

THE EFFECT OF AN EDUCATIONAL INTERVENTION
ON INFORMATION-SEEKING BEHAVIORS
OF NEW GRADUATE NURSES

A RESEARCH PAPER

SUBMITTED TO THE GRADUATE SCHOOL
IN PARTIAL FULFILLMENT OF THE REQUIRMENTS
FOR THE DEGREE MASTERS OF SCIENCE

BY

MOLLY CHRISTIANS, BSN, RN-BC, PCCN
DR. KATHRYN RENEE TWIBELL - ADVISOR

BALL STATE UNIVERSITY

MUNCIE, INDIANA

JULY 2015

TABLE OF CONTENTS

Table of Contents	ii
Abstract.....	iv
Chapter I: Introduction.....	5
An Historical Perspective of Information-seeking Among Nurses	7
Nursing and Education.....	9
Nursing and Evidence-based Practice.....	10
Information-seeking Skills Applied in Clinical Practice.....	12
Statement of the Problem.....	14
Purpose of the Study	14
Research Questions.....	14
Theoretical Framework.....	15
Definition of Terms.....	16
Limitations	17
Assumptions.....	17
Summary.....	17
Chapter II: Literature Review.....	20
Purpose.....	21
Research Questions.....	22
Organization of Literature.....	22
Theoretical Framework.....	22
Information-seeking Behaviors among Nurses and Nursing Students	23
Strategies to Influence Information-seeking Behaviors.....	40

Information Applied in Practice.....	48
Information-seeking Behaviors of Nurses Compared to Other Professionals	54
Summary.....	60
Chapter III: Methodology and Procedures.....	64
Research Questions.....	64
Population, Sample, and Setting	65
Protection of Human Subjects	65
Procedures.....	67
Instruments and Methods of Measurement.....	69
Data Analysis	69
Summary.....	70
References.....	72

ABSTRACT

RESEARCH PAPER: The Effect of an Educational Intervention on Information-seeking Behaviors of New Graduate Nurses

STUDENT: Molly J. Christians, BSN, RN-BC, PCCN

DEGREE: Masters of Science in Nursing

COLLEGE: College of Applied Sciences and Technology

DATE: July, 2015

Sound information-seeking processes are essential to nurses' clinical decisions and the delivery of safe patient care. Research suggests that experienced nurses prefer to gain information verbally from colleagues over formal information sources, such as policies, procedures, and research. As technologies advance and options for accessing information proliferate, research is lacking on nurses' information-seeking behaviors, especially of new nurses. Furthermore, no research has examined the effect of clinical simulations on information-seeking behaviors of new nurses. This study explored information-seeking behaviors before and after an educational intervention incorporated within simulated patient care scenarios for new nurses and compared new graduate nurses' information-seeking behaviors to those of experienced nurses. Framed by Wilson's (1999) decision-making model, this pre-test post-test single-site study was conducted with a convenience sample of registered nurses (n = 80). Participants reported sources of information for clinical decisions and frequency of usage before and after an educational intervention incorporating use of electronic and policy-based resources. Results illuminate an important element of the clinical decision-making processes of new nurses and guide educators and preceptors in shaping the information-seeking behaviors of new nurses.

Chapter One

Introduction

Information-seeking skills of nurses contribute to the delivery of safe, high quality care for patients. Nurses must gather information from multiple sources, decide if the information is accurate and relevant, and then integrate the information into a tailored plan of care that ensures optimal outcomes for patients in diverse health care settings. Patient outcomes must meet high standards in the United States of America (USA) in order for health care providers to be reimbursed for care. Public reporting of patient outcomes for specific health care facilities increases the demand for the delivery of high quality care that produces key outcomes and is judged as highly satisfying to patients (Hamric, Hanson, Tracy, & O'Grady, 2014).

Patient outcomes are directly impacted by provider decisions. Decisions made by nurses are directly influenced by nurses' information-seeking skills in unfamiliar situations. Nurses must decide what information is needed and the best source of the information, given time constraints, situational demands, and accessibility of information. Failed problem-solving activities are commonly due to poor information acquisition and utilization (Roberts, 2004).

Health care organizations and professionals can recognize and address the need for timely, accurate information, remove obstacles, and support development of nurses' skills to efficiently seek information. While academic preparation of nurses introduces and develops basic information-seeking behaviors, sources of information and specific ways to access information differ across work settings, especially regarding electronic information, such as patient history or side effects of drugs kept in a database. Nurses must learn about information

sources and access in specific work settings. Specific workplaces have varied resources that need to be introduced appropriately to nursing staff at the time of hiring (Spenceley, O'Leary, Chizawsky, Ross, & Estabrooks, 2008).

New nurse orientation sessions should include an overview of resources and information access strategies. However, little or no research has explicated the best approaches to prepare new nurses to seek information, especially in acute care settings where time is short and demand for information is nearly continual. Nurses employed in hospitals report that they have limited time for information-seeking during their daily routine and are unfamiliar with complex information-seeking practices and databases. Nurses cannot be expected to be efficient in a new environment with new resources without appropriate time to be introduced to their resources. Purposeful tools and training will encourage nurses' trust and use of electronic resources (Kostagiolas, Ziavrou, Alexias, & Niakas, 2012). Use of multiple strategies can increase the transfer of knowledge within the work environment.

With the recent growth in technology, health care and nursing practice are changing. Information is more readily available, and yet staff seems to spend more time in information-seeking (Kostagiolas et al., 2012). Nurses are challenged with lack of time, lack of access to information resources, and lack of skills to efficiently retrieve information (Tannery, Wessel, Epstein, & Gadd, 2007).

Research to date supports that preferred sources of information for nurses are other humans, such as nursing colleagues, team leaders, physicians or pharmacists. Human sources give quick answers when patient needs require quick decision making at the point of care (Ndosi & Newell, 2010). Colleagues ranked higher in accessibility than text-based or electronic sources, even when all were available (Marshall, West, & Aiken, 2011). Reliance on people to

provide information has been based on the view that text and internet resources are not as useful. Non-human sources of information include protocols, guidelines, and the internet. Information received from other people, although quick, may not be evidence-based (Ndosi & Newell, 2010). It has been argued theoretically that nurses are more likely to access standardized protocols when they are available because they provide a greater potential for accuracy; however, this tenet does not appear to be true in practice (O'leary & Mhaolrúnaigh, 2012).

An Historical Perspective of Information-seeking Among Nurses

Over the past 100 years, nursing has evolved from a work group that carried out physician orders into a profession of its own, gaining credibility with licensure and standardized education. Nurses now practice independently within a defined scope of practice. This development has allowed physicians to deliver more accurate and efficient medical care, as the nurse provides independent nursing care and also remains the eyes and ears for the physician and reports changes in patients' conditions. The nurse-physician relationship has evolved from a dependent one to a collaborative one. Today, nurses independently are developing and implementing care plans to ensure individualized focus on recovery and wellness.

Attention to information-seeking as a desired skill for nurses may have started with the adoption of the nursing process into the mainstream of nursing practice in the 1970s. Prior to the discipline-wide adoption of the nursing process as a core structure and process, nurses had little or no societal mandate to think, only to do as told by physicians. It is now widely recognized that nurses need access to a wide range of information in order to problem solve within unique patient situations as well as coordinate care across disciplines and providers (American Nurses, Association, 2013).

The nursing process is a systematic way to collect, analyze, plan, and evaluate care. The first step in the nursing process is assessment, which primarily involves information-seeking. Information obtained through this process may be physiological, psychological, sociocultural, spiritual, economic, and personal life-style data. Nurses are challenged to become experts in assessment and information-seeking with patients, as well as within their practice area. They learn the specific skills necessary to complete tasks appropriate to the role, dependent upon their place of work. They also learn site-specific system information, such as how to work equipment, the importance of and expectation of following policies, and communication skills. A nurse's success in providing safe patient care may be related to his or her ability to find the appropriate information (American Nurses Association, 2013).

The nurse's knowledge base includes basic medical and scientific knowledge, for example, so as to know when to alert a physician to a change in patient status. Nurses need a basic understanding of pharmaceutical knowledge, since administering medications is a significant part of nurses' scope of practice within acute care. Knowledge about education and the understanding of human behavior is also necessary to provide individualized patient care. Nurses provide care to patients regardless of their cultures, educational levels, or age, which requires broad knowledge and the ability to be flexible. Information sources that nurses may use include humans, as well as medical reference books and journals, which may be housed electronically or in paper form. A nurses' professional experience informs one's practice decisions, just as the professional experiences of colleagues provide a resource to tap for making practice decisions (Marshall et al., 2011).

Optimal patient outcomes are demanded in health care systems in the USA because reimbursement is now linked to outcomes. Nurses play a key role in achieving desired patient

outcomes, such as length of stay, satisfaction, absence of complications, and readmission rates. Nurses are a crucial line of defense in protecting patients from harm while hospitalized. Most commonly patients encounter harm from adverse drug events; improper transfusions; surgical injuries, including incorrect side; restraint-related injuries including death; falls; pressure ulcers; burns; and mistaken patient identities. Nurses' information-seeking skills and subsequent decisions directly impact patient outcomes and errors. Nurses must be skilled in gathering patient information, evaluating its accuracy and relevance, and integrating the information into an individualized plan of care that is cost effective and tailored to the patient. If nursing staff are not given sufficient training and are not effective in using available resources, patient outcomes may be compromised through poor decision-making and planning (Institute of Medicine, 1999).

Few research studies have examined information-seeking behaviors of nurses. Empirical studies with a focus on information-seeking are limited in both medicine and nursing (Roberts, 2004). A further understanding of the current information-seeking processes of nurses would help systems to support sound decision-making in the fast-paced environments of acute care. Furthermore, research is needed to determine the effect of an educational intervention within a clinical simulation on the information-seeking behaviors of new graduate nurses.

Nursing Education

Nursing educational programs are required by accrediting bodies to prepare graduates to adequately assess patients, families, and communities. State nursing practice acts hold registered nurses accountable for the assessment of patients' needs and planning care. Effective strategies for acquiring information provide a foundation for planning care, managing resources, and communicating in a variety of circumstances (Roberts, 2004).

New graduate nurses take a few years after completing an educational program to fully develop into the professional role. Patricia Benner's (1982) novice-to-expert theory proposed that expert nurses develop over time. Nurses advance from the novice role as a student to that of expert through a strong educational foundation and many professional experiences. Nurses develop in information-seeking skills as they gain experiences and new knowledge. Indeed, previous research has noted an association between increased levels of education and performance when acquiring information. However, nurses cannot be taught everything they will need to know in an academic program; they will need to learn in a practical setting the specifics of accessing information that guides sound decisions (Alligood & Marriner-Tomey, 2010).

Concern has been expressed that nursing educational programs have given insufficient attention to the planning of nursing care and the development of skills that enable a nurse to assess and assimilate patient information accurately (Roberts, 2004). When nurses graduate and take a professional position, employing clinical sites assume nurses have information gathering skills, and little attention is given to information-seeking activities in orientation programs. Many nurses, then, do not know the most efficient and accurate sources of information and how to quickly access them. More research is needed to determine the effectiveness of an educational intervention that provides information-seeking support for new graduate nurses.

Nursing and Evidence-based Practice

Even with the growing availability of high quality research information and a stronger focus on evidence-based practice by policy makers, nurses and other healthcare practitioners, have been slow to adopt research evidence into their daily decision-making (O'leary & Mhaolrúnaigh, 2012). In many countries, government policy has promoted evidence-based

practice in the form of clinical guidelines and protocol-based care. Health care organizations have developed guidelines to incorporate research and provide readily available, efficient and cost-effective interventions for quality care. Examples are the Agency for Healthcare Research and Quality (AHRQ) in the USA, and the National Institute for Health and Clinical Excellence in England. In the late 1980s, the evidence-based practice movement first emerged in Canada. The definition of evidence-based practice by Sackett, Rosenburg, Muir Gray, Haynes, and Richardson (1996) marked an implicit shift from research-based practice to the term evidence-based practice, inclusive of clinical and practitioner expertise, incorporating local context. By definition, evidence-based practice included as credible sources of information organizational policies and local data, such as audits and service evaluations (Gerrish, Ashworth, Lacey, & Bailey, 2008).

