

Nursing Informatics Competencies in an Undergraduate Nursing Program

A Thesis submitted  
to the Graduate School  
Valdosta State University

in partial fulfillment of requirements  
for the degree of

MASTER OF SCIENCE

in Nursing

in the Department of Nursing  
of the College of Nursing

December 2011

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BSN, Valdosta State University, 2007

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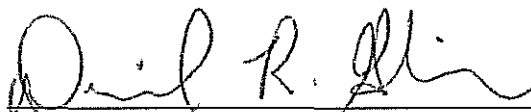


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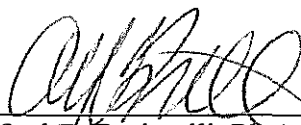


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## ABSTRACT

With the changes in healthcare and the increasing use of technology, efforts must start with nursing education programs to ensure that nursing graduates are ready for professional practice. To achieve this, nursing education programs will need to include the use of technology and nursing informatics competencies in their curricula. The purpose of this study, therefore, was to identify how nursing informatics competencies were specifically being operationalized in undergraduate college of nursing courses and curriculum as well as perceived barriers to the implementation of those competencies. The study focused on one baccalaureate nursing program in southern Georgia during the academic year of 2010-2011. A mixed method descriptive design was used for this study. The sample consisted of 16 nurse faculty members who were responsible for courses taught in the newly revised curriculum at the participating Bachelors of Science in Nursing program.

The findings of the study suggested that nursing informatics competencies most frequently reported as being included in the curriculum were email, Internet, electronic medical records, literature searches, ethical use of information systems, and clinical documentation systems. Infrastructure and equipment were reported as the leading barriers to implementation of nursing informatics competencies into courses and curriculum. The study provides the participating college with data to assist with program evaluation efforts, guide faculty development needs, and support curriculum revision.

## TABLES OF CONTENTS

I. INTRODUCTION.....	1
Statement of Problem.....	1
Statement of Purpose.....	2
Background and Significance.....	3
Statement of Research Questions.....	5
Variable Delineation.....	5
Conceptual Definitions.....	6
Operational Definition.....	7
Theoretical Framework.....	7
Limitations.....	8
Summary.....	8
II. REVIEW OF LITERATURE.....	9
Importance of Nursing Informatics Competencies.....	9
Nursing Informatics: What BSN Students Need to Know.....	11
Interpretation of Nursing Informatics Competencies for Educators.....	14
Barriers to Incorporating Nursing Informatics Competencies into BSN Curricula.....	18
Summary.....	22
III. METHODS.....	23
Introduction.....	23
Research Design.....	23
Sample and Setting.....	23
Instrumentation.....	24

Data Collection and Procedure.....	25
Data Analysis.....	26
Summary.....	27
IV. RESULTS.....	29
Research Question One.....	30
Research Question Two.....	34
Summary.....	36
V. DISCUSSION.....	38
Research Question One Discussion.....	39
Research Question Two Discussion.....	42
Limitations.....	44
Recommendations for Nursing Practice.....	44
Recommendations for Nursing Education.....	45
Recommendations for Future Research.....	46
Conclusion.....	47
REFERENCES.....	48
APPENDICES.....	52
Appendix A: Participant Questionnaire.....	52
Appendix B: Data Collection Sheet for Interview Responses.....	55
Appendix C: Sample American Association of Colleges of Nursing (2008) Essentials Grid... ..	59
Appendix D: Institutional Review Board Exemption Report.....	61
Appendix E: Site Approval Letter.....	63
Appendix F: American Association of Colleges of Nursing (2008) Nursing	

Informatics Competencies Included in study.....65

## LIST OF FIGURES

1. Frequency of faculty responses for Likert scale questions pertaining to: (a) including nursing informatics competencies in BSN curricula, (b) necessary skills to incorporate nursing informatics competencies, and (c) barriers that inhibit implementation of nursing informatics competencies into courses (N = 27)..... 30
2. Frequency of “yes” responses by participants for nursing informatics content included in BSN courses (N = 27)..... 32
3. Frequency of “yes” responses by participants for each perceived barrier to implementation of nursing informatics competencies into BSN courses (N = 27)..... 35

## LIST OF TABLES

1. Definitions of Nursing Informatics.....	6
2. Informatics Competencies for Beginning Nurses as Outlined by Staggers et al. (2002).....	12
3. Examples of Institute of Medicine’s (IOM) Descriptions of Nursing Informatics (IOM, 2003).....	14
4. Specific Examples of Nursing Informatics Content Included in BSN Courses (N = 27).....	31
5. AACN (2008) Nursing Informatics Competencies Included in BSN Courses (N = 27).....	34
6. Perceived Barriers that Inhibit Robust Implementation of Nursing Informatics Competencies into Bachelors of Science in Nursing (BSN) Courses (N = 27).....	35

## ACKNOWLEDGEMENTS

To Dr. Maura Schlairet, thank you for serving as my thesis committee chair and guiding me through this experience. I truly appreciate all of your comments and many words of wisdom.

To Dr. David Gibson, thank you for serving on my thesis committee and offering your expertise in this process.

To Dr. Deborah Weaver, I am very grateful that you agreed to serve on my thesis committee. As a nursing educator, your expertise is greatly appreciated.

To Dr. Susan Wold, thank you for all your efforts in helping me with my thesis. You were a true inspiration and will always hold a special place in my heart. You will be missed.

To my family, I thank you for the kind words, love, and support that you have given me throughout this adventure. I could not have made it without you. I love you all very much.

A special thanks for my loving husband, Scott. I am truly blessed to have you in my life. Thank you for supporting me and always believing in me. I love you very much.

To Brenda “Honey B” Merchant, I am forever grateful for all your help, guidance, love, support and encouragement during this endeavor. Thank you for the many nights at the round table as I worked on this study. You are the best mother in the world and I love you more than words can express.

To my nephews, Jake and Alex, thank you for always making me smile. When times were stressful I knew that I could turn to you to make me feel better. I love both of you to the heavens.

To SGC faculty, thank you for your support during endeavor. I am lucky to have such a great group of co-workers.

To Jaime Carter, thank you for the encouraging words that you gave me during this stressful time. I am grateful to have such a wonderful co-worker and friend.

To Kasey Strickland, thank you for the many talks we shared on our trips to VSU. Hang in there, you are almost done.

## Chapter I

### INTRODUCTION

Providing healthcare in a more efficient manner is a major concern in the United States. One way of improving the efficiency of healthcare is through technology. Technology has become more prominent in providing quality and safe healthcare. “The ways in which we communicate, conduct business, learn, travel, and even play are all affected by technology” (Curran, 2008, p. 523). As society relies more on the implementation of technology in providing healthcare services, nursing education programs will need to include the use of technology and nursing informatics competencies in their curricula. According to Curran, “there is an increasing demand for technology-driven techniques and informatics content in curricula; however faculty have not kept pace with this educational challenge” (p. 524).

The American Association of Colleges of Nursing (AACN) recognizes and acknowledges the significance of technology and nursing informatics (AACN, 2008). This organization has developed a framework for the preparation of professional nurses which includes 12 nursing competencies related to information management and patient care technology. Undergraduate nursing programs accredited by AACN are required to include these competencies in their curricula.

#### Statement of Problem

Paper and pencil as tools of the trade for nursing are quickly becoming outdated and obsolete. Federal initiatives are pushing towards the use of electronic health records

(EHRs) in all healthcare arenas by the year 2014 (National League of Nursing [NLN], 2008). The NLN states that nursing graduates should know how to interact with nursing informatics tools and how the use of nursing informatics will ensure safe high quality care (2008). With the nursing shortage affecting healthcare, graduates need to be prepared for the workforce. Information technology has changed the way the world works, learns, lives and plays (Skiba, Connors, & Jeffries, 2008).

Several studies have been conducted to analyze the importance of nursing informatics and what nursing students need to know in regard to nursing informatics (Hart, 2008; McDowell & Ma, 2007; Ornes & Gassert, 2007; Stagers, Gassert, & Curran, 2002). Although most nursing schools and nursing faculty realize the importance of including nursing informatics, there are few studies and limited data to support that these competencies are actually being taught.

Interpretation of nursing informatics competencies for educators is important to ensure consistency among nursing curricula. Many initiatives have been put in place to facilitate nursing programs in teaching and using nursing informatics (AACN, 2008; American Nurses Association [ANA], 2008; Institute of Medicine [IOM], 2003; NLN, 2008), but as of yet, evaluating these endeavors has not been done. Barriers to the incorporation of nursing informatics competencies into curricula need to be identified so that faculty development needs can be determined.

#### Statement of Purpose

The purpose of this study was to identify how AACN nursing informatics competencies were specifically being operationalized in an undergraduate college of nursing curriculum. The study focused on one baccalaureate nursing program in southern

Georgia during the academic year of 2010-2011. The study provided the participating college with data that will assist with program evaluation efforts, guide faculty development needs, and support curriculum revision.

### Background and Significance

The importance of nursing informatics is recognized and described throughout the literature. According to the President's Council of Advisors on Science and Technology (2010), the potential benefits of health information technology include: (a) patients receiving better quality of care; (b) patients participating more in their health care decisions; (c) aiding in clinical studies of medical interventions; (d) improving knowledge of the population; (e) developing new tools for medicine; and (f) increasing administrative efficiency. In addition, federal initiatives are in place for EHRs to be used in all healthcare arenas by 2014 (NLN, 2008). With the increasing use of technology in healthcare settings, nursing graduates must possess nursing informatics knowledge and skills. AACN therefore mandates that nursing education programs include nursing informatics competencies into curricula so that graduates will be prepared for the workforce (AACN, 2008).

A systematic review of literature by Hart (2008) focused on whether nurses in the United States have sufficient skills to provide evidence-based quality care and use EHRs to advance care. The review identified that many nurses are unprepared to provide evidence-based care. Hart (2008) states that, "although nursing attitudes are good, three primary issues cannot be overcome by positive attitude: insufficient knowledge, insufficient skills, and insufficient support in terms of training, resources, and time" (p. 328).

The IOM's five core competencies are to: (a) provide patient centered care; (b) work in interdisciplinary teams; (c) use evidence-based practice (EBP); (d) apply quality improvement; and (e) utilize informatics (IOM, 2003). A review of literature conducted by Overstreet et al. (2006) of the IOM's five core competencies showed that although there is increased awareness of the importance of the competencies, there is little published research about teaching these competencies.

With the changes in healthcare and the growing use of technology, efforts must start with nursing education programs to ensure that graduates are ready for the workforce. It is important to recognize what nursing students need to know in regard to nursing informatics. Health care delivery systems have changed dramatically over the past decade, which makes computer information and literacy crucial to the future of nursing (AACN, 2008). According to the AACN's *Essentials of Baccalaureate Education for Professional Nursing Practice* (2008), course work and clinical experiences should prepare baccalaureate nursing graduates with the skills and knowledge to use information management and patient care technologies to provide safe, high quality care.

Although nursing programs are guided by the AACN nursing informatics competencies and IOM core competencies, there are few data on whether these competencies are being taught and how the competencies are operationalized at the course level. Nursing informatics competencies need to be interpreted for educators to facilitate the incorporation of these competencies into undergraduate curricula. This study is an attempt to identify how one baccalaureate nursing program in southern Georgia is

incorporating the AACN's and IOM's recommendations for nursing informatics competencies into their curriculum.

Barriers to the incorporation of nursing informatics competencies into undergraduate curricula are present among educational programs. According to McNeil, Elfrink, Beyea, Pierce, and Bickford (2006), "there is a lack of clarity among nursing faculty about essential nursing informatics content and how to effectively integrate this content into nursing curriculum" (p. 58). Study authors also stated that other barriers include lack of qualified faculty, lack of resources, lack of perceived need, and lack of time (McNeil et al., 2006). The current study will also attempt to identify potential barriers to operationalization of nursing informatics competencies. The results can be used to determine ways to assist with program evaluation efforts, guide faculty development needs, and support curriculum revision.

#### Statement of Research Questions

Two research questions were developed for this study:

1. How are AACN (2008) and IOM (2003) requirements for nursing informatics competencies operationalized in courses in a Bachelors of Science in Nursing (BSN) curriculum?
2. What, if any, are potential barriers to operationalization of AACN (2008) and IOM (2003) recommendations for nursing informatics competencies at the course and curriculum levels for a BSN program?

#### Variable Delineation

In this study, the construct of interest was nursing informatics competencies. There was not an all inclusive list of nursing informatics competencies or a universal

definition for nursing informatics (Staggers et al., 2002). The terms informatics, information technology, and computer literacy were used in the literature. Although there were many definitions for nursing informatics, for the purpose of this study, the definitions from IOM (2003), ANA (2008), and AACN (2008) were used (see Table 1). AACN's *Essentials of Baccalaureate Education for Professional Nursing Practice* (2008) was used as the list of nursing informatics competencies to be studied. This study focused on AACN's (2008) Essential IV, Information Management and Application of Patient Care Technology.

Table 1

*Definitions of Nursing Informatics*

Organization	Definition
ANA	Integrates nursing science, computer and information science, and cognitive science to manage, communicate and expand the data, information, knowledge and wisdom of nursing practice (ANA, 2008).
IOM	Communication, management and knowledge to mitigate error and support clinical decisions using information technology (IOM, 2003).
AACN's Quality and Safety Education for Nurses (QSEN)	Health information technology is information processed using both computer hardware and software for the entry, storage, retrieval, sharing and use of health care information (QSEN, 2007).

Conceptual Definitions

Nursing Informatics: Using technology and computer science to help support clinical decisions, communication, manage knowledge, and support safe nursing care by decreasing errors. This can include but is not limited to using computer hardware, software, Internet, intranet, databases, and email (ANA, 2008; IOM, 2003; QSEN, 2007).

Competency: A cluster of related abilities, commitments, knowledge, and skills that enable a person (or an organization) to act effectively in a job or situation (Business Dictionary, 2011).

### Operational Definition

Nursing Informatics Competencies: Including technology and computer science in curricula to help students meet the outcomes as set forth by AACN (2008). By using technology and computer science to help support clinical decisions, communication, manage knowledge, and support safe nursing care by decreasing errors, students will be prepared as professional nurses. AACN (2008) lists 12 nursing informatics competencies that are required to be included in the curriculum.

### Theoretical Framework

The work of this study was grounded in Kurt Lewin's (1951) three-step change theory which consists of three stages: unfreezing, change, and refreezing. The first step in the process is to unfreeze the situation or the resistance by individuals or groups.

Activities that can help in this stage include: "motivating participants by preparing them for change, building trust and recognition for the need to change, and actively participating in recognizing problems and brainstorming solutions within a group"

(Kritsonis, 2005, p. 2). According to Lewin (1951), the second step involves change in thoughts, feeling, behavior, or a combination of all three that in some way is more productive. The last step, refreezing, is establishing the change as a new habit so that it becomes the way of practice. Lewin's (1951) theory demonstrates the effects of things that promote or inhibit change. By using Lewin's (1951) theory this study attempted to

describe potential forces or behaviors that help to promote or inhibit the implementation of nursing informatics competencies into the nursing curricula.

### Limitations

A limitation of this study was the inability to generalize the results to associate degree programs or other baccalaureate nursing programs, since this study focused on baccalaureate nursing students from one college in southern Georgia. Another limitation was the small sample size ( $N = 16$ ) of faculty.

### Summary

With the ever-changing health care environment it is becoming more imperative that nursing graduates have knowledge and skills in nursing informatics. The nursing shortage is still affecting the country, which compounds the need to produce high quality nursing graduates ready to enter the workforce. The demand to include nursing informatics into nursing curricula is an expectation for nursing education programs. The results of this study were intended to help educators better implement nursing informatics competencies in undergraduate nursing curricula.

## Chapter II

### REVIEW OF LITERATURE

The review of literature has been organized into four sections. The first section explains the importance of nursing informatics. The second section presents content nursing students need to know in regard to nursing informatics. The third section describes how nursing informatics competencies have been interpreted for educators, and the fourth section identifies barriers to implementation of nursing informatics competencies into curricula. With the initiative to adopt EHRs and consumer's use of personal health records and electronic communication devices, "it is imperative that graduates of today's nursing programs know how to interact with these important informatics tools" (NLN, 2008, p. 1).

#### Importance of Nursing Informatics Competencies

The existing literature (McDowell & Ma, 2007; McNeil et al., 2003; Ornes & Gassert, 2007) concludes that there are three main themes addressing the importance of nursing informatics competencies. The themes are: (a) patient safety, which includes medication errors and shift change errors; (b) support for clinical decisions including EHRs, electronic medication systems, computer charting; and (c) implementing EBP and communication technology including personal digital assistants (PDAs), email, and wireless monitors. With the continuously changing healthcare environment, it is essential that nurses are able to provide safe and quality care to patients. Nursing

informatics facilitates the combination of data, information, and knowledge to support clinical decisions in all settings of practice (Hart, 2008). Research suggests that the effort must start in nursing school to educate students about the importance of and need for nursing informatics (Forbes & Hickey, 2009; Hart, 2008).

Nursing informatics competencies are imperative in improving healthcare access, healthcare quality, reducing healthcare errors, and cost effectiveness (Fetter, 2008). The IOM indicates that up to 44,000, and possibly as many as 98,000, people die each year as a result of preventable medication errors, which suggests a continuing problem in the healthcare system (Overstreet et al., 2006). McNeil et al. (2003) noted that “because health care delivery increasingly requires timely information for effective decision making, information technology must be integrated into nursing education curricula for all future nurse clinicians and educators” (p. 341). Although technology advancements have dramatically increased over the past decade, incorporating basic nursing informatics competencies into nursing curricula has been lacking (Hart, 2008).

The systematic review by Hart (2008) found that research on nurses’ use of information technology in the clinical setting has been focused on nurse attitudes toward information technology. With the recent trend to paperless systems and the national effort to have EHRs, nurses will be required to possess computer knowledge and skills, not just a positive attitude. Nurses, who have requisite knowledge, are able to use technology and databases to retrieve information to make evidence-based decisions (Ainsley & Brown, 2009). The review by Hart (2008) also found that further research is needed to define competencies and to build nursing informatics competency curriculum and assessment tools. Barriers to implementation of EBP are centered on inadequate access and

resources, insufficient time, and insufficient training. “EBP requires that nurses possess the cognitive skills necessary to identify problems, research them, and solve them by applying new knowledge” (Ainsley & Brown, 2009, p. 231).

Nursing Informatics: What BSN Students Need to Know

A study by Staggers et al. (2002) revealed that, although there is a need for a research-based list of nursing informatics competencies, a current list is not available. Staggers et al. (2002) defined the levels of nursing related to informatics as beginning nurses, experienced nurses, informatics specialists, and informatics innovators. Staggers et al. (2002) produced a list of informatics competencies for each level for the categories of computer skills, informatics knowledge, and informatics skills. Undergraduate nurses are considered to be beginning nurses. The list of skills for this level along with examples is provided in Table 2.

Table 2

*Informatics Competencies for Beginning Nurses as Outlined by Staggers et al. (2002)*

Competency	Example of Competency
<b>Computer Skills</b>	
Communication	Email, Internet
Data Access	Literature searches, computerized care plans
Documentation	Uses an application to document patient care
Education	Information technology for patient education
Monitoring	Computerized patient monitoring
Basic desktop software	Word processing
Systems	Operating systems, hand-helds
<b>Informatics Knowledge</b>	
Impact	Recognizes the skills, time, and effort required for effectiveness
Privacy/Security	Patient rights in regard to computerized information management
Systems	Explain use of networks for electronic communication

With the integration of nursing informatics technology (IT) in the healthcare field, students must attain skills to effectively use the technology to care for patients (McDowell & Ma, 2007). Differences in nursing student's informatics competencies between admission and graduation were compared (McDowell & Ma, 2007). Findings suggested that nearly all nursing students entered the program with basic computer skills in word processing, email, and Internet, but were lacking in skills needed for database searching, which is one of the critical skills for new nurses (McDowell & Ma, 2007). The recommendation by McDowell and Ma (2007) is to include more activities or exercises which incorporate using spreadsheets, databases, and statistical software in courses in the undergraduate nursing curriculum.

Before determining what should be changed in nursing curricula, what is currently being taught must be assessed first. McNeil et al. (2003) focused on exploring what particular information technology and computing skills were being taught in nursing education programs. Data from 266 nursing program administrators, managers, deans, directors, and nurse educators showed that information technology content most frequently reported as being included in the curriculum was assessing electronic resources, ethical use of information systems, and computer based patient records. McNeil et al. (2003) concluded that current baccalaureate nursing programs are focusing on computer literacy skills (e.g. word processing, e-mail) rather than on information literacy skills (e.g. bibliographic retrieval, use of Internet). Only 37% of the programs reported "EBP" as a component of their nursing curricula. Upon graduation 80% of the programs expected students to be competent in computer literacy skills and information

literacy skills, and only 33% expected students to be competent in using databases and spreadsheets (McNeil et al., 2003).

In 2008, the AACN developed nine *Essentials of Baccalaureate Education for Professional Nursing Practice*, which provides a framework for nursing baccalaureate education. AACN (2008) Essential IV: Information Management and Application of Patient Care Technology list the following 12 competencies that each graduate should possess:

- Demonstrate skills in using patient care technologies, information systems, and communication devices that support safe nursing practice.
- Use telecommunication technologies to assist in effective communication in a variety of healthcare settings.
- Apply safeguards and decision making support tools embedded in patient care technologies and information systems to support a safe practice environment for both patients and healthcare workers.
- Understand the use of computer information systems to document interventions related to achieving nurse sensitive outcomes.
- Use standardized terminology in a care environment that reflects nursing's unique contribution to patient outcomes.
- Evaluate data from all relevant sources, including technology, to inform the delivery of care.
- Recognize the role of information technology in improving patient care outcomes and creating a safe care environment.
- Uphold ethical standards related to data security, regulatory requirements,

confidentiality, and client's right to privacy.

- Apply patient-care technologies as appropriate to address the needs of a diverse patient population.
- Advocate for the use of new patient care technologies for safe, quality care.
- Recognize that redesign of workflow and care processes should precede implementation of care technology to facilitate nursing practice.
- Participate in evaluation of information systems in practice settings through policy and procedure development.

Graduates must have basic technical skills including using computers, patient care technologies such as monitors, data gathering devices, and information systems such as decision support systems to help guide care (AACN, 2008). In addition, the AACN states that baccalaureate course work and clinical experiences will prepare graduates to use knowledge and data to facilitate effective communication, provide safe, high-quality care, and use research to make evidence-based decisions (AACN, 2008).

Information technology has become an integral part of the healthcare environment. This has been a driving force for nursing programs to integrate nursing informatics competencies into curricula (Curran, 2008). It has been challenging for nursing programs to educate students with the advancing technology from clinical information systems to computerized medical equipment (McDowell & Ma, 2007). The National Advisory Council on Nurse Education and Practice (2009) states that technology should be used as a “tool to research, access, manage, integrate, evaluate, and communicate information, and the possession of a fundamental understanding of the ethical/legal issues surrounding the access and use of information” (p. 59).

### Interpretation of Nursing Informatics Competencies for Educators

The position statement by NLN (2008) states that there are multiple forces working towards incorporating information and communication technologies throughout the entire healthcare system, which includes:

- Institute of Medicine (IOM);
- The Technology Informatics Guiding Education Reform (TIGER) Initiative;
- Office of the National Coordinator of Health Information and Technology; and
- The Robert Wood Johnson Foundation (RWJF) funded QSEN Initiative.

To facilitate improving the quality and safety of patient care, IOM has developed five interrelated core competencies to be integrated into health professionals' education: patient-centered care, interdisciplinary teams, EBP, quality improvement, and informatics (IOM, 2003). The IOM's interpretation of nursing informatics (see Table 3) is to communicate, manage knowledge, mitigate error, and support decision making using information technology (IOM, 2003).

Table 3

*Examples of IOM's Descriptions of Nursing Informatics (IOM, 2003)*

Communication	<ul style="list-style-type: none"> <li>• By using email and EHRs patients and providers can access and share information while protecting the patient's privacy and confidentiality</li> <li>• Enhancing patient education</li> <li>• Understanding ethical and legal aspects</li> <li>• Using online databases to help support decisions to improve care</li> </ul>
Manage Knowledge	<ul style="list-style-type: none"> <li>• Online databases for literature searches to provide EBP</li> <li>• