with others, just as Brandi learned how to use the HIT through others. Abby, Denise, Gail, Felicia, and Helen formed their own patterns of using BCMA by interacting with other nurses. Although Abby and Felicia said they taught others to use HIT, they did not scan patients’ identification when administering medications. Julie described how monthly reports are run on nurses’ use of BCMA: by number of medications scanned, not by both
medications and patients’ identification bands scanned. Helen said it did not make a
difference as long as you were scanning the medication, since it did not change the
charting. Through interactions, nurses made meaning when administering medications
using HIT such as BCMA and the medication dispensing device. Frequently, after nurses
administered medications, they updated patient information in the EHR.

**Documenting in the electronic health record.** Nurses had multiple patterns of
documenting in the EHR. Carol, Denise and Abby documented assessments and updates
to assessments at the patient’s bedside, while the other nurses collected notes on their
patient summary sheets to enter later. Abby stated that nurses had created new patterns in
the immunization documentation application. Additionally, two nurses had different
patterns in responding to malfunctioning computers when documenting patient findings.

Brandi sat down at the desk in the hall and logged into the computer using the
barcode on her employee badge. She entered the assessments of all four patients,
referring to her handwritten notes. She also reviewed other notes, such as previous
assessments, lab results, and imaging reports, that were entered into the EHR. While
Brandi was sitting at the desk, her mobile phone rang. She spoke with a physician about
her assessment on one of the patients. She said, “Yes, I was just about to enter his
assessment.” Brandi had completed the assessment a couple of hours previously, but was
just entering the findings; thus the physician called to learn about the patient’s status.

Just about the same time that Brandi was entering her patient assessment findings,
Felicia returned to the desk to document findings from her four patient assessments. She
stated, “I don’t usually type up all the assessments when I am in patients’ rooms. I get too
distracted from patients and family members talking with me and I can’t get my work done” (Felicia, Interview). Felicia’s mobile phone rang and she said, “I’ll come talk with you” and disconnected the call.

Felicia walked to the physician’s dictation room on the unit to talk with the doctor face-to-face. She spoke with the physician about a patient. They discussed the plan of care. The physician said she was writing an order to start an IV with 1000ml of NaCl and other medication orders. After collecting the supplies and starting the IV, Felicia returned to her desk to complete documentation of the IV placement. While she was entering the IV start information in the EHR, Felicia remarked how difficult it was to locate the correct descriptor of the IV catheter site in the EHR. Another nurse at the desk joined the conversation stating, “After clicking on the tab, scroll down three pages to locate the right antecubital” (Nurse, Observation). Felicia completed the documentation and headed to another patient’s room for another assessment.

*Immunization documentation.*

So, the vaccines are the new thing. And even, like, when I was doing that discharge and I said, “Oh, it says you refused.” So the vaccines . . . when we admit people there are two new screens on there. They’re a pain in the butt and they ask way too many questions, and some of the questions we don’t know how to deal with. We don’t even know how to answer them right. So the new one is, everybody’s cheating and doing the “refused.” So like when I discharged her and I said, “Oh, it refused both of those,” I’m surprised and half the time we don’t even say that because people go, “Oh, no, I never refused it,” but the nurses have learned that you don’t have to deal with all the junk on the computer if you just put “refused.” And now we are off season, so you can do “refused” or “criteria not met.” (Abby, Interview)

Abby stated that the immunization documentation was cumbersome and that nurses do not know how to respond to the questions. Through interactions, nurses had
found a way to work around the questions in the admission and discharge documentation. Upon admission, nurses are to offer patients immunizations for influenza and pneumococcal if they are not current. Abby stated:

The admitting screen is a whole new thing; now you have to XYZ on this—“You have to do this, you have this.” And so, the immunizations are part of that; so much new stuff has been thrown at us that some of it, they’re really pounding, like the HCAHPS and the Core Measures. (Abby, Interview)

Chris stated that in the EHR some information is pulled over to the discharge instructions from the admission assessment; that included offering patients pneumococcal vaccination and influenza vaccination during this hospital visit. When Abby was completing the discharge paperwork, she noted that the nurse who admitted this patient to the hospital marked that the patient had refused the immunizations. It could have been an inadvertent marking of the documentation. Abby remarked that this had become a new pattern used by nurses to avoid the cumbersome documentation. Abby did not inquire further with the patient. She presented the discharge information both verbally and in written form to the patient and her family members who were present. Once the paperwork was completed, the patient left in a wheelchair pushed by a hospital transporter without further questioning regarding her immunization status.

Brandi was preparing a packet of paperwork prior to discharging one of her patients. She too noticed “patient refused” pneumococcal vaccination and the flu vaccination were marked for this patient. Brandi remarked that the patient had refused without discussing the matter further with the patient. She proceeded to compile the discharge paperwork and printed two copies of about seven pages of information for the patient. Brandi reviewed the discharge information with the patient. She reviewed with
the patient what to watch for with his recent diagnosis of congestive heart failure, encouraged him to make an appointment with his primary care doctor in 3 days, and stated, “We did not give you the vaccinations . . . you can talk with your primary doctor about these next time you see him in the office.” The patient nodded his head.

When Chris was asked about the revised immunization module, he admitted it was difficult for the nurses to use. Chris noted that offering patients immunizations upon admission is part of the CMS [Centers for Medicare & Medicaid Services] Core Measures:

We recently implemented this project I’m in charge of, um, a new immunization module as part of our electronic charting; it’s a CMS Core Measure for global immunizations for pneumo-vacs and, influenza vaccines and the barcoding that we use, which is then called [product name] is barcoding for the drug, then you scan the patient, the drug . . . um, it is not able to capture all the information needed to record immunizations so the nurses have to manually put in the lot number, the date, and the manufacturer every time, for every immunization they give. So, they find that kind of burdensome. And, if you’re a certain age, you can’t really read the backs of the vials, which has nothing to do with technology. I unilaterally added in the immunization module, which I’m getting ready to take back out, so . . . it’s junk. (Chris)

The nurses co-created a new pattern in response to the designed immunization documentation process. This co-created pattern was noticed in the organization’s outcome measures. The hospital had a 53% completion rate in terms of offering pneumococcal immunization, while their influenza immunization offering rate was at 70%, both falling well below the nationally reported Core Measure goal of greater than 90% performance.

Through interactions, nurses created new patterns for completing the admission/discharge documentation. Brandi and Abby stated that the documentation process was difficult to understand. Abby admitted, “Everybody’s cheating and doing the
“refused.”’’ The two discharges I observed had documented that the patient refused the immunization. This pattern of nurses’ documentation was reflected in the organization’s performance measures. Not only did nurses encounter obstacles documenting within the EHR, but they also encountered obstacles with the computer hardware.

Malfunctioning computer workstations. Nurses used computers both at the desk and at patient’s bedsides frequently during their shift. Computers malfunctioned during observations of both Carol and Abby. The hardware malfunction consumed time the nurses could spent taking care of patients.

Carol returned to the desk to review new orders and times when she was to give medications. She greeted other nurses in the area; all three appeared to be gathering notes and supplies to return to patient rooms. Carol sat down at the computer and flashed the barcode on her employee badge to gain access to the network and the EHR. She saw a message on the screen: “Access denied.” She tried again and received the same computer response. Then she remarked, “The badge sign-on stinks! It does not work; we have to sign on first time every shift, but it still does not work” (Carol, Observation). She then turned to her friend Carla and asked if she had had difficulty using her badge to log in. Her friend said no. Clearly, Carol was frustrated about being unable to scan her badge to gain access. Carol turned to Helen, who was at the desk, and asked her how she had gotten the computer to recognize her badge the previous week. Helen responded, “I turned the computer off and restarted it” (Helen, Observation). Carol then re-entered her login information and password. Still, she was unable to gain access to the network and the EHR. She then powered the workstation off and tried again. This time she was able to
scan her badge and get into the EHR. She did not move to one of many other computers on the unit; she worked to restore the computer she had started on. She spent close to 10 minutes attempting to gain access to the EHR using the barcode on her badge.

Later in the afternoon, Abby was at a patient’s bedside to administer a medication she had just removed from the medication dispensing device. She logged into the computer using the barcode on her employee badge. She opened the EHR and highlighted the patient’s name. The patient’s electronic record did not appear on the screen; the unit census with the patient’s name highlighted remained on the screen. Abby waited a moment and then highlighted another patient’s name. Nothing new appeared on the screen. Abby tried to close the program, but this command was not accepted either. Abby pushed the power button for one minute and the computer shut down. She then talked with the patient for a few minutes and turned the computer back on. The dim green light in the power button was illuminated, yet nothing came on the computer screen. Abby then told the patient she had his medication that was due. The patient opened his hand for the pill, Abby gave it to him, and he swallowed it. Abby left the patient’s room and went to the computer at her desk and documented the given medication, highlighting the reason the medication was not scanned as “unable to scan.” Abby did not call the Help Desk to inform them that the bedside computer was not working.

A couple of hours later, a nurse from the IT department walked through the unit and said “Hi” to Abby. Abby noticed that the woman’s badge indicated she worked in the IT department. As the IT nurse was walking past the desk where Abby was sitting, Abby called out, “Hey, are you from IT?” The nurse turned around and answered yes. Abby
told the nurse the computer in room 22 was not working. The nurse went to that room while Abby stayed at the desk. The IT nurse returned in just a few minutes and reported that the computer was now working. Abby stated that it was rare to see IT personnel walk through the unit and that she had “never seen her before” (Abby, Observation). Nonetheless, the timing was fortunate. It was not clear to me why the IT nurse had walked through the unit, but what was clear was that Abby, a full-time nurse working on this unit and also involved in training clinicians in the use of new HIT applications, did not recognize the IT nurse.

Both Carol and Abby experienced difficulty with the computer hardware. Carol talked with others about restoring the computer. Abby did not seek out others to help fix the malfunctioning computer at the patient’s bedside. The unexpected appearance of the IT nurse on the unit was fortuitous. Abby talked with this nurse and she was able to restore the hardware. Neither of these nurses contacted the Help Desk to fix their ailing computer; they relied upon local interactions.

*Entering assessment data at the bedside.* Early in the night shift Denise completed a head-to-toe assessment with a patient. She logged into the bedside computer by scanning the barcode on the back of her employee badge. She entered her findings, looked for new orders entered, and looked up when the next medication(s) were due for this patient. Denise stated that right after completing an assessment she likes to complete documentation at the bedside since this gives her more opportunity to interact with the patient and family. Denise noted that the patient had medication due in the next hour; she
told the patient when she would be back with the medication. She logged off the computer. She set the bed alarm and promised to return in a little while.

*Entering assessment data at the desk.* Ellen had received a report on her four assigned patients from the day shift nurses at the patient’s bedside. Once she had received reports on all the patients, she moved from room to room completing head-to-toe assessments and writing notes on her patient summary sheet. After completing all of the assessments, she returned to her desk in the inner core of the unit. She entered her findings from assessments, referring to the notes she had written. She commented,

> Our charting is set up to chart by exception. We have choices for every assessed item. We can hover the mouse over this box (showing the assessment screen) and read the parameters of that box. I have to make a comment. I will check WDL (within defined limits), then open a comment box to further define what I saw or heard because my nursing instructors said, “If it is not charted, it is not done.” I’ve been told by the unit supervisor that I don’t need to chart all I do, but I cannot limit my charting because I keep hearing those instructors. (Ellen, Observation)

Ellen made several additional comments within each assessment flow sheet further describing her findings. She expressed the belief that making a thorough note is better than marking a box explaining findings from patient assessments. The interaction she had with nursing faculty years previously continued to influence her documentation patterns.

After leaving the patient in Room 21, Gail went to the main desk and said to the HUC, “I understand there are new orders for my patient” (Gail, Observation). “Yes,” the HUC said, “I just entered them; here’s the chart.” Gail reviewed the new physician’s orders and placed the notebook chart in the chart rack. She went to her desk and opened the EHR by scanning the barcode on her employee badge. At the desk, Gail entered findings from the four patients’ assessments.
As she entered findings from the assessments, Gail was alerted through her phone that a patient had pressed the nurse call button. She walked away from the open EHR to respond to the call light. When asked about the EHR being left open, Gail said, “Oh, we never sign out of the computer at the desk because we will be back in just a few minutes and there is no problem with letting it sit there open” (Gail, Observation).

*Patient-controlled analgesia documentation.* Irene and the off-going day shift nurse went to the patient’s bedside to complete the shift change report. The nurses included the patient in the exchange of information about the care. This patient had had abdominal surgery earlier in the day and had a patient-controlled analgesia pump running. This equipment looks much like a smart pump with the exception that the settings are behind a locked clear piece of plastic and there is a cable connected to the patient’s activation button. The patient can push the button to infuse analgesic medication several times an hour, although limits are set so that the patient does not receive too much medication. During the nurse shift change report, Irene signed into the bedside computer and brought up the medication list containing the physician’s orders for the settings of the patient-controlled analgesia pump. The two nurses compared the pump settings with the physician’s orders and recorded how much medication had been used. Both nurses electronically signed a form after verifying the amount of analgesia that had been removed from the syringe. The two nurses located and completed the co-signature form within the EHR.

Across a 24-hour timeframe, nurses used many components of HIT. During my observations, nurses were seen to use many components of HIT, such as the EHR,
BCMA, medication dispensing devices, smart pumps, and patient-controlled analgesia pumps as they cared for patients. Nurses interacted with other nurses, the pharmacist, and the shift supervisor when using HIT and when encountering obstacles with HIT. Nurses had interactions with their nurse co-workers that influenced how they used BCMA; seven out of the nine nurses brought up patient medication profiles in the same way, a way that allowed them to work around the need to scan the patient’s identification band, and bypassed the question concerning remaining medications in the bin. Similarly, evidence suggested that nurses had talked about how to handle the question of immunization status in the admission and discharge forms by marking “patient refused.” Nurses changed their work flow patterns after interacting with others.