Nurses have not been quick to embrace evidence-based practice, preferring to practice in traditional ways that may or may not have scientific merit. Barriers to the implementation of evidence-based practice reported by nurses over the past decade have included: lack of knowledge and skills on the part of the individual nurse to identify and appraise research reports; unsupportive organizational context, including insufficient time to access and review research reports; lack of authority and support to implement evidence-based findings; and failure of researchers to communicate their research findings effectively to practitioners (Gerrish et al., 2008). When compared across multiple countries and health care systems, barriers to evidence-based practice have shown remarkable consistency.

Little is known about what sources of evidence are used by nurses and the characteristics of nurses who choose to use them. There is a need to examine to what extent nurses access and use different forms of evidence (Gerrish et al., 2008).

Information-seeking Skills Applied in Clinical Practice

Previous research has identified a preference for colleagues as a source of useful, accessible, accurate, and high quality information. Research-based evidence is valued by some nurses, although participants in past research studies also have demonstrated a preference for obtaining information through social interactions with colleagues. Additionally, clinical decisions are informed by information from monitoring equipment and patient care notes. (Marshall et al., 2011).

The Joint Commission, the national accrediting body for safety of patient care services, requires current, authoritative knowledge-based information resources available within the clinical setting. Technologies, such as electronic books, journals or databases, are available in many accredited hospital settings. Nurses also should have access to basic information on Nurse Practice Act provisions, as well as professional standards and guidelines. Publications by professional organizations should be considered a part of the nurse's resources and may be sought for information. In addition, hospital systems and individual nursing units have policies and procedures to guide safe practice, available either in hard copy or electronic version.

Dissemination and adoption of processes to access essential professional information have been slow, and in some settings processes for efficient access to information sources are rarely fully integrated. The rate technology is adopted is impacted by the personal characteristics and attitudes of the individuals learning to work with it (Tannery et al., 2007).

Shaughnessy, Slawson, and Bennett (1994) described the factors that make medical information useful, specifically in relation to drug information for nurses. They determined that drug information needed to be comprehensive and address the knowledge needs of nurses; information needed to contain accurate and up to date drug information; and the effort required

to access information must be minimal so that nurses did not need to leave their patients for very long. When a text reference was needed, hospital nurses preferred using the nursing drug handbook as compared to drug references used by physicians or pharmacists. Nurses tended to have situation-specific questions and often sought out other people for answers. Time was reported to be of the essence, and it was not surprising that nurses tended to consult humans, who gave quick and concise answers. Human sources, however, were not necessarily authoritative, and their availability was variable, which limited efficiency in patient care, such as with drug administration (Ndotsi & Newell, 2010). Evidence shows that nurses will seek information from professional leaders such as managers and clinical nurse specialists (CNS). Those in leadership roles need to be particularly targeted with specified training and resources so they are supplying current evidence based information (O'leary & Mhaolrúnaigh, 2012).

Hospital libraries have an important role in assisting with formal information searches and providing information for nurses who seek data for clinical decisions. However, little is known about how health care professionals prefer to receive information or the exact role libraries play (Kostagiolas et al., 2012). Nursing leaders play a key role in encouraging and rewarding evidence-based practice within the clinical environment. Providing access to current evidence-based practice information supports patient care. Time and opportunity for nurses to acquire skills to use electronic resources and apply information may be necessary. Librarians to provide training and organized information sources within hospital networks may facilitate quick and easy access to the resources (Tannery et al., 2007).

This study attempts to fill a gap in nursing knowledge by exploring the information-seeking behaviors of new and experienced nurses. Even more significantly, this study attempts

to evaluate the effect of an educational intervention about electronic information resources available within the clinical setting on information-seeking behaviors of new nurses.

Statement of the Problem

Nurses have an ever-present need for information. Diverse workplaces offer a variety of information sources, which nurses may or may not access and use. There is no standardized approach to educating nurses about information sources and information-seeking. Little evidence exists concerning possible educational approaches, specifically for new graduate nurses in an orientation program. Furthermore, research has not yet determined the effect of an educational intervention on the information-seeking behaviors of new nurses in an acute care setting. In addition, research has not revealed differences between the information-seeking behaviors of experienced nurses who did not receive an educational intervention and information-seeking behaviors of new graduate nurses who did receive an educational intervention.

Purpose of the Study

The primary purpose of this study was to evaluate the effect of an educational intervention about electronic information resources available within the clinical setting on information-seeking behaviors of new nurses. An additional purpose of the study was to explore differences between information-seeking behavior of new graduate nurses and experienced nurses in an acute care setting.

Research Questions

The following questions guided this study:

1. What is the effect of an educational intervention on the information-seeking behavior of new graduate registered nurses in an acute care setting over time?

2. What are the differences between information-seeking behavior of new graduate nurses and experienced nurses in an acute care setting?

Theoretical Framework

Limited use of theoretical frameworks was found when reviewing the literature on information-seeking behaviors of nurses. Wilson's (1999) problem-solving model was used to describe information-seeking activities in a study conducted by O'leary and Mhaolrunaigh (2012). Wilson's model represented a cognitive process in which an alert person moved gradually from uncertainty to certainty relative to a specific situation. This process followed steps of gathering information, problem identification requiring a decision, uncertainty and the necessity for more information. The nurse, or human being, continued to loop back to seek further information until enough certainty was obtained to make a decision and move forward. At each stage, the person was working toward increased certainty; if enough certainty was not obtained to make a decision, a loop back occurred to find more information. Absolute certainty, the theorist noted, was unlikely to be achieved; information-seeking continued until enough certainty was found to make a decision (O'leary & Mhaolrúnaigh, 2012).

In the present study, Wilson's problem solving model (1999) framed the study. The aspect of the model focused upon in this study was the activities involved in the loop to gather information and move toward certainty. This study sought to describe the information-seeking behaviors that occurred during the loop among practicing and newly hired nurses and to assess how information-seeking in the loop changed after newly hired nurses received an educational intervention featuring content about the electronic resources available in the workplace setting and how to access them.

Definition of Terms

Information-seeking behaviors.

Conceptual definition: Cognitive steps which one follows to find answers to dilemmas or queries.

Operational definition: Total score on the 13-item instrument developed by Cork, Detmer, and Friedman (1998) to measure nurses' preferences for information-seeking behaviors and factors that influenced decision-making about which sources to use.

Educational intervention on information resources.

Conceptual definition: Education and training for registered nurses on using sources of information in an acute care setting.

Operational definition: Hospital policy-based training courses, which included instruction on using sources of information. New progressive care nurse training includes two eight-hour classes where instruction on electronic resources was incorporated into multiple simulated clinical experiences with unstable patient scenarios. Accessing electronic resources in the moment during simulated clinical experiences was expected and if not completed, students were asked to review and demonstrate use during debriefing. Electronic resources used included the hospital internal website, Lexi-comp a medication reference tool, online hospital policies and procedures, and drug quick references created internally.

New graduate nurses.

Conceptual definition: Newly licensed nurses in one Midwestern state in the USA.

Operational definition: New progressive care nurses employed in the hospital where this study was conducted and participating in required hospital-policy-based training courses.

Experienced nurses.

Conceptual definition: Nurses currently practicing within a selected healthcare system

Operational definition: Nurses currently practicing within the healthcare system that may or may not have had previous training in information resources available to them

Limitations

The study was limited by a pre-test post-test study design used with a convenience sample. The pretest scores may not be as adequate as having a comparison group that provided data before and after an intervention. Threats to internal validity included possible events occurring between the pre-test and post-test which could have changed the results of the post-test, maturational effects of the participants, or testing threats that could have altered participants' performance on the post-test simply by taking the pre-test. Generalizability was restricted since the study was performed at a single hospital setting, with a single unit staff represented in the convenience sample. The modified version of the instrumentation (Tannery et al., 2007) did not have proven reliability and validity.

Assumptions

Following are the assumptions that grounded this study:

1. Participants responded honestly to all survey questions.
2. The sample represented the population being studied.

Summary

Information-seeking skills contribute to the success of safe patient care. Patient outcomes are directly impacted by information-seeking skills in unfamiliar situations and subsequent decisions made by health care providers. Poor outcomes of a nursing process sequence may often be due to poor information acquisition and utilization, not necessarily lack

of information (Roberts, 2004). Health care professionals should remove obstacles and support development of staffs' skills to efficiently seek information when necessary. When evaluating information-seeking behaviors, multiple factors may influence success (Kostagiolas et al., 2012). Time dedicated to learning new technologies cannot be undervalued. Nurses cannot be expected to be efficient in a new environment with new resources without appropriate time to be introduced to their resources. Purposeful tools and training encourage nurses' usage and trust in the value of electronic resources.

Each hospital setting will have varied resources, which cannot be taught in the academic setting. Programs specific to the work environment need to be introduced appropriately to nursing staff (Roberts, 2004). Research was not found to support the use of training to resources to promote information-seeking skills within the work environment. This study attempted to fill the gap and identify if an educational intervention focused on information-seeking processes for new nurses transferred to the clinical practice setting and if it is increased when compared to nurses that did not receive the same training and were currently working within the hospital environment.

Chapter II

Literature Review

Healthcare today enjoys unprecedented access to information and scientific evidence to guide practice, yet not without challenges (Spenceley et al., 2008). Many different professionals require clinical information, and therefore, a wide range of information needs and information-seeking behaviors exist. The term information-seeking behavior is applied to a wide variety of activities, including searching for, evaluating, retrieving, managing, and using information. Information availability is an important asset at the organizational level for hospital professionals to maintain or improve health care services.

Patient outcomes are directly impacted by provider decisions. Patient outcomes must meet high standards in the USA in order for health care providers to be reimbursed for care. Expectations around using evidence-based practice within care environments have never been greater. As technologies change, nurses also need to constantly renew their skills and knowledge to stay proficient in retrieving information (Kostagiolas et al. 2012).

Information-seeking is a part of the nursing process of providing of patient care. Nurses need information to make patient-care decisions within nursing's scope of practice and directly contribute to patient outcomes. A better understanding of nurses' information-seeking behaviors is necessary. Barriers to using electronic resources have been identified in prior research and have included lack of time, lack of access to information sources, and lack of skills to

efficiently retrieve the information. Many studies have been reported in the literature evaluating nursing students' knowledge and skill in information retrieval. Few studies have been published about hospital nurses' access to and use of information resources (Tannery et al., 2007).

Professional nursing has identified goals around increased use of the best available information to guide practice in order to ensure optimal outcomes for patients within diverse health care settings. Variability in nursing practice may be a result of nurses using multiple information sources, some of which may not be accurate (Marshall et al., 2011). Nurses must learn about information sources and access in specific work settings. Reports of lack of time and unfamiliarity can be overcome by facilitating introduction to and proficiency in use of resources specific to the work setting. Nurses cannot be expected to be efficient in a new environment with new resources without appropriate introduction. Purposeful tools and training encourage nurses' trust and use of electronic resources including access strategies (Kostagiolas et al., 2012). Training in specific work setting resource use will need to be evaluated for transfer of knowledge to the work environment. It is necessary to understand the sources of information nurses rely on to guide their practice and explore ways to influence nurses' information-seeking behaviors (Spenceley et al., 2008).

Purpose

The primary purpose of this study was to evaluate the effect of an educational intervention about electronic information resources available within the clinical setting on information-seeking behaviors of new nurses. An additional purpose of the study was to explore differences between information-seeking behavior of new graduate nurses and experience nurses in an acute care setting.

