Exploring Nurse to Physician Communication in Nursing Homes

EXPLORING NURSE TO PHYSICIAN COMMUNICATION IN NURSING HOMES

by

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As members of the Dissertation Committee, we certify that we have read the dissertation prepared by Susan Marie Renz entitled "Exploring Nurse to Physician Communication in Nursing Homes" and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy.

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Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copies of the dissertation to the Graduate College.

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STATEMENT BY AUTHOR

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SIGNED: __Susan Marie Renz_____

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"We but mirror the world. All the tendencies present in the outer world are to be found in the world of our body. If we could change ourselves, the tendencies in the world would also change. As a man changes his own nature, so does the attitude of the world change towards him. This is the divine mystery supreme. A wonderful thing it is and the source of our happiness. We need not wait to see what others do."

-Mahatma Gandhi

For my father, Eugene E. Renz, Jr., (1930-2013). I wish you were here to see me walk across the stage. I refocused my "*dream camera"* and look what happened.

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ABSTRACT

Background. The well-cited report from the Institute of Medicine stated that nearly 100,000 deaths in acute care are largely due to miscommunication. Residents in nursing homes are transported for acute care three times higher than those under the age of 65. Approximately 25 percent of these hospital transfers are avoidable. The influence of nurse-to-physician communication upon the decision to hospitalize nursing home residents is not well understood.

Objective. The purpose of this study is to explore nurse-to-physician communication in the nursing home setting utilizing the Informatics Research Organizing Model (IROM) and Carrington's Exploring Nurse-to-Nurse Communication Framework.

Methods. The methodology use for this study was a qualitative descriptive (QD) design, with in-depth, one-on-one interviews of nurses and physicians with semi-structured open-ended interview questions. Communication between nurses and physicians regarding clinical events experienced by nursing home residents was digitally recorded and transcribed. Data was analyzed using natural language processing (NLP) methodology and conventional content analysis, as a means of intra-methods data triangulation. A purposive convenience sample of nurses and physicians who provide clinical care to nursing home residents at two sites was recruited. In addition to obtaining recorded communications between nurses and physicians pertaining to clinical events, these same study participants were interviewed to determine their perceptions regarding communication of the clinical events.

Outcomes. Findings from this study will increase understanding of nurse-to-physician communication and its contribution to avoidable hospitalizations. Results will inform the

development of an electronic interface that supports nurse-to-physician communication in the nursing home setting.

CHAPTER I: BACKGROUND AND SIGNIFICANCE

Introduction

Avoidable hospital transfers among long-stay nursing home residents are common (Saliba et al., 2000; Grabowksi, O'Malley, & Barhydt, 2007). While there are numerous factors which impact the decision to hospitalize older adults such as family or physician preference or inability of the nursing home to manage clinical complexity of the resident, suboptimal communication between nurses and physicians concerning unstable nursing home residents has been identified as a major causative factor for over-hospitalization (Renz, Boltz, Wagner, Capezuti, & Lawrence, 2013; Buchanan et al., 2006; Ouslander et al., 2011). Hospitalization of nursing home residents is associated with iatrogenic complications (e.g., pressure ulcers, falls, and functional decline), increased morbidity, and increased healthcare expenditures (Ouslander et al., 2010; Ouslander et al., 2011). In 2011, data collected by the Office of the Inspector General revealed that nursing homes nationally transferred 25% of their Medicare residents to hospitals for admissions at the cost of $14.3 billion to Medicare (Department of Health and Human Services). Mor, Intrator, Feng, and Grabowski (2010) described a growing trend between 2000-2006 regarding 30-day re-hospitalization of nursing home residents and the costly nature associated with treatment for conditions deemed as treatable in the nursing home setting. In 2011, 25% of Medicare beneficiaries residing in nursing homes were hospitalized at a cost of $14.3 billion (Office of Inspector General, 2013).

Communication failures in health care have been directly linked to medical errors, resulting, in some cases, in severe patient injury and unexpected patient death. The well-cited 1999 Institute of Medicine (IOM) report revealed that almost 100,000 people die each year in

hospitals in the United States due to medical errors involving ineffective communication (IOM, 2000). Medical errors caused by the failure of a nurse to effectively communicate to another nurse or a physician are a pervasive problem in health care organizations and were the leading root cause of the sentinel events reported to the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) from 2004 to 2015 (JCAHO, 2015). Little is known how ineffective communication impacts care in the nursing home setting. Ineffective communication in the nursing home setting results in poor outcomes and needless transfers of residents to acute care. This chapter outlines the background and significance of this planned research, the purpose of this research, and the planned research questions.

Background and Gaps in Knowledge

In the nursing home setting, ineffective communication between nurses and physicians has been linked to "over-hospitalization" (or over-transfer of residents from nursing home to acute care) of nursing home residents who experience an acute change in condition (Buchanan et al., 2006; Ouslander et al., 2010). The impact of unnecessary hospitalization of older adults has been well documented (Ouslander et al., 2010; 2011; Grabowski et al., 2007) as well as the avoidability of transfers for conditions that could have been safely managed in the nursing home setting through early identification and effective communication (Lamb, Tappen, Diaz, Herndon, & Ouslander, 2011; Renz et al., 2013). Older adults are transferred to acute care settings three times higher than those under the age of 65, often for commonly occurring, treatable conditions such as congestive heart failure, urinary tract infections, falls, change in mental status, and respiratory illnesses (Lamb et al., 2011; Ouslander et al., 2011). The contribution of miscommunication towards these figures is not well understood (Renz & Carrington, 2015).

A review of the literature (Renz & Carrington, 2015) pertaining to nurse-to-physician communication yielded high quality evidence that improving nurse-to-physician communication in the nursing home setting is needed to create an improved culture of resident safety and quality of care. Previous studies have focused on several areas that have been identified as factors impacting nurse-to-physician communication, including: communication barriers (Tjia et al., 2009; Whitson et al., 2008; Renz et al., 2013); the use of communication protocols (Ouslander et al., 2011; Renz et al., 2013); as well as the resulting impact of communication on clinical outcomes (Field et al., 2011, Ouslander et al., 2011; Whitson et al., 2008; Renz et al., 2013). Little is known about nurse-to-physician communication in the nursing home (system) or the utility of the electronic health record (EHR) as an intervention on the communication between nurse and physician pertaining to key clinical events or acute change in resident status.

Nurse-to-Physician Communication

Effective collaboration and communication between nurses and physicians is essential to maximize patient safety, improve clinical outcomes, and improve satisfaction of nurses, physicians, and patients. While communication has not been studied extensively in the nursing home setting, there are numerous studies that have focused on nurse-to-physician *verbal* communication in the acute care setting. Common objectives among these studies was to measure satisfaction, identify barriers, test interventions to improve communication, and examine nurses' and physicians' perspectives of the practice environment and the impact of environment on communication patterns (Vazirani, Hays, Shapiro & Cowan, 2005; Lindeke & Sieckert, 2005). Several studies have specifically examined nurses' and physicians' perspectives on the quality of verbal communication, both in-person and on the phone. Baggs and colleagues

(1999) examined the association between nurse-to-physician collaboration and clinical outcomes in three intensive care units (ICU). Nurses and physicians completed questionnaires at the time of patient transfer from the ICU to ascertain how much collaboration was necessary to decide to transfer the patient out of the ICU. The study showed that nurses reported that collaboration and communication improved patient outcomes; physicians reported no association. Another study examined the relationships between nurses' perceptions of their practice environment, nurse-to-physician communication, and patient outcomes. The results demonstrated that nurse-to-physician communication was predictive of nurse-assessed medication errors and, that some characteristics of work environments fostered improved communication (i.e., Magnet™ status, perception of empowerment by nurses, and quick response to pages by physicians) resulting in improved patient outcomes (Manojlovich & DeCicco, 2007). Additionally, physicians often report having better communication in general with nurses than nurses report having with physicians (Manojlovich, 2013).

Negative consequences of ineffective nurse-to-physician communication in the acute care setting have been reported including decreased job satisfaction and decreased retention of nurses (Manojlovich & DeCicco, 2007). The Joint Commission cites communication failures as the leading root cause for medication errors, delays in treatment, and wrong-site surgeries, as well as the second most frequently cited root cause for operative and postoperative events and fatal falls (JCAHO, 2015). Commonly identified barriers to communication include nurses' and physicians' personal values and expectations, hierarchy, gender, complexity of care, and varying levels of preparation and qualifications (Agency for Healthcare Research and Quality, 2008). Since communication between nurses and physicians can impact patient outcomes and numerous

other factors, more research is needed to evaluate potential solutions to improving communication in all care settings.

Verbal Communication in Nursing Homes

When a nursing home resident experiences a change in condition, the responding nurse is responsible for conducting an assessment of the resident in order to describe and document presenting symptoms and objective findings based on a physical assessment. The nurse then determines the resident's stability and prepares to inform the physician as to their perceptions of why the situation may/may not be problematic (Dimant, 2003). Once the nurse collects the assessment data, verbal communication with the physician occurs. Typically, this communication between the nurse and physician, aimed at determining a treatment plan, occurs in the context of brief telephone conversations (Field et al., 2011). In-person communication can occur as well, however this is less likely given the fact that the majority of physicians billing Medicare spend less than 10% of their practice time in nursing homes (Kuo, Raji, & Goodwin, 2013).

There are numerous factors that have been shown to impact verbal communication in the nursing home setting including the nurse's preparedness before making the phone call, receptivity of the physician to verbal communication, availability of quiet space to make phone call, and the quality of the clinical data communicated to the physician (Renz et al., 2013). Human factors such as cognitive overload, stress, environmental factors, and poor interpersonal skills contribute to poor communication and greatly increase the risk of over-hospitalization of nursing home residents and medical errors (Dingley, Daugherty, Derieg, & Persing, 2008; Ouslander et al., 2011; Hastings, Whitson, & McConnell, 2007).

Tools designed to organize patient data to prepare the nurse prior to communication include SBAR or Situation, Background, Assessment, and Recommendation. SBAR originated with the United States Navy and was adopted into healthcare in an effort to improve communication (Institute for Healthcare Improvement, 2017). The effectiveness of SBAR has been shown to be an effective tool to assist nurses with organizing assessment data before communicating with the physician in the nursing home setting (Renz et al., 2013; Ouslander et al., 2011). Another study examined the utility of SBAR to enhance nurse-to-physician communication of resident change in condition, comparing phone communications using "scripted cases" describing common resident changes in condition versus the use of no scripts. The analyses of 92 phone conversations revealed that for the nurses using no script, or who were reliant on self-organization of data prior to the phone call, critical clinical information was omitted from the phone call (Joffe et al., 2013). These studies demonstrate that while SBAR has been studied in the nursing home setting as a tool to facilitate clinical information prior to phone communication, there remains variation in the content required to complete the tool which can impact of the way clinical events are communicated.

Electronic Health Record and Paper Systems in Nursing Homes

Electronic health records (EHRs) are digital versions of a patient's paper medical chart that is maintained by the provider over time. EHRs are real-time and patient-centered, allowing the authorized users instant access to information as well as the sharing of information with other healthcare providers and organizations (HealthIT.gov, 2016). The EHR typically includes key administrative clinical data relevant to patient care including patient demographics, progress notes, medications, vital signs, past medical history, laboratory data, and radiologic reports

(Centers for Medicare & Medicaid Services, 2012). The EHR also has the capacity to provide clinical alerts to assist providers in the early identification and timely treatment of clinical conditions. These alerts have been described as part of clinical decision support mechanisms that, when applied effectively, improve care outcomes through linking the right information to the right people, through the right channels (e.g., EHR) (Centers for Medicare & Medicaid Services, 2015). The use of the EHR in any healthcare setting is pivotal toward the implementation of meaningful use, wherein EHR technology is utilized to improve quality, safety, and reduce health disparities; engage patients and their families in their health; improve care coordination; improve population and public health; and, maintain the privacy and security of health information (Centers for Disease Control and Prevention, 2017).

Current research suggests that the EHR in the acute care setting has been shown to improve continuity of care through streaming provider notes and medication lists as well as providing preventative care reminders (Healthcare Information and Management Systems Society, 2015). There are reported cost benefits to an organization through streamlining reimbursement rates, decreasing redundant laboratory studies, improving billing efficiency, and decreasing length of hospital stays (Nelson & Staggers, 2013). Usability of the EHR, however, remains inconclusive. Studies report that the EHR supports data entry, however, is cumbersome for data retrieval threatening communication (Carrington & Effken, 2011). Unintended consequences or barriers and workarounds are another area of interest in describing nurses' experience using the EHR. Nurses have expressed frustration that the EHR interferes with their workflow or process for taking care of patients, have stated they are taking care of the computer not the patient, and commented that they often enter the same information multiple times (Effken

& Carrington, 2011; Carrington & Effken, 2011; Gephart, Carrington, & Finley, 2015; Gephart, Bristol, Dye, Finley, & Carrington, 2016; Carrington, Gephart, Verran, & Finley, 2015).

Recent trends indicate that many nursing homes are adopting EHRs despite the lack of financial incentives currently being provided to hospitals and physicians (Resnick, Manard, Stone, & Alwan, 2009). Reasons for increased utilization include changing consumer expectations, the need to improve patient (resident) quality of care and safety, improving administrative efficiency and effectiveness, and implementing new business models (American Health Information Management Association, 2014). Known barriers to implementation in this setting include high cost of purchasing and maintaining EHR, lack of technology support, implementation and training challenges, and lack of evidence of return on investment (Cherry, Carter, Owen, & Lockhart, 2008).

A study by Abramson, Edwards, Silver, and Kaushal (2015) described that the uptake of health information technology among healthcare sectors not receiving financial incentives, such as nursing homes, continues to increase at a very slow pace. The majority of nursing homes surveyed for this study in 2012 described that while the computerized functionalities of the EHRs utilized had increased, the two prime areas where functionality had not increased were for order entry and clinical decision support tools. While numerous studies have investigated the correlation between health information technology and patient outcomes in the acute and ambulatory settings, there is limited information regarding how nursing homes use EHRs to identify change in resident condition. Reasons for the differences in functionality across care settings may include that most EHRs have been created with the acute care setting in mind rather

than being designed with support from nursing home clinical users (Kruse, Mileski, Alaytsev, Carol, & Williams, 2015).

The predominant EHR software programs used in nursing homes function mainly as a repository of information and do not contain clinical alert mechanisms for nurses to utilize or a means to communicate data to physicians (Phillips, Wheeler, Campbell, & Coustasse, 2010). While the EHR can provide clinical alerts, evidence-based care support, preventative care reminders, and outcome data collection, these functions are not utilized by most nursing home EHR platforms (Healthcare Information and Management Systems Society, 2015). There is a need to better understand how nurses in the nursing home setting actually utilize the EHR to document and communicate clinical events.

Within nursing homes and long-term care facilities, the impetus to implement electronic health records (EHR), compared to that of acute care, has been essentially non-existent. The Health Information Technology for Economic and Clinical Health Act (HITECH) of 2009 was constructed to stimulate implementation and adoption of the EHR in acute care (Department of Health and Human Services, 2009). Here, healthcare organizations were "incentivized" to demonstrate meaningful use of the EHR to increase patient safety (Blumenthal & Tavenner, 2010). Without equivalent economic resources and lack of federal incentives, many nursing homes still use paper based documentation systems.

Many nursing homes use the "hybrid" approach to documentation due to the limitations of EHR design to fulfill complete information management as well as medical provider resistance to changing to an electronic documentation format (Ajami & Bagheri-Tadi, 2013). Several studies comparing paper documentation versus electronic in the acute and ambulatory

care settings have reported user frustration with increased documentation time and decreased face-to-face patient time alone with speculation about whether the use of EHR versus paper actually improved clinical outcomes (Chiang et al., 2013; Smith & Haque, 2006). Despite the known disadvantages of paper chart format, including cost associated with paper and copying supplies, accessibility, and fragmentation, many practice settings are reluctant to completely abandon the paper format. The parallel use of electronic and patient-based medical records can lead to inconsistencies in documentation and increase the risk of medical errors (Mikkelsen & Aasly, 2001; Stausberg, Koch, Ingenerf, & Betzler, 2003).

Usability studies of the EHR have been performed predominately in the acute care setting. Little is known of the nurses' perceptions of the effectiveness of the EHR to communicate sudden changes in condition of nursing home residents. Additionally, little is known about perceptions of nurses about EHR compared to a paper documentations system.

Clinical Events

Nursing home residents are often transferred to the hospital when they experience an acute change in condition. An acute change in condition can be defined as "a sudden, clinically important deviation from a patient's baseline in physical, cognitive, behavioral or functional domains that, without intervention, may result in complications or death" (American Medical Directors Association, 2015). The most common new diagnoses that have been identified for nursing home residents after transfer to the hospital include pneumonia, urinary tract infection, dehydration, congestive heart failure, chronic obstructive pulmonary disease, and end-stage renal disease (Ashcraft & Champion, 2012; Neuman, Wirtalla, & Werner, 2014).

Each of these new diagnoses are preceded by sudden changes in condition such as fever, pain, changes in respiratory status, changes in level of consciousness, changes in output, and bleeding. These six high-risk clinical events are closely associated with unexpected death in acute care (Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky, 2002). These clinical events are the focus of research seeking to understand nurse-to-nurse communication (Carrington, 2012).

Building on prior research, the researcher postulated that with effective nurse-to-physician communication of clinical events in the nursing home, the rate of hospital transfers would decrease (Carrington, 2012; Gephart, Carrington, & Finley, 2015; Ouslander et al., 2011; Renz et al., 2013; Whitson et al, 2008; Tjia et al., 2009). The researcher sought to address the following gaps as potential factors that impact nurse-to-physician communication: the effectiveness of the EHR as a communication tool in the nursing home setting and the process of nurse-to-physician communication of clinical events.

Definition of Terms

The following terms will be used frequently throughout this study. The definitions that follow will assist in understanding how these terms will be used.

1. *Nursing home:* A nursing home is a long-term care facility licensed by the state that offers 24-hour room and board and health care services, including basic and skilled nursing care, rehabilitation, and a full range of other therapies, treatments, and programs. People who live in nursing homes are referred to as residents. For the purposes of this study, a nursing home is differentiated from other long-term care settings including assisted living.

2. *Clinical event:* According to Carrington (2008), a clinical event is an unexpected event during the course of recovery in an acute care setting that does not require a patient transfer and is not associated with a nursing care protocol. In the nursing home setting, clinical events are described as change in status, defined as a decline or improvement in resident status that will not normally resolve itself without intervention by staff or by implementing standard disease-related clinical interventions. For the purposes of this study, clinical events are represented by fever, bleeding, pain, changes in level of consciousness, respiratory status, and output (Forbes, Surdeanu, Jansen, & Carrington, 2013).
3. *Electronic health record:* An electronic health record (EHR) is an electronic version of a resident's medical history, that is maintained by the provider over time, and may include all of the key administrative clinical data relevant to that person's care under a particular provider, including demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data and radiology reports.
4. *Paper documentation system:* This type of documentation system records pertinent medical information on paper versus electronically.
5. *Communication:* Communication is defined as the imparting or exchanging of information between nurses and physicians pertaining to change in resident status or the identification of a clinical event.

Purpose of Study

A review of the literature pertaining to nurse-to-physician communication in the nursing home setting revealed evidence that improving communication is necessary in order to create a

culture of patient safety and quality care (Renz & Carrington, 2015). Previous studies have identified numerous barriers to communication (Tjia et al., 2009; Cadogan, Franzi, Osterweil, & Hill, 1999: Renz et al., 2013), the benefit of utilizing structured tools to improve communication (Ouslander et al., 2011; Renz et al., 2013; Velji et al., 2008; Whitson et al., 2008; Schmidt & Svarstad, 2002), and the impact of effective communication on clinical outcomes in the nursing home setting (Ouslander et al., 2011; Field et al., 2011; Renz, Boltz, Capezuti, & Wagner, 2015; Schmidt & Svarstad, 2002; Whitson et al., 2008). Building on this work, the purpose of this study is to explore the nature of nurse-to-physician communication in the nursing home setting. A clear need exists to understand the dynamics between the nursing home system, the communication patterns, and the outcomes associated with clinical events, as little is known about nurse-to-physician communication in the nursing home environment.

Research Aims and Questions

The following research questions guide this research:

Research questions:

1. What are the words that nurses use to communicate clinical events to physicians in the nursing home setting?
2. What are the nurses' perceptions of the strengths and limitations of communication with physicians when a resident experiences a clinical event?
3. What are the physicians' perceptions of strengths and limitations communication with nurses when a resident experiences a clinical event?

4. What are the nurses' and physicians' perceptions of the strengths and limitations of electronic vs. paper documentation systems to communicate a clinical event in nursing home environment?

Study Significance

According to the Centers for Disease Control and Prevention [CDC] (2014), more than 1.4 million older adults currently reside in nursing homes (approximately 12% of the age 65 and older population). A portion (36%) of older adults admitted come directly from the hospital (Centers for Medicare and Medicaid Services [CMS], 2015). While nursing homes historically were reserved for the very old and frail, there has been a significant shift in this trend with a greater emphasis on providing care for older adults who require short-term rehabilitation and sub-acute care for medically complex conditions (Mor, Caswell, Littlehale, Niemi, & Fogel, 2009). With the continued growth of the older adult population, current nursing home residents demonstrate higher acuity, more complex co-morbid conditions, and overall higher care needs than ever before (Buchanan et al., 2006). Baseline vulnerabilities place older adults at risk for iatrogenic complications including avoidable functional decline and excessive resource consumption underscoring the need for high-level evidence-based care delivered by effective interprofessional teams (Gaugler, Duval, Anderson, & Kane, 2007).