When nurses encountered obstacles, they self-organized around the tensions by asking co-workers for ideas about how to continue with patient care activities. These self-organizing interactions were sensitive to initial conditions, multidirectional, and influenced by rules of ideology and power relations. In the example in which Carol received the message on the computer, “Access denied,” she immediately asked her co-workers whether they were also experiencing difficulty in logging on to the computer and asked for ideas to restore the computer. Because of previous interactions with these nurses, Carol sensed that she could ask them how to respond to the obstacle. The interaction was multidirectional, since Carol did not know how others would respond to her question. The interaction was also influenced by rules of ideology and power relations, since these nurses valued attempts to fix the computer immediately by turning it off and restarting it. I saw relations of power in the interaction because Carol was enabled
to shut down the computer and restart it. Her actions were constrained by the unit norms that prescribed leaving the malfunctioning computer for someone else to handle. When nurses used HIT as they offered patient care activities, multiple examples of self-organizing interactions were evident in which new patterns emerged. In the next sections I address the study’s subquestions with data generated from reflections on interviews, observations, and selected organizational documents.

Research Subquestion 1: What narrative themes characterize the experience of nurses using HIT?

Four narrative themes emerged in the experience of these nurse participants using HIT: nurses responded to HIT obstacles through self-organizing interactions, that were sensitive to initial conditions, multidirectional, and influenced by a plethora of sets of rules. In the self-organizing interactions, nurses changed patterns that brought about transformation in their practices, finding what they believed was a better way to deliver care to patients. Innovation is a process of changing interaction patterns to bring about transformation in practices or products that have the potential to contribute to social wellbeing. Innovation emerged from obstacles when nurses participated in self-organizing interactions that were sensitive to initial conditions, multidirectional, and influenced by many rules when using HIT.

Self-organizing interactions. The first theme that emerged from the data was nurses self-organizing interactions. Nurses responded to HIT obstacles by interacting with others. Through self-organizing interactions, nurses transformed how they practiced nursing by finding a better way to deliver care to patients. When nurses encountered HIT
obstacles during patient care activities, they made choices how to respond. Nurses had three choices when they encountered a HIT obstacle: they could involve someone who could remove the obstacle; they could have ended the patient care task; or they could have taken accountability for their practice by interacting with others to respond to the obstacle. Self-organizing patterns among nurses were observed when they used HIT applications including the medication dispensing device.

When removing medications, IV fluids, and saline flushes from the medication dispensing devices, nurses found the immediate solution to the question on the screen, “Are there XX number remaining in the bin” by responding yes. In my reflective narrative of nurses using the medication dispensing devices, I realized nearly all nurse participants responded to the question of inventory in the same way, with the exception of Ellen, who occasionally counted the remaining medication. I understand nurses have talked to each other about how to proceed past the question to administer medications to patients. In self-organizing interactions, nurses were seeking a better way to respond to the HIT while being accountable for delivering medication safely and efficiently to patients. I reflected upon the nurses’ self-organizing interactions. I sought to position my ways of thinking with nurse scholars. I reflected upon Benner et al. (2011), who noted that under-determined patient situations require nurses to use clinical and moral imagination that comes from interacting with others. In their self-organizing discussions in under-determined situations, nurses found a way to obtain non-controlled medications, IV solutions, and saline flushes that support their individual and collective identity. In finding a common solution, (answering “yes” to the question without counting) nurses
were enabled to bypass the question of inventory. By identifying a common solution, I did not hear of any nurse further investigate why that question was there; they all quickly went to the common solution by answering yes. Nurses self-organized to answer the medication dispensing device question when removing non-controlled medications, IV fluids, and saline flushes. Nurses’ ability to self-organize was sensitive to the initial conditions of being able to communicate with others when they experienced an HIT obstacle.

**Sensitivity to initial conditions.** The second narrative theme that emerged from the data that characterize the experience of nurses using HIT is that nurses’ self-organizing interactions are sensitive to initial conditions. Nurses’ actions were sensitive to initial conditions as nurses interacted with co-workers with whom they had a history. In the interactions with co-workers, nurses found ways to respond to HIT obstacles by talking with those they knew in order to resolve the immediate obstacle in patient care. In my reflection upon sensitivity to initial conditions, I wondered if nurses interacted with only a select few co-workers or anyone who was available. I did not notice formed patterns of interaction among nurses. When I asked nurses, “Who do you consult with when you experience an HIT obstacle?”, nurses responded they ask whoever is around. I observed nurses ask other nurses who were physically in the area when they encountered an HIT obstacle.

Medications were not always located in the dispensing device and this presented an opportunity for nurses to find a better way to do things. During the day shift, nurses contacted their co-workers and the pharmacist when they encountered an obstacle
locating medications. I wrote a reflective narrative of the nurses’ relationship with the pharmacist. Within the coded data, I recognized that the day shift nurses quickly called the pharmacist when medications were not where the nurse expected to find them. In self-organizing interactions with the pharmacist, which were sensitive to initial conditions (ability to talk with the pharmacist and knowing who could help locate medications), nurses were able to change their interaction patterns to better take care of patients. Nurse and pharmacy leaders identified that collaborative relationships are necessary to ensure safety and quality throughout the medication-use process (Sessions, 2003). The reflective narrative focused on the collaborative relationships between nurses on the day shift and pharmacist with a common goal to ensure safety and quality throughout the medication-use process. Lee noted it was important to have collaborative relationships with nurses on the units, “Nurses are on the front end, we’re not on the front end…the pharmacists here try to be very open and receptive to the nurses calling us.” I noticed nurses self-organized with the pharmacist to locate medications. Nurses’ priority was timely administration of medication. To achieve this goal nurses talked with the pharmacist. Their self-organization was sensitive to initial conditions of previous interactions with the pharmacist. Through interactions with the pharmacist, obstacles in patient care were immediately removed. For example, when Felicia could not locate a medication in the dispensing device or find it near the pneumatic tube system, she called the pharmacist. Felicia took accountability for delivering medication to the patient safely and efficiently by self-organizing with the pharmacist. Through the interaction with the pharmacist,
Felicia learned the medication was misplaced in the other dispensing device. She obtained the medication and administered it.

Carol also contacted the pharmacist after asking co-workers when she could not locate a medication. Immediately after talking with the pharmacist, the medication arrived via the tube system and Carol administered the potassium to the patient. Nurses during the day shift frequently self-organized with the pharmacist when medication was not in the medication dispensing device. Interactions of nurses on the night shift were sensitive to initial conditions in their inability to self-organize with the pharmacist after 10 o’clock. After 10 o’clock, nurses did have the ability to call a pharmacist at a sister hospital, but this was not often observed. Nurses self-organizing interactions were sensitive to initial conditions and they were also multidirectional.

**Multidirectional interactions.** The third narrative theme that emerged from the data that characterize the experience of nurses using HIT is that nurses’ self-organizing interactions are multidirectional. The self-organizing interactions were multidirectional as the nurse asking for ideas to respond to an obstacle did not know how another nurse would respond; there was the potential for amplification of small differences. In reflective narratives of nurses’ multidirectional interactions, I considered Ray (1989). Ray (1989) identified there are multiple perspectives of caring within a hospital that have the potential to transform and unify patterns of interaction.

In their daily activities, nurses’ self-organizing interactions included their ability to interact with others who had a different perspective of caring when using HIT. For example, the pharmacist and the IT project manager held a different perspective of using
the medication dispensing device than the nurses. These people had different
accountabilities than nurses in their work activities. Lee said it was important for nurses
to count the remaining medications in the medication dispensing device as this is how the
pharmacy knows when to refill the medications. While Carol noted “I’m not sure why it
asks you that. At least to my knowledge I’m not expected to count that; only if it’s a
controlled substance and it will ask you in a different way” (Carol, Interview). There are
different understandings of what nurses are to do when removing medications and saline
flushes from the medication dispensing device emerging from unique positions within the
organization. Lee’s perspective was formed by his role as a pharmacist that supplies
enough medication for nurses to administer to patients. His job is to ensure there is no
situation where patients do not have the medications when they need them. When asked
if he understood nurses are to count remaining non-controlled medications in the
medication dispensing device Lee responded,

I don’t know that they always do that but the issue comes in if there’s a
discrepancy. Let’s say…it says, there shows 15 and there’s really only 2 and they
take those 2, then the pharmacy thinks that there’s 15 up there and nursing’s
going to run out. Which typically, we don’t find many discrepancies…we’re sort of like a grocery store or a drug store and we have this candy machine, the
[medication dispensing device] has a par level for each item. And if the par levels
are kept accurate, then we put a level that they can’t go below and so when it gets
below that number, that’s when we refill it. And if it doesn’t get below that
number, then we don’t refill it. And we don’t go looking; we run a report every, I
don’t know, like, two times a day, three times a day. (Lee)

Lee was asked, “Are the nurses expected to count the saline flushes as well?”

No. The IV flushes are in the [medication dispensing device] but they don’t have
to count them. There is a par level but we try to check those everyday because
nurses are well known for grabbing three or four flushes and saying they took
one…which, I would do if I were up there. So, we just try to check them every
day. (Lee)
Morgan had a different understanding of nurses counting flushes when removing them from the dispensing device. I asked him if nurses knew they were expected to count the remaining medications but not the remaining saline flushes,

Yeah, I think they know…yeah. You know, cause saline is saline. I’m going to use it for as many times as I need to pull it out for a flush cause it’s part of keeping my line open or whatever. But, yeah, when I have to give a narcotic, yeah, that’s a controlled substance or…and I have to make sure that that count is accurate. I think it’s important because, yeah, I perceive that they feel that that’s important because, if I’m in a critical care unit and I rely on those type of meds to be available and if I can’t do my part in keeping the par count up, then when it comes time to actually give and I pull a drawer open and it’s like, ‘Ok…people didn’t, you know, keep the count up and now I’m in a pickle situation where I need to give this medication to the patient and I’m out.’ So, yeah…they know. It’s important to keep that level up to date. (Morgan)

There were multiple understandings among the nurses, the pharmacist, and the IT project manager in how nurses should respond to the medication dispensing device question. Often nurses asked co-workers for ideas to respond to an HIT obstacle. Nurses did not know how the other would respond to their gesture. There were new ideas brought into nurses’ interactions, although the ideas were limited by co-workers experience and perspective. By self-organizing with co-workers, nurses often found a way to complete patient care activities in a therapeutic manner, yet ideas were limited by the co-worker’s experience and perspective and did not include the multiple perspectives of other members of the organization. Nurses’ self-organizing interactions were sensitive to the initial conditions, multidirectional, and were influenced by many sets of rules.

**Influenced by a plethora of sets of rules.** The fourth narrative theme that emerged from the data that characterize the experience of nurses using HIT is that nurses’ self-organizing interactions are influenced by a plethora of sets of rules. Nurses’ actions were always influenced by ideology and power relations in order to stay in relationship
with co-workers. For example, when a nurse began to pass medications and the BCMA technology did not allow her/him to scan the patient’s identification band, she/he recognized that patient safety and timeliness were priorities, determined that these priorities were met and proceeded to administer the medications in spite of the policy to check the arm band.

Nurses found solutions to obstacles during patient care activities by self-organizing with nurses within the unit. There were a plethora of sets of rules that influenced Ellen’s self-organizing interactions when she encountered an obstacle with BCMA. The rules that influenced her actions were in her values of wanting to take care of the patient safely and efficiently, unit norms of asking others for ideas, and making choices to use the BCMA in a way that would be found acceptable by the group. Ellen stated that she wanted to make sure it wasn’t a problem just with her.

When I was first having problems with it, I think, the first thing was, like, uh, I wanted to make sure it wasn’t just a problem with me, like, is there something I’m doing wrong? Why is it not working for me? So, that’s when I went to a couple of the other nurses and discussed it with the other nurses and compared notes. “Are you having the same problem I’m having? Yes, you are? Ok . . . let’s talk to our shift supervisor . . .” Yes, and others were having the same problem too. I talked to a couple of the other nurses and they said they were having the same problems with it too. And so they, too, were pulling it up the same way, instead of scanning the barcode on the patient’s band. And, we did tell the supervisor about it . . . we had talked to the managers about it in a meeting also. So, they were aware that it wasn’t working. (Ellen, Interview)

Ellen’s self-organizing interaction was influenced by rules as she assumed accountability for creating a response to the BCMA obstacle with nurses and compared notes with them.

In my reflection upon Ellen’s words I understand her actions were influenced by how they were evaluated by her co-workers. In the interaction with co-workers, she was enabled to administer medication to patients by not scanning the identification band
forming her collective identity. I noted Ellen’s choices were influenced by her value (of taking care of the patient), unit norms of pulling up the medication profile, and relations of power that enabled her individual and collective identity by acting the same way as her co-workers. Through self-organizing interactions that were sensitive to initial conditions, multidirectional, and influenced by rules, Ellen and her co-workers created a better way to administer medications to patients, thus changed practice in one part of the organization. Nurses’ power relations and themes of ideology are at the center of the organizational knowledge creation process (Stacey, 2001). The nurses found an innovative solution to the medication administration process through self-organizing interactions.

In summary, the four narrative themes that characterized the experience of nurses using HIT were self-organizing interactions that were sensitive to initial conditions, multidirectional, and were influenced by sets of rules. Nurses’ self-organizing interactions most often were with nurses on the unit. For example, Carol encountered a HIT obstacle with a computer workstation at the desk and self-organized with co-workers for an immediate solution. The self-organizing interaction was sensitive to the initial condition that Carol could ask others for ideas to restore the malfunctioning workstation. In the self-organizing interaction, Helen suggested to Carol that she turn the computer off and restart. Multidirectional interactions are unpredictable as there are differences in multiple understandings. In multidirectional interactions multiple perspectives can be explored when nurses encounter HIT obstacles. Self-organizing interactions are influenced by sets of rules. Carol’s value of having functioning equipment and a unit

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norm of trying to fix it themselves, she restarted the computer. In her action, Carol took accountability for her action to have a working computer for her and others to use. Carol’s action sustained her relations of power within the group. Carol participated in self-organizing interactions when she encountered an HIT obstacle that were sensitive to initial conditions, multidirectional, and were influenced by sets of rules. In self-organizing interactions, nurses found immediate solutions to HIT obstacles that were formed by and forming individual and collective identity. In nurses self-organizing interactions when they encounter HIT obstacles there is the potential for organizational transformation in practices and products that will produce better ways to care for patients.