Research Questions

The research questions that guided the study were:

1. What is the effect of an educational intervention on the information-seeking behavior of new graduate nurses in an acute care setting over a one-year period of time?
2. What are the differences between information-seeking behavior of new graduate nurses and experienced nurses in an acute care setting?

Organization of Literature

The literature review provided the background for understanding the information-seeking behaviors of nurses. This review was divided into five sections. First, the theoretical basis for the study is reviewed. Then, studies reviewing nurses' information-seeking skills are discussed, followed by studies that evaluated strategies to influence information-seeking behaviors. In the fourth section, studies are summarized that address the application of information to practice. Finally information-seeking behaviors of nurses are reviewed in relation to information-seeking behaviors of other health care professionals. As a part of this review, no specifics were identified on how or when nurses are generally trained on information sources.

Theoretical Framework

Limited use of theoretical frameworks was found when reviewing the literature on information-seeking behaviors of nurses. Wilson's (1999) problem-solving model was used to describe information-seeking activities in a study conducted by O'leary and Mhaolrunaigh (2012). Wilson's model represented a cognitive process in which an alert person moved gradually from uncertainty to certainty relative to a specific situation. This process followed steps of gathering information, problem identification requiring a decision, uncertainty and the necessity for more information. The nurse, or human being, continued to loop back to seek

further information until enough certainty was obtained to make a decision and move forward. At each stage, the person was working toward increased certainty; if enough certainty was not obtained to make a decision, a loop back occurred to find more information. Absolute certainty, the theorist noted, was unlikely to be achieved; information-seeking continued until enough certainty was found to make a decision (O'leary & Mhaolrúnaigh, 2012).

Wilson's problem solving model (1999) was used to frame this study. The aspect of the model focused upon in this study was the activities involved in the loop to gather information and move toward certainty. This study sought to describe the information-seeking behaviors that occurred during the loop among practicing and newly hired nurses and to assess how information-seeking in the loop changed training nursing staff about specific resource usage.

Information-seeking Behaviors Among Nurses and Nursing Students

Studies reviewed in this section explored the information-seeking behaviors of nurses and nursing students. The purpose of a research study by Roberts (2004) was to explore senior nursing students' information-seeking skills and investigate whether students from different programs of study used different information-seeking skills. Concern has been expressed that nursing educational programs have given insufficient attention to the planning of nursing care and that students needed to more effectively master techniques in acquiring information, planning, managing, and communicating about patient care delivery. This study was conducted as a written case study simulation exercise to identify students' information-seeking strategies during a patient admission interview, often one of the very first encounters a nurse has with a patient before planning or providing care. Three institutions within the United Kingdom (UK) were recruited and allowed their nurses to be invited to participate in this research. Each institution represented a different nursing educational program, specifically a diploma,

Registered General Nurse (RGN), or integrated degree program, which was similar to a bachelor's degree-granting nursing program in the United States. Of the students invited to participate (n = 410), 253 agreed (62%) to participate. At the time of the study, all participants were in their senior year of their respective program.

The gender of the sample in this study reflected the female bias of the profession, specifically 231 females (91 %) and 22 males (9%). Education level of nursing students prior to entering nursing schools varied. Data were not reported for the distribution of participants among the three programs (Roberts, 2004).

The highest educational level achieved by students participating was compared to the total number of information requests by each participant. An older patient scenario was created to serve as a focal point for data collection. The content of the scenario was based on the characteristics of the population that nurses in these hospitals served; the case presented was an elderly woman admitted to a medical ward. The scenario was reviewed by experts and verified as realistic. The time allocation was ten minutes to reflect on the reality of the clinical situation. Students documented on a blank sheet of paper data they would obtain during the admission interview in order to plan the patient's care. Students were also asked to include rationale for each item obtained during the interview. Data were analyzed by a coding frame that included format, content, and quantity of information sought. Previous research has identified that information is typically collected in the domains of physical, social, and psychological needs, with the physical domain regularly of first priority. Based on this information, data in this study were also evaluated for a holistic approach. Coding categories included structural format, use of assessment tool, use of nursing model, initial information sought, rationale for data requests, holistic approach, patient history, immediate nursing and medical roles, and total information

requests. Data were analyzed by one researcher to prevent rater drift. Numerical data were analyzed by non-parametric statistical analysis using chi-square test, Kruskal-Wallis tests, and Mann Whitney U test (Roberts, 2004).

During the patient interview, students from the diploma program initially focused on biographical factors, such as next of kin, name, age, and address. Initial information sought by integrated degree students was related to client history. Rationale for data requests was documented infrequently; more students from the integrated degree program cited rationale, compared with diploma and RGN students. A systematic format for data collection from the patient scenario was demonstrated by less than 33% of the students. Integrated degree students adopted an approach that was sequential and logical. A significant difference was noted between integrated degree students and diploma students on the structural format of data they requested ($\chi^2 = 13.470$, $p < .005$). Those with the highest level of education outside of their current program cited the highest number of rationales. When nursing programs were compared, integrated degree students cited more rationale for data requests. A significant difference was noted in that more RGN program students used a nursing model as compared to the diploma and integrated degree students ($\chi^2 = 18.67$, $p < .025$). Assessment tools were cited by more RGN program students when compared to their counterparts. The overall percentage of those that referenced tools was only 6%. Less than half of the sample displayed a holistic approach when acquiring information. In the patient history category, a Kruskal-Wallis test revealed a significant difference among the three nursing programs ($p < .01$). Significant differences were identified between the integrated degree program participants and the RGN program participants with the Mann-Whitney U test ($p < .004$). A significant difference was also noted between the RGN program and diploma program ($p < .05$). RGN students requested more biographical

information on each occasion. Of the three categories of information obtained while taking a patient history, present history, past history and medication, just over half of the students requested medication information. No significant differences were noted on medication evaluation based on academic program. Students with previous degrees made the largest number of information requests. No statistical significance was noted between the highest educational qualification and total number of information requests, nor between the highest level of education and the amount of rationales cited (Roberts, 2004).

Roberts (2004) noted that many factors may contribute to the differences found between the nursing programs studied. The students' choice in initial requests could have been related to increased awareness of the change in healthcare financing. In early research by Putzier, Padrick, Westfall and Tanner (1985), four approaches to acquiring information were identified. Of the approaches that could have been utilized, students in Roberts' study utilized the most unorganized. Research does support that, for the novice practitioner, orderly collection of information may be particularly useful in guiding thoughts. Nursing programs must take into consideration that extended time in a four-year program may give students increased opportunity to practice and refine skills.

Roberts (2004) further noted that limited work has been conducted in the UK to support the use of nursing models in practice. Less than one quarter of the senior nursing students in Roberts' study made reference to the use of a model. Findings were consistent with the literature. RGN program students more frequently used a nursing model. This finding was consistent with previous research where RGN students perceived nursing models in a more favorable light when compared to other undergraduates. Limited use of nursing models within the integrated degree students may be reflective of the questioning approach this group

developed during undergraduate study. Diploma students and integrated students may be more cognizant of the limitations of such tools, especially the lack of reliability and validity. Use of assessment tools remains peripheral to information gathering among student nurses.

Roberts (2004) posited that a multifocal approach to information acquisition has been shown to be a prerequisite to holistic patient care. Under half of the students adopted such an approach. Students were expected to apply and integrate knowledge in practice, yet topics were often taught in complete separation. This dichotomy may lead to a non-holistic approach to care. On another note, Britain's older population has known problems with polypharmacy. Just over half of the senior students requested information related to the patient's medication regimen. The researcher noted that the nature of the pharmacological input needed to be emphasized by nursing programs and lecturers. It was also worth noting that multidisciplinary teamwork was perceived as emphasized in curriculum, yet minimal information was obtained in this scenario related to the immediate nursing role or immediate medical role. This was perhaps an example of topics taught in separation from the clinical setting that did not translate into practice.

Although only one case scenario was used in Roberts' (2004) study, the findings showed basic clinical reasoning may be present, although the need for further development of such skills cannot be ignored. A minority of participants used a systematic format in information-seeking while obtaining patient information in order to plan care, and few rationales were documented. This finding could reflect students' tendencies to memorize information for testing while in school as opposed to mastery, which may inhibit translation into the clinical workflow. Some students believed that the amount of information necessary to learn while in nursing school required memorization, yet this strategy of memorizing, as opposed to understanding, has not been found to be helpful in information-seeking with electronic resources. In addition, the

higher the previous educational level the more requests for information were made. More years of schooling may be directly related to age and life experience. A personal frame of reference to someone requiring nursing or medical care may influence ability. In the future, a replication of this study may benefit from refinements of the coding framework in order to enhance content validation. Future research using multiple case scenarios would increase the potential to generalize study findings.

In a different approach to exploring information-seeking behaviors, Ndosu and Newell (2010) investigated information-seeking behaviors focused specifically on medication administration in registered nurses. Rather than respond to a scenario, participants in this study responded to a survey that yielded quantitative data about a specific aspect of nursing care. Medication management is an important aspect of most nurses' professional practice and requires nurses to use their knowledge and exercise professional judgment with a focus on the best interest of the patient. Nurses need to be informed by credible, evidence-based information sources. Therefore, information-seeking related to medication administration was selected as the focus for this study.

The purpose of the study by Ndosu and Newell (2010) was to identify what sources of information nurses used while administering medications within a hospital system in the UK. The study was conducted in northern England. All nurses who worked within this hospital were invited to participate. The wards of this hospital were general surgical, urology, orthopedics, gynecology, day surgery, and private unit wards. It was previously established that the wards were comparable in type of medications administered, thus the researchers believed that results could be combined. A convenience sample of 42 out of a possible 98 staff participated. A cross-sectional survey was used to address four questions:

1. Was the greatest part of the nurses' pharmacology training learned from preregistration, at work, or postgraduate training;?
2. When did nurses last look up pharmacology information on a drug?
3. What was the average time spent to administer medications to 15 patients, based on a morning drug round and assuming there were no interruptions?
4. What is a cumulative listing of all the pharmacology information sources normally used while administering medications? (Ndosi & Newell, 2010).

The data from the surveys were summarized and analyzed using descriptive statistics. Average work experience of the participating nurses was 12.6 years. Demographics of the participants included an unequal distribution by department. One participant was an enrolled nurse, which is a title specific to the UK that is similar to a licensed practical nurse (LPN) or associate-degreeed registered nurse in the USA. The great majority of the sample were staff nurses (n = 34), and seven were sisters or charge nurses. Educational level was recorded; 13 staff nurses had certificates, 19 staff was diploma graduates, six were undergraduates, and four had graduate degrees (Ndosi & Newell, 2010).

Results of this study indicated that most staff (n = 38) believed the majority of their pharmacology training was learned in the workplace. More than half (n = 23) had looked up information on a new drug within the last two months. Nineteen reported it had been more than two months since they looked up information on a drug. The time taken to administer medications to 15 patients ranged from 10-75 minutes, with a mean of 42 minutes. The British National Formulary (BNF) was the most referenced source (95%), followed by the pharmacist (57%), nursing colleagues (31%), doctors (24%), and patient information packets (24%). Resources were categorized as text-based or human. It was clear that nurses relied greatly on

human sources, second to the BNF. This study supported the finding that most nurses learned pharmacology in the workplace through self-directed learning and practical experience, as opposed to a formal setting. The results of this study showed that nurses used several sources of drug information (Ndosi & Newell, 2010).

Limitations of the study included a small sample inclusive of only one hospital setting, as well as the exploratory design of the study. Voluntary participation meant that the sample was self-selected and nurses with little experience were under-represented. Drug information sources were explored; however, the extent or circumstances in which the sources were used was not addressed. The results were not conclusive and could not be generalized. Future studies are needed with larger samples and with newer nurses (Ndosi & Newell, 2010).

In a similar study of nurses' information-seeking behaviors related to a specific aspect of nursing care, Marshall et al. (2011) conducted a study focused on information-seeking behaviors related to enteral feeding. Enteral feeding was identified as a clinical practice area in which nursing care varied notably and one in which new research was being disseminated. Information sources in this study were also evaluated for accessibility and usefulness.