While the primary goal of nursing home placement is to provide care to attain and/or maintain improved functional status, stabilize medical conditions, and deliver dignified end-of-life care, many nursing home residents are at risk for re-hospitalization due to numerous factors. Nursing home residents are frequently admitted to emergency departments, accounting for approximately 2.3 million visits annually (Wang, Shah, Allman, & Kilgore, 2011). Reasons for

these emergency room transfers that often result in hospital admissions include the higher overall acuity of nursing home residents compared to non-nursing home older adults and the fact that many of these residents had experienced a recent hospital stay (Wang et al., 2011).

The successful management of the clinically complex nursing home resident to prevent re-hospitalization requires that nursing homes provide adequate staffing, communication-specific staff training, and protocol-driven evidence-based care. Cycling into and out of hospitals, especially in the older adult population, can also be emotionally upsetting and can increase the likelihood of medical errors related to care coordination (Mor et al., 2010). The lack of appropriate and timely follow-up care can quickly undermine the benefits achieved in the previous setting, resulting in further functional dependency and permanent institutionalization. Poorly executed care transitions, resulting from faulty communication, can also lead to greater use of hospital, emergency, post-acute, and ambulatory services (Coleman & Boult, 2003). An increasing awareness of the need to create a culture of safety in nursing homes (Castle, Wagner, Perera, Ferguson, & Handler, 2009), as well as a reimbursement schematic that lessens incentives for hospitalizing residents (i.e., pay for performance and payment bundling), demand that nursing homes develop systems to circumvent avoidable hospitalization (Ouslander et al., 2011).

Structural Characteristics of Nursing Homes that Impact Care

According to the National Nursing Home Survey (NNHS) completed in 2004, there were 1.7 million nursing home beds in the United States (approximately 108 beds per nursing home) (Jones, Dwyer, Bercovitz, & Strahan, 2009). Most of the nursing homes were designated proprietary (61.5%), while 30.8% were non-profit, and the rest either private or government

owned/operated (Jones et al., 2009). Some services provided to nursing home residents were delivered through formal contracts with outside providers. For example, pharmacy (84.1%) and medical director (83.5%) were the services most commonly provided under an outside contract. Other outside services included hospice (78%), therapy services 68.7%), podiatry (66%), and diagnostic services (58.9%). Currently, approximately 12% of nursing homes do not have physical therapists, 20% are without occupational therapists, and 26% are lacking in speech/language therapists (CDC, 2016). This lack of rehabilitation staff has serious implications for residents requiring these services post-hospitalization.

In 2014, of the 1.7 million full-time employees in nursing homes, approximately two-thirds were nursing staff (i.e., registered nurses, licensed practical nurses, and certified nursing assistants) (CDC, 2016). Nursing staff turnover is pervasive, costly, and negatively impacts care in nursing homes. Fewer registered nurse (RN) and certified nursing assistant (CNA) hours have been correlated to a higher number of deficiency citations, which is one measure of nursing home quality (Harrington, Zimmerman, Karon, Robinson, & Beutel, 2000). In some states, CNA turnover is greater than 100% annually (CDC, 2016). Staff turnover has been associated with lower staffing levels than in comparable facilities, poor quality of care, and for-profit ownership (Castle & Engberg, 2009).

Nationally, the average hours per patient day provided by direct care staff (RNs, LPNs, CNAs) has steadily increased from 3.13 hours in year 2000 to 3.73 hours in 2009 (American Health Care Association, 2014). However, this increase is not sufficient to meet the care demands of a more medically complex and care-dependent resident population (Harrington & Carrillo, 2015). Medicaid provides reimbursement for approximately 65% of nursing home

residents (CDC, 2016). Studies have demonstrated that higher rates of Medicaid reimbursement directly impact the quality of care (Mor et al., 2011). Additionally, several studies found that increasing the RN staffing to 30 minutes per resident per day resulted in better clinical outcomes, including decreased hospitalizations (Dorr, Horn, & Smout, 2005; Horn, Buerhaus, Bergstrom, & Smout, 2005).

While inadequate staffing has been identified as a causative factor for poor quality of care, lack of policy implementation and knowledge deficits regarding the quality improvement process have resulted in poor resident outcomes. Most medical directors lack training in quality improvement processes (Kissam et al., 2003). A study by Rantz et al. (2001) demonstrated that nursing homes that were provided education about quality improvement did not show improvement in clinical practices and that nursing homes that were not proficient in conducting quality improvement required on-going education and oversight to impact care outcomes.

Characteristics of Nursing Home Residents

Intrinsic characteristics of nursing home residents have been identified as salient factors that impact care delivery and quality care outcomes, including unplanned hospitalizations. Long-stay nursing home residents tend to be frail, have more chronic health problems, and experience higher levels of cognitive dysfunction and functional impairments (Jones et al., 2009). Residents between the ages of 85-95 comprise greater than one-third of the nursing home population. Approximately 50% of nursing home residents have Alzheimer's disease or some type of dementia, 48% have the diagnosis of depression, and 32% have diabetes mellitus (CDC, 2016). More than one-third of residents are incontinent of bowel and bladder and almost 39% have impairment in four activities of daily living (CMS, 2015).

Studies that have identified resident characteristics that contribute to nursing home admissions and increase the risk of hospitalization have primarily focused on medical diagnoses (Feigenbaum et al., 2012). More recently, studies have examined administrative data related to a resident's clinical status, care practices, specific resident characteristics similar to those described previously, and specific disease states such as congestive heart failure and chronic obstructive pulmonary disease (Friedman, Jiang, & Elixhauser, 2008; McGhan, Radcliff, & Fish, 2007). Utilizing this broader approach to the examination of factors associated with hospital readmissions can assist nursing homes and hospitals with the identification of residents who are at higher risk. Through an analysis of 537 hospital readmissions of nursing home residents across 18 hospitals, Feigenbaum et al. (2012) determined that multiple factors contributed to potentially preventable hospital readmissions, 47% were preventable, and that reducing readmissions required a comprehensive evaluation of quality improvement focus areas.

Several studies have identified potentially avoidable hospitalizations through the recognition of certain conditions that are commonly experienced by nursing home residents. These include congestive heart failure, electrolyte imbalance, respiratory infections, sepsis, hypoglycemia, and urinary tract infections (Walsh, Freiman, Haber, Bragg, Ouslander, & Wiener, 2010; Kramer, Eilertsen, Goodrich, & Min, 2007). These conditions were chosen using clinical judgment by the researchers to focus efforts on improving nursing care through early detection of change in status and revising infection control policies to prevent hospitalizations. Studies have determined that these conditions may be safely medically managed in the nursing home through early identification of symptoms, communication of assessment findings, and appropriate management (Lamb et al., 2011; Ouslander et al., 2010).

Role of the Healthcare Provider

Physicians and nurse practitioners play an integral role in the decision to hospitalize nursing home residents. Most physicians who practice in nursing homes have outside community practices and spend limited time on-site at the nursing home, often preferring to hospitalize rather than treat manageable conditions at the nursing home (Levy, Epstein, Landry, & Kramer, 2006). Nursing home residents who have primary care physicians who devote less than 5% of their clinical effort to nursing home care are at 52% higher risk of potentially avoidable hospitalizations (Kuo et al., 2013). The availability and utilization of nurse practitioners has been shown to be effective in reducing potentially avoidable hospitalizations. Some studies have concluded that the savings from reducing avoidable hospitalizations could pay for a nurse practitioner in every nursing home (Ouslander et al., 2010).

Decisions to hospitalize nursing home residents are highly dependent on communication between nurses and physicians. Nurses play an integral role in the assessment of residents and communicating of clinical findings to physicians. These communications often are brief, occur during high care times, and are made after hours or on weekends to covering physicians (Tjia et al., 2009). Medical errors caused by the failure of a nurse to effectively communicate to another nurse or a medical provider are a pervasive problem in health care organizations and were the leading root cause of sentinel events reported to the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) from 2004 to 2015 (JCAHO, 2015). Numerous factors may contribute to compromised communication including the medical complexity of the residents, organizational characteristics of the health care setting, differences in training and education of nursing staff, and lack of training of professionals regarding teamwork and communication

(Dingley et al., 2008; Renz & Carrington, 2016). Many older adults are transferred to the hospital for conditions that could have been safely managed in the nursing home setting through early identification and effective communication (Renz et al., 2013; Lamb et al., 2011).

Studies in the nursing home setting have determined several barriers to effective communication between nurses and physicians. Tjia et al. (2009) reported several barriers to communication perceived by nurses including lack of openness to communication, logistic challenges such as a noisy environment, lack of professionalism (rudeness and disrespect), language barriers, and inconsistencies in nurse preparedness. Other challenges include problems with the timing, clarity and content of information (Tjia et al., 2009; Young, Barhydt, & Boderick, 2010), and the nurse's inability to organize and communicate clinical information (Beckett & Kipnis, 2009). Interventions to improve communication such as the use of structured communication tools have resulted in improved nurse and physician satisfaction with communication and an overall reduction in avoidable hospitalization of nursing home residents (Renz et al., 2015; Ouslander et al., 2011).

Availability and skill level of staff have the potential to impact quality of care within nursing homes as well as the decision to hospitalize for change in resident condition. Although nursing homes are required to have an RN on staff eight hours a day, the RN may serve primarily in an administrative role, and many nursing homes do not have an RN on site during off hours. Nursing homes with fewer than 60 residents are only required to have an RN on duty eight consecutive hours per day. In facilities with greater than 60 residents, the staffing requirement does not vary with the number of residents in the facility. On the night shift, many facilities may have only a licensed practical nurse (LPN) on site. LPNs have limited training in identifying

medical symptoms and managing complicated care-plans. There is evidence that residents of nursing homes that make greater use of LPN staff were at greater risk of hospitalization (Carter & Porell, 2003). Renz et al. (2013) determined that the majority of the resident assessments, completion of the communication tools, and calls to the covering physician were performed by LPNs when there was an observed change in resident status. The LPN's dominant role in these processes may have significantly influenced clinical decision-making by the physician and decisions to hospitalize residents.

Summary

Ineffective communication has emerged as a growing concern for patient safety in healthcare. There is a need for a clear and common understanding of the concept to assist in the development of effective strategies and policies to eradicate the multi-dimensional aspects of the communication phenomena affecting the nursing practice arena. The concept of nurse-to-physician communication is presented with the attributes, antecedents, and consequences of poor communication (Renz & Carrington, 2016). Communication barriers, communication protocols, and the impact of communication on clinical outcomes impact effective communication in nursing homes (Ouslander et al., 2011; Renz et al., 2013). Improving nurse-to-physician communication in the nursing home setting has been shown to increase nurse and physician satisfaction with communication and improve the timeliness and quality of clinical interventions. Further examination of the impact of nursing home culture and the interface between nurse and computer language is warranted to identify barriers within this process. This study will ultimately lead to an electronic interface that both supports nurse-to-physician communication as well as the timeliness of communication of clinical events.

CHAPTER II: THEORETICAL FRAMEWORK

To examine the nature of communication processes within the nursing home setting, numerous factors must be considered that influence communication. A theoretical framework is necessary to both give structure to the study and provide a means to consider the influence of these factors. This chapter contains a review of several frameworks as well as the overarching grand theory, how they apply to the nursing home setting, and how they will be utilized in this study.

Informatics Research Organizing Model (IROM)

Selection of a theory to guide research was preceded by reflection on the ontology of communication, which are the set of concepts and categories that both describe and influence communication as well as the properties and relationships between these concepts. Communication, the act of using words, sounds, signs, or behaviors to express or exchange information (Merriam-Webster, 2016), is a necessary vehicle of interaction between human beings and also a core component to quality healthcare (IOM, 2001). Hans-Georg Gadamer (1900-2002) identified language as the means to gain a better understanding of human experiences (Regan, 2012), while also rejecting the idea that hermeneutics (the theory and methodology of interpretation) was a method *only* for the human sciences (Reed, 2014). Gadamer believed that hermeneutics was a process of human understanding that should be widely practiced by all and as an alternative method to acquire knowledge along with the traditional scientific method and philosophic inquiry. Gadamer's theory of hermeneutics or interpretation supports knowledge acquisition through an understanding of the meaning of language and the deeper levels of human dialogue (Renz, 2014). Gadamer stressed the

importance of dialogue and also viewed tradition as being an influence in a person's history or worldview, but also reasoned that tradition could be transformed by reflection (Code, 2003). Gadamer's theory further builds on Heideggerian hermeneutics wherein three processes of human interpretation of language are emphasized, including the importance of searching for overall meaning of text in its entirety, text analysis to look for meanings of the parts to the whole and vice versa, and looking beyond the parts and the whole to still decipher what is still not understood (Ortiz, 2009). Gadamer's theory provided the necessary link between Heideggerian hermeneutics and analytic philosophy to better understand an ontologic focus of the lived experience (Gadamer, 1976; Regan, 2012; Reed, 2014).

The theoretical framework is the underpinning from which all knowledge is created within a research study and requires the researcher to examine personal epistemological beliefs before selecting a framework for a study (Grant & Osanloo, 2014). A researcher's beliefs, assumptions, values, and ethics all have the potential to influence how research is examined and explored, which necessitates reflection on one's own worldview and process for conceptualizing problems (Grant & Osanloo, 2014). The Informatics Research Organizing Model (IROM), a theoretical framework that incorporates the nursing metaparadigms to differentiate between nursing systems research and systems research (Effken, 2003), guided this study. This grand theory was appropriate for the study of nurse-to-physician communication in the nursing home setting because it provided a framework for examining the interface between systems, interventions, and clinical outcomes (Renz & Carrington, 2016).

The IROM provided a framework for studying the influence of language/words on clinical decision-making of physicians as well as the ability to examine the relationships between

the various constructs that exist within the nursing home environment. Since the IROM includes the nursing meta-paradigms, the resident (patient), environment, nurse-patient interaction, and the influence of technology all are considered. The ability to examine the inter-relationship of these constructs in a non-linear but dynamic fashion includes the key concepts described by Gadamer. The framework suggests that relationships are mutual, dynamic, and fluid. The framework allowed for the study of these constructs using qualitative methods rather than examining these constructs as having cause-effect relationships. While the IROM has been utilized as the framework for various research studies including the examination of decision support tools in the acute care setting (Effken, Verran, Logue, & Hsu, 2010), methods of communication during patient handoffs (Benham-Hutchins & Effken, 2010), modeling factors that influence person health record adoption (Logue & Effken, 2012), it has not been used to examine communication processes in the nursing home setting. (See Appendix E for an adaptation of the IROM.)

Evaluating the Adequacy of the IROM

Using Walker and Avant's (2011) strategy for theory analysis, the following is a summary of my examination of the IROM as well as its suitability for a descriptive qualitative study (Renz, 2016).

(1) *Origins of the IROM*: The IROM was developed in 2003 by Dr. Judith Effken in response to the identified need to develop a theory to support nursing informatics research. The IROM was derived from the Systems Research Organizing Model (SROM) and the Systems Development Life Cycle, an informatics process model (Brewer, Verran & Stichler, 2008). While several nursing informatics models have been proposed to guide

nursing informatics research, none of these models had the intention of serving as grand theories for organizing frameworks for a discipline (Effken, 2003).

(2) *Meaning*: The IROM provides a framework for examining the interaction between systems (hospital, nursing home, home care), nursing interventions including technology, and patient clinical outcomes. The relationships between these concepts are clearly represented in the model (non-linear) as well as how these concepts provide a model to generate and test new theories.

(3) *Logical Adequacy*: A strength of this model is in its broad application to guide systems research in any setting, with any type of computer application, and with any type of user based on the definition of the inter-relatedness of the constructs (Effken, 2003). The model clearly defines how nursing knowledge can be advanced. Planning for a nursing informatics innovation can be achieved through an understanding of the evaluation of the interaction between the client (patient), context (environment), user (nurse), and the technology (e.g. electronic health record). Predictions can be made using this model that are independent of the content of the concepts (Walker & Avant, 2011).

(4) *Usefulness*: The theory provides a framework for customizing the concepts of interest based on the research question and setting. The constructs of the IROM are defined at a high level of abstraction necessitating further explication and operationalization by the researcher (Effken, 2003). Using this theory, the researcher examined the interaction of the utility of the electronic health record (intervention) and the communication of clinical data for change in resident status (intervention and outcome) in the nursing home setting. These concepts have not been studied using this framework in the nursing home

environment.

(5) *Generalizability and Parsimony*: The IROM has broad applicability for nursing informatics research focused on planning, design, implementation, or evaluation of electronic interfaces. Because it is a meta-framework, other models and frameworks can fit within the IROM similar to how grand theories are elucidated into middle-range theories for application and testing (Effken, 2003).

(6) *Testability*: There are limitations to the IROM for testability due to the fact that it is a grand theory. The constructs needed to be clearly defined to examine the relationships between them and the overarching influence on each other and the system as a whole.

The rationale for using the IROM for this research study is its applicability to research that falls within the informatics domain (through the examination of the utility of the EHR in the communication pathway), capacity to examine numerous domains within an organization that influence communication, and the ability of the theory to support the key elements of the adapted Carrington Communication Framework. While it is not possible to examine all of the constructs described in the IROM within one research study, this study identified the constructs that are most critical in the examination of nurse-to-physician communication. These included some characteristics of the organization (nursing home), the intervention (communication-verbal and written) and the users (nurses and physicians). In order to better understand the relationship among these constructs, a communication framework was necessary.

Communication Framework

Shannon and Weaver's (1949) prototypical communication model was originally developed as a means to promote effective communication between sender and receiver. This

linear model and associated information theory has been widely accepted as foundational to communication studies. Claude Shannon's goal was to signal transmission from source to destination through a transmitter across a channel with minimal interference or error. Information theory (Shannon, 1948) was initially developed to separate the noise from the signals that were carrying the information. Warren Weaver later extended Shannon's information theory to various types of communication (Foulger, 2004). Shannon and Weaver's model has proven to be valuable to communication engineers in managing the capacity of various communication channels in 'bits per second' (Chandler, 2014).

Weaver and Shannon's model has six main elements described as follows (Chandler, 2014) (Figure 1):

- Information source: produces the message and can be a mixture of any form of written or spoken, image or sound.
- The transmitter (encoder): changes the message into signal.
- Message: what is sent and received.
- Channel: the path that the message passes through from the transmitter to receiver.
- Receiver (decoder): the reverse transmitter, which changes the signal back into a message.
- Destination: the target place of the transmitted message.
- Noise: Any unwanted additions to the transmitted signal, which can cause distortion or error in the transmission.

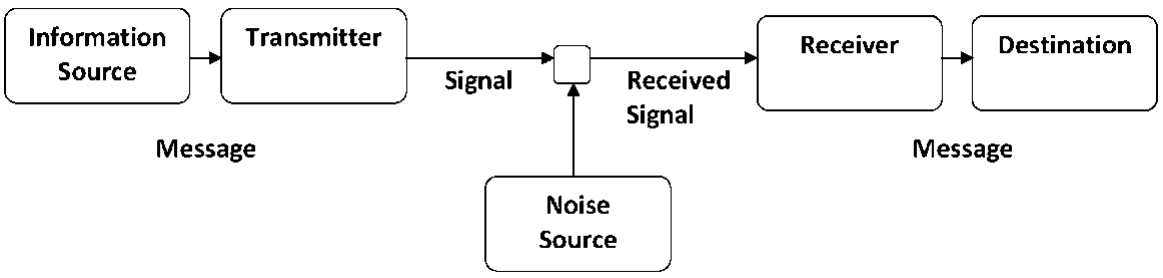


FIGURE 1. Shannon-Weaver Communication Model (Adapted from: Shannon, C.E., & Weaver, W. (1949). *A Mathematical Model of Communication.* Urbana, Il: University of Illinois Press.)

Four concepts of this model have become staples in communication research. These four concepts are entropy, redundancy, noise, and channel capacity. Entropy is the measure of uncertainty within a system or the information contained in the message (Carrington, 2012). Entropy increases when the number of items contained in the information source to construct the message increases. In contrast, entropy is low when the information source has a low degree of randomness or choice. Shannon (1948) believed that the proportion of entropy in messages would differ for different speakers-hearers. Sperber and Wilson (1995) furthered this concept by describing that listeners/receivers proceed on the principle of least effort, wherein listeners try to balance the effort required to interpret the message. If entropy is too high (the message is complex and unpredictable) the effort to decode the message becomes too difficult.

Redundancy refers to the degree to which the message is not unique to the system, wherein items that add no new information to the message are repetitious or have little value (Chandler, 2014). Fifty percent of the words contained in a message are unnecessary, add no new information to the message, and can be omitted without altering the completeness of the message (Chandler, 2014). Similar to entropy, Shannon (1948) believed that since redundancy increased the degree of predictability for a receiver through the anticipation of what items come next in a

word sequence, there must be a balance between the unexpected and predictable items in a message.