**Research Subquestion 2: What interactions do nurses participate in when they encounter an HIT obstacle?**

The interactions nurses participated in when they encountered an HIT obstacle were in two forms: local interactions with co-workers and focused task force interactions. In the day-to-day activities, nurses were observed to participate in interactions primarily with co-workers. In other interactions, Abby and Denise spoke of participating in hospital-wide committees to make improvements to processes. Abby and Denise were the only nurses who spoke about interacting with others in the organization to bring about change. Improving the use of HIT in patient care activities requires drawing on diverse perspectives, information, and experience. One of the central insights from complexity science is that diversity is necessary for the spontaneous emergence of novelty (Stacey, 2001). Nurses’ interacting only with co-workers limited their access to diverse perspectives, information, and experience, while those who participated in organization-
wide committees gathered information for improvement and had the potential to share their perspectives, information, and experience.

**Local interactions.** Nurses were observed to frequently interact with co-workers when they experienced an HIT obstacle. Although such interactions may be convenient, they lack the diversity to improve a process, product, or service. For example, Ellen reported talking with other nurses when she first experienced an obstacle with BCMA. Together the nurses found a way around the obstacle; yet they did not improve the process of using the HIT. They found an immediate way to administer medications by bypassing a key feature of BCMA, such as verifying that they were administering medication to the right patient. In the local interaction, diverse information and experience about how the HIT functioned were limited. As a result of the nurses’ interacting only within the local work group, others, such as technology designers, quality improvement personnel, and managers, remained unaware that the HIT was not working as expected.

Nurses rarely interacted with their managers when they experienced an HIT obstacle. Although one of the managers were in the office on the unit frequently from five in the morning until after the night shift had received reports in the evening, the managers were rarely contacted about HIT obstacles. When Julie was asked how often she had interactions with nurses when they experienced an HIT obstacle, she said maybe once or twice a month.

As far as manager, I would probably say I probably get called least. Maybe, once, twice a month someone will call me. And it will be something like, maybe bigger, maybe not just a computer in the room. I think nurses, one, they try themselves to reboot, then they may call the supervisor, who’s right there, accessible, and then
they may call me third. But the computer, as far as, like, repair issues or any kind of concerns, um, I would say the staff probably comes to me maybe once or twice a month, at the most. At the most . . . and I think it’s more because they have themselves, each other, and the support from IS, and then even the supervisors on the floor. (Julie)

Nurses did not involve Julie in their HIT obstacles. She stated that the nurses have other resources, including other nurses, the shift supervisor, and the Help Desk, to interact with. Nurses were observed to interact most often with co-workers when they encountered an HIT obstacle.

It is possible that my presence brought diversity in interactions with nurses and facilitated the interaction between Brandi and Carol. I told Brandi I had seen other nurses scan patients’ identification bands during BCMA. Brandi asked Carol and another nurse on the unit if they were able to identify patients using BCMA so that when they scanned the patient’s band the patient’s name appeared on the EHR screen. Carol replied that she scanned patients’ bands and explained her process. This interaction occurred after Brandi learned from me that others on the unit were able to scan patient bands. For Brandi, change occurred in the interaction with others on the unit who had different information about using the HIT. Prior to my telling Brandi that I had observed others verifying the patient using BCMA, she believed the HIT was not functioning properly. With the new information, Brandi started using BCMA to verify the five rights of medication administration. In this example of new patterns being formed as a result of local interactions, it is clear that, with this new information, innovation emerged in the interaction between Carol and Brandi as Brandi changed her pattern of using BCMA in a way that transformed her practice, thereby contributing to the wellbeing of patients.

Brandi found new information in the local workgroup; other nurses found new
information by participating in interactions bigger than those offered by the local workgroup.

**Interactions in hospital-wide committees.** Two of the nine nurses observed participated in hospital-wide discussions to improve processes and services. For example, Denise spoke of participating in a task force that explored how to improve documentation of the patient’s care plan. Denise said there had been varied practices among nurses in terms of completing care plan documentation, with documentation of some patients’ care plans not being entered for days. Denise reported that nurses met with the technology designers and in the interactions a decision was made to combine the patient assessment flow sheet with the care plan flow sheet.

We just changed [to the revised electronic flow sheet] at the beginning of this year. It has made a big difference. Before, we would see, you would follow somebody and—not that they were doing a horrible job—but you would see a care plan hadn’t been touched in a couple of days. And now you see that every shift, everyone’s looking at it because it is part of the assessment flow sheet. You can see if it’s, if someone’s not been following it. (Denise, Interview)

New ideas were generated through interactions with nurses from different units and technology designers. The interactions among nurses and technology designers who had diverse perspectives and experiences held the potential for an improved flow sheet to emerge.

Abby reported that the agenda of the committee she participated in was to explore flow and process issues. She explained that recent work of the committee had been focused on removing documentation elements in the EHR, looking for “what do we not need here. If this is all repetitive and we’re clicking boxes and they’re all the same boxes, do we need to be doing this?” (Abby, Interview). Abby participated in the documentation
committee, yet she did not report having discussed the cumbersome immunization documentation with the committee. This interdisciplinary committee seemed to be a great forum for nurses to discuss obstacles in their workflow, such as those arising in immunization documentation. The potential exists to improve HIT—not only by removing repetitive data, but also by investigating other HIT designed processes, such as BCMA, the medication dispensing device, and immunization documentation, through diverse interactions.

Nurses participated in many interactions when they encountered an HIT obstacle. Most interactions were local, with co-workers on the unit, although two nurses participated in hospital-wide committees. In local interactions, nurse found immediate solutions that allowed them to continue with patient care activities. For example, Brandi learned new information from her co-workers that allowed her to improve her process of using BCMA. In terms of other interactions in the local work group, I did not notice new information emerging in the discussions, and patterns continued to operate in the same way. For example, Denise asked others if they had experienced a problem with BCMA, and in the discussion the nurses identified that they were using it in the same way. Rarely did new ideas or information come from the local interactions. Abby and Denise participated in hospital-wide interactions through committees. As a result of the committee work, Denise was able to influence improvement in care plan documentation, while Abby explored what was not needed in the EHR. There was no evidence that Denise or Abby discussed with the committees HIT obstacles in their workflow such as those with BCMA, counting noncontrolled medications in the dispensing device, or
immunization documentation. Some diverse interactions occurred that brought about positive change in the workflow; more interactions with diversity may bring about more positive change in nurses’ daily activities with patients. The interactions nurses participate in are formed by and form their ideology.

**Research Subquestion 3: What are the norms and values (ideology) associated with the experience of nurses using HIT?**

Themes of ideology emerged from the data that are associated with the experience of nurses using HIT. Ideology is the criterion for evaluating individually felt compulsions to choose one desire, action, or norm over another. Nurses’ evaluation of choices emerged in social interaction as inclusion or exclusion formed by and forming nurses’ collective and individual identity. In the history of communication patterns of gesture-response, themes emerged and variations on patterns were reproduced such that there was the potential for transformation in nurses’ interactions (Stacey & Griffin, 2005). Four themes of ideology will be explained as nurses’ formed by and forming identity in their workgroup, asking others for ideas, identity in hospital-wide committees, and identity in interactions with managers.

Nurses explained that their focus when taking care of patients was to deliver safe, efficient, and quality care to patients. This priority was demonstrated in the gesture-response pattern between Brandi and Carol as the potential for transformation emerged in the variation of patterns in their discussion about how to use BCMA. In gesture-response patterns, nurses accounted to one another for what they did. In the accounting to one another, individual and collective identity was formed by and formed the interaction of
care and healing for patients. When nurses encountered an HIT obstacle, they chose one desire or action over another; that choice was then open to evaluation by themselves and others. In the patterning process of communication, themes of inclusion and exclusion emerged. In this study, the themes of inclusion-exclusion were observed in nurses’ actions when they interacted with patients and co-workers when an HIT obstacle was encountered.

I did not observe any interactions in which a nurse’s action led to exclusion from the group, as this may be difficult to observe and not as apparent for an outsider in 3 weeks of observations. However, I remember from my experience as a direct care nurse and manager that nurses do choose actions that are not accepted by the group, such as failing to complete documentation prior to handing care on to the next nurse, that form an identity of exclusion. Nurses’ ideology was observed in their words and actions; they were formed by and forming identity in their workgroup by interacting with patients for care and healing and by creating an identity with co-workers, in asking others for ideas, by participating in hospital-wide committees, and in interactions with their manager.

Identity in the workgroup. An ideological theme that emerged from the data was nurses formed by and forming identity in their workgroup. Nurses were observed to choose one action or desire over another, thereby being formed by and forming an identity of inclusion with the group. Their identity of inclusion was formed by and forming in their interactions with patients and co-workers. Nurses were motivated to interact with co-workers to find good solutions to HIT obstacles for the care and healing of patients.
For patient’s care and healing. Nurses explained that they were motivated to take care of patients; this motivation was seen in their individual choices and in the evaluation of their choices by themselves and others in their workgroup. Nurses noted that their motivation to participate in interactions was to make the experience for the patient the best it could be. Nurses on the unit described policies and designed processes as secondary to their patient’s experience in their estimation of relevance. For example, Ellen said in the interview,

Patients are always my main priority. I want to make sure that they’re, you know, everything . . . that they’re safe and everything’s okay with however I’m going to go about the obstacle. If it’s going to harm them or it’s going to be, um, a problem for them, then I don’t want to do it the way I’m thinking of going around it. Um, my priority is if the patient is going to be safe or affected by it, definitely. (Ellen, Interview)

Nurses in this study suggested that their desire to safely address the needs of their patient constituted a threshold when they encountered obstacles when using HIT. Carol said during the interview, “I try to take care of the patient first, without violating any . . . nursing . . . I’m more concerned about my patient than the policy, but in the end I’ll try to meld them . . . I want to make sure my patient’s safe and comfortable first.”

When asked about her perception regarding the impact to the patient when she does not follow designed processes, Brandi replied:

Ultimately, you need to get to a goal . . . I think that by using other skills or using other resources, that can get you to the, you know, the end result you want; I think that is better for the patient. Because you are not, you know, you’re not holding up treatment. (Brandi, Interview)

When I asked Gail during the interview if variations to designed processes were accepted on this unit, she responded, “No, I don’t think it’s accepted, but sometimes,
depending on the situation, it’s needed” (Gail, Interview). When asked how important following hospital policies are to her, Gail responded, “Depending on what the reason is for the policy . . . for patient safety or patient care? They’d be pretty important. But if they are things involving schedule or personally affecting me, they’re less important on the priority scale” (Gail, Interview). When answering my question about the impact on the patient when she or others work around an obstacle, she responded,

I think it is better for the patient. If there’s something that’s slowing up time or slowing up me getting something that’s like a pain med, some things that will benefit the patient, if I’m working around an obstacle saving time, I think that benefits them. (Gail, Interview)

Nurses’ identity was formed by and forming values and norms in the workgroup regarding patient’s care and healing. Nurses identified that their priority when participating in self-organizing interactions was the patient’s care and healing.

Nurses were observed not always using HIT as it was designed; they also admitted that such was the case. Sometimes they found the design interfered with the care and healing relationship with patients. Nurses spoke of encountering HIT obstacles and how they used their clinical judgment, which included interacting with co-workers, to resolve the patient’s situation. Nurses were motivated to adapt to HIT obstacles to promote the care and healing of patients. Nurses explained that they worked around HIT obstacles based on the needs of the patient’s situation. For example, Gail stated that her priorities were

Based on the patient; if it’s something, something vital to them . . . if something’s going on with their, you know, their blood pressure or their heart rate or urinary output or pain . . . pain is a big one. You want to administer those quickly to patients in a lot of pain. So, my priorities . . . it’s always the patient, based on what’s going on with them and how quickly can I resolve an obstacle or work
around it. That’s how I would base it if the patient needed care or something with
the patient needed to be addressed immediately or if it’s something that could
wait a little bit. (Gail, Interview).

When asked, “When you run into an obstacle as you care for patients, what are
your priorities?” Denise responded,

Um . . . patient safety, always! Oh, yeah, always! Because you want to make sure
that there’s nothing, no harm done to the patient. Um, so, if it’s something that
will directly affect the patient, then it needs to be done immediately to be fixed,
whatever it could be. Um, but that’s the number one, I believe. I can’t think of
anything that could be more important. (Denise, Interview)

Ellen was asked, “When you encounter an obstacle, what are your priorities?” She
replied:

Well . . . patients are always my main priority. I want to make sure that they’re,
you know, everything…that they’re safe and everything’s okay with however I’m
going to go about the obstacle. If it’s going to harm them or it’s going to be, um, a
problem for them, then I don’t want to do it the way I’m thinking of going around
it. Um…my priority…is if the patient is going be safe or affected by it, definitely.
(Ellen, Interview)

I asked Carol, “When you run into an obstacle as you perform patient care, what
are your priorities?” She stated,

I try to take care of the patient first, without violating any . . . you know, nursing,
uh, I mean, I’m more concerned about my patient than the policy but, in the end,
I’ll try to meld them. I want to make sure my patient’s safe and comfortable first.
(Carol, Interview)

Brandi was asked if she had ever run into a time when she had to choose between
following the rules or policies and doing what was right for the patient. She said,

Yeah, I think, ultimately, as a nurse, I want to make sure my patients are getting,
you know, what they need. You weigh your options. You know, is this going to
ultimately benefit or hurt the patient? And go from there. (Brandi, Interview)

In response to the same question, Felicia stated, “I will follow policy first, but
then I will also vary my patient care, I always follow orders . . . we did have, you have
incidents. I hesitate . . . because it wasn’t a good outcome” (Felicia, Interview). When asked what motivated her to do her job, Felicia stated, “I’m scared of the law, I don’t want to go to court . . . I don’t want to harm my patients.” Felicia said she followed policy first when providing care to patients because she was afraid of a bad patient outcome and the laws surrounding her nursing license. Yet, she also admitted to varying patient care when she encountered an obstacle.