Contrary to Ndosi and Newell's (2010) work, the study by Marshall et al. (2011) utilized qualitative methods. Between 2005 and 2006, a naturalistically designed study was conducted in an Australian tertiary teaching hospital within a 13-bed ICU unit. A three-staged approach was taken. In the first stage, nurses were observed while providing care during the first two hours of their shift. Think aloud data were produced continually by six participants, and recordings were made via direct observation. Stated thoughts and environmental context were recorded. Retrospective probing by the observer was used as a strategy to gain further insight when necessary, and context was recorded when necessary. Data were analyzed to identify

information sources used. An inductive approach to data analysis was used to identify concepts, themes, or a model through interpretation of the raw data (Marshall et al., 2011).

In the second phase of the study, data were collected according to Q methodology in order to evaluate the subjective views of accessibility and usefulness of information sources. A cumulative list of 56 available information sources was created based on sources identified during the first phase of data collection and through a unit audit. A Q sort distribution was conducted to identify sources as human, print, or electronic for future analysis. The second phase of the research was conducted by asking participants (n = 17) to consider the usefulness of the information source in relation to a clinical scenario that highlighted variable practice and score the item. The case study design used in the Q methodology allowed for understanding the phenomenon, rather than case-specific particulars. Data were analyzed using PQ Method software to identify the number of natural groupings of individual Q sorts (Marshall et al., 2011).

In the third phase of this research, a focus group session with senior nurse clinicians (n = 6) was arranged to explore perspectives on the accessibility and usefulness of the information sources identified. Data were transcribed verbatim and analyzed inductively (Marshall et al., 2011).

Among the 56 identified sources of information in this clinical setting, it was clear that participants perceived people as the primary information source among all three phases of the study. In the first phase, people were the most frequently identified source of information. Proximity was an important factor in selecting who to ask. If clinical uncertainty was not resolved in the first instance, many participants sought additional information from a different person. Some participants spoke of specific characteristics they would look for in the person from whom they sought information. Participants clearly discriminated between individuals and

more frequently approached those in a position of influence, or with a higher level of experience or perceived specific expertise (Marshall et al., 2011).

Text and electronic information were infrequently identified as sources of information used to support clinical decision making in both the first and second phases of this study and received lower rankings. However, without exception, the process of medication administration was one area of clinical practice where text and electronic information were used. For non-medication information-seeking, participants noted as barriers the expertise needed to locate and critique published literature and the volume of materials to sift through. Nurses expressed that guidelines were popular sources of information for non-medication related issues (Marshall et al., 2011).

Q factor analysis in this study identified that speed of accessibility of information was crucial in deciding what source to access. Participants indicated the speed at which the information could be obtained contributed to effective time management. Ease of access to the information was imperative for the need to resolve dilemmas in a timely manner; the priority of timeliness drove which colleague was engaged in the information exchange. Participants articulated multiple electronic sources of information and the authority behind them, yet speed of access outweighed accuracy or completeness of information. One nurse described increased societal impatience reflected in nurses' need for answers quickly. Time was also a barrier for using the organization's own printed information. Overall, electronic information did not rank high in terms of accessibility. Three out of 11 electronic sources were rated positively. Factors that impacted accessibility of electronic information included having one computer for every three patients. Computers were not located at the bedside, which may have impacted perception of accessibility. When electronic information was utilized, items were located by search engines

such as Google. Easily locating text-based information was a barrier for some. Research was hard to access, even for those skilled in accessing research. Participants reported barriers, such as difficulty accessing passwords, caused sufficient frustration, and participants would abandon searches as result. Participants reported rarely, if ever, would they seek information from a colleague who had less experience. Staff understood that the quality of information obtained in the most preferred sources varied widely (Marshall et al., 2011).

In the Q sort analysis, usefulness of information identified two distinct groups. Of 56 information sources, 20 information sources were considered consensus statements, meaning they did not help to distinguish among the two groups. The predominant perspective included 15 out of 17 participants. This group identified 27 sources, 14 of which were positively ranked and 10 of which were people. The alternate perspective included 2 out of 17 people. This group positively ranked 12, five of which were people. No significant participant characteristics were found to explain varying group perspectives. Both groups scored two print-based sources positively. The predominant group highlighted enteral feeding clinical practice guidelines and the ICU enteral feeding protocol. The alternate group scored conference information and library resources positively. The predominant group scored print sources higher than electronic sources, scoring electronic versions of the same document lower than print versions. The alternate group stated the opposite, scoring electronic documents higher than print counterparts. Hospital and unit-based document sources rated higher in usefulness than original sources of information. Usefulness of information was affected by what was considered accessible (Marshall et al., 2011).

Key findings from this study included preference for colleagues as information sources and the value of accessible and useful information when making clinical decisions to resolve

clinical uncertainty. Every participant in this study indicated a preference for using other people as sources of information. Preference for use of information from colleagues was consistent with other research on examining information used in clinical nursing practice and among other health disciplines. The authors noted that nurses have close working relationships, which contributes to the oral culture of the profession. Estabrooks et al. (2005) described validation based on collaboration with colleagues as affirmational support, a sense that clinical uncertainty has been resolved. Shared decision making has been researched between patients and health care professionals and between doctors and nurses; however, no reports of shared decision making between nurses was located by this research team and indicated an area for future research (Marshall et al., 2011).

Using colleagues as an information source was considered to be more efficient than accessing text or electronic based information. Perceived insufficient time was identified as a barrier to accessing formal sources. Nurses' concept of time in the context of clinical practice was unclear. The authors noted that the nursing profession placed high value on being busy; in fact, it is rewarded. Decreased emphasis on the thinking aspect of nursing work and the increased focus on task completion were often identified as a positive workplace element and a deterrent to accessing research-based information in the workplace. The thinking behind nursing, reflection on practice, or engagement with research may not be perceived as real work (Marshall et al., 2011).

Marshall et al. (2011) noted that accessibility scores over-ruled usefulness scores among people as well. The roles of intensivist or clinical nurse consultant, although considered useful, scored low on accessibility. This may have been related to geographical location. Duties, such as teaching, may have impacted the amount of time spent in the clinical area. Print documents

developed by the organization to incorporate evidence based practice, such as the enteral feeding protocol, were considered accessible, although were not observed being used in clinical practice. The documents developed to incorporate evidence-based practice into bedside nursing care, included a brief list of references, many of which were not primary research. Data-supported, unit-based practices were viewed as important and provided security in decision making. Participants were still more likely to gain information about unit-based practices by asking others, as opposed to accessing the documents themselves. While information obtained from colleagues had the potential to have a research base, the use of original research to inform clinical decisions was not common among nurses. Information from peers had the potential for bias. Nurses needed to continue to think critically about the source of information as well as the credibility of the information for the purposes of validity, reliability and accuracy.

Within this study, limitations were noted, including that data were collected with a specific focus on enteral feeding practice. Context influenced nurses' access and use of information in practice, specifically the amount of computers and location. As work-related demands changed, information-seeking behaviors may have changed. Observations in the first phase of this study were completed during the first two hours of the shift, a busy patient care time, and may be a less likely time for nurses to purposely access information. Small sample size must be noted. Twenty-five percent of the unit staff participated in data collection. Results may have differed had the entire staff been involved (Marshall et al., 2011).

This study identified a clear preference for information through social interaction. It was unclear how much information passed on through verbal communication was based on evidence. Assessment of verbal information quality was difficult. Variability of information sought may have impacted resolution of clinical uncertainty. The authors concluded that having clinical

practice leaders to communicate evidence based information would be an asset in any clinical area (Marshall et al., 2011).

O'leary and Mhaolrúnaigh (2012) took a broader view of information-seeking behaviors among nurses and did not limit investigation to a specific clinical practice area. The purpose of the study was to identify sources that were accessed for information, as well as the processes of information-seeking behavior among registered nurses.

A sequential mixed methods approach was used in this study to identify how nurses informed their decision making in the workplace. This study was completed using a sequential exploratory research strategy in the Southern Health Service Executive (HSE) region in Ireland. In the first phase of the study, a sample of 29 nurses was recruited and represented 22 places of employment. Sampling criteria were that participants would have at least two years of nursing experience and employed for at least six months in their current role. In the first phase, qualitative data were collected, consisting of semi-structured interviews that lasted 40 to 90 minutes. Vignettes with specific examples of patient care scenarios were used as context for the interview discussion. Participants were asked to conceptualize the information sources and information-seeking processes used to decide on a nursing course of action. Thematic data analysis was conducted on data transcribed from the interviews (O'leary & Mhaolrúnaigh, 2012).

In the second phase of the study, 1356 questionnaires were distributed using a disproportionate stratified random sampling method. A total of 388 questionnaires were returned, reflecting a response rate of 29%. Nurses not involved in clinical care were excluded from analysis, which left 377 participants, for a 28% response rate. The questionnaire included six sections: demographics, use of research in practice, views on nursing guidelines, research awareness, sources of information used in practice, and barriers and facilitators to using research

evidence. Attitude questions were scored on a 5-point Likert scale ranging from strongly disagree to strongly agree. Other questions varied in response format. The tool was reviewed by experts and piloted with a convenience sample of 270 nurses. Data from the second phase were analyzed using SPSS software, descriptive statistics, Mann Whitney U test and chi square testing, with statistical significance set at 0.05 (O'leary & Mhaolrúnaigh, 2012).

Methodological triangulation allowed for review of convergence and divergence across the quantitative and qualitative data. Results from both phases were reported in integrated form. Demographics in both phases were very similar. Respondents were 92% percent female in both phases of the study. Average age was greater than 40 years in both groups. Nursing experience averaged between 16-17 years (O'leary & Mhaolrúnaigh, 2012).

Many interview participants identified a distinction between routine and non-routine decisions. They noted that many of the decisions made throughout the workday are routine in nature. Routine decisions were based on previous care experience. Interview participants described practices that were contraindicated by research evidence, showing their knowledge could be outdated. Rarely was a routine practice decision questioned. Information sought was more likely to be on how others made the decision rather than best evidence (O'leary & Mhaolrúnaigh, 2012).

Of the 55% of respondents that looked up research less than once a month, 53% percent of them agreed that decisions were made based on one's own knowledge and experience. Sources nurses used included colleagues, textbooks, internet, and guidelines. Interview participants reported, if they did not have the experience to make the decision at hand, they would access external sources. Even with the options of multiple information sources, nurses were not focused on quality of information. Extensive searches were not reported. Searches

would end when the nurse decided he/she had sufficient information to make the decision (O'leary & Mhaolrúnaigh, 2012).

Most sources of information did not clearly fit into categories of research-based or not research-based. Interview participants were often unaware of whether information was research-based or not. Nursing colleagues dominated as the top source of information givers. Of other top sources, four out of five were other humans. Staff with less experience was more dependent on nursing colleagues, nursing managers, CNSs, and other professionals than those with more experience. In the top five sources were nursing guidelines. Ninety percent of questionnaire respondents agreed that guidelines were useful sources of information. A large majority agreed that the research-based guidelines were updated regularly, although, when asked if clinical nurses were involved in updating them, less than half agreed. Some participants disagreed with the content of nursing guidelines and even spoke of feeling constrained by them. The internet was used at work by only 27% of questionnaire respondents. A chi-square test showed that respondents who used the internet at work reported that more of their practice was based on research; they also reported looking up more research information cite p value if significant. Internet searches were conducted using internet databases (O'leary & Mhaolrúnaigh, 2012).

Interviewed staff placed high value on information from study days or training events. Most had at least one example of information gained. Most questionnaire respondents felt that study days provided research information and stated they changed practice based on results of the study days. Interview participants did not rank study days high among other the sources of information because of minimal opportunities to attend (O'leary & Mhaolrúnaigh, 2012).