Increasing redundancy can have benefit to improve message efficiency when additional signals cause interference with the message (Chandler, 2014). Signals that are not related to the message are called noise, which can cause distortion or error in transmission. Noise, or message interference, may result from background noise in the environment, from noisy channels (like a crackling phone line or microphone), or from the organization and semantic aspects of the message (syntax noise). Noise is not considered a detriment unless it significantly interferes with the message and even when noise is substantial, redundancy can be increased to facilitate transmission of the message.

Channel capacity is the measure of the maximum amount of information a channel can carry. Channel capacity can be influenced by noise, excessive redundancy, and entropy. While enhancements in technology have emphasized how fast we can transmit information over a communication channel, we must remain mindful of the need for accuracy as well as speed to ensure the message is received. Channel capacity can be impacted in verbal communication as well represented by the simple example of too many senders talking to a receiver at the same time.

While there are limitations to this model, the strengths include its simplicity, generality, and quantifiability (Foulger, 2004), which make it useful for developing models for application in health care communication research.

Communication Theory for Nursing Research

Communication and information theory have foundational value for nursing research that seeks to examine communication processes. Carrington (2012), through the use of theory-driven research, developed a conceptual framework to guide research examining nurse-to-nurse communication of clinical events in the acute care setting. Utilizing information theory as one of the theoretical underpinnings, an adaptation of the Shannon and Weaver's communication model was created (Figure 2). Concept refinement and reduction was performed to move abstract constructs related to communication to a measurable level (Carrington, 2012). The constructs were then depicted in a model which "allows the researcher to see the fluidity and connectivity of the constructs" (Carrington, 2012, p. 296). The model depicts the flow of information from the clinical event (the stimulus), to the responder (the nurse), engagement in communication, to receiver (nurse), and finally to the outcome of the clinical event. This provides an adaptable framework to examine communication of clinical events in various settings.

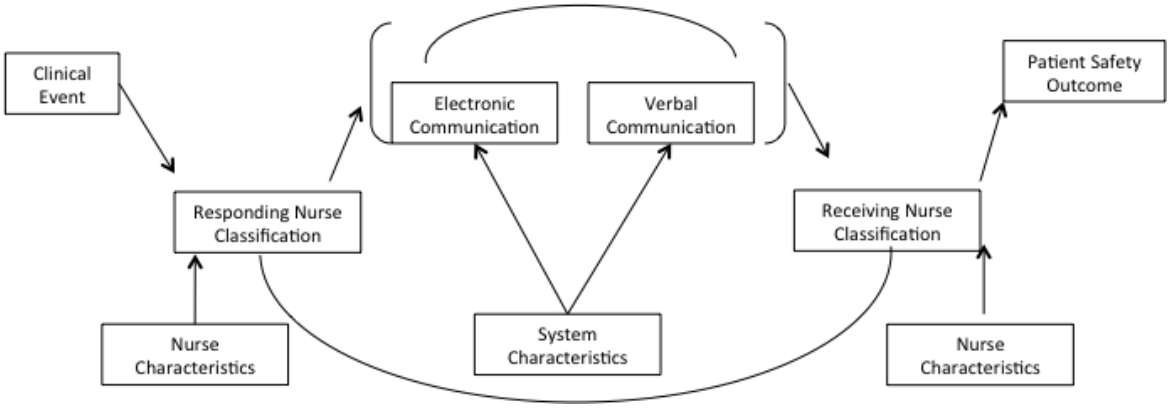


FIGURE 2. Effective Nurse-to-Nurse Communication Framework (Adapted from Carrington, J. M. (2012). Development of a conceptual framework to guide a program of research exploring nurse-to-nurse communication. *CIN: Computers, Informatics, Nursing*, *30*(6): 293-299.)

The Effective Nurse-to-Nurse Communication (ENNC) framework represents a blending of Information Theory and Symbolic Interaction Theory whose core tenet is that all

communication is symbolic and based upon interaction and meaning (Mead, 1967; Blumer, 1969). While this model has demonstrated utility in describing nurse-to-nurse communication, it also has applicability in other settings as well as with other communication pathways due to the model's ability to integrate various domains that impact communication. Additionally, the model allows for the examination of the resolution of the clinical event, that is, the outcome resulting from the communication. For the purposes of this study, an adaptation to the model was described that captured factors specific to the nursing home setting that could impact communication between nurses and physicians, as well as the outcome of the reporting of the clinical event. The specific words nurses use to describe clinical events and how this communication occurs in the nursing home environment has the potential to influence the clinical decision-making of physicians, thus having important implications toward not only the resolution of the clinical event but overall resident safety.

Application of ENNC Framework

Examining communication processes in the nursing home setting can be accomplished utilizing an adaptation to Carrington's communication framework. (Figure 3) In this model, the setting is the nursing home. The stimulus is the clinical event, whose identification can represent a broad range of conditions experienced by older adults in nursing homes. According to Carrington (2008), a clinical event is defined as an unexpected change in patient condition that does not require patient transfer or utilization of a nursing protocol. This study utilized the same definition for clinical events. Since nurses were asked to reflect on written text pertaining to clinical events from an electronic health record (EHR) or paper chart format, the settings

included a nursing home that utilizes EHR and one that continues to utilize paper documentation for comparison purposes.

When a nursing home resident experience a clinical event, the responding nurse is responsible for conducting an assessment of the resident in order to describe and document presenting symptoms or condition changes. The nurse then needs to determine the resident's stability and be able to articulate why the situation may/may not be problematic (American Medical Directors Association, 2015). Utilizing a structured communication tool such as SBAR (Situation, Background, Assessment, Recommendation) has been shown to be an effective tool to assist nurses with assessment data organization before contacting the physician (Renz et al., 2013; Ouslander et al., 2011). Once the responding nurse collects the assessment data, verbal communication with the physician (the receiver) occurs. Typically, communication (channel) between the nurse and physician, aimed at determining a treatment plan, occur in the context of brief telephone conversations (Field et al., 2011). In-person verbal communication between the nurse and physician can occur as well, however this is less likely given that the majority of primary care providers billing Medicare spend less than 10% of their practice time in nursing homes (Kuo et al., 2013). The verbal communication between the responding nurse (sender) and the physician (receiver) results in outcome, i.e., a treatment decision, decision to transfer to hospital, or no treatment. The model also depicts the EHR as a component of the communication cascade, yet adoption of the EHR in long-term care has been slow due to adoption costs, unclear return on investment, interoperability, and resistance to change in facility culture (Phillips et al., 2010). Additionally, the predominant EHR software programs used in nursing function mainly as a repository of information and do not have clinical alert mechanisms for nurses embedded or a

means to communicate clinical data to physicians (Phillips et al., 2010). While the EHR can provide clinical alerts, evidence-based care support, preventative care reminders, and outcome data collection these functions are not utilized by most nursing home EHR platforms (Healthcare Information and Management Systems Society, 2015). Documentation of clinical event details usually occurs well after the clinical event has occurred.

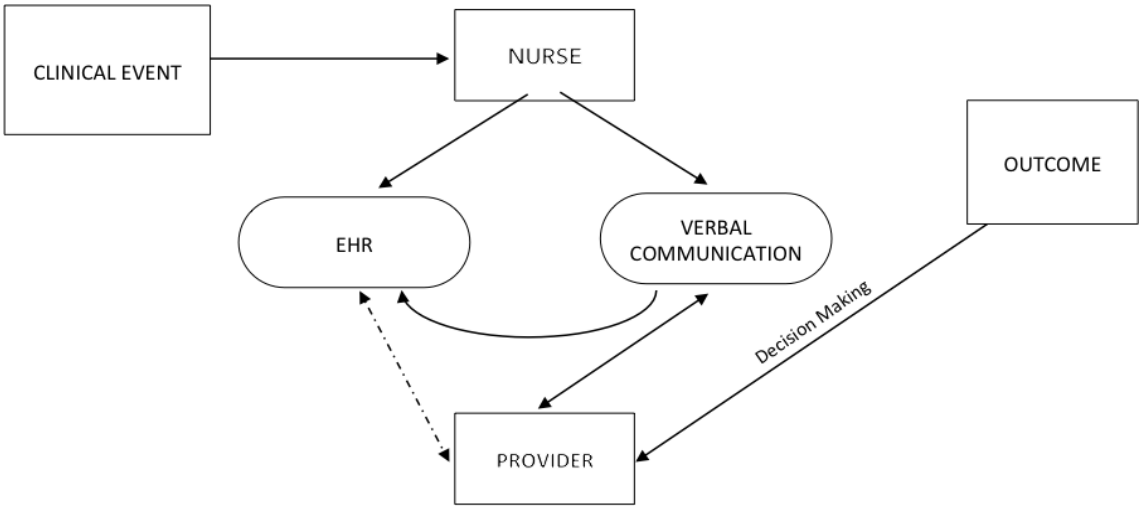


FIGURE 3. Adaptation of ENNC for this Research

There are numerous factors that can cause interruptions in the communication pathway in the nursing home setting. Entropy, or uncertainty, can be increased when the content of the communication pertaining to the clinical event is not specific or accompanied by information that is not relevant, such as the responding nurse failing to convey accurate details regarding lung assessment when communicating with a physician about new onset shortness of breath (Carrington, 2012). Noise, which can cause distortion to the message, can occur in the nursing home environment when the responding nurse is unable to make a phone call in a quiet environment, or if the nurse is unable to reach the physician in a timely manner resulting in the failure of the physician to receive the message. Examples of redundancy include the practice of

verbally communicating the clinical events and then entering the same details into the EHR. Since there is limited use of the EHR in nursing homes pertaining to transmission of clinical data, channel capacity, the rate at which information can be reliably transmitted over a communications channel, is not impaired (Shannon, 1948). However, a responding nurse not having access to a phone could affect channel capacity.

Summary

The impact of the nursing home culture, the utility of the electronic health record, and the communication of clinical data pertaining to change in resident status have not been studied in the nursing home setting using the IROM or the ENNC. The combination of these frameworks will provide a mechanism for examining the dynamics between systems, interventions, and clinical outcomes and will expand on the existing literature that has identified the impact of poor communication on patient safety and avoidable hospitalizations.

CHAPTER III: METHODS

The methodology used for this study was a qualitative descriptive (QD) design, with in-depth, one-on-one interviews of nurses and physicians with semi-structured open-ended interview questions. Communication between nurses and physicians regarding clinical events experienced by nursing home residents was digitally recorded and transcribed. Data were analyzed using natural language processing (NLP) methodology and conventional content analysis, as a means of intra-methods data triangulation. This chapter includes a detailed description of the methodological processes that were utilized to answer the proposed research questions.

Purpose of Research

The purpose of this study was to explore nurse-to-physician communication in the nursing home setting pertaining to clinical events utilizing the Informatics Research Organizing Model (IROM) and Carrington's Exploring Nurse-Nurse Communication (ENNC) Framework.

Research Questions

The researcher sought to answer the following questions:

1. What were the words that nurses used to communicate clinical events to physicians in the nursing home setting?
2. What were the nurses' perceptions of communication with physicians when a nursing home resident experienced a clinical event?
3. What were the physicians' perceptions of communication with nurses when a nursing home resident experienced a clinical event?

4. What were the nurses' and physicians' perceptions of the strengths and limitations of electronic versus paper documentation systems to communicate a clinical event in the nursing home setting?

Qualitative Research

The purpose of qualitative research is to examine and understand how social experiences are created and given meaning (Denzin & Lincoln, 2000). The focus of this methodology is not causation, rather an examination of practices and activities to further explore thoughts, beliefs, values, and opinions of individuals within a population (Denzin & Lincoln, 2000). The goal of qualitative research is to understand what individuals are thinking, but additionally the "why." User experience (UX) qualitative research focuses on understanding user behaviors, needs, and motivations through observation techniques, task analysis, and other feedback methodologies (Kuniavsky, Goodman, & Moed, 2012). Data collection methods for UX studies depend primarily on the research question(s).

The overarching aim of qualitative research, a form of social inquiry, is to gain an understanding of certain social phenomena (Pope, Zeibland, & Mays, 1999). According to Denzin and Lincoln (2000), qualitative research involves the studied use and collection of a variety of empirical materials, such as the case study, description of personal experiences, life stories, interviews, observational, historical, interactional, and visual texts, all aimed to describe moments and meanings of individuals' lives. Because in this study the researcher sought to gain an understanding of communication processes between nurses and physicians, a qualitative design aligned with the aforementioned purpose and research questions to best examine the process of nurse-to-physician communication in the nursing home setting.

Descriptive Research

Descriptive research refers to the type of research question, design, and data analysis that is applied to a given topic (Knupfer & McLellan, 1996). In this research, the investigator used qualitative descriptive (QD) methodology, an approach that has distinct differences from other qualitative methods such as ethnography, grounded theory, and phenomenology, which are methods aimed at providing thick description, theory development, and interpretive meaning respectively. Rather, the aim of QD is to provide a straight description of an experience or event, wherein the researcher stays close to the data in terms of the analysis and presentation of the data (Neergard, Olesen, Anderson, & Sondergaard, 2009). The use of QD methodology has often been criticized for neither being clear nor theory-based (Milne & Oberle, 2005); however this criticism is not justified if QD is utilized for the right purposes based on the research question(s) (Neergard et al., 2009). QD is an appropriate method for research questions pertaining to healthcare because QD can help to examine the perspectives of patients, healthcare professionals, and processes within a healthcare organization. According to Sandelowski (2000), researchers conducting QD studies "stay closer to their data and to the surface of words and events" where "language is the vehicle of communication" (p. 336) compared to other known qualitative methods whose surface readings not be considered "superficial, trivial, or worthless" (p. 336).

QD design (as part of mixed-methods approach) has been used in several previous studies to examine nurse-to-physician communication in the nursing home setting (Tjia et al., 2009; Renz et al., 2013; Whitson et al., 2008). Similar to the aim of this study, the authors through the use of structured open-ended interviews with individuals, sought to better understand the participants' perceptions and experiences with communication in the nursing home environment.

Based on prior research as well as the stated aims of this study, a QD design is well suited to answer this study's research questions about the nature of nurse-to-physician communication.

Setting

The setting for this research was two nursing homes. Site A was located in a suburban area approximately 35 miles north of Philadelphia, Pennsylvania. This nursing home was a 53-bed skilled nursing facility that is part of a not-for-profit, faith-based continuum of care. This site utilized paper charting documentation system. Site B is an 84-bed skilled nursing facility located in West Philadelphia. This nursing home was designated as a for-profit facility. Site B utilized the EHR charting system PointClickCare©.

Sample

The sample for this study was 10 clinical events at sites A and B or N=20. The target populations for this research were nurses and physicians. Nurses were defined as registered nurses (RNs) and Licensed Practice Nurses (LPNs). The nurses included both registered nurses and licensed practical nurses because these two levels of nursing preparation and training function in this care environment. Site A physician and Site B physician participants were employed by the nursing home or by outside medical practices. Nurses and physicians were recruited to participate in the study, which included interviews with 10 nurses (RNs or LPNs), 20 recorded phone conversations and/or recorded in-person communication of the clinical events, and physician interviews post-data collection.

A purposive convenience sample of nurses and physicians who provided clinical care to nursing home residents at two single sites were recruited. In addition to obtaining recorded communications between nurses and physicians pertaining to clinical events, these same study

participants were interviewed to determine their perceptions regarding communication of the clinical events.

Recruitment

Recruitment of study participants began after receiving Human Subjects Protection approval from the University of Arizona Human Subjects Review Committee. Consent to conduct the study from the facility was achieved through direct contact between the researcher and the facility administrative staff, wherein the researcher introduced the study and provided an executive summary of the study details. A letter of consent from each nursing home was secured as part of the Institutional Review Board application process (Appendix A).

Nurses employed by the nursing homes were recruited via staff meetings and fliers that described the study, which included a description of the required level of participation. The researcher routinely visited the nursing homes and rounded on the nursing units to become aware of clinical events and to continue recruiting study participants. Physicians were recruited through face-to-face meetings where the study and the requirements of participation were discussed. (Appendix B).

Inclusion criteria for this study included RNs and LPNs who were employed full-time by the nursing home for at least three months, who were adults, age 18 and older, and who understood and spoke English. Site B nurse participants must have had at least three months' experience with using the electronic health record (EHR). Physicians were included who had been identified as the primary clinician for the nursing home residents identified by the clinical events. These included English-speaking medical doctors and doctors of osteopathic medicine. Both participant groups must have been willing to participate in a face-to-face digitally recorded

interview with the researcher. Participants in both groups were excluded if they did not meet the above-described criteria. Additionally, nursing students and nurse practitioner students were not permitted to participate in the study.

Nurses who were interested in participating in the study received additional information regarding the study through informal meetings on the nursing units as well as through staff meetings organized by the facility administration. During these meetings, the following was explained: the purpose of the study, the consent process, inclusion/exclusion criteria, the definition of a clinical event, the mechanism for recording phone conversations with physicians regarding clinical events, and information pertaining to the interviews (location, privacy, and digital recording) following a communication of a clinical event. Nurses were informed that the interviews were scheduled at a time close to the communication of the clinical event, with consideration having been given to resident care needs and the nurse's workflow. Physicians received information pertaining to the study including: purpose, consent process, inclusion criteria, definition of a clinical event, and mechanism for recording phone conversations with nurses. Interviews with physicians took place at a convenient time and location to the physician, within a reasonable time following the communication of clinical events. All signed consent forms were stored in a locked file cabinet and data were saved on a password-protected computer. All participants were informed that they could withdraw from the study at any time without risk or penalty and that the identity of study participants would remain anonymous.

Data Collection

Data collection for this study involved two sources: recorded phone conversations between nurses and physicians and interviews with nurses and physicians regarding clinical events. Each is further described below.

Nurse-to-Physician Phone Recordings

The verbal communication between nurses and physicians of 10 or more (until saturation was met) clinical events were identified for analysis. According to Bowen (2008), since the aim of qualitative research is to explore the range if opinion and diversity of views, the number of participants required depends on the nature of the research. The adequacy of sampling is justified by the reaching of saturation and used as an indication of quality (Guest, 2006). According to Carrington (n.d.), the average nurse-nurse communication of a clinical event is approximately 150 words. While the number of words spoken during a nurse-to-physician communication has not been studied, this average number of words can be used to estimate the number of words needed to evaluate nurse-to-physician communication. In order to reach a corpus of 10,000 words, the projected sample size was 20 communications between nurses and physicians regarding clinical events. Before finalization of sample size, direct observations of one (or several) nurse-to-physician communications of clinical events were conducted to determine what the average number of words used in the communications total. (The natural language processing software used for data analysis did not specify the minimum number of words needed for corpus.)

Nurse and Physician Interviews

In-depth interviews of both nurses and physicians were conducted to elicit information pertaining to the communication of a clinical event that could not be obtained solely from participant observation. Semi-structured open-ended questions delivered via an interview guide were performed. Interviews were used to describe the participant's point of view (Kvale, 1996) and to further expand on the why of actions or beliefs exhibited by the participant. The interviewer used the questions sought to explore and describe nurses' and physicians' beliefs, attitudes, and meaning of actions pertaining to communication of clinical events, how the electronic record/hand-written chart supported or impaired communication, and what impact communication had on the clinical decision-making of the physician. Responses of nurses and physicians were compared and contrasted. For the purposes of this study clinical events were defined as unexpected changes in patient condition, including pain, bleeding, fever, or changes in output, respiratory status or levels of consciousness (Carrington, 2008).

The in-depth interviews used open-ended questions to encourage participants to describe their respective experiences with nurse-to-physician communication of a clinical event, use of the electronic health record or hand-written nurses' notes regarding clinical event documentation and communication, and outcomes of clinical events post-communication, such as resolution of clinical event and/or decision to hospitalize nursing home resident. The researcher provided short prompts and question clarification to both nurses and physicians to promote elaboration of answers to questions.

Data collection also included recorded nurse-to-physician communications of a clinical event. Demographic data were collected on all study participants. (Appendix C).

Nurse and Physician Interview Questions

The following interview questions were used for nurse and physician participants (sample questions were different for facility with "EHR" versus hand-written notes "Chart" (Table 1). The table is constructed to include the study or research questions guiding the interview and then questions for sites A and B.

TABLE 1. *Nurse and Physician Interview Questions*

Research Questions	Interview Question: Nurses Sites A and B
RQ 1. What were the nurses' perceptions of communication with physicians when a nursing home resident experienced a clinical event? RQ 2. What were the similarities and differences in verbal and written descriptions of the clinical event by the nurses?	1. Tell me about when you determined that the resident had experienced a change in condition, i.e., fever, bleeding, pain, changes in level of consciousness, respiratory status, and output? 2. Describe for me the experience of talking with the physician about the clinical event? What was your goal in talking to the physician? What was the clinical event and what was the outcome for the resident? 3. What information about the event did you enter in the EHR/Chart? 4. What there anything that you wanted to enter into the EHR/Chart about the event that you felt you couldn't? What made that entry difficult? 5. When you have continued care following an event, what information have you looked for in the EHR/Chart? Was anything missing that you thought was important? How did you obtain that information? 6. Comparing the conversation with the physician and what was documented in the EHR/Chart, is there anything you told the physician that was not entered in the EHR/Chart? Anything that you entered into the EHR/Chart that was not communicated to the physician? 7. What difficulties did you confront while talking with the physician about the event? How did you overcome these difficulties? Were there any that you could not overcome? 8. What are the strengths of this process, calling the physician and using the EHR/Chart? Weaknesses? How would you recommend making improvements? Describe methods you use to facilitate communication with physicians. 9. What is the outcome of the resident who experienced a clinical event thus far? Describe whether the EHR/Chart facilitates communication of clinical events. 10. While using the EHR/Chart to enter information about a clinical event, what makes this process difficult? What makes it easy? 11. Describe how the verbal communication of a clinical event and EHR/Chart documentation are similar or different.