Denise, Ellen, and Gail acknowledged the spiritual nature of their nursing work and reflected upon a higher motivation. In response to the question “What motivates you to do your job?”, Denise responded,

I love it . . . I love nursing. I’ve been in it for a long time. Um, just helping people; taking care of people . . . making a difference for the patient. I enjoy taking care of them . . . I enjoy seeing them get better and going home. Especially when they’ve been here for a long time and you’re seeing slow improvements but knowing that you could contribute to that and that your decisions can be, you know, life or death for them, could be a big difference sometimes, you . . . since you’re the eyes on the patients more often than the physicians are. Just like what we caught with that doctor, he was going to walk away and say, “Yeah, I’m done with him,” but we caught him. We told him what the nurses had been seeing and then he did a full assessment and found that this guy maybe did have a stroke. So, I think that, you know, I enjoy that part of it because we get to kind of be their eyes. (Denise, Interview)

When asked what motivated her and inspired her to do her job, Ellen replied,

Um . . . to be the best I can be; to help people, to make them feel like I’m here for them. And I’m here for a . . . it makes me feel like I’m here for a reason . . . God put me on this earth for a reason. And, hopefully, that’s the reason why . . . to make their experience or their illness experience as better as I can. Nobody wants to be happy and smiling at you when they’re not feeling good. But, you want to try to make them as comfortable as you can and make the experience as good as possible. Because they’re going to be even more miserable if you’re miserable. (Ellen, Interview)
Helen responded to the question of what motivated her or inspired her to do her job by stating, “Well, ‘cause it’s my job and it’s my, it’s my, what’s the word, my privilege to be able to do it. You know, it’s a gift. Mm-hmm (Helen, Interview).

The nurses articulated that their identity was formed by and forming in attending to patients’ care and healing. Nurses found that to deliver the best care they could to patients, they needed to interact with co-workers.

*For inclusion with the workgroup.*

Definitely! That’s the number one thing . . . especially if you’re in a situation where you have to be called to court or something. It would be, you know, um, is this what other nurses would do? If it’s going against your policy, is this something that other nurses would typically find themselves doing also? So, it’s good to float ideas off each other. (Denise, Interview)

To be included in the identity of the group, nurses interacted with co-workers when they encountered an HIT obstacle. When nurses interacted with co-workers, there was little variation among the nurses in terms of how they used HIT. Seven of the nine nurses observed used BCMA with the same patterns, pulling up medication profiles in the EHR. Two of the nine nurses had a different pattern when using BCMA, but did not announce this information to the group (except that when asked, Carol did describe her pattern to Brandi). Nurses did not communicate different patterns of using BCMA, thereby maintaining patterns of inclusion. Nurses continued with patterns of interaction so that their identity was maintained as part of the group by selectively following policies in the same way as other members of the group and by asking others for ideas.

Nurses were selective in terms of which policies they followed when using HIT. Some of the tasks nurses perform during patient care activities are process initiatives, such as asking patients about their immunization status. Other nursing activities involve
direct patient outcomes, such as administering antibiotics via a smart pump and administering medication through a patient-controlled analgesia pump. For example, a policy not followed consistently was specific to computer security. Nurses selectively logged off computers at patient’s bedsides and left them open when walking away from the desk. During activities when nurses did not understand how a process designed for an activity the designed process would positively contribute to the quality and safety of care for the patient, they applied a mental filter and were less inclined to complete the process as designed.

Nurses worked around policies that they did not understand as relevant in the patient’s situation. Policies that enforce national initiatives, such as the CMS initiative to offer pneumococcal and influenza vaccines to all inpatients, were categorized by nurses as not relevant when they were caring for patients in the current situation. Nurses worked around the policy. For example, Abby reported,

So the vaccines: When we admit people there are two new screens on there. They’re a pain in the butt and they ask way too many questions, and some of the questions, we don’t know how to deal with. We don’t even know how to answer them right. So the new one is, everybody’s cheating and doing the “‘refused’” . . . . . . the nurses have learned that you don’t have to deal with all the junk on the computer if you just put “refused.” (Abby, Interview)

Nurses did not know how to deal with all the questions in the EHR and filtered them as not being relevant to the patient’s situation. The nurses have found a work-around to the questions on the computer by answering “patient refused.” The policy was selectively disregarded when nurses did not find relevance to the patient’s situation.

During BCMA, nurses chose to scan medications being administered and chose not to scan the patient’s identification band. For example, Helen noted,
I know who the patient is because [of] the name on the tag [on the computer screen], and I know the patient as I’ve had report on him. To me, I don’t think that makes a difference, not scanning them first, as long as you are scanning the med and it’s the right patient. It does not change any of the charting or anything; it’s still scanning once the patient comes up. (Helen, Interview)

When using HIT to conduct patient care activities, Helen filtered the policy to scan patient identification bands as not important since she was confident she knew the patient. Helen did not think there was a difference in verifying the patient’s identity by using BCMA or by relying on her memory. Ellen reported that she and other nurses experienced an obstacle with BCMA and that they selectively did not follow the policy when administering medication because it did not work as they expected, and they found they could work-around the obstacle by pulling up the patient’s medication profile. Nurses were selective in following policies when they understood that the designed process directly impacted care provided to the patient.

Nurses did not find counting non-controlled medications, IV solutions, and saline flushes in the dispensing device relevant to taking care of their patients, so they did not count when removing medications. For example, Carol stated, “I’m not sure why it asks you that. At least to my knowledge, I’m not expected to count that; only if it’s a controlled substance and it will ask you in a different way” (Carol, Interview). Carol and the other nurse participants did not see the relevance of counting all the medications in the bin every time they removed one unless if it was a controlled substance or the inventory was running low. The nurses selectively accounted for the remaining controlled substances.

Nurses followed policy when their patients were receiving medications via a smart pump or a patient-controlled analgesia pump. During the bedside report with
Carol, Denise reviewed the smart pump settings. Gail programmed the smart pump when she hung a new bag of antibiotics. Nurses on this unit were not seen to work-around smart pumps when starting a new infusion, and they checked the previous programming of the pump to ensure that patients were receiving medications at the standard rate. Irene and the off-going nurse reviewed the patient-controlled analgesia pump settings during the bedside report. These nurses found relevance in following the policy for administering medications to patients via pumps and diligently programmed and checked the settings.

Nurses filtered their behavior according to where the computer they were using was located; which computer they were located they and selectively logged off the computer at the patient’s bedside and did not logging off computers at the desk. All the nurse participants walked away leaving EHRs open while at the desk, while none of them walked away from an open EHR at a patient’s bedside. It may have been that nurses wanted to protect the patient’s medical record from visitors in the room and believed the record to be safe at the nurses’ desk. Nurses applied a filter when logging off computers, using one pattern for bedside computers and a different pattern for computers at the desk. Nurses’ identity was formed by and forming the acceptable practices of the workgroup; including selectively following policies. Themes of ideology that were formed by and forming nurses’ identity were also observed when they asked others for ideas to HIT obstacles.

**Asking others for ideas.** Nurses frequently asked others for ideas when they encountered HIT obstacles. For example, Carol asked Carla and Helen how to restore a
computer at the desk when she received the message “Access denied.” When nurses asked only those within the group for ideas, they continued with their usual patterns of activity and new ideas did not enter the conversation. The message on the screen could have meant something different to a Help Desk technician than it did to the nurse. These patterns of interaction may have been easy to access and may have reinforced the nurses’ identity as part of the group, but they limited the emergence of new ideas that had the potential to improve the process, product, or service. While these patterns of interaction of asking others within the same group for ideas did not challenge nurses’ identity within the group, they did limit the flow of new information.

**Identity in hospital-wide committees.** Denise and Abby participated in group interactions outside their everyday interactions, yet these interactions did not appear to change patterns in the way they worked around HIT obstacles. The interactions maintained the nurses’ identity with their group. For example, Abby explained her work with the committee was to explore redundant documentation and remove the elements that were not needed. There was no evidence that she discussed the cumbersome immunization documentation with the documentation committee. Her action maintained her identity within her workgroup and therefore she found it acceptable to enter “patient refused” to meet her goal. Denise reported that the work the task force integrated the patient assessment flow sheet and the care plan into one flow sheet. There was no evidence that Denise brought to the taskforce discussion the notion of making Lantus available on her unit at night or of removing the question on the medication dispensing device for noncontrolled medications and supplies. Nurses participated in hospital-wide
committees, yet there was no evidence that they discussed HIT obstacles in their everyday work flow, thereby maintaining an identity of inclusion. In the committee discussion, they could have started an investigation into the underlying causes of HIT obstacles. Had they admitted to the committee that they found the immunization documentation cumbersome, they would have risked exclusion if others did not find the documentation difficult to use.

**Identity in interactions with managers.** Nurses maintained their inclusion with the workgroup and limited variation by talking to the manager about HIT obstacles only once or twice a month. I did not observe any of the nurses talking with their managers about an HIT obstacle. Ellen reported that after she talked with her co-workers about not being able to scan patients' identification bands using BCMA, the nurses told their managers about the obstacle at a meeting. Ellen offered no further examples of interacting with managers to investigate the HIT obstacle. Nurses’ patterns of using BCMA remained static, and nurses’ identity of inclusion within the group was maintained.

Ideology is the criterion for evaluating nurses’ choices of desires, actions, and norms. Nurses in this study chose actions that maintained their identity within their group. There was little variation of actions among the nurses, which allowed them to avoid risking exclusion from the group. Nurses in this study responded to HIT obstacles in the same way. These nurses selectively followed policies consistent with those of others in their workgroup in order to avoid being excluded from the group. In asking others from within their workgroup for ideas when they encountered HIT obstacles,
nurses limited the inflow of new information. Nurses who participated in hospital-wide committees also limited the inflow of new information concerning HIT obstacles in their workflow by refraining from discussing them in the committee. The nurse manager was also viewed as someone outside the workgroup and was asked or informed about HIT obstacles once or twice a month, a dynamic that reinforced the patterns in the workflow and allowed the nurses to maintain their individual and collective identity. The evaluation criteria of actions are closely tied to relations of power, which is the emergence of enabling and conflicting constraints.

**Research Subquestion 4: What are the power relations associated with the experience of nurses using HIT?**

Power relations are processes of relating that form and are formed by individual and collective identity that allow nurses to form and stay in relationships with others. When a person is in relationship with others, he or she cannot do whatever he or she wants. Relationships constrain and are constrained by others, just as they also enable and are enabled by others (Stacey & Griffin, 2005). Power relations are a balance of an enabling-constraining relationship. In relationship with others nurses have powerful feelings of belonging, although the power balance is tilted in favor of some and against others depending on the relative need they have for each other. For example, the nurse participants had a need to belong to their workgroup and to not be excluded, so they asked other nurses in their workgroup for ideas when they encountered an HIT obstacle. The relationships between nurses enable them to gather ideas from co-workers while constraining ideas from others outside the workgroup. The enabling-constraining power
relations observed among the nurse participants were categorized as relating to belonging
and to the relative need nurses have for one another. Nurses’ sense of belonging is
described using an excerpt from Ellen, followed by four examples of nurses’ relative
need they have for one another formed by and forming individual and collective identity;
then multiple perspectives are presented that have the potential to transform the
organization through relationships.

**Belonging.** The nursing group had a strong sense of belonging. Nurses recognized
their need for one another and their need to form and stay in relationship with one
another. Ideology forms and was formed by nurses’ need to be included in social
interactions. Frequently during conversations, nurses on this unit mixed first person and
third person, making it difficult to understand if they were talking about themselves or
about others, and easy to wonder if their individual and social identities were difficult to
separate. For example, Ellen described her process for removing medication from the
medication dispensing device; she started with third person language, and ended with
first person. It is not clear why she transitioned from third to first person, but it suggests
that perhaps she identifies herself with “them.” An example of Ellen’s shift from third to
first person follows.

> Like stool softeners, they go through them so quickly and it’s just . . . that’s
something that’s kind of an over the counter drug. They don’t bother counting it
until it gets down to five or six because it seems like a waste of my time. A lot of
times, the count is off anyway and then you have to adjust it and I used to count
all of them. (Ellen, Interview)

Ellen identified herself as belonging to this group. She described “her” and “their”
practice as one and the same, a quirk that contributed to forming a strong sense of
individual and collective identity. In her sense of belonging, Ellen’s actions were
influenced by the enabling-constraining relationship depending on the relative need she had for others. Nurses in this workgroup did have a need for one another if they were to delivery safe and quality care to patients.

**Relative need for one another.** In relations of power, nurses formed and were formed by identifying themselves as a part of the workgroup. Denise spoke of the work she and other nurses undertook to improve documentation in the EHR of the patients’ plan of care, so that patients would consistently receive care that met the norms of the unit. By working together, nurses and IT designers changed the assessment flow sheet to include the patient plan of care on the same electronic flow sheet. Denise offered the following explanation:

A while ago, I was showing you how in our charting we can now do, um, like you can document your plan of care while you are documenting your assessment. Previously, there were two separate tabs to go to so we suggested for that to come together because, maybe, after your fourth or fifth assessment, you’re thinking, “Gosh, was it that patient that I forgot to do the plan of care on or was it . . .?” and then you’re constantly searching, “Who was it on now?” After we, you know, said it would really be easier if we could do it this way, they put it in, they made the change to the flow of it and now we can document our plan of care. You can still document it separately, if you’d like to. You can still click on it and document each nursing care plan separately, um, or you can document it while you are assessing so that you’re doing it at the same time. We just changed that [at] the beginning of this year. It has made a big difference. Before, we would see . . . you would follow somebody, and not that they were doing a horrible job, but you would see, “Hey, this plan of care hasn’t been touched in a couple of days . . . what’s going on here?”, and now you see that every shift, everyone’s looking at it because it is part of your assessment; you can see if it’s, if someone’s not been following it. (Denise, Interview)

Denise recognized the relative need nurses have for one another in forming their individual and collective identities as nurses delivering quality care. Denise found that she and other nurses were better able to deliver quality care after making revisions to the documentation of the patient’s care plan. Denise reported that the revised care plan
improved communication among the nurses. Nurses in this group had a choice about whether to use the revised documentation. Nurses used the revised care plan because of their relationships that form and are formed by individual and collective identities; they wanted to be identified with the group. Using the care plan was enabled by some relationships and constrained by others. Relationships would be constrained if a nurse chose not use the revised document, thereby creating an identity of difference. As in all human relating, the power balance is tilted in favor of some and against others, depending on the relative need they have for each other. Through relationships, a new flow sheet was created and knowledge emerged.