Differences in information-seeking behavior were identified between routine and non-routine decision making. Data were examined in the context of Wilson's (1999) problem solving

model. The two main differences between routine and non-routine decisions were the number of feedback loops in the information-seeking process and the type of information being sourced. In routine decisions, feedback loops were often absent. Only a limited gap in knowledge occurred requiring minimal information clarification. For example, experienced practitioners matched new situations with similar clinical experiences from their past. Experienced nurses making routine decisions were satisfied with their experience as a source of information whether or not it was evidence based. When a non-routine decision needed to be made, a greater gap in knowledge required multiple loops back in Wilson's framework. With each loop, uncertainty was reduced until the nurse was comfortable making the decision (O'leary & Mhaolrúnaigh, 2012).

In conclusion, the findings in this study were similar to other previous studies worldwide. Limitations of this study included use of self-report and a questionnaire response rate of 28%, which limited generalization of results. Sources nurses regarded as most efficient and reliable were other healthcare professionals. Nurses in this study rarely used sources that gave them original research and favored prepackaged information. Nurses with less experience were more heavily dependent on other people for information. Experiential information sought from others was held in the highest regard. Interview participants did recognize utilizing certain people, such as a CNS, because they were thought to provide evidence-based information. Participants also identified that knowledge from experience and knowledge from research easily began to blur as it was integrated into routine practices. The amount of experience of study participants did not influence their use of clinical protocols or guidelines. In practice, when nurses encountered a non-routine decision to be made, focus was placed on finding enough evidence, not finding the best evidence (O'leary & Mhaolrúnaigh, 2012).

Strategies to Influence Information-seeking Behaviors

In one of the few studies that tested interventions to influence information-seeking behaviors, Tannery et al. (2007) studied information-seeking behaviors specifically related to electronic knowledge-based information. This research was conducted to evaluate the information-seeking practices of nurses before and after access to a library's electronic information resources within a rural community hospital.

A pre- and post-intervention study was conducted in a 374-bed facility on two campuses in a rural area of northern Pennsylvania in 2001. The facility cared for many types of patients: primary care, emergency medicine, cardiology, oncology, ophthalmology, sleep disorders, orthopedics, maternity, rehabilitation, arthritis, and chemical dependency. The hospital also supported three physician residency programs. The University of Pittsburgh Health Sciences Library System (HSLS) included approximately 30 web-based databases, drug databases, full-text evidence-based journals and books. The HSLS was introduced to the hospital, and a pre-implementation survey sent to all 573 nurses five months after the implementation, before any promotions or trainings occurred. Previously, this hospital had no access to a librarian on staff and had only a small reading room with outdated books and journals. Nurses now were able to access the HSLS 24 hours a day, seven days a week from any computer attached to the hospital network and through remote access by password. Self-report surveys were used to evaluate nurses' adoption of computer use for locating information in order to answer their questions related to patient care activities. The survey gathered information on nursing staff demographics, use of electronic resources, and information-seeking behaviors, specifically, frequency of computer use, web use, which electronic sources were used, why, and what effect

their use had on clinical decisions being made. A follow-up survey was planned one year later (Tannery et al., 2007).

During the time between the pre- and post-data collection, electronic sources were promoted among nursing staff through a variety of strategies. Articles were published in hospital newsletters with information on the new resources and how to access them. A librarian also conducted 14 instructional sessions offered to nurses. One year after the pre-implementation survey was sent all nurses who responded to the initial survey were invited to complete a post-implementation survey. The mailing included a handout, which described the library electronic resources available to nurses and instructions on how to access them. SPSS software was used to perform statistical analysis to identify relationships among the surveys. Variables were cross-tabulated and tested with the Pearson chi-square statistic to determine differences pre and post implementation (Tannery et al., 2007).

Data from 117 nurses who had completed both the pre-and post-implementation surveys were compared. Pre-implementation data identified more than 53% of respondents used a computer greater than five hours per week, and the web was used by 43% of respondents for professional tasks. Post-implementation, 76% reported using a computer greater than five hours a week, although the finding was not a significant increase. Seventy-one percent used the web for professional tasks post-implementation ($\chi^2 = 32.4, p < .001$). The computer was used to access clinical information, lab data, locate patient education materials, communicate with colleagues, completing continuing education, and documenting patient information. In both surveys, nurses were asked to estimate weekly frequency of use of multiple resource categories. Analysis revealed nurses sought answers from colleagues three times more often than from printed books, printed journals, and electronic resources. An increase in use of all resources was

found when pre- and post-survey data were compared; significance differences included increased use of colleagues ($p < .002$), drug or equipment brochures ($p < .010$), printed books and journals at home ($p < .038$), and online Medline databases such as OVID or PubMed ($p < .045$). Use of resources that did not significantly change from pre to post implementation were use of printed books and journals in the office, electronic resources via the computer office, electronic resources via computer, printed books or journals on hospital unit, and pocket handbook (Tannery et al., 2007).

Approximately one-fifth of the 117 nurses began using the library's electronic resources by the time the post-implementation survey was completed. Nurses who used the library's electronic resources were more likely to have used a computer greater than five hours a week, used the web for professional tasks, and spent less than 80% of their time in a clinical setting ($p < .004-.043$). Three-fourths of the respondents reported accessing the library's electronic resources in their clinical decision making to locate drug information, 70% to locate patient education, 70% to access online articles, 61% to stay current with changes in medicine and health care, and 61% to locate answers to specific questions (Tannery et al., 2007).

This study drew on the theoretical tenets of Rogers' diffusion model (1983) to describe the adoption of new technologies. According to Rogers, early innovators were able to understand and apply complex technical knowledge. Multiple characteristics were required for innovations, such as new technologies, to be adopted: relative advantage, compatibility with existing practices, and the social setting. These characteristics impacted the rate of adoption of a new technology or processes. According to Rogers' personal characteristics and attitudes of individuals also influenced rate of dissemination. This study identified early adopters based on their use of the computer for professional tasks. Increased use of electronic resources suggested

a change in how the nurses found information to answer clinical questions. Nurses who used the resources spoke positively about their experiences. It was not identified if the nurses who incorporated the electronic resources into their information-seeking practices exhibited similar behaviors when adapting to other technical innovations or with changes in regard to professional duties and patient care. It may be helpful to identify in the future if the early adopters in this study tended to be early adopters of other changes as well (Tannery et al., 2007).

Limitations of the study by Tannery and colleagues (2007) included a small sample size, lack of a control group, and use of a convenience sample. Response rates were similar to previous research published in this area. No specific differences in demographics were identified between those that responded and those that did not, although the response rate was not high enough for confidence in generalizing the results. Future research should focus on institutional barriers impacting nurses' use of electronic resources. Items to consider may be personal, such as poor computer skills, distrust of technology, or lack of professional curiosity. Environmental influences may discourage use such as supervisors' or managers' opinions and perceptions of others in regard to if it is acceptable to access professional literature during work hours.

The impact of electronic information requires further exploration, including studies in other settings, such as large urban hospitals and specialty hospitals to determine if the results of this study can be replicated. Additional studies are necessary to evaluate how the diffusion of technology impacts nurses information-seeking behavior (Tannery et al., 2007).

In the past two decades, many researchers have conducted research studies within the area of information-seeking. Taking the research one step further, an integrative review was conducted by Spenceley et al. (2008). The purpose of this review was to identify sources of information nurses used to inform practice. The study was thought to be significant because

knowledge about the ranking of information sources could allow for better support of practice with best available evidence, as information needs of nurses change with emerging roles in evolving healthcare systems.

Spenceley et al. (2008) noted that the process of using knowledge was depicted within information science and knowledge use literature with many terms, causing confusion. Terms used included research utilization, evidence-based practice, and information-seeking behavior. Both knowledge utilization literature and information science literature were the terms used for this integrative review. Empirical studies were synthesized and examined for sources of information registered nurses used to support direct, hands-on, patient care in any care setting. Information sought included previous practice or educational experience as well as other sources available in the practice environment (Spenceley et al., 2008).

The literature was reviewed to identify primary sources for empirical outcomes using at least two search strategies. Databases were searched, reference lists of articles selected were reviewed, hand searching was conducted, and potentially relevant papers were also noted. After a thorough literature review, studies included met the following criteria: empirical research published between 1985 and 2006, dissertations, written in the English language, more than 50% of the sample consisted of registered nurses, nurses studied were accessing knowledge for direct patient care, more than one information/knowledge source was examined, and sources of knowledge were ranked in some way (Spenceley et al., 2008).

Data were assessed for overall quality and validity. This process was extremely complex because of the diverse methods used by primary studies. Studies were mostly cross-sectional and conducted across a broad range of settings including both hospital and community based. Most frequently, in-hospital nurses were studied caring for patients with medical or surgical

problems. The majority of the research was conducted in North America or the United Kingdom. Sample sizes ranged from 12 to 1715. Studies were mostly descriptive without attempt to identify relationships between variables and approximately comparable in terms of quality (Spenceley et al., 2008).

Data analysis included a number of steps. Sources nurses turned to most consistently were reported in the form of frequency per source in 30 out of 32 studies. In two studies, nurses were asked to identify available resources most useful to patient care. Results of this review therefore reflected frequency of access. Sources of information accessed cannot be assumed to be best sources, or even preferred. Further data reduction revealed that, in 27 out of 32 studies, questionnaires were used to determine frequency of access to sources. Investigators reported frequency through interviews in four studies; in one study, observations were conducted. In eight of the survey studies, Likert scales were used, and mean scores were calculated. In the other 24 studies, sources were ranked. Five studies generated lists of sources. In the majority of studies, the participants chose from a pre-existing list. Sources identified ranged from 4 to 20. Only a few used previously validated instruments (Spenceley et al., 2008).

A hierarchical classification of information sources was used to display data. Sources were mapped and categorized into seven categories: print, electronic, communication with other, formal education, experiential, organizational and other. A scoring scheme was identified and used for comparison of the top five most frequently accessed sources. The top source was identified as registered nurses/peers; second, nursing journals; and thirdly, reference material. Data were compared for patterns, themes, or relationships. Interpretations were clarified and rival explanations reviewed. Rankings revealed human and experiential sources served a substantial role, as was previously found by other authors. It was unclear why journal use was

ranked so high. Previous literature had shown nurses do not rely on journals as a source of information. In previous work with samples that included participants with higher educational preparation, higher journal use was not noted. Other studies among different health professions all described journals as passive and largely ineffective for integrating knowledge into practice. It was noted that, in 13 out of 32 studies, journals were identified as one of the top three most frequently accessed resources. There may be several reasons for this result. Potential biases include one study's sample of library users, specific wording of questions in regard to use of the library and other reading materials, and social desirability bias based on self-report techniques used to collect data. Growing emphasis on evidence-based practice may have also influenced the ranking of journals high. It is noted in previous literature that journal use is over-reported and use of colleagues as information sources underreported. Journals may be great sources in highly specialized circumstances. Advanced practice nurses (APNs) may also represent the high journal use group based on their level of education and information needs for the advanced role, including the expectation to stay on top of current literature (Spenceley et al., 2008).

Data were further compared through conceptual mapping. Results indicated a linear pattern around nurse information-seeking. A number of factors influenced or contributed to the identification of information needs and the decision to pursue information, including time available, other priorities, workload, urgency, expectations of others, source attributes, preferences and barriers within the work setting. Only one study was identified that took the next step to explore results of the effects of information retrieval on practice (Spenceley et al., 2008).

Abstract evaluation of the concept map revealed two themes: setting, context and structure of nursing network, as well as scope of practice related to information needs. In regard

to setting, context and structure of nursing network, the researchers noted that resources in the work setting needed to be facilitative of information-seeking and involvement of nurses in designing new information sources and in determining how information sources would become incorporated into practice settings was necessary. The data analysis suggested that professional development and training in information access could impact information-seeking practices, although no tests of this assertion have been published. The researchers noted that the time-compressed nature of nursing work in the face of competing priorities resulted in a focus on completion of tasks and required timely information, often offered by colleagues that were seen as trusted sources of quick information. The researchers also noted that positive employer attitudes, encouragement, and employers being supportive of change facilitated information-seeking and elevated its value in evidence-based practice (Spenceley et al., 2008).