TABLE 1 – *Continued*

Research Question	Interview Questions: Physicians Sites A and B
RQ 1. What were the physicians' perceptions of communication with nurses when a nursing home resident experienced a clinical event?	1. Describe a situation when the communication of a clinical event influenced your decision-making regarding a nursing home resident. What was the clinical event and what was the outcome? 2. Describe any barriers in the communication of clinical events from nurses to physicians. 3. Describe examples of what you consider good communication of clinical events. Poor communication? 4. What are the components of the verbal communication that are most critical to your determining action for the resident? 5. Do you have access to the electronic health record/chart at nursing home X and, if so, describe how you use it to access information? What information do you seek out when accessing the EHR or Chart? If no, how do you access clinical information when you are on site at nursing home X?

(See Appendix D and E for Interview Guides)

Data Collection Process

The sequencing of data collection followed a logical progression to collect data pertaining to how clinical events were identified and communicated. The sequencing was summarized as follows. (Table 2)

TABLE 2. *Data Collection Process*

Response to Clinical Event	Data Collection Process
1. Receiving nurse identified a clinical event and assessed the resident.	• Demographic data for each receiving nurse were identified for each clinical event (RN or LPN)
2. Receiving nurse initiated phone call to physician regarding clinical event.	• Each phone conversation was digitally recorded and transcribed
3. Receiving nurse documented details of clinical event.	• Nurses were interviewed (per interview guide) within 2 hours of phone communication • Physicians were interviewed (per interview guide) following data collection of sample clinical events

Nurse recruitment was completed through researcher conducted information sessions and fliers posted in Sites A and B. Physicians were recruited first through email and then in-person to elicit participation in the study. Once informational sessions for nurses were completed, private

meetings were held with nurse participants to review the consent procedure and obtain informed consent. Private meetings with all physicians were held to review consent procedure and obtain consent. The timeline for completion was two (2) weeks.

When a CE was identified, the responding RNs or LPNs that were taken through the consent process for the study digitally recorded the phone communication with the physician. Consent forms for both the responding nurses and physician were checked for completion before the researcher reviewed and transcribed the recorded data from the recorded phone communication. The timeline for completion was two months pertaining to ten (10) CEs per nursing home.

Consented RNs and LPNs then took part in semi-structured interviews with the researcher. The interviews took approximately 45 minutes per participant and were digitally recorded with the participant's permission. The interviews took place in a private, quiet convenient meeting area determined by the participant. The time and place of the interview was chosen by the participant so as not to interrupt work routines/responsibilities. For the nurses, these interviews were conducted within the respective nursing homes. The physicians were interviewed in the nursing home (Site A or B) or in their private office. Nurse interviews took place within 24 hours of the CE. Physician interviews were conducted post-data collection for Sites A and B.

Rigor

Rigor was established in this research using the following techniques. First, at the conclusion of each interview, the researcher summarized what was heard to the participant. Feedback from the participants enhanced the understanding of the identified themes and, in a

very cursory way, served as a method to triangulate findings through the use of an interpretive team (Lincoln & Guba, 1985). Second, excerpts from the interviews and summary of emergent themes were provided to selected committee members for review and agreement. This provided verification of data analysis understanding and processes.

Trustworthiness, according to Lincoln and Guba (1985), was achieved in the following manner: (1) Credibility, or the confidence in the 'truth' of the findings, was achieved through peer debriefing, modified within-methods triangulation (presented in analysis), and member checking (as described above); (2) Transferability, showing that the findings have applicability in other contexts, was achieved through the use of peer reviewers; (3) Dependability, showing that the findings are consistent and could be repeated, was accomplished through a detailed description of and adherence to, each process described to conduct this study enabling an external researcher to repeat the study and achieve similar results. The researcher had a sound understanding of the chosen methodology and their effectiveness; and, (4) Confirmability, the degree of neutrality to which the findings are shaped by the respondents and not researcher bias, was evaluated using an audit trail where the process of data collection, analysis, and interpretation was detailed. Confirmability was also established using reflexivity, wherein the researcher examined her own background and position to determine if this had any influence on the research findings.

Reflexivity, defined as the attitude of attending to the context of knowledge construction (Lincoln & Guba, 1985) was fostered in the following manner. First, the design of the research study included multiple investigators (dissertation committee) to promote varying perspectives of the study situation, and by virtue of feedback, challenged the researcher's beliefs, values, and

perspectives of the phenomena being studied (Lincoln & Guba, 1985). Second, reflexivity was also enhanced through the use of a journal, used by the researcher to reflect on what was happening with the research process. The use of journals or field notes is a commonly used technique in research, wherein the researcher makes regular entries during the research process. A journal was used by the researcher in this study to record notes pertaining to communication with participants, observations made during interviews, and other logistical issues that emerged during the study. These entries were useful for the researcher to reflect on personal values and interests as well as support methodological decisions and the reasons for them.

Human Subjects Protection

Human subjects were protected at the highest standard throughout this study. The researcher used the following to sustain these standards for human subject protection: privacy, confidentiality, and anonymity. After obtaining approval from The University of Arizona's Institutional Review Board (IRB), privacy was sustained through allowing the participants to have control over the extent and circumstances of participating in the study. This was maintained through the consent process, the timing and location of the interviews, the use of de-identified data, and reassurance that recorded phone communications were only reviewed by the researcher and then deleted.

The IRB process also included provisions for protection of autonomy (decision to participate or not participate), informed consent with a determination of competence to participate, and clear inclusion/exclusion criteria. Confidentiality and anonymity were maintained through the use of de-identified data and a plan for secure storage of data (including notes, interview transcripts, recordings, and other documents). Stored data was locked in a

secured area and data saved in electronic format that was password protected. Any data shared with committee members remained de-identified and encrypted with password protection.

Finally, a waiver of protected health information (PHI) was approved by the IRB because the phone communications between nurses and physicians mentioned resident names and health details. The waiver was granted due to the researcher's planned deletion of the recordings after transcription and de-identification of resident-specific details.

Data Analysis

Introduction

An organized and comprehensive data management plan is integral to the overall research study to ensure that good scientific practice is followed, that data are stored in a safe and secure location during all phases of the research, and that data are organized to facilitate sharing of findings once the research has been completed (Johnson, Dunlap & Benoit, 2010; Miles, Huberman & Saldana, 2014). The researcher used the components described below sought to ensure not only how data was collected, created and stored but also how human subjects' protections were maintained through this phase of the study.

Data Management Plan

The first step in the data management process was to ensure that the data collection methods were aligned with the research questions. Since this study's aims were to examine the nature of nurse-to-physician communication in the nursing home setting, text data were collected via digitally recorded nurse-to-physician communications. Using recordings required that the communication were captured via speakerphone in a private location when the physician was off-site. In-person communications were recorded in private locations. The digital recordings

were reviewed and transcribed to create text files (Word documents) for analysis. Resident information captured in the recording was de-identified in the transcription process and alpha-numeric codes were used to organize CEs and participants.

The nurse communicating and documenting the clinical event was interviewed within 24 hours in a private location within the nursing home. The interview was recorded and transcribed. Physician interviews were conducted at a location determined by the physician following completion of data collection of CEs and nurse interviews per site. These interviews were recorded and transcribed. All recorded interviews were reviewed for accuracy by the researcher. The researcher maintained a journal to chronicle reflections on research proceedings, including reflective notes regarding process, issues with methodology, and any other thoughts regarding emerging themes from interviews.

Data obtained from these afore-mentioned processes were categorized, labeled, and securely stored before and after data analysis. A back-up copy of all text files and audio recordings were created and stored in a locked file cabinet within a locked office. All raw data captured via researcher's notes were stored in locked file cabinet. Files stored on the researcher's computer were password protected. Linguistic Inquiry and Word Count (LIWC©) software, used for data analysis, was stored on a password-protected computer.

Data Analysis Plan

Data derived from the phone communications and nurse interviews were analyzed utilizing two methods of content analysis, a technique of intra-methods data triangulation (Renz, 2017). Analysis and interpretation of the text data using the two methods was performed independently, in order to prevent one method's results from influencing the other. All text files

were analyzed using LIWC© software, a computer-assisted modality to perform content analysis. According to Miles and Huberman (1994), organizing and analyzing qualitative data can be better managed through data reduction, data displays, and conclusion drawing and verification. All text files were converted to Word or Excel documents per the LIWC© manufacturer's recommendation. Text files were cleaned prior to analysis, checking for misspellings and abbreviations that may have proven difficult for the program to discern. Data analysis output was entered into an Excel spreadsheet for further analysis. A sub-analysis of the LIWC© results was performed using SPSS software.

Data display(s), an organized and compressed assembly of information, were utilized in this study in the form of matrices, flowcharts, and possibly other visual methods. Matrices were utilized to organize data, analyze data, and allowed for later cross-case analysis (Miles et al., 2014). These matrices were developed from data output contained in the Excel files. This allowed the researcher to conduct further evaluation of the similarities, differences, and themes derived from interview responses and recorded communications. Examples of descriptive matrices that were utilized included one that depicted and examined nurses' patterns and beliefs regarding communication with physicians, a matrix that depicted a comparison between nurses' written and verbal communication of a clinical event, and a matrix that summarized the physicians' beliefs and attitudes regarding nurse-to-physician communication.

Text files for the nurse interviews were also analyzed utilizing conventional content analysis, an extremely useful method for analysis of spoken or written language in studies aimed at describing the properties of text and phenomena (Hsieh & Shannon, 2005) in a subjective yet scientific manner (Zhang & Wildemuth, 2009). Similar to the steps described above to prepare

text for computer-assisted analysis, the following steps supported valid and reliable inferences derived from the data for conventional content analysis (Renz, 2016). These steps included: 1) preparing the data through transcribing interviews; 2) reading and re-reading transcripts to achieve immersion and obtain a sense of the whole (Tesch, 1990); 3) creating notes from the transcripts and listing the various types of information found in the text; 4) defining the unit of analysis using themes as the unit of analysis (derived from smaller data bits and categories of data) (Zhang & Wildemuth, 2009); 5) developing a coding scheme to organize data in a comprehensive manner; 6) coding all text; and, 7) interpreting and describing findings. The physician's responses to interview questions, which were brief, were summarized.

Trustworthiness

According to Lincoln and Guba (1985) there are four aspects of trustworthiness for qualitative research that must be considered including true value, applicability, consistency, and confirmability. The first is truth value, more commonly known as credibility, which is how the researcher makes sure that there is sufficient rigor in the research process. This was accomplished through the utilization of peer de-briefers, prolonged and continual observation in the field (in this study the nursing home), researcher reflexivity, and participant checks. The second is applicability, the degree to which the findings can apply to other similar contexts and settings or with other groups; it is the capacity to generalize from the findings to greater populations. Since this study was conducted in nursing homes, the results can be applied to other nursing homes with same or similar resident populations. Consistency was achieved through both the study design and the data analysis process that could be replicated in another nursing home setting using the same techniques. Confirmability was assured by virtue of the fact that the

study results were shaped by the respondents' answers to interview questions and analysis of verbal and written text, not based on the researcher's motivation and interests.

Another method to enhance trustworthiness and rigor for both methods of analysis was the utilization of two methods of content analysis as a means of data triangulation (Renz, 2017). Denzin (1970) suggests that the use of triangulation has the potential to increase the validity of the study, decrease researcher bias, and provide multiple perspectives of phenomenon under study. Leech and Onwuegbuzie (2007) suggest that the concept of triangulation should extend to data analysis to promote legitimation and representation in qualitative research. The authors further define legitimation as the trustworthiness, credibility, dependability, and transferability of the inferences made from the analysis (Onwuegbuzie & Leech, 2007a; Guba, 1981). Using both methods of content analysis as an intra-methods form of triangulation had the potential to generate more meaning from the data and enhanced the inferences derived by the researcher from the words and responses of study participants. There is potential for bias using two methods of analysis, as the results of one method can influence the researcher's perceptions of the results of the second method of analysis.

Content Analysis

Content analysis of the nurse interview data was accomplished using two methods, or within-methods data triangulation. First, using traditional content analysis consistent with strategies outlined by Miles and Huberman (1994). This process involved examining the text data (nurse interviews and phone conversations) for categories and themes that emerged or coding. Coding was organized in a Microsoft Excel spreadsheet (codebook). Possible codes emerging from the data included the nurses' positive and negative perceptions of

communication, varieties of words or phrases used to describe clinical events, words, phrases or emotions that described perceptions of the use of the EHR/Chart, perceptions and behaviors associated with the resolution of clinical events, and differences in perceptions, emotions, and communication of clinical events comparing verbal and written communication.

Natural language processing (NLP) is a computational approach to text analysis (Crowston, Allen, Li, Scialdone, & Heckman, 2012). In this qualitative descriptive study, content analysis using LIWC© software was used to find evidence of concepts of interest using text as raw data (Myers, 1997). LIWC© is a computer-assisted data analysis program that calculates the degree to which people use different categories of words across a wide array of text including emails, speeches, poems, or transcribed daily speech (Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007). According to Carrington (n.d.), LIWC© analyzes text data and searches for linguistic dimensions. In this study, both linguistic dimensions (categories of words) and psychological dimensions (cognitive processes and emotions) were used to describe words that applied to the communication of a clinical event. LIWC© compared each word contained in the text files to a user-defined dictionary of words; the dictionary then identified which words fell into psychologically relevant categories (Pennebaker et al., 2007). The program essentially performed the coding, however analysis by the researcher was necessary to validate accuracy of the identified categories and themes.

Coding was organized in a Microsoft Excel spreadsheet (codebook). Possible codes emerging from the data included positive and negative perceptions of communication (nurses), varieties of words or phrases used to describe clinical events (nurses), words, phrases or emotions that described perceptions of the use of the EHR/Chart, perceptions and behaviors

associated with the resolution of clinical events, and differences in perceptions, emotions, and communication of clinical events comparing verbal and written communication.

Summary

The methods detailed in this section were congruent with the purpose of this study and met the criteria for a rigorous qualitative descriptive research design. Qualitative research methods were suitable for the exploration of nurse-to-physician communication in the nursing home setting. Conventional content analysis and NLP were utilized as methods of analysis of text analysis. Combining these methods as a form of intra-methods triangulation enhanced the trustworthiness and rigor of a qualitative study combined with other well-established methods.

CHAPTER IV: RESULTS

The purpose of this chapter is to present the results of this study. Data presented includes the demographics for both the nurse and physician participants, a description of the clinical events, an analysis of the words used by the nurses to describe the clinical events, and an analysis of the interviews conducted with study participants (nurses and physicians). The categories, sub-categories, and themes that emerged from the interviews are presented. Finally, the data are presented according to four research questions.

Demographics

Nurse Participants

Demographics of the nurse participants by site are shown in Table 3. Two master's (RN), 10 baccalaureate (RN), and three certificate prepared (LPN) nurses participated total *n*=(15) nurse participants.

TABLE 3. *Nursing Experience of the Sample (n=15)*

	Site A (*n*=8)			**Site B (*n*=7)**		
	Range (Years)	Mean (Years)	(SD)	Range (Years)	Mean (Years)	(SD)
Nursing Experience	3.0-47	20.5	(14.46)	4.0-40	20.14	(13.78)
Worked in a Nursing Home	1.0-25	11.5	(9.72)	2.0-30	15.85	(10.43)

Physician Participants

Demographics of the physician participants by Site are shown in Table 4. Two physicians were board certified in both internal and geriatric medicine total *n*=(3).

TABLE 4. *Physician Experience of the Sample. (n=3)*

	Site A (*n*=1)			**Site B (*n*=2)**		
	Range (Years)	Mean (Years)	(SD)	Range (Years)	Mean (Years)	(SD)
Years as Provider in Nursing Home	0	17	n/a	6-29	17.50	(16.26)

Clinical Events

The recording of phone conversations between nurses and physicians was required in this study in order to systematically evaluate how nurses communicated clinical events (CEs) in the nursing home setting. The researcher used methods described in Chapter III (Methods) to identify the CEs, their outcomes, and the words used to describe them. The nurses' descriptions of the CEs were captured in the post-call interviews. A total of 20 clinical events requiring physician notification were identified between both sites (Site A=10; Site B=10). The digital recordings were erased immediately after transcription. These clinical events, as defined by Carrington (2008) and identified in the nurse's own language, are summarized in Table 5 along with the frequency of occurrence.

TABLE 5. *Clinical Events*

Clinical Event Domains	**Clinical Event Reported**	**Frequency of Occurrence**
Pain	Pain in chest with palpitations	1
	Pain in abdomen	2
	Leg pain	2
	Lower extremity pain	2
	Back pain	1
	Chest pain	1
Fever	Fever	4
Bleeding	Laceration with bleeding	2
	Vaginal bleeding	1
Change in level of Consciousness	Change in mental status	2
Change in Output	Diarrhea	1
Change in Respiratory Status	Shortness of breath	1
Total		**20**

Words Used to Describe Clinical Events

Pain. Of the 20 clinical events reported, ***pain*** was the most frequently occurring (9 occurrences) CE. ***Abdominal pain*** occurred twice in these data, with both occurrences at Site B. Nurses used the following words to report this CE: *"severe abdominal pain and increased abdominal pain."* Additional associated symptoms reported to the physician included: *"last bowel movement 4 days ago, started on Oxycontin too, isolation for C.diff but no loose stools for the last 24 hours, has bowel sounds, small amount of emesis, and denies diarrhea."* Both of the residents experiencing these CEs were provided on-going treatment and monitoring at the nursing home.

Leg pain occurred twice in these data, both occurrences at Site A. Nurses used the following words to describe this CE: *"leg appears internally rotated and swollen, and resident has hip pain."* The only additional words used to describe associated symptoms of these CEs included: *"found on floor and resident experiencing pain and is grimacing."* Both of these residents were sent to the emergency room for evaluation.

Lower extremity pain was reported twice at Site A. One resident was described as having *"hip pain"* that had occurred on a previous occasion. The nurse further informed the physician that, *"The resident was in a great deal of pain and the x-ray technician showed me on the x-ray that the hip was dislocated."* Another resident was described as having *"leg pain and increased swelling in the leg."* Additional information provided to the physician was a test result demonstrating a deep vein thrombosis. Both of these residents were sent to the hospital for further evaluation and treatment.

The CE ***chest pain*** occurred once at Site A. The nurse used the following words to describe the CE: "*Resident is having chest pain on the left side of chest. Pain radiating down left arm."* Additional information provided included: *"she looks pale and she has never had pain like this."* This resident was sent to the emergency room.

The CE ***chest pain with heart palpitations*** occurred once in these data at Site B. The nurse used the following words to describe this CE: *"heart rate elevated to 90 and heart palpitations."* Additional supporting words used to further describe the event included: "*blood pressure elevated and resident demanding to be sent out to the hospital. She also has a history of a new pacemaker and has no chest pain."* This resident was transferred to the emergency room.

A resident at Site A experienced ***back pain*** after a fall. Key words during the phone call included: *"The resident is complaining of back pain after a fall and the resident is in so much pain she wanted to kill herself."* Both of these residents were sent to the hospital for evaluation.

Fever. The CE ***fever*** was the next most frequently occurring (4 occurrences) CE. Nurses used the following words to describe symptoms associated with fever including: "*flushed, temperature 101, elevated temp, and shivers, and resident complaining of chills."* Additional associated symptoms reported to the physician included: "*non-productive cough, short of breath, doesn't look good to me, lethargic, low blood pressure, burning on urination, low blood pressure and pulse oximetry, pulse 150, O2 sat 86, and on oxygen, and shaking, and pale."* Additional information provided by the nurse for one resident included that the resident *"had been found on the floor and had refused the breakfast meal."* Of the four CEs categorized as fever, treatment and further monitoring was provided at the nursing home for the two residents, while the other two residents were transferred to the hospital.

Bleeding. This CE occurred three times in these data, with occurrences in each of the sites. Nurses used the following words to report this CE: "*laceration left hand and small laceration on the forehead."* Additional associated symptoms reported to the physician included: *"fell and landed on arm, can't stop the bleeding, observed her on the floor, bumped head, neuro checks fine and range of motion normal, and bleeding stopped."* For these two reported CEs, one resident was transferred to the emergency room for subsequent care while the other resident obtained treatment and on-going monitoring at the nursing home. One resident at Site B experienced the ***bleeding*** from the vagina. The nurse reporting this CE described the event using these words: *"Resident bleeding from vagina for 2 days and the bleeding is very heavy."* The nurse also reported that the resident had "*no pain*." This resident was sent to the emergency room.

Change in mental status. The CE ***change in mental status*** was reported twice at Site B. Words used by the nurse to describe this CE included *"lethargic but responding to sternal rub and he's just not himself."* Additional symptom description contained the information: *"blood pressure 88/68, we held his medications, he is getting current treatment for a UTI and he had wounds too."* This resident was sent emergently to the hospital.