The interaction between Carol and Brandi demonstrated the fact that nurses have a need for one another’s help if they are to deliver safe and quality care to patients. All the nurses recognized that the “right” way to use BCMA was to scan the patient’s identification band and scan the medication being administered. Yet only two of the nine nurses observed had a practice of using BCMA in this way. Because of their relationship, Brandi was enabled to ask Carol how she brought up the patient’s medication profile by scanning the band, and Carol offered words of instruction. From this interaction, Brandi learned that she had been skipping a step in BCMA. With the information from Carol, Brandi was able to scan the next patient’s identification band and the medication using the HIT to verify that she had the right patient, right medication, right route, right dose, and right time. Had forming a collective identity not been important to Brandi and Carol, their relationship would have had a constraining effect on their sharing information to facilitate the use BCMA. The relationship, their relative need for one another, enabled
knowledge to be created between Carol and Brandi. In the enabling-constraining relationship, meaning was made.

I noticed that a unit norm among these nurses was to walk away from their open EHR at their desk, which meant that they were not following health information national privacy rules. In the nurses’ relative need they had for one another, the nurses demonstrated their trust in co-workers by leaving the EHR open and patient health information available when they walked away from their desk. To continue forming collective identity in this trustful relationship, nurses were also constrained in terms of being unwilling to enter information in the open EHR using the signed-in nurses’ electronic signature, or to move to areas of the EHR that they did not have a need to be viewing. Others outside this relationship did not have influence on nurses’ actions since “power is not something which one possesses but is rather a characteristic of all human relating” (Stacey & Griffin, 2005, p. 5). Relations of power were present in the interactions of these nurses. I understand the nurses’ action of walking away from the open EHR at the desk to be a method whereby nurses formed their “we” identity with their co-workers separate from the authority that operated outside of the interaction. Those outside the relationship were constrained in their ability to influence nurses’ actions since nurses’ actions were enabled by the powerful feelings of belonging and the relative need nurses have for one another.

Ellen and the shift supervisor demonstrated their relative need for one another by sharing email log-in information and a password. Ellen had recently taken on the role of a relief shift supervisor. The relief shift supervisor was responsible for staying “in the
communication loop of issues and meeting times” (Ellen, Observation). Ellen did not have a functioning hospital e-mail address. In order for her to be current with unit communication the shift supervisor shared her hospital e-mail account with Ellen. During the shift Ellen was talking with the shift supervisor about an upcoming shift supervisor meeting. The shift supervisor asked Ellen if she saw the e-mail about . . . . Ellen said yes, she did, and asked about the background of an agenda item. In relationship these nurses demonstrated their relative need for one another, as Ellen had a need to be aware of unit communication and meeting times while the shift supervisor had a need for Ellen to know the issues while she was away from the hospital. The relationship between Ellen and the shift supervisor enabled them to share e-mail log-on and password information while it constrained others outside the relationship from influencing the sharing of this information. In the relative need they had for one another, the two found a way to share e-mail communication. This interaction demonstrated that the power balance was tilted against those outside the relationship in favor of the relationship between Ellen and the shift supervisor that was formed by and forming collective identity.

**Multiple understandings can transform.** Power relations influence nurses’ actions when they are using HIT. People throughout the hospital held diverse understandings of how nurses should use HIT. Nurses’ patterns of using HIT were formed by and form individual and collective identity through patterns of inclusion and exclusion. Carol did not think she was expected to count remaining medications and saline flushes in the medication dispensing device, whereas Lee did expect nurses to count medications. Morgan reported that he thought nurses knew the difference between
counting medications and counting flushes. Formed by and forming relationships of
inclusion and exclusion, nurses frequently did not count remaining noncontrolled
medications or flushes. Their patterns were influenced by relationships that enabled their
noncounting action. Lee and Morgan were constrained in their influence on the nurses’
actions. Lee and Morgan did not have relationships that were formed by and forming
individual and collective identity with the nurses. The power balance was tilted in favor
of the nurses since their actions were formed by and formed their identity within the
workgroup. The power balance was tilted against Lee and Morgan since they were not in
relationship with the nurses. A change in practice patterns necessitates engaging in
relationships that tilt the power balance. Through interactions that move through the
inclusion-exclusion pattern of forming identity, the potential for transformation emerges.
Multiple understandings are diversity; in diversity there is a potential for new patterns to
emerge. In processes of human relating, patterns form and are formed by individual and
collective identity.

Through relationships, nurses are formed by and form individual and collective
identities that guide their actions and desires. Power relations influenced nurses’ forming
and staying in relationship with others. The power balance was tilted in favor of some
and against others depending on the relative need they had for one another. Nurses on this
unit were found to have a sense of belonging that influenced their actions. Also, nurses
demonstrated that they had a need for one another, and to stay in relationship with others,
that enabled some actions while constraining others. While those within the relationship
were enabled to redesign a flow sheet, create knowledge in using BCMA, walk away
from open health records, and exchange e-mail log-in and password information, others outside these relationships were constrained from influencing these actions. In the diversity of multiple understandings among those in the hospital, the potential for transformation emerges in human interactions and is related to the quality of those relationships. Nurses’ actions when using HIT were influenced by power relations. Three themes emerged from the analysis of data: nurses had a sense of belonging to this workgroup, they demonstrated a need for one another to deliver safe and quality care to patients, and there are multiple understandings by members of the organization related to how HIT can be used in the delivery of safe and quality care to patients. The choices nurses made when they used HIT were influenced by many sets of rules.

Summary

This chapter summarized the findings from observations and interviews with nurses on a medical/surgical/telemetry unit. Nurses used many applications of HIT during their daily activities with patients. As they cared for patients, nurses participated in self-organizing interactions when they encountered HIT that included problems with BCMA, the medication dispensing device, the EHR with applications such as nursing documentation flow sheets, and care plan flow sheets. Narrative themes emerged from the data that revealed nurses self-organize when they encounter HIT obstacles. These self-organizing interactions are sensitive to initial conditions, multidirectional, and influenced by a plethora of sets of rules. Nurses participated in many interactions when they encountered HIT obstacles; these included local interactions and interactions within hospital-wide committees. Nurses’ self-organizing interactions were multidirectional as
they did not know how others would respond to them when they encountered an HIT obstacle; creating uncertainty in the interaction. Themes of ideology of nurses on this unit were identified as nurses formed by and forming identity with their workgroup, asking others for ideas, in hospital-wide committees, and in interactions with their managers. Relations of power were observed in nurses’ interactions enabling some actions while constraining others. Nurses were observed to have a need for one another in forming individual and collective identity to deliver efficient, safe patient care. Nurses participated in self-organizing interactions when they encountered HIT obstacles in the delivery of care to patients on a medical/surgical/telemetry unit. Nurses self-organized around HIT obstacles with other nurses and support staff in the complex and uncertain environment of a medical/surgical/telemetry unit to care for patients in their time of seeking care and healing. In Chapter 5 the analysis of these findings, recommendations, and the implications for practice and future research are discussed.
Chapter 5

DISCUSSION

Overview

This chapter presents a discussion of the major findings that emerged from this narrative research study, recommendations, and implications for research and practice. This narrative study was to understand and describe how the interactions among and between nurses guided their use of HIT when in caring relationships with patients. Using a narrative inquiry allowed me to collect stories from nurses, through observations and interviews, and retell them with the purpose of informing implementation strategies so that creative ideas generated by nurses and other members of the organization may be used to deliver efficient, safe, and effective patient-centered care. Complexity science informed how local human interactions bring about organizational change (Stacey, 2001) and provided a perspective on nurse interactions. Complex responsive processes of relating is both a theory to understand nurses’ interactions within a hospital organization and it is a narrative inquiry method to collect and analyze data. The conceptual model that guided this study incorporated dynamic movement of the four constructs that produce either continuity or transformation in the everyday interactions of nurses. Within all interactions, these four constructs have the capacity to generate either continuation of the same or new patterns. When an HIT obstacle is encountered by nurses in their work, the dynamic movement of these constructs has the potential to produce transformation, either destruction or innovation. It is in local human interactions that are self-organizing,
sensitive to initial conditions, multidirectional, and influenced by a plethora of sets of rules that improvements to care can be found.

**Summary of the study**

This section will summarize the findings from the study. A discussion of the findings are presented that include the four themes that emerged from the data: a) innovation emerged from HIT obstacles, b) nurses interact with co-workers when they encounter HIT obstacles to collaborate to find ways to continue patient care activities, c) nurses interactions with patients and co-workers are influenced by ideology, and d) nurses’ interactions with patients and co-workers are influenced by power relations.

**Innovation Emerged from HIT Obstacles**

A finding from this study is that innovation emerged from HIT obstacles in nurses’ everyday interactions with co-workers and patients. When nurses encountered an HIT obstacle they were found to self-organize around the obstacle. These self-organizing interactions were sensitive to initial conditions, multidirectional, and influenced by a plethora of sets of rules. Nurses participated in self-organizing interactions when they encountered an HIT obstacle, the most common HIT obstacles nurses encountered were observed with BCMA, the medication dispensing devices, and within forms and flow sheets in the EHR. Many of the obstacles observed and discussed with nurses occurred on a regular basis and the adapted behavior had become part of their work patterns, such as with BCMA.

**Barcode medication administration.** Most nurses observed experienced an obstacle during BCMA. BCMA has been implemented to improve the accuracy of the
medication administration process (Hook et al., 2008). According to Hook and colleagues (2008), BCMA process ensures the ‘Five Rights’ of medication administration are maintained. Nurses were observed to encounter an obstacle when scanning the patient’s identification band to activate the medication profile (list) to verify they were administering medication to the right patient.

Nurses self-organized with other nurses on the unit when they were unable to scan the patient’s identification band. Improved ways to administer medication to patients were found when nurses self-organized around the BCMA obstacle. Nurses used clinical reasoning to find a better way to administer medication to patients when the technology did not work as they expected. This finding is consistent with nursing scholars who have noted expert nurses respond to under-determined patient situations by using clinical reasoning (Benner et al., 2010). Nurses’ clinical reasoning is from their own and other’s experience by using cognitive capacities to think in relation to the particular demands of the clinical situation. Clinical reasoning was enhanced through the self-organizing interactions of nurses that were socially embedded and involved ethical choice and action within the present moment (Benner, 2001; Benner et al., 2010, Watson, 2008). With seven of the nine nurses observed using BCMA in the same way, it appeared many of the nurses self-organized when they encountered this obstacle.

These nurses reported either BCMA never functioned as they were trained, or it functioned for a while, but with a system upgrade it stopped functioning. Koppel et al. (2008) and Wideman, Whittler, and Anderson (2005) encourage frequent communication between nurse end-users, pharmacists, and technology experts during BCMA
implementation and afterward to modify end-user practice and/or functionality of the HIT.

Interestingly, previous studies of BCMA identified obstacles with BCMA, yet technical problems with scanning patient identification bands had not been identified (Koppel et al., 2008; Wideman et al., 2005). Koppel et al. (2008) identified some patient’s identification bands were unreadable to the scanner for reasons such as they were cut, smudged, chewed, or deteriorated. Wideman et al. (2005) presented lessons learned from implementing BCMA, but the discussion focused on functionality issues related to scanning medications and intravenous fluids. A unique finding of this study is that seven of the nine nurses observed stated scanning patient’s identification band during BCMA does not work for them. It was not clear if the HIT changed after the nurses were trained to use BCMA or if nurses were improperly trained to use it. Thus, opportunities exist to improve nurses’ use of BCMA that supports safe medication administration by teaching nurses the relevance of using BCMA is to verify the five rights of medication administration, including verifying that the medication is being administered to the right patient. Another opportunity exists that includes facilitating interactions between nurses, technology designers, and trainers of technology so that the HIT is functional in nurses’ workflow.

Another finding from this study that may have contributed to the ongoing obstacle of nurses using BCMA is that the performance report only measured the percentage of medications scanned over the total medications given. The report did not measure the percent of scanned identification bands over number of patients receiving medications.
Measuring the whole BCMA process could identify if the HIT is ensuring the five rights of medication administration process of identify opportunities for improvement.

**Medication dispensing devices.** Nurses in this study found it an obstacle to count remaining noncontrolled medications, IV fluid, and flushes when they removed these items from the medication dispensing devices. The question on the screen appeared to be the same regardless of whether nurses removed Lopresser, 1000ml normal saline, or saline flushes. Once I observed on the screen a question asking if there were 176 saline flushes remaining in the bin. Are nurses expected to count 176 saline flushes remaining in the bin? If not, posing this question may be an unnecessary step in the nurses’ workflow. The data offers evidence that nurses had talked with co-workers about how to answer that question since they all quickly responded “yes” to the question. This finding is consistent with Stacey and Griffin (2005) who noted organizational change emerges from everyday interactions. Change in an organization occurs through cooperative and competitive relating between people rather than through an authority that operates outside the interactions (p. 18).

It was apparent that the nurses had become so accustomed to not counting remaining noncontrolled medications that they no longer noticed the question. Brandi said they were expected to count medication, fluids, and flushes, but did not. While Carol said “I’m not expected to count that; only if it’s a controlled substance and it will ask you in a different way.” The pharmacist stated that nurses were expected to count medications; they were not expected to count the flushes. This may be an example of nurses’ using HIT during the performance of patient care activities that is not helping and
is possibly hindering care (Benner et al., 2011) since nurses did not notice they were entering false information into the device. Nurses have made a routine of entering unverified data into the device, which is cause for concern.