The scope of practice and information needs included several key tenets. The researchers noted that nurses who sought information did so within a focused segment of the continuum of care. Convenient and time-efficient information sources were necessary in the modern care context due to patient acuity, shorter hospitalizations, increasing workloads and, again, time-compressed work environments. Acute care environments needed specific, immediate procedural information in order to do the work. The expectations of others' were also influential in information-seeking behaviors. For example, employers of APNs expected them to be experts in access and use of the most current practice information. If nurses administered medications, employers expected that information sources were used to stay up to date. Information-seeking was expected to be more frequent among nurses new to roles, such as prescribing, and yet expected to diminish with gained experience. Information-seeking behaviors were more visible when practitioners were inexperienced. Often nurses in new roles experienced a sense of

pressure to have immediate answers, especially when patients expected them to have all the necessary information and make on-the-spot decisions (Spenceley et al., 2008).

Limitations of this study included publication bias and bias of the authors based on interpretive analysis. Comparison was difficult across studies based on the inconsistent terminology across studies. Infrequent use of theoretical or conceptual frameworks made comparison between studies difficult. Self-reported responses compared to direct observation would provide more accurate records of source use. Only two studies reviewed in this integrated review included direct observation. Many studies reviewed had small sample sizes and were predominantly descriptive, limiting generalization. Further attention needs to be on the outcomes of information use (Spenceley et al., 2008).

Information Applied in Practice

Gerrish et al. (2008) studied the development of evidence-based practice and revealed insight as to how nurses' information-seeking behaviors impacted the use of information in the clinical environment. A cross-sectional survey study at two hospital sites was conducted in the UK to compare factors identified by junior and senior nurses that influenced the development of evidence-based practice skills. A comparison of responses from the two subgroups was also evaluated. Data from the two hospitals were similar and therefore combined for analysis. Almost half of the available nurses responded to a survey ($n = 598$), for a 42.4% response rate. Sample size was calculated to be adequate in determining actual differences between junior and senior nurses' responses. The two hospitals were typical of the UK in terms of size and healthcare services provided. One was a university teaching hospital, and the other a district general hospital. All registered nurses were invited to participate, with the exception of those

working in two clinical areas that were already participating in another study related to evidence-based practice (Gerrish et al., 2008).

The survey used for this study was developed by the author, Developing Evidence-Based Practice (DEBP) Questionnaire. The survey was composed of five sections. Section 1 identified sources of knowledge used by nurses in their practice. Section 2 examined barriers to nurses finding and reviewing evidence. Section 3 identified barriers to nurses changing practice. Section 4 focused on colleague relations. Finally, in Section 5, nurses rated themselves on skills of finding and reviewing evidence and using it to impact change. The response format for the first four sections was a 5-point Likert scale. Responses in Section 5 were on a scale ranging from complete beginner to expert. At the end of the questionnaire were some personal information questions, such as job title and level of seniority (Gerrish et al., 2008).

Survey results were analyzed using SPSS software. Items in the first four sections were ranked for importance after calculating means. Descriptive statistics were calculated for each item as well as Pearson correlations. Calculations were made to determine the means for each item for junior and senior nurses; means of items were then analyzed for differences between the two levels of seniority (Gerrish et al., 2008).

Junior nurses comprised 60% of the sample. Sources of knowledge ranked highest by the nurses were information from patients and fellow professionals. Readily accessible formal sources, such as training courses and protocol manuals, ranked second. Published articles ranked 14 out of 18. Tradition information from the media and internet ranked even lower. The greatest perceived barriers to finding and reviewing evidence-based practice were insufficient time and resources ($x = 3.95$). Time and resources were the perceived greatest barriers to changing practice ($x = 3.09$). Difficulty in understanding and judging the quality of research were also

reported as important barriers to finding and reviewing evidence for practice ($x = 2.92$).

Respondents did not list as barriers the ward culture or lack of confidence to make changes in practice ($x = 2.18, 2.2$). Colleagues, managers and medical staff were perceived as barriers to changing practice ($x = 3.05-3.13$) with colleagues reported as being least supportive (Gerrish et al., 2008).

Self-appraised skill in finding and using evidence was analyzed. All nurses were least confident in bringing about change in practice based on evidence and new information. Half of all respondents rated themselves as beginners or novices at using research evidence to change practice (50.7%) and in using organizational information to change practice (48.5%). Over one-third rated themselves as beginners or novices in finding and reviewing research (39.5%) and organizational evidence (34%). Nearly one quarter rated themselves as competent or experts at finding and reviewing research e (23.6%) and organizational evidence (24.7%) (Gerrish et al., 2008).

Statistically significant differences were found between junior and senior nurses in multiple areas. Senior nurses were more likely to use formal sources of knowledge in the form of research journals and audit reports ($p < .001$) whereas, junior nurses drew on their education to a greater extent ($p < .001$). Senior nurses made greater use of information gained via the internet than did junior nurses ($p < .001$). Junior nurses seemed to identify more barriers to finding and reviewing evidence and were less skilled than senior colleagues in finding organizational evidence ($p < .001$). It was also suggested that junior nurses were more likely to perceive organizational information as not readily available ($p < .003$). Junior nurses were statistically more likely to feel they lacked authority in the workplace to make changes in practice ($p < .001$). Junior nurses also perceived more than senior nurses that the culture of their

ward department was not receptive to change ($p < .001$). Junior nurses felt that it would be difficult to overcome barriers to achieving evidence-based practice changes ($p < .001$). Junior nurses also felt less confident in bringing about changes in practice ($p < .001$), compared to senior colleagues. Junior nurses rated medical staff colleagues as less supportive than senior nurses did ($p < .001$). In self-rating of ability to find, review, and use sources of evidence, senior nurses rated themselves more skilled in four areas: finding organizational information, reviewing organizational information, higher confidence levels in their expertise in using research evidence and higher confidence levels in using organizational evidence to change practice ($p < .001$) (Gerrish et al., 2008).

Factor analysis was conducted to validate the questionnaire and identified ten factors. Statistically significant differences among junior and senior nurses were evident on three factors ($p < .05$). Senior nurses were more likely to use published information as a source of knowledge in their practice. Senior nurses drew more extensively than junior nurses on patient contact and their personal knowledge and experience, although the difference was not significant. Senior nurses were significantly more likely to show a concern or interest in the effective use of research (Gerrish et al., 2008). The researchers concluded that nurses draw most frequently upon experiential knowledge and work-based information. It was worthwhile to consider how evidence-based practice could be facilitated through these channels. Information gained from professional colleagues was ranked third. It was not clear which colleagues were used as sources of information. CNSs could be instrumental in disseminating evidence-based information at the unit level. Clinical educators also could play a similar role. Further research should examine the role that the specialist nurses play in promoting evidence-based practice among front line nurses (Gerrish et al., 2008).

The authors noted that lack of time was consistently seen as a major barrier to nurses engaging in evidence-based practice, regardless of the country in which they worked. Strategies to promote evidence-based practice should take account of the constraints under which nurses' work. Evidence-based guidelines that were available in the workplace and in-service trainings maximized opportunities for nurses to develop an understanding of evidence relevant to their practice. The findings of this study raised questions as to where emphasis should lie in developing skills to support evidence-based practice. Traditionally, focus has been on equipping clinical nurses with skills to access, appraise, interpret, and apply research findings to their practice. Nurses fell short of this expectation because of lack of skills, time, and resources. Those expectations may be ambitious in light of the circumstances. Undertaking a systematic review of research findings on a particular clinical topic may not be a realistic goal for a clinical nurse. The skills necessary to deliver evidence-based practice were very broad. A more realistic and achievable approach might be for nurses to develop skills to appraise research products, such as clinical protocols (Gerrish et al., 2008).

Information obtained from the internet was one of the least used sources of evidence by nurses in this study, a finding that merited further investigation. Previous research also has reflected that nurses used online sources of knowledge less frequently than other types of resources, although it was not clear whether this reflected lack of access to computer terminals or lack of information related to technology skills. The authors noted that information technology in health care was escalating, and considerable investment was being put forth to make evidence-based guidelines and electronic journals readily available via the internet. Nurses' use of the internet at home had increased compared to that of the general population. Use at work lagged behind other healthcare professionals. Previous research has indicated an overall low awareness

of information resources amongst nurses. Nurses reported lack of time during the work day and limited access within clinical settings as major obstacles. Senior nurses gained confidence in accessing and using evidence. They were also more likely to draw on organizational information. Senior nurses were more likely to utilize research publications and information obtained via the internet than junior nurses. Junior nurses relied more on information gained during their education, which suggested junior nurses in the UK may not be acquiring the skills needed to implement evidence in practice (Gerrish et al., 2008).

This study chose a broad definition of evidence-based practice, including organizational information as a source of evidence. Junior nurses were less likely to know where to find such information and know how to appraise it and utilize it in their practice. Nurses tended not to use evidence-based guidelines in practice; it was not examined whether there were differences in utilization between senior and junior nurses (Gerrish et al., 2008).

Junior nurses consistently perceived greater barriers to changing practice than seniors, primarily based on a lack of authority to initiate change. They perceived culture as less receptive to change, indicating that medical staff was more likely not to support change. Positive perception by the senior nurses was potentially related to their positional power within the hierarchical structure of nursing in the UK. Professional development programs may better equip junior nurses with change management skills; consideration must also be given to the culture of the clinical environment. Senior nurses exerted greater influence. Senior nurses have regarded themselves as having skills in finding, reviewing and using evidence. They focused on more formal sources, particularly research reports. Senior nurses also exercised confidence in their capacity to obtain knowledge about individual patients and the organization and synthesized their knowledge to inform their practice. Junior nurses were much more aware of the barriers,

including availability of information and finding time to access such sources (Gerrish et al., 2008).

Limitations of this study included that bias may have been introduced naturally by a self-selected response rate of 42.4%. Those that did not respond may have had different attitudes towards evidence-based practice. However, 40% is typical for similar surveys in previous research. Further research is needed with a wider UK base, as well as replication in other countries in order to test the generalizability of this study's findings. The DEBP questionnaire was tested and shown to be reliable and have construct validity. Factors of the DEBP appeared to be stable, although further validation is needed in diverse samples (Gerrish et al., 2008).

Information-seeking Behaviors of Nurses Compared to Other Healthcare Professionals

A number of previous studies have shown that nurses are behind other healthcare professionals in their use of the internet as a tool to access information for practice (O'leary & Mhaolrúnaigh, 2012). Health care leaders need more knowledge to understand the information-seeking behaviors of health care professionals. New knowledge is needed to understand the differences among professional groups in information-seeking behaviors and in order to establish adequate library and information services. Each professional group may have different needs within the same hospital. Hospital staff members of all professional groups increasingly rely on information services and the internet. Kostagiolas and colleagues believed that research was needed to provide insight into the most the appropriate information services (Kostagiolas et al., 2012).

To identify the information-seeking behaviors of the hospital staff, a study was conducted by Kostagiolas et al. (2012) in a large public hospital in Greece. The aim of this study was to reveal information resources used among the hospital staff as a whole, specifically, information

needs, obstacles faced when seeking information, and opportunities for hospital libraries to help health professionals meet their needs more effectively. METAXA Cancer Hospital offered a wide range of cancer treatment; it was recognized nationwide and among the eastern Mediterranean for its advances and reputation as a well-respected cancer center.

A stratified random sample was selected of METAXA's 822 professionals to participate in this study. Hospital staff (n = 167) were invited to complete a questionnaire regarding information-seeking; the sample represented 20% of the hospital staff. For this study, hospital staff included those in the roles of medical, nursing, administrative, technical and excluded auxiliary staff (Kostagiolas et al., 2012).