Another resident at Site B experienced a ***change in mental status*** secondary to hypoglycemia. Words used by the nurse during the phone communication included: *"blood sugar 62 and resident feels shaky."* Additional information provided to the physician included: "*OJ administered and blood sugar rechecked. Blood sugars trends have ranged from 60-76 at this same time of day. He is currently on 12 units of Lispro before meals. Appetite stable."* The

physician in response to this CE ordered treatment for ongoing monitoring and a reduction in the insulin dose.

Change in output. ***Diarrhea*** was reported for one resident at Site B along with updated laboratory results information. The words used to describe the CE included: *"continues to have diarrhea although decreased and is having mild abdominal pain."* Additional data provided during the call: *"PT/INR results 2.09, stool negative for c.diff, resident is eating and drinking."* Orders were given by the physician to continue to monitor the resident at the nursing home.

Change in respiratory status. This CE, represented by ***shortness of breath***, occurred once in these data at Site A. The nurse used the words *"short of breath and can't catch his breath"* to describe the CE during the phone call. Additional symptoms/assessment data provided included the presence of *"cough"* and *"resident has abnormal lung sounds."* Orders were given for this resident to receive new treatment and ongoing monitoring at the nursing home.

Table 6 summarizes the reported CEs by Site and treatment outcome (nursing home or hospital).

TABLE 6. *Clinical Events and Outcomes: Sites A and* B

Clinical Event Domains	Clinical Event Reported	Outcome Site A	Outcome Site B
Pain	Pain in chest with palpitations (1)		Hospital
	Pain in abdomen (2)		Nursing Home Nursing Home
	Leg pain (2)	Hospital Hospital	
	Lower extremity pain (2)	Hospital Hospital	
	Back pain (1)	Hospital	
	Chest pain (1)	Hospital	
Fever	Fever (4)	Nursing Home Hospital	Nursing Home Hospital
Bleeding	Laceration with bleeding (2) Vaginal bleeding (1)	Hospital	Nursing Home Hospital
Change in level of Consciousness	Change in mental status (2)		Hospital Nursing Home
Change in Output	Diarrhea (1)		Nursing Home
Change in Respiratory Status	Shortness of breath (1)	Nursing Home	
Total (*n*=20)		**10**	**10**

Analysis of Phone Calls: LIWC©

The transcribed text files for the recorded phone conversations were further analyzed using LIWC©. Data were prepared for analysis using LIWC© in the following manner. Text files were first cleaned according to program recommendations and then saved to Microsoft Word documents. The files were then analyzed by LIWC© software, wherein the text contained in the file were compared to the program's 85 internal dictionaries that contain 6,400 words. The comparison of the words contained in the text files to the program's dictionaries yielded numerous dimensions that categorized the words for further analysis. The summary variables, analytical thinking, clout, authenticity, and emotional tone, were added to the program in 2015 to provide a broader analysis of overall program results. The dimensions, reported in Table 8,

include four summary language variables, three general descriptor categories (words per sentence, percent of words greater than six letters), 21 linguistic dimensions (pronouns, verbs, etc.), 41 word categories tapping psychological constructs, six personal concerns, five informal language markers, and 12 punctuation categories. A detailed description of the summary variables and cognitive processes is further described in the next section.

For this data, the mean scores (represented as percentages of overall word count) were reported for each site and compared to the mean scores for the LIWC© dictionary. Results in dimensions marked by an asterisk are further detailed following Table 7. These results are summarized in Table 7.

TABLE 7. *LIWC© Output for Sites A and B Nurse-to-Physician Phone Calls*

LIWC© Dimension	**Output Label**	**LIWC© 2015 Mean**	**Result Site A**	**Result Site B**
Word Count	WC	11,921.82	1282	1051
Summary Variables				
Analytical thinking*	Analytic	56.34	49.07	44.45
Clout*	Clout	57.95	84.11	88.46
Authentic*	Authentic	49.17	5.62	1.52
Emotional tone*	Tone	54.22	29.69	56.31
Language Metrics				
Words per sentence	WPS	17.40	9.64	9.73
Words >6 letters	Sixltr	15.60	13.26	16.94
Dictionary words	Dic	85.18	82.29	77.83
Function Words	function	51.87	47.11	47.67
Total pronouns	pronoun	15.22	14.82	14.94
Personal pronouns	ppron	9.95	11.08	11.99
1st pers singular	i	4.99	2.26	2.00
1st pers plural	we	0.72	.94	0.67
2nd person	You	1.70	1.09	1.24
3rd pers singular	shehe	1.88	6.55	7.99
3rd pers plural	they	0.66	.23	0.10
Impersonal pronouns	ipron	5.26	3.74	2.95
Articles	article	6.51	4.29	3.90
Prepositions	prep	12.93	10.37	10.09
Auxiliary verbs	auxverb	8.53	9.52	10.75
Common adverbs	adverb	5.27	3.59	3.43
Conjunctions	conj	5.90	5.62	6.18
Negations	negate	1.66	1.95	1.14

TABLE 7 – *Continued*

LIWC© Dimension	Output Label	LIWC© 2015 Mean	Result Site A	Result Site B
Other Grammar				
Regular verbs	verb	16.44	17.16	16.37
Adjectives	adj	4.49	2.26	2.28
Comparatives	compare	2.23	0.78	0.95
Interrogatives	interrog	1.61	1.33	0.48
Numbers	number	2.12	2.57	4.57
Quantifiers	quant	2.02	1.33	0.86
Affect Words	affect	5.57	6.94	6.18
Positive emotion	posemo	3.67	3.59	3.90
Negative emotion	negemo	1.84	3.35	2.28
Anxiety	anx	0.31	0.62	0.57
Anger	anger	0.54	0.39	0.10
Sadness	sad	0.41	0.31	0.29
Social Words	social	9.74	14.51	15.03
Family	family	0.44	0.23	0.00
Friends	friend	0.36	0.00	0.00
Female referents	female	0.98	4.21	5.23
Male referents	male	1.65	2.34	2.76
Cognitive Processes*	cogproc	10.61	7.33	4.85
Insight	insight	2.16	1.01	0.95
Cause	cause	1.40	0.78	0.86
Discrepancies	discrep	1.44	1.17	0.67
Tentativeness	tentat	2.52	2.11	1.33
Certainty	certain	1.35	0.78	0.10
Differentiation	differ	2.99	2.34	1.81
Perceptual Processes	percept	2.70	3.82	2.57
Seeing	see	1.08	1.40	0.76
Hearing	hear	0.83	0.94	0.29
Feeling	feel	0.64	1.48	1.14
Biological processes	bio	2.03	9.36	9.51
Body	body	0.69	3.04	3.14
Health/illness	health	0.59	6.16	5.71
Sexuality	sexual	0.13	0.00	0.10
Ingesting	ingest	0.57	0.31	1.24
Drives and Needs	drives	6.93	5.23	4.57
Affiliation	affiliation	2.05	1.87	1.62
Achievement	achieve	1.30	0.31	0.19
Power	power	2.35	2.11	2.00
Reward focus	reward	1.46	0.86	0.67
Risk focus	risk	0.47	0.39	0.10
Time Orientation				
Past focus	focuspast	4.64	4.37	3.04
Present focus	focuspresent	9.96	11.93	12.94
Future focus	focusfuture	1.42	0.78	0.86

TABLE 7 – *Continued*

LIWC© Dimension	Output Label	LIWC© 2015 Mean	Result Site A	Result Site B
Relativity	relativ	14.26	13.57	11.80
Motion	motion	2.15	2.42	1.71
Space	space	6.89	7.10	5.14
Time	time	5.46	4.21	5.23
Personal Concerns				
Work	work	2.56	1.40	0.76
Leisure	leisure	1.35	0.31	0.38
Home	home	0.55	1.64	1.05
Money	money	0.68	0.00	0.00
Religion	relig	0.28	0.00	0.00
Death	death	0.16	0.23	0.00
Informal Speech	informal	2.52	2.96	2.09
Swear words	swear	0.21	0.00	0.00
Netspeak	netspeak	0.97	0.39	0.00
Assent	assent	0.95	1.56	1.62
Nonfluencies	nonfl	0.54	1.01	0.38
Fillers	filler	0.11	0.08	0.10
All Punctuation	Allpunc	21.35	21.14	21.12
Periods	Period	7.49	10.84	12.18
Commas	Comma	4.75	2.11	1.43
Colons	Colon	0.64	3.20	3.71
Semicolons	SemiC	0.30	0.00	0.00
Question marks	QMark	0.58	1.79	0.86
Exclamation marks	Exclam	1.00	0.00	0.00
Dashes	Dash	1.19	0.86	0.01
Quotation marks	Quote	1.67	0.00	0.00
Apostrophes	Apostro	2.46	1.79	1.33
Parentheses	Parenth	0.53	0.16	0.19
Other punctuation	OtherP	0.73	0.39	1.33

* Dimensions labeled with asterisk will be further explained in next section.

Analysis of LIWC© Output

The results of the comparison of the words used in the nurses' phone conversations against the LIWC© means demonstrated some key differences in the following dimensions: analytic thinking, clout, authenticity, emotional tone, and cognitive processes. A sub-analysis of these dimensions was performed using the Wilcoxon sign-rank test to compare the results of these five dimensions to the LIWC© mean as well as a comparison between Sites A and B using the Mann-Whitney rank-sum test. Significance was set at $p < .05$. The results of the sub-analysis are contained in Table 8.

TABLE 8. *Descriptive Statistics and Comparisons of Five LIWC© Features from Calls by Site*.

		Site A			Site B			
	LIWC2015 Mean	median (range)	mean (sd)	p-val*	median (range)	mean (sd)	p-val**	p-val***
Analytical thinking	56.34	62.9 (12.0, 87.3)	53.7 (28.6)	0.721	37.8 (19.5, 91.9)	43.9 (24.8)	0.169	0.597
Clout	57.95	83.0 (63.7, 97.8)	82.0 (11.5)	**0.005**	85.8 (74.2, 98.6)	86.0 (8.21)	**0.005**	0.450
Authentic	49.17	3.9 (1.0, 81.2)	17.3 (26.4)	**0.013**	1.0 (1.0, 11.8)	3.6 (4.1)	**0.004**	0.064
Emotional Tone	54.22	25.8 (1.0, 85.4)	35.3 (28.9)	0.074	62.8 (4.6, 99.0)	56.0 (34.4)	0.799	0.226
Cognitive Processes	10.61	6.2 (2.1, 13.2)	7.2 (5.0)	**0.037**	4.8 (1.3, 8.1)	4.7 (2.4)	**0.005**	0.174

*For comparison of Site A to LIWC2015 mean; Wilcoxon sign-rank test
**For comparison of Site B to LIWC2015 mean; Wilcoxon sign-rank test
***For comparison of Site A to Site B; Mann-Whitney rank-sum test

The mean scores for ***analytic thinking*** reported in Table 8 were lower for Sites A (49.07) and Site B (44.45) compared to the program mean. A Wilcoxon Signed-ranks test indicated no statistically significant differences between Sites A (Mdn = 62.9, P = .721) and Site B (Mdn = 37.8, P = .169) from the program mean. The ***analytic thinking*** dimension describes the degree to which the nurses used words that suggested logical, formal, and hierarchical thinking patterns. Lower scores indicate a more informal or personal thinking, a result expected in the communication of clinical data regarding resident change in condition. These phone communications were mainly focused on a reporting of a situation, rather than the nurses' views, opinions, or even an analysis of the clinical event. There were no statistically significant differences between the two sites when compared to each other.

Statistically significant differences from the program mean were observed in both Sites A (84.11) and B (88.46) for the dimension ***clout.*** Clout can refer to social status, confidence, and/or leadership that are expressed in speaking or writing. A Wilcoxon Signed-ranks test indicated scores for Site A (Mdn =82, *P* = .005) and Site B (Mdn =86, *P*= *.005*) were significantly higher

(and similar) than the LIWC© mean (57.95). Higher scores for this dimension indicate confidence and expertise in speech, wherein lower scores reflect a tentative or humble speaking style. There were no statistically significant differences between the two sites when comparing Sites A and B.

Significantly lower scores were observed for both sites (A 5.62, B 1.52) for the dimension ***authentic***, which reflects how nurses reveled themselves in an honest or candid manner. A Wilcoxon Signed-ranks test showed the median results and p-values for Site A (3.9, *P*= .013) and Site B (1.0, *P* = .004) were statistically different to the program. Lower scores in this sample do not suggest that the nurses were dishonest. According to Pennebaker et al., (2007) people who are authentic tend to use more I-words (e.g. I, me, mine), present-tense verbs, and relativity words (e.g. near, new) and fewer she-he words (e.g. his, her) and discrepancies (e.g. should, could). The low scores for this dimension would be expected given the nurses reporting details of an event that has occurred concerning a nursing home resident, i.e. someone other than themselves. There were no statistically significant differences between the two sites when compared to each other.

The dimension ***emotional tone*** describes the degree of emotionality or ambivalence detected in speech. The mean scores resulting from the program analysis resulted in a lower score for Site A (29.69) and a higher score for Site B (56.31) compared to the LIWC© mean (54.22). A Wilcoxon Signed-ranks test showed the median results and p-values for Site A (Mdn = 25.8, *P* = .074) and Site B (Mdn = 62.8, *P* = .799). While these results are not statistically significant, the lower or higher scores reflect the types of words the nurses used to describe the clinical event, rather than emotion words (positive or negative) spoken about their own

experiences. There were no statistically significant differences between the two sites when compared to each other.

The dimension ***cognitive processes*** include numerous sub-dimensions such as insight, cause, discrepancies, tentativeness, certainty, and differentiation. Mean scores for Site A (7.33) and Site B (4.85) fell slightly below the program mean (10.61). A Wilcoxon Signed-ranks test showed the median results and p-values for Site A (6.2, $P = .037$) and Site B (4.8, $P = .005$). These results suggested that the nurses did not consistently demonstrate cognitive processes in their observations and reflections of the nursing home residents during the phone calls. While these calls were brief, the content did not indicate a high degree of nurses conveying cause-effect analysis and/or language indicative of decision-making for the clinical events. There were no statistically significant differences between the two sites when compared to each other.

Nurse Interviews

As described in Chapter III, nurses were interviewed following the recording of the phone conversations with physicians pertaining to clinical events. The following section reports the data derived from these interviews.

Categories, Subcategories and Thematic Units

The researcher transcribed nurse interviews from both sites verbatim. Data were organized and stored in Excel spreadsheets. Data were sorted or categorized by the researcher using conventional content analysis inductive methods as described in Chapter III. Interviews were coded separately by the researcher and two dissertation committee members and then compared for level of agreement (Miles & Huberman, 1994; Saldana, 2009). The initial coding

agreement was 90%. An intercoder reliability of 95% was achieved after the data analysis had been completed.

Three hundred and six (306) statements emerged from the data and were organized into six categories/themes that were further organized into subcategories. The six categories regarding communication that achieved adequate intercoder reliability included Communication Trigger, Goals of Communication, Charting Communication, Barriers of the Written Record, Utility of the Chart, and Barriers to Communication. A detailed description including the definition of each category, sub-themes, number of nurses who provided statements pertaining to each category and exemplar statements is provided in the following section.

Communication Trigger

The category Communication Trigger (Table 9) was defined as the cause of (the clinical event) that prompted phone communication by the nurse to the physician. This category included four themes: event detected by nursing assistant, resident request for hospitalization, event detected through nursing assessment, and emergency situation. This category included 72 statements with all 20 participants providing information.

TABLE 9. *Communication Trigger*

Category and Theme	Definition	Exemplar Statement
Communication Trigger 72 statements 20 participants	The cause of the clinical event that prompted communication	
Event detected by nursing assistant (n=35)	Signs and symptoms of CE detected by aide and reported to nurse	*The aide came to me and said the resident did not come down to breakfast and while delivering tray she noticed resident didn't look right*

TABLE 9 – *Continued*

Category and Theme	Definition	Exemplar Statement
Nursing assessment triggered (n=20)	Nursing assessment determined need for further action	*So I went to assess the resident including taking vital signs and then went quickly to call the doctor*
Emergency situation (n=9)	Resident's request superseded assessment by nurse	*She said please send me to the hospital*

Goals of Communication

The category Goals of Communication (Table 10) was defined as the intended action resulting from the nurse's perspective of the phone communication. This category included four themes: Wanting something done (action), figuring out what to do (collaboration), and simply reporting what happened (conveying facts). This category included 54 statements with all 20 participants providing information.

TABLE 10. *Goals of Communication*

Category and Theme	Definition	Exemplar Statement
Goals of Communication 54 statements 20 participants	Intended action resulting from call	
Wanting something done (n=32)	Nurse wanting action from physician regarding care	*The goal of the call? To get something done because the resident didn't look good at all*
Figuring out what to do (n=12)	Action determined through collaborative effort with physician	*My goal was to what had occurred since he had been called already and try figure out together what to do*
Reporting what happened (n=10)	No specific goal identified, conveying facts	*My goal was to alert the physician of the test results*

Charting Communication

The category Charting Communication (Table 11) was defined as how the nurse captured the details of the communication of the clinical event in the medical record (both electronic and paper chart). This category included two themes: same as the phone call and description of CE

plus clinical data. This category included 27 statements with all 20 participants providing information.

TABLE 11. *Charting Communication*

Category and Theme	Definition	Exemplar Statement
Charting Communication 27 statements 20 participants	How the phone call is memorialized in chart	
Same as the phone call (n=15)	Details of call and written note are the same	*Same thing I told the doc I guess. It's all the same information*
Clinical data and CE (n=12)	Details of CE with additional clinical data	*I charted what was happening plus the vitals sighs, the doctor's orders, my assessment, and the time the resident left the facility*

Barriers of the Written Record

The category Barriers of the Written Record (Table 12) was defined as obstacles that nurses identified to capturing the CE in the medical record. This category included 4 themes: limits of technology, time constraints, redundancy, and details lost. This category included 47 statements with all 20 participants providing information.

TABLE 12. *Barriers of the Written Record*

Category and Theme	Definition	Exemplar Statement
Barriers of the Written Record 47 statements 20 participants	Obstacles to capturing details of CE in record	
Limits of technology (n=25)	Obstacle cause by technology	*Nothing difficult but sometimes the system is slow and this is frustrating when you want to get to the chard*
Time constraints (n=8)	Time consuming to chart details of CE	*Just time consuming and I think I charted later in the shift. You can't really do both at the same time even if we should*

TABLE 12 – *Continued*

Category and Theme	Definition	Exemplar Statement
Redundancy (n=8)	Verbal and written communication of CE superfluous	*Charting takes so much time and is redundant, slow. I hate charting*
Details lost (n=8)	Details of CE lost when charting done after the fact	*But charting happens later and maybe details are lost. We don't always chart exactly what the doc says*

Utility of the Chart

The category Utility of Chart (Table 13) was defined as how the usefulness of the chart was described by the nurses. This category included three themes: source of information, facilitator of communication, and limited benefit. This category included 92 statements with all 20 participants providing information.

TABLE 13. *Utility of the Chart*

Category and Theme	Definition	Exemplar Statement
Utility of the Chart 92 statements 20 participants	The usefulness of the medical record	
Source of information (n=53)	The chart contains information that is necessary for phone communication	*The strengths? Well the chart can give you good information to use before you make the phone call. You know the doc is going to ask for it*
Facilitates communication (n=24)	Information in chart facilitates verbal communication	*Using the chart before making the phone call helps communication go more smoothly*
Limited benefit (n=15)	Chart does not facilitate communication	*Sometimes the information is not there or we can't find it fast enough before we call the doctor*

Barriers to Communication

The category Barriers to Communication (Table 14) is defined as obstacles described by nurses in communicating CEs. This category included two themes: lack of time and physician attitude. This category included 14 statements with all 20 participants providing information.

TABLE 14. *Barriers to Communication*

Category and Theme	Definition	Exemplar Statement
Barriers to Communication 14 statements 20 participants	Obstacles to communicating the CE	
Lack of time (n=9)	Brevity of phone calls	*The calls are often quick and we don't get a chance to shart all of the assessment details*
Physician attitude (n=5)	Attitude deterrent to good communication	*Some of the doctors can be abrupt and impatient if you don't have all the information right away. Sometimes they slap the phone down*

Analysis of Nurse Interviews: LIWC©

An analysis of the text data derived from the nurse interviews was conducted. Output generated from analysis using LIWC© is contained in Table 15. A sub-analysis of these dimensions was performed using the Wilcoxon sign-rank test to compare the results of these five dimensions to the LIWC© mean as well as a comparison between Sites A and B using the Mann-Whitney rank-sum test. Descriptive statistics and comparisons of five LIWC© dimensions are shown in Table 16.