Nurses encountered an obstacle in counting remaining medications, fluids, and flushes in the dispensing device every time they used the HIT for noncontrolled supplies. The nurses’ actions of answering the question on the medication dispensing device had become highly repetitive. According to Stacey and Griffin (2005), when patterns of interactions lose a particular dynamic, such as the input of new information they lose their ability to create new ideas (p. 7). Opportunities exist to facilitate interactions among nurses and technology designers to modify the HIT so that nurses do not have to count 176 saline flushes when counting the flushes are not used to enhance the patient experience. Through self-organizing interactions, nurses found a better way to efficiently obtain noncontrolled medications and supplies from the medication dispensing device in order to respond to patients’ needs and goals.

**Immunization documentation.** Nurses found a better way to respond to the admission and discharge questions in the EHR to provide care and healing to patient in the immediate situation. Asking patients about their immunization status and then documenting the status during admission was an obstacle for nurses. During the admission assessment and documentation in the EHR, nurses found the electronic forms difficult to understand and cumbersome to complete. Also, nurses did not recognize a patient’s immunization status as an immediate concern in the patient’s care and healing. Nurses participated in self-organizing interactions to find a better way to complete the
admission and discharge forms to address the immediate goals of the patient. This finding is consistent with scholars who have noted that nurses will adapt to HIT obstacles in order to meet the immediate needs of their patients (Anderson, 2004; Halbesleben et al., 2008; Kirkbride & Vermace, 2011; Koppel et al., 2008; Vogelsmeier et al., 2008).

In order to complete the documentation and attend to the patient’s immediate needs, nurses entered “patient refused.” Results from the organization’s Core Measures performance report indicated that this adaptation was a common practice among nurses throughout the hospital, not just on the unit studied. Nurses had the same pattern in responding to the questions, suggesting that nurses had discussed with co-workers how to adapt the documentation process. This is an example of the consequences of one person, or a small group, designing an HIT module by him or themselves and expecting others to carry out their intention. Chris reported that he had unilaterally added the immunization module but was making arrangements to take it out because, as he admitted, it was “junk.” This finding is consistent with finding of previous research indicating that when applications and modules are designed and implemented without end-user input, HIT projects are likely to fail (Brender et al., 2006; Koppel et al., 2008; Wears & Berg, 2005; West, Barron, Dowsett, & Newton, 1999). Opportunities exist to reframe how and when immunization questions are posed to patients and documented.

Nurses encountered many HIT obstacles in their everyday activities with patients. Nurses found ways to adapt to HIT by interacting with others in their local work-group. Through self-organizing interactions, nurses found better ways to complete patient care activities when using HIT. This information would benefit others in the organization in
their efforts to improve the quality and safety of patient care if they knew about it. Koppel et al. (2008) noted, that the ways nurses have responded to HIT obstacles are neither rare nor secret; they are “hiding in plain sight” (p. 420). An opportunity exists to change interaction patterns among members of the organization to bring about transformation in practices or products that have the potential to contribute to social wellbeing. By expanding self-organizing interactions among nurses and other member of the organization wide-spread coherence has the possibility to emerge, improving quality and safety to patients throughout the hospital. Benner et al. (2011) suggested that as technology proliferates, nurses must be in dialogue with engineers and technicians about the impact of technology on the nurses’ overall vigilance regarding the patient’s clinical status. Nurses encountered many HIT obstacles in their daily activities with patients. According to this study, three of the common obstacles nurses encountered were with BCMA, the medication dispensing device, and the immunization module. Nurses have responded to these HIT obstacles with self-organizing interactions.

**Interactions Among Nurses (Collaboration)**

The second finding of this study is that nurses participated in self-organizing interactions when they encountered an HIT obstacle to find a better way to deliver care to patients. Most often nurses were observed to participate in local interactions with co-workers. Two nurses described interactions with others in the organization that took place when they participated in process improvement committees. An opportunity exists for nurses to improve the use of HIT in patient care activities by participating in hospital-wide committees and contributing to the discussion with diverse perspectives,
information, and experience. One of the central insights from complexity science is that diversity is necessary for the spontaneous emergence of novelty. Two key insights were gained from this study: a) that nurses interact most often within their local workgroup when they experience an HIT obstacle; and b) that nurses do participate in interactions with others in committees, but do not discuss their everyday HIT obstacles. Extending discussions beyond local co-workers could provide an opportunity for innovation to emerge in conversations that include diverse perspectives, information, and experience.

**Local interactions.** When nurses encountered an HIT obstacle as they conducted patient care activities, they first went to a co-worker for ideas about how to adapt the HIT to their workflow. When asked whom they go to when they encounter an obstacle, most nurses reported going first to another nurse on the unit. Nurses went to each other because they were most familiar with the HIT and their workflow. Nurses also were more inclined to ask co-workers about ideas for overcoming HIT obstacles because they had a relationship with co-workers and trusted their feedback. Nurses remarked that by asking co-workers what they would do or had done in a similar situation, they received feedback that they believed kept their practice safe. For example, when asked if she collaborates with co-workers, Denise responded,

> Definitely! That’s the number one thing . . . especially if you’re in a situation where you have to be called to court or something. It would be, you know, um, is this what other nurses would do? If it’s going against your policy, is this something that other nurses would typically find themselves doing also? So, it’s good to float ideas off each other. (Denise, Interview)

There were many examples of nurses’ collaborating with co-workers to do what is good on behalf of the patient. Consistent with this finding, Benner et al. (2011) noted that the knowledge of how to handle a crisis or an unexpected event is socially embedded in the
history, lore, and norms of nurses working in a unit. Although seeking feedback from co-workers when an HIT obstacle is encountered may be helpful in the present moment of the tension, it does limit the diversity of the ideas and communications available to the rest of the organization. Benner et al. (2011) noted that collaboration is not yet the norm in many healthcare settings and that change is needed to support and facilitate organization-wide interdependence. Organization-wide collaboration can create new ideas that evolve from diversity.

When a nurse interacts only with co-workers, she limits the input of diverse perspectives, information, and experience, as well as communication among the whole organization. This finding is consistent with the research of West, Barron, Dowsett, and Newton (1999), who found that small, tightly knit groups had fewer advantages in acquiring information and dispersing the information they had. Diversity is needed to improve the function of the organization given that it is needed for innovation to emerge (Stacey, 2001). When nurses interacted only with co-workers to gain ideas and feedback about an HIT obstacle, they were limited to their co-worker’s perspective, information, and experience. For example, Ellen reported that she talked with others in the unit when she experienced an obstacle with BCMA and learned that others were also pulling up patients’ medication profiles using the keyboard mouse. By asking only others in the unit, Ellen missed an opportunity to expand the perspective, information, and experience available to her. By the same token, she created a limit for herself by preventing others outside the unit from knowing she had experienced an obstacle with BCMA. Someone outside the unit might have been able to offer new a new perspective, information, or
experience to use BCMA that included verifying the patient’s identity. In the redundancy of their self-organizing interactions, these nurses continued with their usual patterns of action and limited the potential for innovation. Innovation had the potential to emerge in nurses’ interactions with others from outside their unit who had diverse perspectives, information, and experience.

Committee interactions. Two nurses reported that they had participated in hospital-wide committees to improve processes. These nurses described interacting with nurses from other units, technology designers, and managers to redesign flow sheets in the EHR and remove repetitive charting. What I found interesting in talking with these nurses was that they did not discuss with others in the committees the HIT obstacles in their workflow. These nurses did not introduce to the committee, for example, how BCMA or the immunization documentation was an obstacle in their workflow. These nurses participated in committees, although it did not appear relationships were built in order to share risky information, such as information about obstacles they experienced in their daily workflow. Crow and DeBourgh (2010) noted that participation by all committees members must be an expectation so that relationships are built. Crow and DeBourgh noted that it is important in committees for members to understand that diversity in opinions and perspectives are enhanced when members are enabled “to see the big picture of the organization and to understand how their contribution directly or indirectly supports the services of the organization” (Crow & DeBourgh, p. 234). The big picture of how these nurses contributed to the whole organization’s services was missing
from their perspective when they did not discuss HIT obstacles in their workflow, thereby limiting the potential for innovation to emerge in the interactions.

Ray (1989) observed that in hospitals there are multiple understandings of caring behaviors. In the multiple understandings of caring behaviors, innovation has the potential to emerge through creative problem solving, diverse perspectives, and experience (Ray, 1989). Many of the self-organizing interactions nurses participated in took place within the local workgroup, which limited the inflow of new information that could change patterns. Some nurses interacted with others outside their workgroup in hospital-wide committees, but did not discuss their everyday HIT obstacles. Stacey and Griffin (2005) suggested that these patterns of interactions limit the potential for innovation to emerge, thereby depriving the organization of new patterns. The notion that these patterns of interactions limit the emergence of innovation is consistent with the findings of Sarra (2005). In his research on self-organizing interactions among patients and staff, Sarra identified a number of distinct yet interdependent groupings that were physically demarcated so that there was an amplified sense of who was an outsider and who was an insider. Sarra found that these patterns of self-organizing interactions enabled a sense of stability for the organizational members but constrained the potential for innovation to emerge. Multiple understandings of how HIT can be used while conducting patient care activities represent diversity; innovation has the potential to emerge when those holding diverse perspectives interact. The patterns of self-organizing interactions guided by the ideology of nurse participants limited their interactions with the whole organization.
Ideology Implications

Evaluation of the unit norms and of the nurses’ individually held values guided the nurses’ use of HIT to bring about what they understood to be in the best interest of their patients. The self-organizing interactions nurses participated in were formed by and formed individual and collective identity. Their identity was evaluated against norms and values of inclusion or exclusion. Nurses were motivated to take actions that they believed were in the best interest of their patients. To form an identity of inclusion, these nurses chose actions that were accepted by the group when they encountered an HIT obstacle. For example, many nurses thought it was in the patient’s best interest to administer medications by pulling up the medication profile rather than wait for the HIT to function as they had been trained to use it. Their choice to administer medication in this way was evaluated in terms of group norms and individual values. I interpreted it an acceptable unit norm to adapt to this HIT obstacle. It was acceptable to the group to choose this action and administer the medication in a timely manner, thereby strengthened their collective identity. This finding is consistent with Benner et al.’s (2011) notions of ethical comportment in that on these occasions of experiential learning, each nurse has been formed by and formed the traditions and understandings held sacred within the community of nurses. Nurses relied upon self-organizing interactions with co-workers to confirm their clinical reasoning, judgment, and adaptation to HIT to bring about good in the patient situation; in doing so, they were formed by and formed an identity of inclusion. Their patterns of self-organizing interactions were formed by past interactions, the current interaction, and contributed to the formation of the next interaction. This
behavior built identity within the workgroup but did not expand the nurses’ collective identity beyond the unit to include others in the organization. Nurses did not confirm their clinical reasoning, judgment, or adaption to HIT obstacles with others in the organization outside their own unit.

There were few self-organizing interactions between nurses of this unit and others across the organization when they experienced an HIT obstacle. Patterns of self-organizing interactions beyond the members of their unit could have brought about conflict, diversity, or instability with the resultant possibility that an identity of exclusion would emerge. To strengthen their identity of inclusion, nurses refrained from collaborating with others in the organization. I also did not observe others from outside the unit coming to the unit to interact with the nurses, despite the potential inherent in doing so of facilitating widespread self-organizing interactions. It appeared to be an organization-wide norm to interact only within workgroups since the pharmacist, IT technician, and the unit managers also did not facilitate interactions across unit boundaries. For example, the pharmacist said he did not have the opportunity to interact with others in the organization because he never left the pharmacy. Lee stated that he was the only one to authorize and dispense medications when he was working. A nurse from the IT department walked through the unit but did not interact with others until she was stopped. The nurse managers were observed giving nurses information and instruction but did not ask for information or facilitate further interactions. The evaluative criteria in nurses’ choices of actions when they encountered an HIT obstacle were formed by and formed an identity of inclusion with co-workers; at the same time, these actions were
formed by and formed an identity of exclusion with other members of the organization. Significant opportunities exist for managers and nurses to create individual and collective identity with others beyond their unit so that the potential for innovation emerges in diverse, self-organizing interactions. Themes of ideology organized nurses’ experience of being together; power relations sustained them.

**Power Relations**

The fourth finding that emerged from the data concerned nurses’ power relations. Nurses’ self-organizing interactions were influenced by power relations. The ideological themes that emerged in self-organizing interactions enabled some actions and constrained others. In order to develop experiential learning about what is good for patient, nurses accounted to each other for what they did. For example, Ellen reported that she used to count remaining medications in the dispensing device but others did not, leaving her with a sense of futility as she felt she was wasting time in obtaining medication for the patient. Other nurses’ actions constrained her from counting remaining medications because their action interfered with her ability to keep an accurate count. In this example the “in” group, the collective identity, was enabled not to count while she was constrained by her values. This nurse had a choice to continue patterns with the “in” group to sustain her collective identity or to possibly be excluded from the group to sustain her individual values. The enabling-constraining dynamic established power differences and influenced nurses’ actions. This finding is consistent with the work of Benner et al. (2011), which found that “collective wisdom typically exceeds that of any one individual” (p. 509).
In this study, nurses were observed to have a strong sense of belonging, with the group enabling similar patterns of adaptation to HIT obstacles. The strong sense of belonging created the nurses’ identity of inclusion with the group, enabling like action. The identity of inclusion also constrained nurses’ actions in such a way that they did not choose one action that might have created an identity of exclusion from the group. A nurse could have been excluded from the “in” group if he or she did not choose an action that was consistent with the accepted norms. For example, one nurse said, “I taught the system and it doesn’t make sense to me that you’re not using it” (Abby, Interview). A nurse not using BCMA could be excluded by the group when the nurse who taught its use was part of the “in” group. Interaction themes of inclusion and exclusion influence power relations that enable some actions while constrain others. Stacey (2001) noted that disruptions to current patterns of interaction and power relations are necessary if the potential of innovation is to emerge. There is an opportunity to expand the collective identity of these nurses with a strong sense of belonging and need for one another in a new way to address obstacles in nurses’ workflow by expanding their identity to include others in the organization.

Nurses were formed by and formed an identity of inclusion with co-workers. They had similar patterns when they encountered an HIT obstacle. In their similar patterns of adapting to HIT obstacles, they accounted to each other for their actions; this behavior constrained their clinical reasoning, judgment, and use of HIT by limiting the inflow of new information from others in the organization. Each nurse had adapted her actions to the HIT in a way that was found acceptable by the collective. This finding is
therefore consistent with that of Stacey (2001), who noted that collaborative interaction is essential not only for the survival of every individual, but also for the continued reproduction and transformation of their very selves, or identities, and that any exclusion is felt as very threatening. Ideology and power relations influenced nurses’ choices when they encountered an HIT obstacle, constrained some actions while enabled others. Power relations among nurses can be used in a positive way to advance quality care offered to patients by enabling the formation of individual and collective identity with other members of the organization while constraining actions based upon limited information and experience found in exclusively local interactions.

Findings from this narrative study advance the knowledge of nurses’ use of HIT and their interactions when they encounter an HIT obstacle. Innovation emerged when nurses responded to HIT obstacles with self-organizing interactions that were sensitive to initial conditions, multidirectional, and influenced by multiple rules during caring relationships with patients. Nurses were focused on taking care of patients. When HIT did not function as they expected it to function, they collaborated with others to continue patient care activities. Nurses’ actions were influenced by rules of ideology and power relations. This study presents a way of thinking about nurses’ clinical practice when using HIT and their response to HIT obstacles as complex, multidirectional, and emergent. Through diverse interactions, many HIT applications have been implemented that improve quality and safety of care delivered to patients; when HIT distracts from nurses’ interaction with patients, nurses self-organize around the obstacle to find better ways to deliver care to patients.
Recommendations

Recommendations are identified for direct care nurses, clinical and project managers, healthcare leaders, nurse educators and future research. The recommendations are based upon the study findings and are intended to improve HIT implementation practices in an effort to bring about safe and quality outcomes for patients.

Direct Care Nurses

Expand interactions. HIT is transforming nurses’ workflow patterns at the point of service. The finding statements suggest that nurses participate in local self-organizing interactions to adapt HIT solutions during the provision of patient care. There is a potential to find better solutions to HIT obstacles that improve the safety and quality of care offered to patients with the expansion of interactions to include other members of the organization. This expanded collective identity requires that nurses know others in the organization and seek their ideas when an HIT obstacle is encountered. Collaboration with other members of the organization, including technology experts, will expand nurses’ collective identity beyond the local workgroup and strengthen the power of shared information. Innovation has the potential to emerge in interactions, allowing HIT to be used as a tool to improve the patient experience. In an expanded collective identity, the traditional model of nurses working in isolation at the point of service and HIT designers creating technology solutions is altered, allowing meaning to be made in an environment focused on the patient experience. It is recommended that direct care nurses participate in interactions with other members of the organization to make meaning in
how the HIT is used in patient care activities. This expanded collective includes active participation in multidisciplinary committees.

Process improvement committee discussions are an excellent context in which to expose HIT obstacles in nurses’ workflow. Direct care nurses have an opportunity to discuss obstacles in their daily work activities in these meetings. Meaning making in multidisciplinary meetings expands collective identity formed by and forming norms and values. Direct care nurses have a wealth of information about using HIT efficiently when engaging in patient care activities. They need to share this information with others in the organization so that better solutions to HIT problems can be identified in interactions. Patient care would benefit from nurses’ identifying themselves with those purchasing, designing, and implementing HIT solutions in an attempt to improve the quality and safety of care activities. Expanding interactions to those in the organization, nurses would be formed by and form collective identity with others throughout the organization. In interactions, the potential for more innovative solutions emerges.

**Question processes.** When HIT is not enhancing patient care activities, it is recommended that nurses question the process by developing perceptual awareness. Findings from this study reveal that nurses interact with co-workers in attempts to adapt HIT to the patient situation. Nurses need to be aware of ineffective processes in order to be able to improve them by interacting with others in the organization. Expert nurses use clinical reasoning to understand patients’ clinical situations (Benner et al., 2011); this same problem search and problem identification can be used in workflow situations. Once aware of ineffective processes, nurses can participate in interactions with others in
the organization in an attempt to allow innovation to emerge. In these interactions, the potential exists to enhance the patient experience. In local interactions, nurses have responded to designed processes that do not support their work with patients. Nurses need to share this information with others in the organization so that meaning can be made to contribute to patients’ care and healing.

**Clinical Managers and Project Managers**

**Facilitate interactions.** Interactions between nurses and those designing, training, and supporting the use of HIT are limited. With workers operating in silos, solutions to HIT obstacles remain in the silos. Clinical managers and project managers need to facilitate interactions among nurses, HIT designers, HIT trainers, and technicians at the Help Desk. Interactions must be facilitated across unit and department boundaries so that meaning can be made from HIT obstacles. Interactions must be facilitated so that nurses, HIT designers, trainers of HIT, and the technicians at the Help Desk can discuss the impact of HIT on overall vigilance concerning the patient’s clinical situation. Facilitated interactions will create a history of interactions that will support future self-organizing interactions. For example, interactions can be facilitated to allow HIT designers, trainers of HIT, and the technicians at the Help Desk to shadow nurses for several hours a month while the nurses engage in patient care activities. By the same token, interactions can be facilitated so that nurses shadow HIT designers, trainers of HIT, and the technicians at the Help Desk in their work environment for several hours a month. Facilitating interactions across department boundaries has the potential to create meaning and improve processes through the gathering and integration of diverse perspectives and
information. These interactions will provide both nurses and designers with the opportunity to build relationships and to gain a wider collective identity. Once a history of interactions has been created through shadowing experiences, self-organizing interactions will have the potential to emerge. Through facilitation of multidirectional interactions among nurses, HIT designers, HIT trainers, and technicians at the Help Desk, innovation through diverse information and perspectives has the potential to emerge, bringing with it the potential to improve the patient experience.

Needs to demonstrate relevance. Direct care nurses responded with diligence to the directive to use HIT when they believed doing so was necessary to deliver safe and quality care to patients. It is recommended that nurse managers and project managers oversee the educational programs prior to implementation of HIT to ensure that the training discussion includes discussion of the relevance of HIT to safe and quality of care for patients. According to Wears and Berg (2005), HIT will not be used if it is not tailored to clinicians’ environment of high quality care. Nurses need to be informed about how specific HIT applications will improve the patient experience. The motivation for nurses to participate in self-organizing interactions was their desire to participate in care for and healing of patients. In contrast, nurses did not engage or participate jointly in actions that were not directly linked to patient care and healing. This may seem obvious to nurses and the public alike, yet may not be quite so obvious within organizations. Leaders who want to direct nurses’ activities and control outcomes create process structures to support the organization’s internal standardized operations. Nurses adapt to these process structures if the structures conflict with what the nurse thinks a patient
needs in the care and healing situation. According to Porter-O’Grady and Malloch (2011), all health care is local, and the work of the organization must serve to facilitate interactions at the point of service and allow nurses to provide care to patients. Nurse and project managers overseeing instruction for end-users have the opportunity to ensure that nurses know how the HIT solution is relevant to patient care and healing.

Seek feedback from nurses. Clinical managers need to solicit ideas from direct care nurses to improve processes of care. Evidence from this study suggests managers frequently gave information to nurses without asking about everyday workflow. By looking for and asking nurses about HIT obstacles in their everyday activities, managers have opportunities to investigate these obstacles through their self-organizing interactions. Self-organizing interactions of managers can facilitate movement of diverse information and resources to HIT obstacles in nurses’ workflow. Diverse interactions across departmental boundaries will facilitate movement of information and resources to tensions at the point of service to bring about transformation in practices. Through seeking feedback about nurses’ workflow, managers have the potential to contribute to improvements in patients’ care and healing.

Healthcare Leaders

Facilitate wide-spread coherence. HIT solutions that become obstacles in the realm of patient care are being implemented. Nurses are responding to obstacles with effective solutions in local interactions. Ideology and power relations influence nurses’ choices when they encounter an HIT obstacle. Facilitating interactions, and thereby facilitating widespread coherence of collective identity among workers throughout the
organization, has the potential to transform processes and products to improve outcomes for patients. Nurses and HIT designers alike are experts in their domains. Facilitating interactions across department boundaries will create a history of interaction. Self-organizing interactions with history, diverse information, and diverse perspectives have the potential to provide more innovative solutions that will allow health care professionals to offer patients improved care and healing.

**Implement HIT solutions to improve the patient experience.** Implementing HIT solutions may improve quality and safety in the patient experience while decreasing cost. HIT solutions need to be perceived by nurses as relevant to the nurse-patient interaction or they will not be used. Nurses asserted that their motivation for participating in organizational joint action was to interact with patients to promote care and healing. This motivation of nurses is an asset to healthcare organizations and should be supported by implementing only HIT solutions that will improve the patient experience.

**Medications need to be available to administer.** Medications and supplies need to be available in patient care areas when they are needed. The nurse who was attempting to obtain insulin for a patient after the pharmacy had closed encountered several obstacles that could have been avoided had the medication been available on the patient care unit. Insulin is on the list of high alert medications. Observations made in this study indicate that not having medications on the unit was a risk to patient safety as well. Removing high risk medications from the patient care area does not ensure safe medication administration; in this study, it was found to add risk. It is recommended that medications and supplies be available to nurses in the patient care areas. Having direct care nurses
participate in interactions to determine policies regarding safe storage and administration of medications have the potential for widespread growth of safe and quality care.

**Measure quality comprehensively.** Healthcare leaders would have a greater understanding of the effectiveness of HIT solutions implemented to improve care if they measured the complete process. For example, a finding from this study suggests that evaluation of BCMA safety is based upon the completion of one step, when in fact the process comprises multiple steps. Performance reports should be written in a way that reflects the multistep process. To monitor the quality of HIT solutions, the whole process should be evaluated. Interactions among nurses and other members of the organization have the potential to improve quality measures through finding meaning in the most salient aspects of using HIT in patient care activities.

**Establish a clinical help desk.** A help desk staffed by clinicians familiar with HIT and clinicians workflow needs to be created. This measure would have two benefits. The first benefit would be to provide direct care nurses with another immediate resource to turn to when they experience an HIT obstacle in their workflow. Second, facilitated interactions at the points of tension have the potential to build collective identity among members of the organization. With this history, future self-organizing interaction has the potential to emerge at points of tension. Superusers who know clinical workflow and the applications could be available every day during every shift to interact with clinicians when they encounter HIT obstacles. Through interactions at the points of tension, innovation has the potential to emerge.
Nurse Educators

As nurses are being enculturated and educated into professional nursing practice, they must be taught leadership. Leadership is the ability to influence changes in patterns to achieve a common goal (Hatch, 2004; Northouse, 2010). Nurses entering the profession have the unique perspective to question why HIT is being used in general ways and in particular situations. Educators need to encourage nurses to question these practices before they become unconscious practices. As new nurses enter clinical care, they will be expected to use HIT to improve the quality and safety of the patient experience; their ability to improve practice patterns will depend on their relationships that are formed by and form their individual and collective identity. These new nurses should be taught leadership skills that build diverse relationships within their organization. With the support of diverse interactions, new nurses can question how HIT is being used as soon as they are in clinical environments. Nurse educators need to facilitate interactions among nurses and others in healthcare organizations so that the potential for innovation emerges.

Future Research

Several areas could benefit from future research based on the work of this study. In this study, narrative inquiry was used to tell the stories of nurses’ experience using HIT during patient care activities. These stories have revealed the complex, multidirectional, and uncertain environment in which nurses’ work. In telling the stories of nursing practice multiple voices can be told and new questions of nursing practice are
raised. Future research should use narrative inquiry to understand and describe everyday interaction experiences of nurses when they use HIT during patient care activities.

This study was conducted using observations and interviews from nine nurses on one hospital unit. Future research should explore other units in the hospital, and across multiple units at a different hospital to interpret interaction patterns among nurses when they use HIT.

Future research could construct and test a model of the interrelationships between constructs of this study. The proposed model could be the basis for interventions to promote innovation.

**Implications**

Through self-organizing interactions, nurses have the potential to transform healthcare organizations into high functioning places of care and healing. Nurses participate in self-organizing interactions to find effective solutions to HIT obstacles in order to continue to provide patient care activities. “Positive gold mines of information to improve patient safety” (Lalley, 2013, p. 36) have the potential to emerge when nurses interact with one another as a result of encountering HIT obstacles during the provision of patient care activities. These gold mines of information can be used by all members of the organization to improve quality outcomes for patients.

Nurses encounter many organizational challenges in their daily interactions with patients. These challenges include coordinating and integrating care and services from multiple providers, in collaboration with patients who often have multiple care and healing needs and expectations, and using HIT during the provision of care and healing
activities. Care processes have often been designed by those outside the point of service, including HIT designers. Although many applications of HIT have been implemented to improve quality, safety, and cost in the patient experience, these goals have not yet been fully realized (DesRoches et al., 2010; Himmelstein et al., 2010; Nebeker et al., 2005). Many HIT solutions have been implemented in a top-down authoritative organizational structure. This study explored how innovation emerged through human interaction at the point of service.

Previous literature on nurses’ actions after encountering an HIT obstacle uses the term work-around (Halbesleben et al., 2008; Kirkbride & Vermace, 2011; Koppel et al., 2008; Spear, 2005; Vogelsmeier et al., 2008). In using this term, researchers have assumed that designing a linear, static process for nurses to follow will achieve predefined outcomes. This term assumes that designed processes will function as expected during patient care activities. Nurses have adapted linearly designed processes to meet the care and healing needs of patients. Through local self-organizing interactions, nurses adapt to HIT obstacles. Nurses are not working around HIT—they are adapting to HIT in order to care for patients. Innovation is a process of changing interaction patterns to bring about transformation in practices or products that have the potential to contribute to social wellbeing. Nurses demonstrated innovation when they encountered an HIT obstacle by engaging in self-organizing interactions that were sensitive to initial conditions, multidirectional, and influenced by a plethora of sets of rules to find better ways to deliver care to patients; even better ideas will be found by expanding interactions with others across the organization.
References


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APPENDIX A

THEORETICAL CONSTRUCTS AND BEHAVIORS OF THE STUDY
<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
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| Self-Organization                      | Nurses communicated with others  
                                          Nurses saw a nurse do and did the same |
| Sensitivity to Initial Conditions       | Nurses spoke of past interaction with a specific person or department, or during a specific act |
| Multidirectional Interaction            | Interactions that brought about stability or instability  
                                          Agreement of action or disagreement |
| Ideology                               | Norms, the obligatory restrictions on behavior or socially constructed way to act in the group to be accepted  
                                          Values, individual voluntary choices to choose one action or norm over another, such as choices nurses make when they encounter an obstacle with HIT |
| Power Relations                        | The relative need a nurse has for another, being considered part of the “in” group by norms and values or “out” group based upon norms and values |
APPENDIX B

INFORMED CONSENT
This consent form contains important information to help you decide whether to participate in a research study.