A questionnaire was constructed and organized in five parts: general information or demographics, questions on computer accessibility and internet availability, information needs, information-seeking obstacles faced, and general satisfaction with the current level of scientific information availability in the hospital. The response format for items on the questionnaire was a 5-point Likert scale. Basic descriptive data were analyzed using PASW statistical software. The response rate was 87%; 145 questionnaires were returned. This sample was representative of the overall staff population within the METAXA hospital. Results were distributed among the following roles: 49 physicians, 43 nurses, 25 administrative, 23 paramedical staff, and 5 technical staff. Demographics revealed 34.3% of respondents were male, 65.7% female, 43.3% were less than 40 years of age, and 56.7% over 40 years of age. The education and training level of respondents varied. Graduates of high technological institutes represented 29%, 28.3% university graduates, 9.7% postgraduate degree, 8.3% PhD, and 1.4% secondary education with some additional technical training. All of the respondents in the secondary education level were over 60 years of age. Most respondents indicated internet access was available both at home and

at work (64%). Access to the internet at home only was reported by 19.7%; 7.5% reported using the internet at work only; and 8.2% had no access at all. The majority of respondents (55.6%) reported internet use daily; 34.6% stated several times a week; 6.8% stated once a week; and 3.0% reported no use at all. Personal computer use was indicated for word-processing and software applications 40.8% of the time; 15.6% stated they used personal computers for social networking, 10.9% for online product orders or shopping, 65.3% for email communication, and 83% for scientific information related to their job position in the hospital. Responses on a 5-point Likert scale indicated the importance of specific information sources, which were reported as mean scores, with higher scores indicating stronger importance. Web search ranked highest ($X = 4.0$), followed by scientific journals, personal libraries and print materials ($X = 3.6$). Seeking information from colleagues scored next ($X = 3.5$), followed by conference information ($X = 3.3$), hospital library ($X = 3.0$), mass media ($X = 2.9$), and company representatives ($X = 2.5$) (Kostagiolas et al., 2012).

The importance of categories of needed information was identified using a 5-point Likert scale, reported as mean scores. Hospital professionals mainly sought information related to their social and communication needs ($X = 4.3$), that is, to aid in interacting with others. Information was also commonly sought on specific developments related to areas of expertise ($X = 4.2$), lifelong learning programs ($X = 4.1$), updating skills and knowledge ($X = 4.0$), and supporting research activities ($X = 3.8$). Uncertainty in hospital practices ($X = 2.8$) was considered the least significant of information needs. Main obstacles to information-seeking most often included lack of time ($X = 3.7$). Lack of information services ($X = 3.5$), overwhelming amount of irrelevant information ($X = 3.5$), lack of specialized or certified data ($X = 3.0$), difficulty in understanding information provided in a foreign language ($X = 3.0$), lack of skills in

information-seeking methods and practices ($X = 2.9$), and cost ($X = 2.7$) were also reported. Overall satisfaction regarding current level of information available was reported as very satisfied or satisfied by a cumulative 80% of respondents (Kostagiolas et al., 2012).

Correlations and differences were evaluated for significance at the .05 level. Significant results included that women seemed more willing to use colleagues and co-workers as sources of information as compared to men, and they also acknowledged lack of information-seeking skills as a significant obstacle ($p < .05$). Age correlated negatively to the use of electronic information resources indicating that hospital staff less than 40 years of age was more willing to use the electronic information resources ($p < .014$). Those over the age of 40 put more trust in colleagues as main sources of information. University graduates positively correlated with electronic information sources and negatively correlated information obstacles ($p < .004$). Professionals with secondary education showed even stronger positive correlations with electronic information sources ($p < .001$) and negatively with information obstacles ($p < .004$). Field of expertise statistically affected several aspects of information-seeking behavior. Items impacted by field of expertise were electronic resources ($p < .001$), information needs for lifelong learning ($p < .013$), obstacles ($p < .014$), and overwhelming amount of information ($p < .003$). Medical hospital personnel were the only positively correlated group with electronic resources and lifelong learning, all other staff negatively correlated electronic resources and lifelong learning (Kostagiolas et al., 2012).

Results noted that the more hospital professionals considered information-seeking as related to continuous professional education and training, the more they sought information from general information search engines ($r = .225$, $p < .006$) and within electronic databases ($r = .321$, $p < .000$). The more hospital staff members appreciated information sharing with colleagues, the

more they sought information through formal electronic databases ($r = .204, p < .013$). The more hospital professionals considered their main information needs related to the uncertainty in their professional environment, the more they sought information through formal electronic databases ($r = .396, p < .000$) and the less they sought general web search engines ($r = -.178, p < .031$). The more hospital staff appreciated use of formal electronic databases for information-seeking, the more they considered lack of the required skills and knowledge an obstacle ($r = .260, p < .001$). The more hospital staff believed lack of organized library and information services was an important obstacle, the more they believed information-seeking through colleagues and friends was essential ($r = .319, p < .000$). The more hospital staff believed large amounts of information made available through the internet was an obstacle, the more they believed information sought through colleagues and friends was essential ($r = .228, p < .005$) and the more they considered formal electronic databases to be reliable ($r = .299, p < .000$). The more hospital staff believed shortcomings in information availability constituted an important obstacle, the more they considered formal electronic databases to be an asset ($r = .164, p < .047$) (Kostagiolas et al., 2012).

Staff that participated in this research reported that they required information in order to follow scientific developments and renew their skills and knowledge. Survey results demonstrated that hospital staff had extensive information needs. Physicians sought information to complete scientific research; nursing staff needed information for classes and training in both electronic and print formats. Hospital administrators needed information around economic evaluation, budgeting, maintenance, operators, and scheduling issues. The majority of respondents had access to internet use on a daily basis, which was above that of the general population based on previous studies in the European Union. The information resources,

information needs, and information-seeking obstacles reported by all hospital staff were common across various roles within the hospital. Consistent with other studies, general search engines were preferred and were likely the main point for access information-seeking (Kostagiolas et al., 2012).

Demographics such as gender and age did affect information-seeking behaviors. Men did not prefer colleagues and co-workers for information-seeking. Staff members with university degrees used electronic resources more frequently and were more confident in the use of electronic systems and databases. Medical staff used well-established information resources, including the Internet and databases such as MEDLINE. Nursing staff reported lack of training and specific skills required for information-seeking within medical databases, information resources and the internet as their main obstacle. In general, lack of time was the most important obstacle reported followed by lack of a hospital library (Kostagiolas et al., 2012).

This survey highlighted the invaluable role of the hospital library. In Greece, the hospital libraries faced serious problems and were in need of financial resources. The majority of hospitals did not have adequate library facilities; those that had facilities were understaffed and without administrative power. There was no official collaboration among hospital libraries in Greece and therefore no strategy for rights, obligations, or role of the hospital librarian. The researchers recommended that future collaboration with the Heal-link consortium of academic libraries would significantly enhance their services. Underdevelopment of hospital libraries underestimates the impact that medical librarians could contribute to the high quality and effective information services that hospital staff receive (Kostagiolas et al., 2012).

In conclusion, rapid technological progress and the increased amount of published health care scholarly information have created new issues in information access and processing for

health care professionals. Health care professionals' knowledge and skill in information-seeking needs to be developed in order to meet the new demands (Kostagiolas et al., 2012).

Summary

This study evaluated the effect of an educational intervention about electronic information resources available within the clinical setting on information-seeking behaviors of new nurses. An additional purpose of the study was to explore differences between information-seeking behavior of new graduate nurses and experienced nurses in an acute care setting. To provide the background for this study, eight studies related to information-seeking behaviors of nurses in clinical practice were reviewed. The studies were published between 2004 and 2012. There was not a common theoretical framework or implication of a common concept behind this research. A majority of studies were based on self-report as opposed to direct observation. Most samples were convenience samples. The most evident theme that emerged was that nurses often look to other human sources for information. Accessibility of information routinely trumped usefulness and accuracy of information in a majority of the studies reviewed. Preferred information sources were colleagues, as opposed to text or electronic based information, primarily due to the perceived efficiency of asking a colleague.

Missing from the research on information-seeking behaviors of nurses were intervention studies and any tests of ways to assist nurses in advancing or improving their information-seeking skills. Overall, the level of research was not rigorous, and most studies were descriptive or correlational in design.

A majority of the studies investigated as a part of this literature review were conducted overseas, for example, in the UK, Greece, Ireland, and Australia. It is important to consider that studies were consistently conducted within one national healthcare system. Variation among

healthcare systems and samples was evident between studies, making it difficult to generalize study findings.

Also lacking from the existing literature was consensus about key instruments to use to measure concepts of interest, such as information-seeking behavior. Most tools used a Likert response scale and relied on self-report. No two studies used the same tool for measurements. Overall, the information-seeking literature is fragmented and would benefit from the development and testing of a common tool or set of tools (Spenceley et al., 2008).

Multiple areas of future research were identified. Future interventions should be targeted at patterns of nurse information-seeking routines. Further studies are needed to differentiate between sources most useful and sources accessed most frequently. Interventions that maximized interactivity, sensitivity to practice context, and included nurses in design and decisions around sources were more likely to succeed. Factors influencing source use were embedded in the current structures of nursing work and need to be further evaluated. Programs of research in this area could strengthen the knowledge base; confirm the use of informal, interactive, sources of knowledge; and influence information-seeking that supports practice. It may be helpful to have a better understanding of variation or similarities of information-seeking behaviors among various healthcare professional groups (Spenceley et al., 2008).

The studies reviewed agreed that continuous professional development was crucial to maintain appropriate and current information-seeking skills in practice settings. Polished skills in information-seeking allowed professionals to evaluate and choose relevant, useful, timely sources to meet their needs. Purposeful development of hospital information services contributed to the more efficient usage of hospital resources by reducing time spent by personnel for independent information-seeking (Kostagiolas et al., 2012).

Against this backdrop of existing evidence, this study added to what is known about information-seeking behaviors of nurses and contributed insight into how nurses with differing degrees of practice experience gathered information. In addition, this study was one of the first to trial an educational intervention and measure changes in information-seeking behaviors among nurses in an acute care setting.

Chapter III

Methodology and Procedures

Information-seeking is a part of the assessment phase of the nursing process, which provides the structure and means for designing effective plans for patient care. Nurses need information to make patient-care decisions within their scope of practice and directly contribute to patient outcomes. The literature paints a clear picture that nurses' first choice when seeking information is to look to other humans. Numerous sources report that accessibility is ranked above quality of information (Kostagiolas et al., 2012; Marshall et al., 2011; O'leary & Mhaolrúnaigh, 2011). Few studies have been published about hospital nurses' access to and use of information resources (Tannery et al., 2007). No studies were identified that looked at usage of information resources after an educational intervention.

This study was based on the work of Tannery et al. (2007) but not only described information-seeking behaviors but evaluated the effect of an educational intervention about specific work environment resources. The rationale for testing an educational intervention was that nurses must learn about information sources and access in specific work settings, since nurses cannot be expected to be efficient in a new environment with new resources without appropriate introduction. Purposeful education could enhance nurses' perceived value and use of electronic resources.

Research Questions

The following questions guided this study:

1. What is the effect of an educational intervention on the information-seeking behavior of new graduate nurses in an acute care setting over time?
2. What are the differences between information-seeking behavior of new graduate nurses and experienced nurses in an acute care setting?

Population, Sample, and Setting

This study took place in a large teaching hospital in the Midwestern United States. The population consisted of approximately 100 registered nurses working within two progressive care units in one acute care hospital. The target sample size was 80, derived through a convenience sampling plan. Forty were experienced, currently employed nursing staff, and 40 were new graduate nurses, recently hired to the organization and required to take policy-based hospital courses. No exclusion criteria were incorporated based on age or gender. All participants were required to be licensed registered nurses, able to read English, and employed on one of the nursing units participating in this study.