TABLE 15. *LIWC© Output for Sites A and B Nurse Interviews*

LIWC© Dimension	Output Label	LIWC© 2015 Mean	Result Site A	Result Site B
Word Count	WC	11,921.82	4459	4952
Summary Variables				
Analytical thinking*	Analytic	56.34	48.92	40.61
Clout*	Clout	57.95	49.91	59.33
Authentic*	Authentic	49.17	45.05	38.61
Emotional tone*	Tone	54.22	28.38	37.94
Language Metrics				
Words per sentence	WPS	17.40	14.11	13.72
Words >6 letters	Sixltr	15.60	17.00	16.30
Dictionary words	Dic	85.18	91.88	92.04
Function Words	function	51.87	58.71	59.75
Total pronouns	pronoun	15.22	15.77	16.42
Personal pronouns	ppron	9.95	9.22	9.69
1st pers singular	i	4.99	4.75	4.36
1st pers plural	we	0.72	1.53	0.81
2nd person	You	1.70	0.54	1.96
3rd pers singular	shehe	1.88	1.95	1.94
3rd pers plural	they	0.66	0.45	0.63
Impersonal pronouns	ipron	5.26	6.55	6.72
Articles	article	6.51	9.17	9.43
Prepositions	prep	12.93	11.50	10.46
Auxiliary verbs	auxverb	8.53	10.92	11.59
Common adverbs	adverb	5.27	5.14	4.85
Conjunctions	conj	5.90	7.13	8.48
Negations	negate	1.66	2.60	2.38
Other Grammar				
Regular verbs	verb	16.44	21.42	20.94
Adjectives	adj	4.49	3.59	3.38
Comparatives	compare	2.23	2.51	2.87
Interrogatives	interrog	1.61	2.09	1.66
Numbers	number	2.12	0.31	0.30
Affect Words	affect	5.57	4.15	4.16
Positive emotion	posemo	3.67	2.13	2.42
Negative emotion	negemo	1.84	1.97	1.74
Anxiety	anx	0.31	0.18	0.12
Anger	anger	0.54	0.11	0.10
Sadness	sad	0.41	0.22	0.40
Social Words	social	9.74	9.69	11.11
Family	family	0.44	0.07	0.10
Friends	friend	0.36	0.02	0.08
Female referents	female	0.98	1.35	0.95
Male referents	male	1.65	0.61	0.99

TABLE 15 – *Continued*

LIWC© Dimension	Output Label	LIWC© 2015 Mean	Result Site A	Result Site B
Cognitive Processes*	cogproc	10.61	17.04	16.30
Insight	insight	2.16	3.88	3.98
Cause	cause	1.40	2.29	2.34
Discrepancies	discrep	1.44	2.56	2.54
Tentativeness	tentat	2.52	4.24	4.30
Certainty	certain	1.35	1.97	1.45
Differentiation	differ	2.99	4.42	4.77
Perceptual Processes	percept	2.70	2.51	2.18
Seeing	see	1.08	0.90	0.97
Hearing	hear	0.83	0.72	0.71
Feeling	feel	0.64	0.90	0.40
Biological Processes	bio	2.03	4.28	4.08
Body	body	0.69	0.90	0.57
Health/illness	health	0.59	3.45	3.39
Sexuality	sexual	0.13	0.00	0.00
Ingesting	ingest	0.57	0.04	0.18
Drives and Needs	drives	6.93	7.40	7.43
Affiliation	affiliation	2.05	2.74	2.04
Achievement	achieve	1.30	1.17	0.87
Power	power	2.35	2.20	2.97
Reward focus	reward	1.46	1.50	1.70
Risk focus	risk	0.47	0.63	0.75
Time Orientation				
Past focus	focuspast	4.64	9.26	7.05
Present focus	focuspresent	9.96	10.34	12.52
Future focus	focusfuture	1.42	0.72	1.45
Relativity	relativ	14.26	11.71	10.64
Motion	motion	2.15	2.38	2.12
Space	space	6.89	4.19	3.92
Time	time	5.46	5.34	5.15
Personal Concerns				
Work	work	2.56	2.42	2.38
Leisure	leisure	1.35	0.09	0.20
Home	home	0.55	1.59	0.83
Money	money	0.68	0.02	0.00
Religion	relig	0.28	0.00	0.00
Death	death	0.16	0.04	0.00
Informal Speech	informal	2.52	0.29	0.38
Swear words	swear	0.21	0.00	0.00
Netspeak	netspeak	0.97	0.07	0.00
Assent	assent	0.95	0.04	0.04
Nonfluencies	nonfl	0.54	0.18	0.32
Fillers	filler	0.11	0.00	0.02

TABLE 15 – *Continued*

LIWC© Dimension	Output Label	LIWC© 2015 Mean	Result Site A	Result Site B
All Punctuation	Allpunc	21.35	11.48	11.23
Periods	Period	7.49	7.04	7.09
Commas	Comma	4.75	1.93	1.92
Colons	Colon	0.64	0.02	0.06
Semicolons	SemiC	0.30	0.00	0.00
Question marks	QMark	0.58	0.07	0.28
Exclamation marks	Exclam	1.00	0.02	0.04
Dashes	Dash	1.19	0.43	0.06
Quotation marks	Quote	1.67	0.16	0.04
Apostrophes	Apostro	2.46	1.68	1.66
Parentheses	Parenth	0.53	0.00	0.00
Other punctuation	OtherP	0.73	0.13	0.08

* Dimensions labeled with asterisk will be further explained in next section.

Analysis of LIWC© Output

The mean scores for ***analytic thinking*** reported in LIWC© output were lower for Sites A (48.92) and Site B (40.61) compared to the program mean (56.34). A Wilcoxon Signed-ranks test showed no statistically significant difference from the program mean with Site A (Mdn = 41.0, *P* = .444). There was a statistically significant difference with Site B (Mdn = 44.5, *P* = .008). This result reflects the nature of the interview questions, with more of a focus on personal beliefs, opinions, and perspectives rather than more formal and hierarchical thinking patterns. There were no statistically significant differences between the two sites when compared to each other.

No significant differences from the program mean (57.95) were observed for both Sites A (49.91) and B (59.33) for the dimension ***clout***. A Wilcoxon Signed-ranks test showed scores for Site A (Mdn =51.2, *P* = .059) and Site B (Mdn =54.2, *P*= .678). Lower clout scores (although fairly close to the program mean) could reflect a lower level of confidence regarding the subject matter or a more humble style. Lower scores may also correlate to the nurses' views on communication with physicians, barriers to communication, and/or perspectives on the utility of

the medical record, revealing a level of concern or anxiety. There were no statistically significant differences between the two sites when compared to each other.

TABLE 16. *Descriptive Statistics and Comparisons of Five LIWC© Features from Interviews by Site.*

		Site A			Site B			
	LIWC2015 Mean	median (range)	mean (sd)	p-val*	median (range)	mean (sd)	p-val**	p-val***
Analytical thinking	56.34	41.0 (28.2, 87.8)	49.6 (21.7)	0.444	44.5 (25.7, 54.3)	41.5 (10.3)	**0.008**	0.744
Clout	57.95	51.2 (27.0, 69.5)	50.5 (11.9)	0.059	54.2 (50.0, 68.0)	59.0 (6.13)	0.678	0.086
Authentic	49.17	47.4 (9.28, 58.1)	45.0 (21.8)	0.508	43.0 (22.0, 68.2)	39.8 (15.9)	0.086	0.462
Emotional Tone	54.22	29.2 (2.5, 64.5)	31.8 (18.1)	**0.009**	34.9 (5.8, 79.1)	40.5 (26.2)	0.110	0.438
Cognitive Processes	10.61	18.0 (9.2, 21.2)	17.0 (3.2)	**0.007**	16.8 (12.4, 18.4)	16.2 (1.97)	**0.008**	0.121

*For comparison of Site A to LIWC2015 mean; Wilcoxon sign-rank test
**For comparison of Site B to LIWC2015 mean; Wilcoxon sign-rank test
***For comparison of Site A to Site B; Mann-Whitney rank-sum test

Lower scores were observed for both sites (A 45.05, B 38.61) for the dimension ***authentic***, which reflects how nurses reveled themselves in an honest or candid manner (LIWC© mean 49.17). A Wilcoxon Signed-ranks test showed the median results and p-values for Site A (47.4, *P*= .508) and Site B (43.0, *P* = .086), showing no significant differences between sites compared to the program mean. Lower scores in this dimension (especially for Site B) may reflect that nurses were not completely candid in their reflections on communicating with physicians, their independent recollection of what they document in the medical record pertaining to clinical events, and/or what they perceive as barriers to communication. An observation made by the researcher during these recorded interviews was that the nurses appeared somewhat guarded in answering the questions, especially questions pertaining to how they communicate with physicians and how documentation occurs relative to the clinical event. Higher scores or scores near the mean would have been expected given that the nurses were

speaking about their own experiences in the first person. There were no statistically significant differences between the two sites when compared to each other.

The dimension ***emotional tone*** describes the degree of emotionality or ambivalence detected in speech. The mean scores resulting from the program analysis resulted in a lower scores for Site A (28.38) and Site B (37.94) compared to the LIWC© mean (54.22). A Wilcoxon Signed-ranks test showed the median results and p-values for Site A (Mdn = 29.2, *P* = .009) and Site B (Mdn = 34.9, *P* = .110). The statistically significantly lower scores for Site A reflected a distinct lack of emotion with respect to their responses to the interview questions. This result may also reflect the turmoil and uncertainty that many of the nurses described regarding the administrative changes in the building. Additionally, the lack of detail in the nurses' responses to interview questions from Site A compared to Site B is reflected in this dimension. There were no statistically significant differences between the two sites when compared to each other.

Mean scores for the dimension ***cognitive processes*** for Site A (17.04) and Site B (16.30) were well above the program mean (10.61). A Wilcoxon Signed-ranks test showed the median results and p-values for Site A (18.0, *P* = .007) and Site B (16.8, *P* = .008). These results suggest that the nurses consistently demonstrated the ability to describe cause and effect and provide insight to issues pertaining to verbal and written documentation of clinical events. They were also able to clearly describe the clinical events and their experiences with communication with a higher level of certainty and insight, correlating to lower scores for emotional tone and affect words. There were no statistically significant differences between the two sites when compared to each other.

Physician Interviews

Three physicians provided responses to interview questions following completion of data collection. Two physicians were board certified in both internal and geriatric medicine. The mean number of years in practice was approximately 17. One physician was from Site A; the other two were from Site B. All three physicians had established office practices separate from their duties at the respective nursing homes.

The physicians were asked questions pertaining to the communication of clinical events by nurses at the nursing homes, examples of "good" and "poor" communication, barriers to communication, and whether or not the EHR was available for use and/or the utility of the EHR to support communication of clinical events. All three physicians described a recent communication of a clinical event as well as the outcome for the resident. The physician from Site A recalled the following: *"Most recently yesterday we had a patient that became hypoglycemic and lethargic. We ordered a Glucagon injection and labs for the morning and we were watching and waiting to see how she does."* Regarding how nurses communicate these events he stated, "*That's the basis of the relationship with the nurses, when the nurse calls us…what are they saying, what do they know and what don't they know, how anxious do they feel, is their voice trembling, do they sound incompetent or are they competent but are not prepared for the phone call, they have to get this or that…well that makes the communication of the event difficult."*

The physicians from Site B also recalled clinical events requiring communication from the nurse. One CE involved a resident who had fallen out of bed. "*The nurse called about a patient who was here for a hip fracture that had been surgically repaired, now had fallen out of*

bed. The nurse said she went back in the room and the resident stated he wanted to go to the hospital. I don't think they even bothered to get him off the floor due to the pain." Another CE was described by the other physician wherein, "*I had a patient with obstructive lung disease and heart failure and his breathing was labored in the middle of the night and um I was called and the patient was transferred to the ER and is now on a ventilator."*

The physicians from Site B described specific barriers to communication including nurses' lack of knowledge regarding previous lab studies, lack of confidence, and lack of organization of information (Site B). One physician (Site B) stated that the phone system was a barrier where calls are routed through a prompt system causing "*a delay in communication*." This same physician stated that RNs provide a more comprehensive evaluation of the patient and the situation as compared to LPNs. The physician from Site A did not describe any barriers in communication.

Examples of good communication included when the nurse knew details of the resident's medical history and the reporting of physical assessment findings, when the nurse gives a "guestimation" as to what is happening with the resident, and when there is a collaborative effort to problem solve between the nurse and the physician (Site B). One physician stated, "*I was very impressed that they knew the entire medical history and series of events which led to them calling me."* Regarding collaboration the physician stated, "*I think it is a good idea because it forces nurses to start thinking at the next level and it spurs them on to gather information they might need."* The physician from Site A stated that good communication occurs when the nurse "*has confidence in her voice, starts with the basic facts, and having knowledge of the relevant facts before the call is initiated. Using SBAR makes a huge difference if they use it."*

Poor communication results from the nurse not knowing lab values that were recently drawn and when the nurse does not know information, described by this physician as the "*whisper down the lane mentality*" (Site B). While the physician from Site A did not describe barriers to communication he did note that poor communication results from the nurse not knowing important details, which "*happens 90% of the time*." The components of verbal communication that were most critical to determining action for the resident included: "*Confidence in what they are saying. To me a good nurse knows what she wants when she is calling. She is not calling so much for questions as she is calling for permission"* (Site A) The physicians form Site B described the following as key to decision-making: *"Well basically everything! The depth of the clinical assessment helps you in terms of your comfort level and vital signs because these are objective measures so they can't be distorted."* The other physician emphasized the importance of collaboration with the nurses, stating, "*Well it means a lot if the nurse is I would say sure in her convictions. Sometimes I rely on the nurses if I am absent to make the diagnosis and many times they are correct in their assessment. So I value that very much."*

Lastly, the physicians were asked if and how they utilize the EHR to access clinical information pertaining to residents. Contrasting views of the utility of the EHR emerged. The physician from Site A (where the EHR has not been adopted yet) stated, "*I don't ever want access to the EHR at home. I am expecting them (nurses) to know the basic information and we address it, because I think that is good nursing care. That the nurse knows and puts together and assimilates and presents the proper case to the physician the same way a medical student would. Even if we had access, I wouldn't use it."* In contrast, the physicians from Site B routinely used

the EHR on and off-site to access critical clinical information. Both stated they use it during phone calls with nurses if time allows. One stated, *"I use the EHR to look at meds, vitals signs, nursing notes. The only thing that is not there are the consults."* The other physician added, "*I can access the chart remotely and it is very helpful to refresh my mind about a patient. I even look at social work notes. I use the chart a lot. I also use the chart for my own communication with the ER physicians, and the docs are very grateful that I call them ahead of time so they know what they are up against."*

Answering the Research Questions

Research Question 1

What are the words that nurses use to communicate clinical events to physicians in the nursing home setting?

The words that nurses used to describe clinical events were captured in digitally recorded phone conversations between nurses and physicians. Specific words were extracted from the transcribed text files and then analyzed using conventional content analysis and NLP. The specific words derived from these phone recordings are summarized in Table 17.

TABLE 17. *Clinical Events, Outcomes and Key Words: Sites A and B.*

Site A: Clinical Events	Outcome	Key Words
Fall with leg pain	Sent to hospital	• *Found on floor* • *Leg appears internally rotated and swollen* • *Pain and grimacing*
Hip Pain	Sent to hospital	• *Pain in hip* • *X-ray abnormal* • *Hip dislocated*
Leg pain	Sent to hospital	• *Found on floor* • *Hip pain*
Fever	Treatment at nursing home	• *Short of breath* • *Non-productive cough* • *Wheezing and crackles in bases* • *Flushed* • *Temp 101*

TABLE 17 – *Continued*

Site A: Clinical Events	**Outcome**	**Key Words**
Back pain	Sent to hospital	• *Complaining of back pain* • *Wants to kill herself*
Fever/chills	Sent to hospital	• *Complaining of chills* • *Found on floor* • *Shaking* • *Pale* • *Refused meal*
Laceration with bleeding	Sent to hospital	• *Fell and landed on arm* • *Laceration left hand* • *Can't stop bleeding*
Leg pain and swelling	Sent to hospital	• *Leg pain* • *Swelling in leg* • *Abnormal test results*
Shortness of breath	Treatment at nursing home	• *Cough* • *Short of breath* • *Can't catch breath* • *Oxygen not helping* • *Abnormal lung sounds*
Chest pain	Sent to hospital	• *Chest pain left side* • *Radiating down arm* • *Looks pale* • *Never had pain like this*
Site B: Clinical Event	**Outcome**	**Key Words**
Fever	Physician to assess at nursing home	• *Doesn't look good to me* • *Lethargic* • *Elevated temp* • *Low blood pressure* • *Low pulse oximetry* • *Burning on urination*
Chest pain/heart palpitations	Sent to hospital	• *Blood pressure elevated* • *Heart rate elevated* • *Heart palpitations* • *Demanding to be sent out*
Abdominal pain	Treatment at nursing home	• *Severe abdominal pain* • *Last bowel movement 4 days ago* • *Started on Oxycontin too*
Fever	Sent to hospital	• *Doesn't look good* • *Elevated temp* • *Pulse 150* • *O2 sat 86* • *On oxygen* • *Shivers*

TABLE 17 – *Continued*

Site B: Clinical Event	Outcome	Key Words
Change in mental status	Sent to hospital	• *He's just not himself* • *Blood pressure 88/68* • *We held meds* • *Current treatment for UTI* • *Wounds* • *Lethargic but responding to sternal rub*
Change in mental status/hypoglycemia	Treatment at nursing home	• *Blood sugar 62* • *Feels shaky* • *OJ administered* • *Blood sugar rechecked* • *Blood sugar trends have ranged 60-76 same time of day*
Abdominal pain	Treatment at nursing home	• *Increased abdominal pain* • *Isolation for c.diff but no loose stools for 24 hours* • *Has bowel sounds* • *Small amount of emesis* • *Denies nausea*
Diarrhea	Treatment at nursing home	• *PT/INR results 2.09* • *Stool negative for c.diff* • *Continues to have diarrhea although decreased* • *Eating and drinking* • *Mild abdominal pain*
Laceration with bleeding	Treatment at nursing home	• *Observed her on floor* • *Bumped head* • *Range of motion normal* • *Neuro checks fine* • *Small laceration forehead* • *Bleeding stopped*
Vaginal bleeding	Sent to hospital	• *Bleeding from vagina for 2 days* • *Bleeding heavy* • *No pain*

Analysis of these conversations as well as answers derived from both nurse and physician interviews, indicated that the manner by which nurses communicate CEs and the words that are used influences the clinical decision-making by physicians. The word *pain* occurred eight (8) times followed by other general physical descriptors including *lethargic, pale, and doesn't look good.* Specific words used to describe system abnormalities included: *bleeding from forehead, hand, vagina; shortness of breath, chest pain, palpitations, and leg swelling/deformity; vital sign*

abnormalities, meal refusal, and wanting to kill themselves. The nurses were able to recall with great detail these clinical events and the purpose of communicating resident-specific findings to the physician.

Further analysis of these words using NLP exposed more about the words that were chosen by the nurses. Clout scores for both sites were higher with statistical significance. This result demonstrated that the words that nurses used to convey information pertaining to the clinical events were conveyed with confidence and expertise. This result is aligned with what nurses stated was the intended reason for the communication, that is, to respond to what triggered the clinical event, communicate findings, and anticipate an outcome. The NLP analysis also revealed that the words chosen by the nurses were lower in authenticity, emotional tone, and cognitive processes, which would be expected given the intended reason for the call. As many of the nurses described, the overarching goal of the phone communication was "to get something done."

Although physicians were not asked specifically about the words that nurses use to describe clinical events, narratives from all three shared the opinion that detail in description and confidence in how the message is conveyed is likely the best predictor of the success of the phone communication, or how physicians characterize "good" communication. Additionally, conclusions regarding the outcome of the clinical event (hospital transfer versus nursing home treatment) based on the words used to describe the clinical event should be cautiously considered within the context of the specific event and/or other resident-specific factors. All three physicians stated that the decision to hospitalize versus treatment at the nursing home was contingent on numerous factors including resident preference, stability of condition, other influencing co-

morbid conditions, the ability of the nursing home to manage an unstable resident, and the physician's confidence in the details of the nurse's assessment and ability to convey this information in the phone communication. The barriers to the communication process that would enable a nurse to convey assessments of clinical events with confidence and clarity will be discussed in the next section.

In summary, the researcher sought to identify and analyze the words that nurses use to describe clinical events in the nursing home setting. Although the words that these study participants used to describe clinical events are not unique to the nursing home setting, the types of words coupled with the nurse's ability to convey detail and confidence influenced the physicians' perceptions of the quality of the phone call and their own confidence in decision-making regarding treatment. The success of the communication is critical in the nursing home setting where, as one physician described, the nurses "are here much more than the doctors on site and they know the residents. I rely on them."

Research Question 2

What are the nurses' perceptions of communication with physicians when a nursing home resident experiences a clinical event?

The factors influencing communication in this setting included time constraints, lack of nursing skill in assessment and data collection, physician attitude, and inability of the nurse to locate and organize important clinical data before making the phone call. Similar themes emerged regarding communication barriers in this study as well as positive perceptions and solutions to improve communication.

With regard to the specific communications regarding the clinical events identified in this study, the majority of nurses characterized the phone communication as successful with no specific problems identified. However, the majority of nurses from both sites identified potential barriers to communication that they had either already experienced in past communications or identified as potential problems for future communications. The major area of concern for nurses was the lack of time for collecting clinical data prior to the phone call and the brevity of the phone calls, providing a less than ideal opportunity to effectively convey key clinical data. Two themes emerged from the data regarding barriers to communication: brevity of the phone calls and physician attitude. (See Table 14 for number of statements for each theme.)