The study staff will explain this study to you. Ask questions about anything that is not clear at any time. You may take home an unsigned copy of this consent form to think about and discuss with family or friends.

- Being in a study is voluntary – your choice.
- If you join this study, you can still stop at any time.
- No one can promise that a study will help you.
- Do not join this study unless all of your questions are answered.

After reading and discussing the information in this consent form you should know:

- Why this research study is being done
- What will happen during the study
- Any possible benefits to you
- The possible risks to you
- Other options you could choose instead of being in this study
- How your personal health information will be treated during the study and after the study is over
- Whether being in this study could involve any cost to you; and
What to do if you have problems or questions about this study.

Please read this consent form carefully.

INSTITUTIONAL REVIEW BOARD
Consent to Participate in Research

Protocol Name: Describing and understanding nurses’ interactions in work-arounds

Sponsor:
Principal Investigator: Cathy Lalley, MHI, RN
Contact Name and Telephone: Cathy Lalley 928-606-4490

Introduction
You are invited to consider taking part in this research study because you offer a unique perspective of nurses interactions when they use of health information technology and possibly work-around obstacles with health information technology. We will be investigating nurses interactions when health information technology obstacles occur. This form will describe the purpose and nature of the study, its possible risks and benefits, other options available to you, and your rights as a participant in the study. Please take whatever time you need to discuss the study with hospital personnel and your family and friends. The decision to take part or not is yours. If you decide to take part, please initial each page, and sign and date the last line of this form.

Background and Purpose of the Study
The purpose of this study is to describe and understand the day-to-day human interaction experiences of registered nurses in a hospital unit using health information technology and working around health information technology when an obstacle is present to inform implementation strategies where creative ideas from nurses, technology designers, and leaders are recognized and used to deliver safe, quality care to patients.

Total Number of Participants
About 7 nurses and 5 other people whom the nurses interact with will take part in this study nationally. People in the study are referred to as “participants.” Twelve participants will be enrolled at this site.

General Plan of This Study
If you decide to participate, then you will join a study involving research of observations and an interview. If you say YES, then your participation will last for a shift for observations followed by an interview expected to last 20-40 minutes. The researcher is
a registered nurse, although will not engage in direct patient care activities. The researcher will observe you participate in patient care activities. For the interviews you and the researcher will find an undistracted location.

Length of the Study for Each Participant
We expect that you will be in the study for a shift of observation followed by an interview lasting 20-40 minutes.

Possible Benefits of Participating in the Study
The possible/main benefits of your participation in the research are to better understand nurses’ interactions when they encounter a health information technology obstacle to inform different technology implementation strategies. Others may benefit in the future from the information we obtain while you are in this study.

Possible Risks or discomforts
There are no known risks from taking part in this study, but in any research, there is some possibility that you may be subject to risks that have not yet been identified.

Who Can Participate?
This study is designed for nurses who use health information technology or others who interact with nurses who use health information technology.

Inclusion Criteria:
Adults (18+) who currently hold a registered nurse license and work on the study unit
Adults (18+) who interact with the registered nurses who work on the study unit
Adults of any gender, ethnicity/race, or socioeconomic status
Adults who consent to participate
Adults who can speak and read in English

Who Cannot Participate
Patients

Participation Options
Participation in this study is completely voluntary. It is ok for you to say no. Even if you say yes now, you are free to say no later, and withdraw from the study at any time.

Your decision will not affect your relationship with Scottsdale Healthcare or Arizona State University or otherwise cause a loss of benefits to which you might otherwise be entitled.

Participation is voluntary and nonparticipation or withdrawal from the study will not affect your treatment or employment status.

If you choose to withdraw from the study, your responses will not be included in the final data analysis of the study.
Confidentiality of the Data Collected During the Study

All information obtained in this study is strictly confidential. The results of this research study may be used in reports, presentations, and publications, but the researchers will not identify you. We would like to audiotape the interview. The interview will not be recorded without your permission. Please let Cathy know if you do not want the interview to be recorded; you can change your mind after the interview starts, just let me know.

In order to maintain confidentiality the researcher will use a pseudonym to identify you in the narrative report, the transcripts from our interview will be destroyed after transcription, and the transcribed record will be kept safe on a password protected computer for up to seven years, then it will be destroyed.

Whenever data from this study are published, your name will not be used.

Costs to You for Participating

The researchers want your decision about participating in the study to be absolutely voluntary. Yet they recognize that your participation may pose some inconveniences.

Payments to You for Participating

Study participants will not be paid for participating in this study.

Your Rights as a Participant in the Study

Participation in this study is entirely voluntary. You have the right to leave the study at any time. Leaving the study will not result in any penalty or loss of benefits to which you are entitled. Should you decide to leave the study, the procedure is the following: notify Cathy that you would like to withdraw from the study. Should you decide not to participate or to withdraw, your treatment or employment status with the hospital or Arizona State University will not be affected.

Problems and Questions

Call Cathy Lalley, MHI, RN at 928-606-4490 day or night if you have questions about the study, any problems, or think that something unusual or unexpected is happening.

Regulatory or Ethical Issues

The Institutional Review Board (IRB) has reviewed this document for compliance with federal guidelines, and ethics. Please note the IRB staff will NOT have information regarding appointment times. You will need to contact the investigator at the number above. If you have questions about your rights as a research participant, you may call or write: IRB Coordinator.
Withdrawal by Investigator
The investigators may stop the study or take you out of the study at any time should they judge that it is in your best interest to do so. They may remove you from the study for various other administrative reasons. They can do this without your consent.

Participant’s Consent

You have read the information provided in this Informed Consent Form (or it was read to you by ____________________________). All of your questions were answered to your satisfaction. You voluntarily agree to participate in this study.

[Upon signing, you will receive a copy of this form.]

Your signature ____________________________________ Date _____________

Investigator’s Statement
I have fully explained this study to the participant. I have discussed the procedures and treatments, the possible risks and benefits, the standard and research aspects of the study, and have answered all of the questions that the participant and the participant’s family members have asked.

Signature of Investigator
or Investigator’s Designee ________________________________
To: Kathy Malloch  
NHI 2  

From: Carol Johnston, Chair  
Biosci IRB  

Date: 08/16/2012  

Committee Action: Expedited Approval  

Approval Date: 08/16/2012  
Review Type: Expedited F7  
IRB Protocol #: 1205007661  
Study Title: Describing and Understanding Nurses Interactions in Work Arrounds  
Expiration Date: 08/15/2013  

The above-referenced protocol was approved following expedited review by the Institutional Review Board.  

It is the Principal Investigator's responsibility to obtain review and continued approval before the expiration date. You may not continue any research activity beyond the expiration date without approval by the Institutional Review Board.  

Adverse Reactions: If any untoward incidents or severe reactions should develop as a result of this study, you are required to notify the Biosci IRB immediately. If necessary a member of the IRB will be assigned to look into the matter. If the problem is serious, approval may be withdrawn pending IRB review.  

Amendments: If you wish to change any aspect of this study, such as the procedures, the consent forms, or the investigators, please communicate your requested changes to the Biosci IRB. The new procedure is not to be initiated until the IRB approval has been given.  

Please retain a copy of this letter with your approved protocol.
August 13, 2012

Catherine Lalley, MHI, RN
200 N 3rd Street
Phoenix, AZ 85004
clalley@asu.edu

RE: [REDACTED] REB #015-006: Your new submission received on 6/26/2012 regarding Describing and Understanding Nurses Interactions in Work-Arounds (None)

Dear Ms. Lalley:

I have reviewed your request for expedited approval of the new study listed above. Your study is eligible for expedited review under FDA and DHHS (OHDP) Category 7. Research on individual or group characteristics or behavior designation.

This is to confirm that as of 8/14/2012 I have approved your application. The protocol is approved through version dated June 16, 2012. The consent form as previously approved remains in effect. You must obtain signed written consent from all subjects. Consent form version 6/17/2012 has been approved at this time. In reviewing your consent procedure for this study, your inclusion of the following special classes of subjects was taken into account:

- Elderly

The following documents were taken into consideration during the review of this study:

- Cover Letter dated 6/26/2012
- Expedited Application received 6/26/2012
- Protocol dated 6/16/2012
- Information Letter-Interviews
- Recruitment Script
- Response to SRC review

You are granted permission to conduct your study as described in your application effective immediately. The study is subject to continuing review before the expiration date of 8/13/2013, unless closed before that date.

Please note that any changes to the study as approved must be promptly reported and approved. Some changes may be approved by expedited review; others require full board review. Contact [REDACTED] (email: [REDACTED], fax 480-785-4866) if you have any questions or require further information.

Sincerely,

[REDACTED]

Institutional Review Board 1-FWA0001751
APPENDIX D

INTERVIEW QUESTIONS AND CONSTRUCTS OF STUDY
<table>
<thead>
<tr>
<th><strong>Interview Questions</strong></th>
<th><strong>Anticipated Study Constructs Being Explored</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you had interactions with others when you experienced difficulties with HIT?</td>
<td>Self-Organizing behaviors</td>
</tr>
<tr>
<td>How do you make meaning of working with HIT when caring for patients?</td>
<td></td>
</tr>
<tr>
<td>Do you consult with others when you experience HIT obstacles? Who?</td>
<td>Sensitivity to initial conditions</td>
</tr>
<tr>
<td>Have you been involved in policy changes after experiencing difficulty with technology when providing care to a patient?</td>
<td>Multidirectional interactions</td>
</tr>
<tr>
<td>Tell me about your interactions with your peers when you experience difficulties with HIT</td>
<td>Ideology</td>
</tr>
<tr>
<td>What are your priorities when providing patient care?</td>
<td></td>
</tr>
<tr>
<td>How do you decide when to follow the rules or do the right thing?</td>
<td></td>
</tr>
<tr>
<td>How are variations to designed processes accepted in this unit?</td>
<td></td>
</tr>
<tr>
<td>How important are following the hospital policies to you? How do you identify yourself within this workgroup?</td>
<td></td>
</tr>
<tr>
<td>What is your perception/response when nurses do not follow the standardized process when using HIT?</td>
<td></td>
</tr>
<tr>
<td>What do you think the consequences are when nurses do not follow standardized processes when using HIT?</td>
<td></td>
</tr>
<tr>
<td>How do you decide when to do the right thing and when to follow the rules when you encounter an obstacle in your workflow when using HIT?</td>
<td></td>
</tr>
<tr>
<td>What motivates you, inspires you to do your job?</td>
<td></td>
</tr>
<tr>
<td>Can you remember a time when you interacted with others when you experienced difficulties with HIT?</td>
<td>Power relations</td>
</tr>
<tr>
<td>Tell me about your interactions with your peers (unit manager, project manager, pharmacist, and others) when you experience difficulties with HIT,</td>
<td></td>
</tr>
<tr>
<td>Do you feel you can influence how HIT is used in your workflow?</td>
<td></td>
</tr>
<tr>
<td>Who are the people who can influence your workflow?</td>
<td></td>
</tr>
</tbody>
</table>
Has there been a time when a nurse found a better process than what was designed?
APPENDIX E

INTERVIEW QUESTIONS
How do human interactions among and between nurses guide their use of HIT when in caring relationships with patients?

1. How have you taken care of patients when you have experienced difficulties with HIT?
   a. Tell me what happened
   b. Can you remember a particular time when you experienced difficulties with technology?
   c. Why does this particular moment stand out?

2. Do you consult with others when you experience HIT obstacles?

3. How do you make meaning out of working with HIT when caring for patients?

4. Have you been involved in policy changes after experiencing difficulty with technology when providing care to a patient?

What are the power relations implications associated with the experience of nurses using HIT?

1. Tell me about your interactions with your peers when you experience difficulties with HIT,
   a. Unit manager
   b. Project manager
   c. Pharmacists and others

2. Do you feel you can influence how HIT is used in your workflow?

3. Who are the people who can influence your workflow?

4. Has there been a time when a nurse found a better process than what was designed?

What are the norms and values (ideology) implications associated with the experience of nurses using HIT?

1. How are variations to designed processes accepted in your unit?

2. How important are following the hospital policies to you?

3. How do you identify yourself within your work group?

4. What is your perception/response when nurses do not follow the standardized process when using HIT?

5. How do you decide what is the right thing to do when you encounter an obstacle in your workflow when using HIT?

6. What motivates you inspires you to do your job?

Do you have any questions for me?

Is there anything I didn’t ask that you think I should have?
APPENDIX F

DEMOGRAPHIC QUESTIONNAIRES FOR DIRECT CARE NURSES
1. How long have you worked on this unit? _________ years _________ months

2. How long have you held an RN license? ____________ years

3. What is your highest level of education? (please circle)
   - Diploma
   - AD
   - BSN
   - MSN
   - PhD

4. Gender:  Female       Male
DEMOGRAPHIC QUESTIONNAIRE FOR SUPPORT STAFF

How long have you worked on this unit? _______ years _________ months

2. Do you hold a professional license? N / Y ___________ years

2. What is your highest level of education? (please circle)

Diploma     AD     BS     MS     PhD

4. Gender: Female    Male
APPENDIX G

MINDMAP OF DATA
APPENDIX I

A MEDI-caton-DISPENSING DEVICE