Protection of Human Subjects

Prior to initiation of the study, approval was obtained by the Institutional Review Board (IRB) of the hospital where the study was conducted. Approval and support were also obtained from the Chief Nursing Officer and Nursing Director of the target progressive care clinical units. The study was introduced to experienced nursing staff at unit based staff meetings. Packets containing study information sheets and surveys were placed in experienced nurses' individual mailboxes. Consent was implied if participants completed and returned the survey. Experienced nursing staff completed the uncoded survey one time. Completed surveys were placed in a sealed envelope provided to participants and returned to collection boxes placed on the nursing

units that were participating in the study. Completed surveys were retrieved by the researcher from drop boxes twice a week during the duration of data collection.

The study was introduced to new nurses during the first week of employment, before classroom orientation experiences began. A packet including a study information sheet and survey were distributed during the welcome meeting. Surveys for new nurses were coded with an identification number so that responses could be matched across the three data collection periods. All potential participants were assigned a code number which they wrote on their survey if they planned to participate. Completed surveys were placed in a sealed envelope provided to participants and returned to collection boxes placed near the orientation room and on the nursing units that were participating in the study. Completed surveys were retrieved by the researcher from drop boxes twice a week during the one-month duration of data collection. A list of identification codes was kept in a locked drawer in the locked office to which only the researcher had access. The list of codes was kept separate from completed surveys. Only the researcher had access to the list of codes, and only the researcher could deduce who participated and who did not.

Nurses were not penalized for refusing to participate, and no specific benefit was received for participation. New nurses received the same classroom instruction as a part of their orientation regardless of their participation or non-participation.

There was no risk to participants for participating in this study. Participation was voluntary, and nurses could withdraw from the study at any time. In order to evaluate the effect of the orientation training about electronic resources on information-seeking behaviors, new nurses were also asked to complete follow-up surveys at six months and one year after the educational intervention. Participants returned completed surveys in sealed envelopes to a

secure drop box located near their clinical unit. New nurses were also asked to complete class evaluations after each training session. Confidentiality of all study information was maintained by storing data in a locked drawer in the principal investigator's locked office. When the study is completed and findings disseminated, paper materials will be destroyed by shredding and computerized data files by deletion, based on hospital and IRB policy.

Procedures

A study packet was placed in each experienced nurse's mailbox, if they met the study qualification of employment on one of the target units. The packet consisted of a cover letter, invitation to participate, one survey, and a return envelope for the completed survey. The cover letter explained the purpose of the study and instructions informing the participants of the designated time frame to complete the survey. Participants had three weeks to return the survey. The study was discussed at each unit's staff meeting, during staff daily huddles, and reminders were sent by email and placed in department bulletins. Nurses were informed to place completed surveys in the secured drop-off box near their clinical unit during the designated time frame. The principal investigator ("researcher") removed the sealed envelopes twice a week for the three-week period of data collection.

New nurses were given time to complete the survey during an orientation session in the first week of employment and were asked to return to the completed survey to a secured drop-off box near the classroom or on the units where they would be employed. Researchers were not present in the classroom during the time the new graduate nurses completed the surveys. New graduate nurses could also take the survey out of the classroom and complete it in private and return it to the drop-off boxes, which remained in place for the three-week duration of the data collection. New staff members' surveys were coded so surveys across the three data collection

times could be matched. Individual emails were sent with links to an electronic version of the survey at both the six month (Time 2) and one year period (Time 3).

The electronic version of the survey was administered through Key Survey, a computerized, off-site hosted survey system. The survey design included configuration steps which prevent the respondents' identify, IP address or email address from being detected. Data were deposited in a general database, compiled and then forwarded to the research team. Respondents were protected by the off-site nature of the electronic survey via Key Survey. The anonymous response feature is enabled because Key Survey is a hosted survey system and the survey responses were not traceable. Thus, no person associated with the hospital or the research study could track or see any individual responses. Data were analyzed by Key Survey and reported as aggregate data.

The list of code numbers and names of the new graduate nurse participants were kept in a locked drawer in the locked office of the principal investigator, separate from any completed surveys. No one had access to the code list or the completed surveys except the principal investigator for the study. Therefore, the data were confidential. In addition, the data from the experienced nurses were anonymous, as no names were requested on the survey and the surveys were not coded.

New nursing staff received the same training regardless of their agreement to participate in this study. All nurses hired within a six-month period were invited to participate in the study. Initial surveys were completed prior to classroom training. The educational intervention for new progressive care nurse training included two eight-hour classes, during which instruction on electronic resources was incorporated into an educational intervention consisting of multiple simulated patient scenarios. Accessing electronic resources in the moment during simulated

clinical experiences was expected and, if not executed, students were asked to review and demonstrate during debriefing. Electronic resources used included the hospital internal website, Lexi-comp a medication reference tool, online hospital policies and procedures, and drug quick references created internally.

Instruments and Methods of Measurement

The instrument used in this study was based on a validated instrument developed by Cork, Detmer, and Friedman (1998). The 13 items on the survey tapped nurses' preferences for information-seeking behaviors and factors that influenced their decision-making about which sources to use. Specifically, nurses were asked how they obtained knowledge-based clinical information when needed and what resources were used to answer clinical questions. Participants were asked to indicate frequency of use based on the resource categories listed. Response formats were 5-point Likert scale and rank ordering. These data were treated as interval level data.

The same instrument was administered to the experienced nurses one time and to the new graduate nurses at Time 1, Time 2, and Time 3. In addition to the 13-items on the study instrument, questions on the pre-training survey and the survey for experienced nurses included demographics, specifically age, gender, and degree program. Additional questions were asked about computer experience, such as frequency and web use.

Data Analysis

Data from all surveys were entered into a database. Responses from the paper surveys from experienced nurses at Time 1 were entered by the principal investigator. Responses from the electronic surveys completed by new nurses at Times 2 and 3 were integrated into the

database through Key Survey. Statistical analysis was performed using Statistical package for the Social Sciences (SPSS).

First, reliability of the survey for the two samples was assessed through Cronbach's alpha internal consistency reliability. Descriptive statistics were then computed, including frequencies, mean scores of items, and total scale score on preferred information sources. Demographics of both groups were examined for differences, using t-tests and Pearson chi square, as appropriate for the level of data (Burns & Grove, 2009). No differences between groups based on demographics were noted. Mean total scale scores on preferred sources of information were compared between the two groups of nurses at Time 1 using t-tests for interval level data. Responses to specific items about resources used were compared between the two groups using t-tests for interval level data.

Survey responses for the new graduate nurse group were compared for Times 1, 2, and 3 using multiple regressions to examine predictive relationships among the mean scores of preferred information sources over time. Differences in subgroups based on age and gender were examined by analysis of variance across the three times of data collection. Statistical significance was set at .05.

Summary

This study's method and procedures were partially based on a replication of Tannery et al.'s (2007) study. A pre-test post-test study design was used with a convenience sample of 80 nurses. Data were collected by utilizing one instrument at multiple times. The instrument used consisted of 13 items. This study collected control data from experienced nursing staff. For the intervention group of new graduate nurses, data were collected as a pre-assessment before classroom training (Time 1), six months after training (Time 2), and 1 year after training (Time

3). This longitudinal design allowed for baseline comparison of experienced and new nurses and subsequent data collection from new nurses to evaluate the effect of electronic resource instruction over time, specifically its carry over to the clinical unit and possible changes in information-seeking behaviors as self-reported by participants. Data were analyzed for differences and relationships among mean scores through the use of t-tests, multiple regression, and analysis of variance.

References

- Alligood, M. R., & Marriner-Tomey, A. (Eds.) (2010). *Nursing theorists and their work* (7th ed.). St. Louis: Mosby
- American Nurses Association. (2013). The nursing process. Retrieved from:
<http://nursingworld.org/EspeciallyForYou/What-is-Nursing/Tools-You-Need/TheNursingProcess.html>
- Benner, P. (1982). From novice to expert. *The American Journal of Nursing*, 82(3), 402-407.
- Burns, N., & Grove, S. K. (2009). *The Practice of Nursing Research: Appraisal, Synthesis and Generation of Evidence*, 6th ed. St. Louis Missouri: Saunders Elsevier.
- Cork, R. D., Detmer, W. M., & Friedman, C. P. (1998). Development and initial validation of an instrument to measure physicians' use of, knowledge about, and attitudes toward computers. *Journal of American Medical Informatics Association*, 5(2), 164-176.
- Estabrooks, C. A., Rutakumwa, W., O'Leary, K. A., Profetto-McGrath J., Milner, M., Levers, M. J., & Scott-Findlay, S. (2005). Sources of practice knowledge among nurses. *Qualitative Health Research*, 15(4), 460-476.
- Gerrish, K., Ashworth, P., Lacey, A., & Bailey, J. (2008). Developing evidence-based practice: Experiences of senior and junior clinical nurses. *Journal of Advanced Nursing*, 62(1), 62-73. doi:10.1111/j.1365-2648.2007.04579.x
- Hamric, A. B., Hanson, C. M., Tracy, M. F. & O'Grady, E. T. (2014). *Advanced Practice Nursing: An Integrative Approach*. St. Louis: Elsevier Saunders.
- Institute of Medicine, National Academy of Health Sciences. (1999). *To Err is Human: Building a Safer Health System*. Retrieved from:

<http://www.iom.edu/~media/Files/Report%20Files/1999/To-Err-is-Human/To%20Err%20is%20Human%201999%20%20report%20brief.pdf>

- Kostagiolas, P. A., Ziavrou, K., Alexias, G., & Niakas, D. (2012). Studying the information-seeking behavior of hospital professionals: The case of METAXA Cancer Hospital in Greece. *Journal of Hospital Librarianship*, *12*(1), 33-45.
- Marshall, A. P., West, S. H., & Aitken, L. M. (2011). Preferred information sources for clinical decision making: Critical care nurses' perceptions of information accessibility and usefulness. *Worldviews on Evidence-Based Nursing*, *8*(4), 224-235. doi:10.1111/j.1741-6787.2011.00221.x
- Ndosi, M., & Newell, R. (2010). Medicine information sources used by nurses at the point of care. *Journal of Clinical Nursing*, *19*(17/18), 2659-2661. doi:10.1111/j.1365-2702.2010.03266.x
- O'leary, D., & Mhaolrúnaigh, S. (2012). Information-seeking behaviour of nurses: Where is information sought and what processes are followed?. *Journal of Advanced Nursing*, *68*(2), 379-390. doi:10.1111/j.1365-2648.2011.05750.x
- Putzier, D., Padrick, K., Westfall, U., & Tanner, C. (1985). Diagnostic reasoning in critical care nursing. *Heart Lung*, *14*(5), 430-437.
- Roberts, J. (2004). Senior student nurses information seeking skills: a comparative study. *Nurse Education Today*, *24*(3), 211-218.
- Rogers, E. (1983). *Diffusion of innovations*. New York, NY: Free Press.
- Sackett, D., Rosenburg, W., Muir Gray, J., Haynes, R., & Richardson, W. (1996). Evidence-based medicine: what it is and what it isn't. *British Medical Journal*, *312*, 71-72.

- Shaughnessy, A. F., Slawson, D. C., & Bennett, J. H. (1994). Becoming an information master: A guidebook to the medical information jungle. *Journal of Family Practice, 39*, 489-499.
- Spenceley, S., O'Leary, K., Chizawsky, L., Ross, A., & Estabrooks, C. (2008). Sources of information used by nurses to inform practice: An integrative review. *International Journal of Nursing Studies, 45*(6), 954-970.
- Tannery, N., Wessel, C., Epstein, B., & Gadd, C. (2007). Hospital nurses' use of knowledge-based information resources. *Nursing Outlook, 55*(1), 15-19.
- Wilson, T. D. (1999). Exploring models of information behavior: The 'uncertainty' project. *Information Processing and Management, 35*(6), 839-849.