Many nurses cited brevity of the phone call as creating a possible barrier to effective communication when coupled with the need to collect information from the chart (either written or EHR) prior to the phone call. One nurse stated, "*Sometimes I can't find what I need in the chart fast and the doctor is asking questions and I have to look for the information*" while another regarding the actual call stated, "*I felt like I had a lot of information to tell him and sometimes I feel rushed."* Most nurses described the time for the actual calls as an opportunity "*to hit the high points*" and, as many of the nurses described, the goal of the phone call was to concisely describe "*what was going on*" in order to "*get something done*." The well-cited issue of lack of time for phone communication has forced nurses to develop strategies to facilitate communication. In both sites, the nurses emphasized the importance of being prepared and that nursing experience, confidence, preparation, and knowing what to say were all factors that influenced communication.

While there were no reported examples of poor communication, many nurses cited the potential for sub-optimal communication due to physician attitude. Several described physicians as "*being abrupt*" or "*rude*" during phone calls with one nurse stating, "*Sometimes they get frustrated and hang up*." Nurses identified "*being prepared*" as a workaround to this potential problem, with many stating that there "*should not be any problems with the phone call as long as you are prepared with the information that you know they are going to ask about."* One nurse stated, "*I have done this so many times, I know exactly what to do. You need to have all the facts and if you are prepared with all of the information, the nurse should have no problem with the phone call."* One nurse felt "*caught off guard*" when she was asked a question that she didn't know the answer to. She later stated that "*the call could have not gone well but it was actually not a problem. He didn't seem upset."*

Nurses emphasized the importance of preparation as a facilitator to communication. The physicians cited this as critical to good communication as well. Nurses consistently referred to strategies to enhance preparation including the use of a structured communication tool such as SBAR, consulting the chart for information before the call, and utilizing other staff such as nurse and CNAs to provide details regarding the clinical event. Nurses emphasized that preparation was the key element to the success of the communication, with less emphasis on nursing experience or their own comfort with speaking to physicians. In summary, these data pertaining to the nurses' perceptions of nurse-to-physician communication suggest that while there were known barriers to communication, there were numerous strategies routinely used by nurses to mitigate potential problems and facilitate care outcomes for nursing home residents.

Research Question 3

What are the physicians' perceptions of communication with nurses when a nursing home resident experiences a clinical event?

Similar to the nurse participants, the physicians expressed positive perceptions of communication with nurses regarding clinical events. The physicians emphasized the importance of preparation that is based on sound nursing assessment, gathering important clinical data, organizing the data, and confidently and concisely communicating the data during the phone call. Both physicians from Site B emphasized that experience and level of education influenced the comprehensiveness of the evaluation and the phone communication. One physician stated, "*I think that in my experience you get more of a comprehensive evaluation when you speak to an RN about a patient situation especially after hours as compared to an LPN."* The other physician from this same site stated, "*Newer nurses need more experience to gain confidence, they need to sound confident and get organized before they call me. And they need to be able to accept phone calls and not be shy if I have any questions."* All three physicians stressed the importance of the nurse sounding confident during the phone call coupled with the detail of the clinical data. One physician stated, "*I was very impressed that they knew the entire medical history and a series of events which led to them calling me. Just even lab data, a patient on Coumadin, where we are checking the PT/INR every couple of days and they call and have that information ready for me. That's a good example of when the calls go well*."

The physicians also emphasized the importance of collaboration with nurses, although there was more emphasized at Site A versus Site B. Site B physicians identified that collaboration resulted in better clinical care for the resident. "*I really like to collaborate with the*

nurses. If I suggest to a nurse that this patient should go to the ER, what do you think? Just to get their feedback and they are not wrong for telling me what they think we should do for the resident. I rely on them." The other physician from Site B placed some of the responsibility for good communication on the physician stating, "*Collaboration is important and it forces the nurse to start thinking at the next level and it spurs them to gather information they might need to get. So if you are trying to think about what the next steps in management are, whether they are right or wrong, it may be that we are just not asking the right questions."*

All three physicians emphasized the importance of the nurse sounding confident in the delivery of the message and stated a preference for nurses to state what they want versus taking a more passive role. One physician stated, "*A good nurse knows what she wants when she is calling, she is not really calling for a question in as much as she is calling for permission. I look for that in the nurse."*

In summary, the physicians did not identify specific issues related to the phone calls recorded in this study. Strategies for enhancing communication were suggested to promote improved clinical outcomes for nursing home residents.

Research Question 4

What are the perceived strengths and limitations of electronic versus paper documentation systems to communicate a clinical event in the nursing home setting?

There are no available studies that have explored nurses' and physicians' perspectives of the strength and limitations of the medical record, comparing two sites where paper charting is utilized against a site using the EHR. This research question used data obtained from interviews

from Sites A and B of both nurses and physicians. Table 18 details the perceived strength and limitations of the medical record by site.

TABLE 18. *Strengths and Limitations of Documentation System by Site*.

Site A: Paper Chart	**Strengths**	**Limitations**
Nurses	▪ Source of Information ▪ Facilitates Communication	▪ Information may not be available ▪ Paper charting "takes too long" ▪ Charting is redundant ▪ Time consuming to find information ▪ Charting happens "after the fact" ▪ Details of the CE lost since charting occurs much later ▪ Inconsistency in charting based on user
Physician	▪ Gives nurses the advantage to be prepared for phone call ▪ Easy access to information by quickly thumbing through chart	▪ No issues identified with paper chart system Regarding **EHR**: ▪ Doesn't want remote access ▪ "Clumsy, complicated, time-consuming instruments" ▪ Difficult to access data
Site B: EHR	**Strengths**	**Limitations**
Nurses	▪ Source of clinical information ▪ Facilitates Communication ▪ Easy to use ▪ Able to see "everything"	▪ Redundancy ▪ Time consuming to locate information ▪ Details of CE lost due to time ▪ System issues: slow lack of access
Physicians	▪ Source of clinical information ▪ Facilitates Communication ▪ Easy to use	▪ Some data are not available (lab studies, consults)

The major differences between the sites were the nurses' and physician's perspectives on the utility of the chart since Site A, as compared to Site B, utilizes a paper charting system. The nurses at Site A believed the paper chart was a valuable source of information but emphasized that information was difficult to locate and the quality varied among users. The physician at Site A placed the responsibility of utilizing the chart for information and to facilitate communication

on the nurses. However, the nurses at Site B found the chart to be a useful source of clinical information. They also believed the EHR was easy to use and that the chart facilitates communication. The nurses identified several barriers to the use of the EHR including lack of time to access information and system slowness. Both physicians at Site B valued the EHR as a source of information and that accessing key clinical information facilitates communication.

Summary

This chapter presented the demographic information of the study participants and the clinical events recorded at each of the sites. The results of this study were reported and the research questions were answered. The key words used by the nurses to describe the clinical events were analyzed using an intra-methods triangulation approach to provide a richer understanding of the words and the context that they were utilized. Nurses' and physicians' perspectives on the communication of clinical events identified strategies to mitigate barriers to communication. Finally, a comparison was made of the strengths and limitations of the clinical documentation systems from the nurse and physician perspectives.

CHAPTER V: DISCUSSION AND IMPLICATIONS

The purpose of this study was to explore the nature of nurse-to-physician communication in the nursing home setting. This chapter includes a discussion of how the results of this research outlined in Chapter 4 relate to prior research on nurse-to-physician communication. The discussion will include a discussion of the categories and the answers to the research questions. Finally, the strengths and limitations of the study will be discussed as well as implications for nursing and future research.

Discussion

In this study, the researcher explored the verbal communications between nurses and physicians concerning clinical events experienced by nursing home residents at two sites. An analysis of the words used to describe these clinical events, the outcomes associated with the clinical events, nurses' and physicians' views of communication, and nurses' and physicians' views of the medical record to support communication was performed to gain insight into the communication process. The results from this study and answers to the research questions summarized in Chapter 4 have shaped the main findings from this study that will be summarized in the next section.

Main Findings

Research Question 1

In order to answer the first research question, *"What are the words that nurses use to communicate clinical events to physicians in the nursing home setting?"* digital recordings and analysis of the recorded conversations were required. This study demonstrated that the words that nurses utilized to describe the CEs fever, bleeding, pain, and changes in output, respiratory,

and mental status, and the associated symptoms influenced the decision-making of the physicians. Nurses were able to clearly identify during their interviews what "triggered" their response to the clinical event and what was the intended purpose of the phone communication. The physicians verified in their interviews that the clinical data communicated by the nurses influenced their clinical decision-making in response to a clinical event.

The categories that emerged from this research pertaining to the phone communications included: Communication Trigger, Goals of Communication, and Charting Communication. Within the category Communication Trigger, four subcategories or themes emerged based on the nurses' statements on how the clinical event was determined. The nurses were able to give context to communication mechanisms within the nursing homes that occur even before the phone communication to the physician is initiated. By describing the triggering events as situations discovered by the nursing assistant, determined by the nurse after conducting a physical assessment, emergency situations where there is no time for a thorough assessment, and/or transfer to hospital by resident request, the nurses provided a deeper understanding of processes that are critical to the sequencing of communication detailed in the communication framework used in this study. The nurses revealed through their description of the communication process that the antecedent events that precede the phone communication have the potential to influence the words chosen by the nurse to communicate the CE. For example, a nurse from site A reported a CE wherein the resident had been discovered by the nursing assistant on the floor and was complaining of pain. Despite a normal physical assessed by the nurse, the nurse also reported that the "*resident wanted to kill herself because of the pain."* The additional information of the nursing assistant finding the resident on the floor (antecedent event

or event that occurred and informed the CE) coupled with the reported pain and emotional distress following the fall, prompted the physician to send the resident to the hospital.

Responses to the question regarding the goal of the phone communication revealed contrasting beliefs from the nurses at the two sites. Nurses from Site A predominately responded that the goal of communication was to *"get something done"* based on the assessed need of the resident. Nurses at Site A also viewed the communication as being a mechanism for *"conveying facts"* to the physician without a specific goal for the call identified. In contrast, the nurses from Site B described their role as communicator as more goal-oriented and collaborative. While nurses at Site B conveyed that the calls were initiated to communicate key clinical findings based on nursing assessment, they majority of the nurses characterized the communication as *'action determined through collaborative effort with the physician".* As one nurse at Site B said, "*we try to figure out together what to do".* Physician interviews conducted post-data collection confirmed the nurses' views on the perceived goal of the phone call. The physician from Site A described the nurse's role as the *"communicator of data, facts, details"* in order for him to make an informed decision regarding treatment for the resident. While the physician from Site A valued clear and concise communication of clinical data, he did not describe collaboration with the nurses as a component of good communication. In contrast, and consistent with the views of the nurses at Site B, both Site B physicians emphasized the importance of collaboration with nurses in order to produce the best outcome for the nursing home resident.

While there is little known about the words that nurses use to communicate CEs in the nursing home setting, several studies have examined communication processes in other care settings. A study by McCaffrey et al. (2011) examined communication between nurses and

physicians in the acute care setting and found that male physicians tended to prefer clear, quick, and more fact-based communication than their female colleagues who preferred a more in-depth discussion of the patient's status. Tjia et al. (2009) reported that nurses perceived lack of willingness of the physician to collaborate in managing patients as a barrier to effective communication.

An analysis of the actual words used during the recorded phone calls using NLP revealed several key differences between the sites in the analytic thinking, clout, authenticity, emotional tone, and cognitive processes dimensions. While analytic thinking scores were lower than the LIWC© program mean, this result is not surprising given the brevity and content of the phone calls. Clout scores were significantly higher than the program mean, indicative of a high level of confidence expressed in the spoken communication. Lower than program mean scores were also observed with authenticity, emotional tone, and cognitive processes. Similar to the analytic thinking dimension, these results were not surprising given the type of communication recorded. The calls were brief (average call less than 2 minutes), concise (average 100/words per phone call Site A and 120/word per call Site B), and inclusive of approximately 9 words per sentence.

Consistent with the literature, clear, concise, and organized nurse-to-physician communication results in improved nurse and physician satisfaction with communication, a reduction in medical errors, and a reduction in unnecessary hospital transfers of older adults from nursing homes (Renz, et al, 2013; Ouslander et al., 2011; Tjia et al., 2009; Whitson et al., 2008; Lamb et al., 2011; Renz et al., 2015). This study suggests that the clarity of the communication combined with the types of words chosen by nurses may influence the decision-making of the physician regarding communication of a clinical event. While there are many factors that

influence whether a nursing home resident requires transfer to an acute care setting, the results of this study demonstrate that the use of words high in clout (confidence) during brief phone calls resulted in an outcome for the nursing home resident.

Nurses were also asked to describe how the details of the communication of the CEs were captured in the medical record. While the majority of the nurses believed the details of the verbal communication were similar, or should be the same, many reflected during the interviews that perhaps the details were not the same. Many nurses believed that the work environment influenced not only verbal communication but also their ability to memorialize the details of the clinical event with a certain level of accuracy. Nurses described the numerous tasks that often interfered with charting the communication in a timely manner, including additional resident issues that required attention, staff supervisory issues, and lengthy medication passes.
There were no key differences between the sites with regard to the charting the communication. Most nurses believed having to chart the details of the clinical event communication was "redundant" or "double work" but also recognized the legal implications of failing to document as accurate a note as possible. The barriers to maintaining accurate and legally prudent documentation of clinical events in the nursing home setting still requires further examination.

Research Question 2

In response to the interview questions developed to ascertain the nurses' perceptions of communication with physicians in response to a clinical event, the majority of nurses characterized communication as "good" and could not identify problems related to the recorded phone conversations. However, many nurses offered that there could be potential problems. Two themes emerged from this category that had potential to negatively impact the phone

communication including the brevity of the phone calls and physician attitude. Many of the nurses, while recalling the details of the clinical event and phone call, offered that they felt some anxiety about whether they could convey the necessary information to the physician in a concise manner. Nurses described strategies utilized to prepare for the phone call including the use of SBAR, notes, and information from colleagues. The overarching belief among the nurses at both sites was that preparation was the key to successful phone communication.

An additional barrier to effective communication identified by the nurses was the attitude of the physician during the call. Most nurses could describe situations when communication with a covering physician did not go smoothly. When asked specifics about how the physician's attitude could influence the phone communication, the nurses described how some physicians sounded "annoyed" when being awakened during the night, "abrupt and inpatient" while the nurse was conveying details concerning the resident, and, in one instance, where the physician slammed down the phone because he seemed frustrated during the call.

Prior research in the nursing home setting has explored the barriers and facilitators to nurse-to-physician communication (Ouslander et al., 2011; Renz et al., 2013; Tjia et al., 2009; Whitson et al., 2008) and outlined strategies to mitigate barriers. Similar to this study, nurse participants in the aforementioned studies identified that preparedness for the phone communication by the nurse and the receptivity of the physician to the communication were key elements to the success of the communication. Preparation for the phone calls can be enhanced with the use of structured communication tools like SBAR, nurse training on communication skills, and the availability of important clinical data specific to the resident (Ouslander et al., 2011; Lamb et al., 2011; Renz et al., 2013; Tjia et al., 2009).

Research in the acute care setting has identified that many barriers exist that may impair nurse-to-physician communication. Constant interruptions to workflow, multiple patient handoffs, and lack of time have all been identified as causative factors to impaired communication (Tschannen et al., 2011). While the nurses in this study identified that any of these factors may influence phone communication, their responses to the interview questions indicated that they had developed effective strategies to overcome potential barriers and that nursing experience and confidence played a large role in the success of the phone communication. The nurses at Site B believed that the collaborative relationship that existed between the nursing staff the two attending physicians was a major factor in the nurses' and physicians' satisfaction with the phone communication. Consistent with prior research, structured communication and collaboration has proven to be an effective strategy in enhancing teamwork and reducing risks in the aviation and healthcare industry with further examination required of the human factors that impair communication in real time crisis situations (O'Daniel & Rosenstein, 2008). This study's results confirmed that both nurses and physicians view collaboration as well as clear and concise communication as key factors in successful communication of clinical events.

Research Question 3

Post-data collection interviews were conducted with three physicians to answer the research question *"What are the physicians' perceptions of communication with nurses when a nursing home resident experiences a clinical event?"* Similar to the nurses interviewed at both sites, the physicians expressed positive perceptions of communication with nurses pertaining to clinical events. The physicians emphasized that the degree of preparation by the nurse and the

confidence conveyed during the phone conversation influenced the physicians' level of comfort and assurance in clinical decision-making. Physicians valued the quality of clinical data reported during phone calls and all three believed the level of preparation of the nurse (RN versus LPN), years of experience of the nurse, and their confidence in speaking on the phone coupled with the degree of preparation were all major factors that influenced positive communication. These findings were consistent with prior research that examined physicians' views on nurse-to-physician communication in the nursing home. These studies emphasized the value of nurse preparation, the ability of the nurse to effectively synthesize clinical information, and the ability of the nurse to deliver content in a quick delivery format (Ouslander et al., 2011; Renz et al., 2013; Whitson et al., 2008; Cadogan et al.; 1999). There are numerous implications for effective communication including improved satisfaction of nurses and physicians, timely implementation of clinical care, improved resident satisfaction, and reduced hospitalization of nursing home residents.

Clearly emphasized by the Site B physicians was the importance of collaboration with the nurses during phone communications. While the physicians at all sites understood that the phone communications are intended to secure orders from the physician, the physicians at Site B believed that care outcomes were improved when the nurse played a role in the decision-making. The collaborative approach was of less importance to the physician at Site A, who conveyed that due to the recent changes in the nursing administration and nurse turnover at the facility, his confidence in clinical information provided to him during phone communications had declined. The physicians at Site B also stated a preference to speaking with more experienced nurses who they believed knew the resident's medical history and possessed better clinical assessment skills

than less experienced nurses. Consistent with prior research the years of experience as a nurse in the nursing home setting had a positive impact on nurse and physician satisfaction with communication, whereas level of educational preparation (RN versus LPN) had less impact (Whitson et al., 2008; Tjia et al., 2009; Velji et al., 2008; Renz et al. 2013).

Research Question 4

Nurses and physicians provided answers to the research question *"What are the perceived strengths and limitations of electronic versus paper documentation systems to communicate a clinical event in the nursing home setting?"* Categories and themes that emerged from the nurse interviews regarding the process of charting included Limits of Technology, Time Constraints, Redundancy, and Details Lost. Nurses characterized the chart and charting as a barrier to workflow rather than a barrier to communication. Nurses described barriers to accessing the chart due to technological obstacles (Site B), excessive time spent on memorializing the clinical event in the record, redundancy in requiring both verbal and written communication, and the loss of details remembered between the clinical event and when charting actually occurred. The nurses clearly indicated that charting was a necessary burden, but in terms of priority the verbal exchange of the details of the clinical event took precedent over the written record. Several nurses offered the suggestion that combining verbal and written requirements would improve workflow and make nurses "a lot happier."

Nurses' responses with regard to the question as to how the chart facilitates communication were mostly positive, especially when information could be accessed prior to the phone call. Categories that emerged from this question included that the chart was a Source of Information and Facilitates Communication. Several nurses from Site A (paper chart) opined that

the chart does not facilitate communication because information is either not contained in the record or the information is not accessible. The majority of nurses believed that the chart provides clinical information that can assist the nurse in preparing for the phone call and "helps the communication go more smoothly."

The physicians had opposing views of the utility of the medical record. The physician from Site A stated that even if he had access to the EHR in the future he would not use it remotely to access resident information. His belief was that it was the nurse's responsibility to access the chart prior to the phone call in order to facilitate communication. The physicians from Site B described the EHR and having remote access as being a valuable tool to facilitate communication with nurses. Both physicians stated that if time allowed they would access the chart during the phone call. They also stated that they used the EHR to facilitate phone communication with emergency room physicians when their residents were sent to the hospital.

The strengths and limitations of the medical record (paper and EHR) have not been studied in the nursing home setting. Similar to findings by Carrington and Effken (2011), nurses in this study identified strengths of the EHR in terms of usability (retrievability) in accessing pertinent resident information as a facilitator to communication. The nurses also viewed lack of access to the EHR due to technological issues (multiple users and system slowness) as a barrier to communication. The EHR has also been shown to play a central role in team collaboration in the acute care setting through several mechanisms: serving as a repository of information, a messenger vehicle, and a monitor where data can be accessed and analyzed (Chase et al., 2014). In this study, the EHR was mostly regarded as a repository of information. There exists a need to expand on the capabilities of the EHR in the nursing home environment to open the

communication channels between nurse-to-nurse and nurse-to-provider to further facilitate communication of clinical events and alert both nurses and physicians to emerging changes in resident status.

Analysis of nurse interviews pertaining to communication of CEs and the utility of the paper versus electronic chart was also performed. These results are discussed in Chapter 4. Lower scores for all of the summary variables were observed, reflecting a more tentative, less emotional, and less analytic manner of speaking with regard to these two areas. Higher scores were observed for cognitive processes, as the nurses were able to clearly describe the clinical events and their experiences with communication at a higher level of certainty and insight, correlating to lower emotional tone and the use of affect words. These results were consistent between both sites.

Application of Research Findings to Conceptual Framework

This study was conducted utilizing the adapted Effective Nurse-to-Nurse Framework illustrated in Chapter 2 to provide an understanding of communication processes of clinical events in the nursing home setting. The framework was effective in identifying key components of communication including how clinical events are identified, key words used by nurses to describe clinical events, the process of completing the phone communication, the role of the medical record in communication, physician perceptions of communication, and the outcome. This study revealed other key elements that were identified by nurses as influential in the communication process that could be added to the framework to give greater context to communication processes in the nursing home setting. Additions to this framework include the antecedent events that were identified in this study and the bi-directional line between the nurse

and the EHR that represents the role of the written record as an information source as well as a facilitator to nurse-to-physician communication. The central shaded area representative of the nursing home environment represents the final addition to this framework. While the nursing home culture was not the focus of this study, it is almost impossible to examine communication processes without considering environmental factors that influence nurse-to-physician communication. Including the system in the framework is consistent with the IROM as well as the ENNC. (Figure 4)

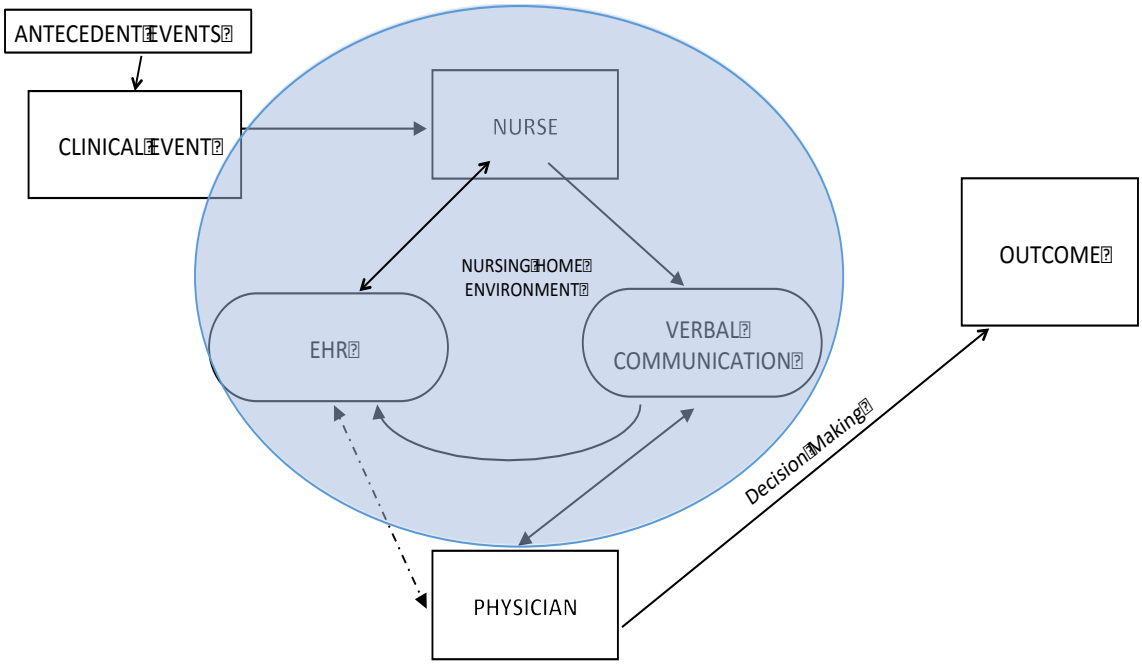


FIGURE 4. An Adaptation of ENNC for Future Research

Strengths of the Study

This study had several strengths. The qualitative descriptive design provided an appropriate methodology to examine communication in the nursing home setting and address the

following gaps in the literature pertaining to communication: examining the key words that nurses use to communicate clinical events, eliciting nurses' perceptions of the communication process with physicians, eliciting physicians' perceptions of the communication processes with nurses, and eliciting perceptions of both nurses and physicians regarding the strengths and limitations of the chart in the communication process. This study also utilized a multi-site design to provide a comparison between a nursing home that uses paper charting versus a nursing home that uses EHR.

This is the first study that has examined nurse-to-physician communication in the nursing home setting using digital recordings of phone conversations to capture the exact words that nurse use to communicate. Additionally, despite a comprehensive search, the use of NLP and conventional content analysis as a within method data triangulation has not been cited in the literature to date as a means to provide a deeper understanding of text data and enhance rigor in a qualitative study. A sub-analysis of the NLP data further strengthened the researcher's understanding of the results and the rigor of the study. Triangulation was not used for the purpose of convergence of data. Rather, the use of this methodology provided a widwr view of the data and strengthened the researcher's understanding of the words used by nurse participants by providing a wider view of not only *what* the participants were saying, but also *how* they were saying it. Figure 5 provides a visual representation of the triangulation methods used to reveal more about the participant's voice and meaning.

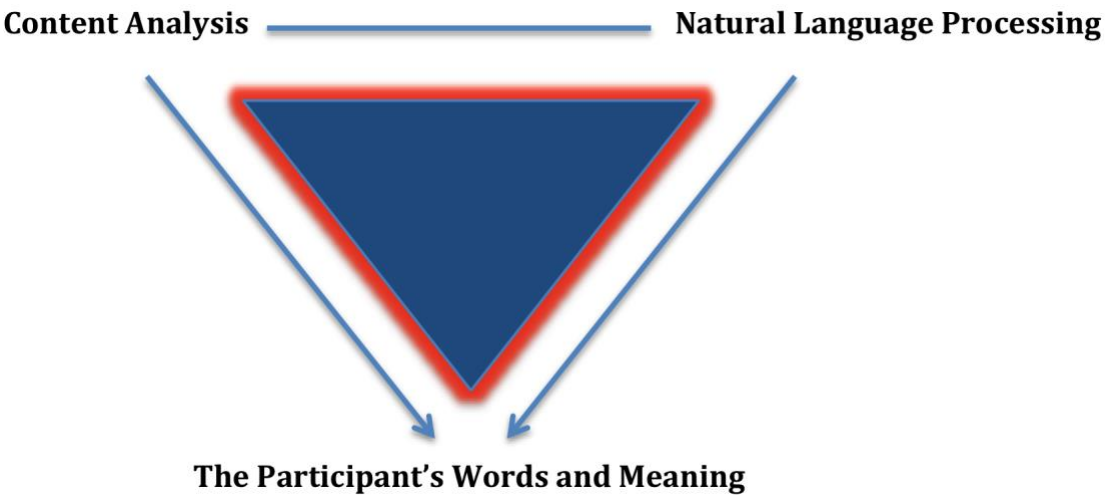


FIGURE 5. Triangulation Model

This study was also strengthened by the use of an adapted ENNC framework and the IROM. There are no examples in the nursing home literature where communication was studied using these models. The ENNC and the IROM provided frameworks for studying the influence of language/words on clinical decision-making of physicians as well as the ability to examine the relationships between the various constructs that existed within the nursing home environment. Theory-guided research has the potential to influence future research, clinical practice, and curriculum development.

Limitations of the Study

Despite best efforts in planning, this study was limited by the following. First, nurses, in general, did not like having their phone conversations recorded. Despite willingly consenting to the study, several phone communications that could have been recorded were not recorded due to the nurses' reluctance to be recorded. The researcher provided reassurance to the nurses that the researcher would only review the recordings and then erase them. Once this reassurance was provided, the nurses appeared to be more comfortable with the process. As a result, perhaps the

sample size could have been larger at both sites. Additionally, due to the administrative changes occurring at Site A it was necessary for the researcher to complete data collection when the administrator and director of nursing were leaving employment. This unanticipated change in leadership at the facility and the premature completion of data collection also reduced the original anticipated sample of 15 CEs per site to ten (10).

Second, a comparison of sites based on response to clinical events could not be conducted because the CEs that occurred in both sites were not similar. Additionally, resident-specific factors have the potential to influence outcomes so an analysis of the outcome based solely on the words that nurses used to communicate could not be performed. Lastly, all three physicians in the participant sample were male, therefore comparisons of phone communications between nurses (male or female) and female physicians using LIWC© and traditional content analysis could not be made. It could be hypothesized that the words used and nature of communication could have differed between nurse-female physician communication versus nurse-male physician communication.

Implications for Nursing

The influence of words nurses use to communicate clinical events, the antecedents to clinical events, nurse characteristics, the role of the EHR/paper chart as a facilitator of communication, and physician receptivity to communication all have potential to influence clinical outcomes in the nursing home setting. A consideration of the other constructs that may influence communication, such as the nursing home environment and the strength of the nurse-to-physician collaborative process, should be considered when studying communication in this

setting. The findings from this study provide additional insight into needed components of training targeting communication.

Future Research

This research was successful in informing the informatics and long-term care communities of nurse-physician communication of CEs in nursing homes. This research has informed the revised framework (Figure 4) and the research that will sustain this inquiry.

The antecedents to the CEs require further research to better understand this relationship and if effective communication of antecedents and CEs can inform improved decision-making and prediction of CEs or resident modeling.

Additional research is necessary to compare the words used by nurses to describe CEs in the EHR and paper documentation systems. While there is a mixed perception of EHR by physicians in nursing homes, increasing the effectiveness of the EHR as a communication system may increase adoption of the EHR by physicians.

The relationship between physicians and outcomes, where decision-making takes place is also worthy of additional research. Results from this study suggest nurses can influence this process. What are the elements of physician decision-making for management of CEs? And, how do these factures inform resident outcomes?

Environmental characteristics of sites A and B may have also influenced nurse-physician communication. Future research exploring the nursing home environment may inform our understanding of workflow, communication systems (electronic, verbal, paper), and influence of families or residents on decision-making for care after CE has occurred.

The definition of a CE may need further clarification in the nursing home environment. Nurses and physicians had difficulty understanding the parameters for a clinical event as defined by this study, as the AMDA (2015) define CEs in the nursing home as any acute change in condition defined as "a sudden clinically important deviation form a patient's baseline in physical, cognitive, and behavioral, or functional domains that, without intervention, may result in complication s or death." A recommendation for future research would be to more closely examine the communication of clinical events based on this definition.

There remains a need to understand how the EHR can become a vehicle for communication of key clinical data in this setting, either in the form of clinical alerts (which is in the process of development) and/or direct communication of clinical event data to the physician via a secure modality. The results from this study provide additional information, which will help in the development of software by providing context to the words, used the most frequently to describe clinical events.

Summary

The purpose of this study was to explore nurse-to-physician communication in the nursing home setting pertaining to clinical events utilizing the Informatics Research Organizing Model (IROM) and an adaptation of Carrington's Exploring Nurse-Nurse Communication (ENNC) Framework. Recorded phone conversations between nurses and physicians were conducted to examine the types of words nurses used to communicate clinical events. Nurses and physicians were interviewed to elicit perspectives on communication processes and the strengths and limitations of the paper versus EHR charting systems. Data derived from the recorded phone conversations and nurse interviews were analyzed using NLP and conventional content analysis.

Physician interviews conducted post-data collection were analyzed using conventional content analysis. Key words were categorized and analyzed.

Categories and themes that emerged from the data provide new information regarding the communication processes in the nursing home setting. These included Communication Triggers, Goals of Communication, Charting Communication, Barriers of the Written Record, Utility of the Chart, and Barriers to Communication. This information will inform future research to continue to improve care processes and outcomes for nursing home residents.

APPENDIX A:

THE UNIVERSITY OF ARIZONA INSTITUTIONAL REVIEW BOARD APPROVAL LETTER

Research
Office for Research & Discovery

Human Subjects
Protection Program

1618 E. Helen St.
P.O.Box 245137
Tucson, AZ 85724-5137
Tel: (520) 626-6721
http://rgw.arizona.edu/compliance/home

Date:	May 01, 2017
Principal Investigator:	Susan Marie Renz
Protocol Number:	1704393593
Protocol Title:	Exploring Nurse to Physician Communication in Nursing Homes
Level of Review:	Expedited
Determination:	Approved
Expiration Date:	April 29, 2018

Documents Reviewed Concurrently:

Data Collection Tools: *demographic.docx*
Data Collection Tools: *nurses.docx*
Data Collection Tools: *physician.docx*
HSPP Forms/Correspondence: *Renz_AppendixF.pdf*
HSPP Forms/Correspondence: *Renz_F107.doc*
HSPP Forms/Correspondence: *Renz_IRB_2017 -3.docx*
HSPP Forms/Correspondence: *Signature page.pdf*
Informed Consent/PHI Forms: *consent.docx*
Informed Consent/PHI Forms: *consent.pdf*
Other Approvals and Authorizations: *facility letters.docx*
Recruitment Material: *Renz_flyer.docx*
Recruitment Material: *Renz_Script.docx*

APPENDIX B:

FACILITY APPROVAL LETTERS

Kearsley
Rehabilitation & Nursing Center

March 24, 2017

Susan M. Renz, DNP, CRNP
233 Dutton Mill Rd.
West Chester, PA 19380

Dear Ms. Renz:

As Discussed in our meeting, Kearsley Rehabilitation and Nursing Center is pleased to be a site for your research study, "Examining Nurse-Physician Communication in Long-Term Care".

Kearsley's philosophy is to support any research that will inform and improve the field of long-term care. Your Research, as a doctoral candidate for the Doctor of Philosophy at The University of Arizona aligns with our philosophy.

Sincerely,

Michael Levy, LNHA
215-863-8402

www.kearsleyrehab.com
2100 North 49th St.
Philadelphia, PA 19131
Tel: 215-877-1565

CHANDLER HALL | KENDAL AFFILIATE
Together, transforming the experience of aging.

March 20, 2017

Susan M. Renz, DNP, CRNP
233 Dutton Mill Rd.
West Chester, PA 19380

Dear Ms. Renz:

As discussed in our meeting, Chandler Hall Health Services is pleased to be a site for your research study, "Examining Nurse-Physician Communication in Long-Term Care".

Chandler Hall's philosophy is to support any research that will inform and improve the field of long-term care. Your research, as a doctoral candidate for the Doctor of Philosophy at The University of Arizona aligns with our philosophy.

Sincerely,

Lynette M. Killen, CEO
1-267-291-2200

99 Barclay Street Newtown, PA 18940 215-860-4000 fax 267-291-2209

APPENDIX C:

RECRUITMENT FLYER

THE UNIVERSITY OF ARIZONA

"Examining Nurse-to-Physician Communication in Long-term Care"
An Invitation to Participate in a Research Study

WHO IS INVITED: **Nurses** (licensed practical nurses and registered nurses) and **Physicians** are invited by Susan M. Renz, DNP, CRNP, a candidate in the PhD program at the University of Arizona College of Nursing.

WHAT IS THE STUDY:
You are invited to:

- Complete a very brief professional information questionnaire, describing your education, years worked a nurse, and years worked at the organization (This will not have your name or any identifying information on it.)
- Have researcher observe and record nurse-to-physician communications pertaining to change in resident status. These recordings could occur for either phone conversations or in-person communication.
- Participate in a 15-minute interview to answer questions pertaining to nurse-provider communications.

You will NOT be asked for any personal health or other sensitive information about yourselves or any patients. ***Your responses are anonymous.***

There are *no risks* associated with participating in this study, beyond those associated with everyday life.

The *benefits* are indirect- adding to the knowledge base around care of nursing home residents.

WHAT IS THE PURPOSE OF THE PROJECT?: The results will be used for research purposes, to help develop systems to prevent avoidable and unnecessary transfers of older adults to the hospital and to improve mechanisms to improve nurse-to-physician communication.

This research will also examine the utility of the electronic health record to enhance communication.

Please contact Sue Renz (contact information below) with questions.

WE VALUE YOUR OPINIONS AND LOOK FORWARD TO YOUR CONTRIBUTION !
Your responses are confidential and anonymous. Your participation is voluntary.

Thank you very much for your participation!

Susan M. Renz, DNP, CRNP
Address: 233 Dutton Mill Rd. West Chester, PA 19380
Tele: 610-574-6246
E-mail: srenz@email.arizona.edu

APPENDIX D:

DEMOGRAPHIC DATA FORM: NURSES AND PHYSICIANS

Demographic Data Form (Nurses)

Participant ID Number:

Date:

1. Gender
2. Age
3. Race
4. RN or LPN
5. Education/Training in Nursing
    a. Certificate
    b. Associates degree
    c. Bachelors degree
    d. Masters degree
    e. Doctoral degree
6. Years of experience as nurse
7. Years of experience in long-term care

Demographic Data Form (Physicians)

1. Gender
2. Age
3. Race
4. Physician (MD or DO)
5. Board certification
6. Years of experience as provider
7. Practice setting

APPENDIX E:

INTERVIEW GUIDE: NURSES

Interview Guide (Nurses)
Time of Interview:
Date:
Location:
Interviewer:
Participant ID Number:
RN or LPN:
Documentation type: EHR/Paper chart
Questions:

1. Tell me about when you determined that the resident had experienced a change in condition, i.e., fever, bleeding, pain, changes in level of consciousness, respiratory status, and output?

2. Describe for me the experience of talking with the physician about the clinical event? What was your goal in talking to the physician? What was the clinical event and what was the outcome for the resident?

3. What information about the defense did you enter in the EHR/Chart?

4. What there anything that you wanted to enter into the EHR/Chart about the event that you felt you couldn't? What made that entry difficult?

5. When you have continued care following an event, what information have you looked for in the EHR/Chart? Was anything missing that you thought was important? How did you obtain that information?

6. Comparing the conversation with the physician and what was documented in the EHR/Chart, is there anything you told the physician that was not entered in the EHR/Chart? Anything that you entered into the EHR/Chart that was not communicated to the physician?

7. What difficulties did you confront while talking with the physician about the event? How did you overcome these difficulties? Were there any that you could not overcome?

8. What are the strengths of this process, calling the physician and using the EHR/Chart? Weaknesses? How would you recommend making improvements? Describe methods you use to facilitate communication with physicians.

9. What is the outcome of the resident who experiences a clinical event thus far? Describe whether the EHR/Chart facilitates communication of clinical events.

10. While using the EHR/Chart to enter information about a clinical event, what makes this process difficult? What makes it easy?

11. Describe how the verbal communication of a clinical event and EHR/Chart documentation are similar or different.

APPENDIX F:

INTERVIEW GUIDE: PHYSICIANS

Interview Guide (Physicians)
Time of Interview:
Date:
Location:
Interviewer:
Participant ID Number:
Questions:

1. Describe a situation when the communication of a clinical event influenced your decision-making regarding a nursing home resident. What was the clinical event and what was the outcome?

2. Describe any barriers in the communication of clinical events from nurses to physicians.

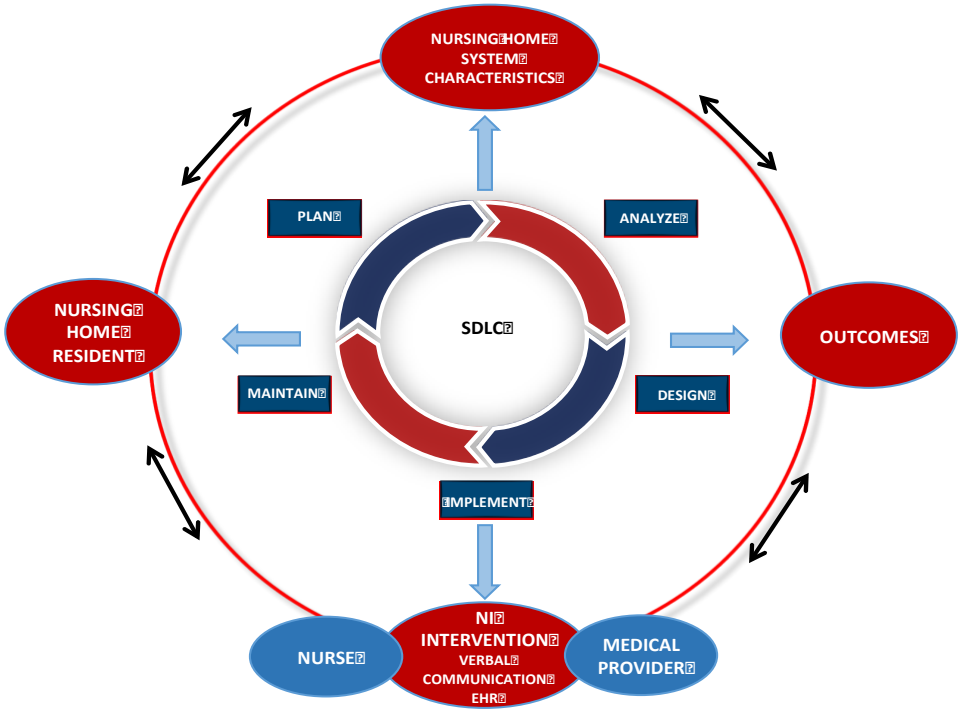
3. Describe examples of what you consider good communication of clinical events. Poor communication?

4. What are the components of the verbal communication that are most critical to your determining action for the resident?

5. Do you have access to the electronic health record/chart at nursing home X and, if so, describe how you use it to access information? What information do you seek out when accessing the EHR or Chart? If no, how do you access clinical information when you are on site at nursing home X?

APPENDIX G:

AN ADAPTATION OF THE IROM


NURSING HOME SYSTEM CHARACTERISTICS
PLAN
ANALYZE
NURSING HOME RESIDENT
SDLC
OUTCOMES
MAINTAIN
DESIGN
IMPLEMENT
NURSE
NI INTERVENTION VERBAL COMMUNICATION EHR
MEDICAL PROVIDER

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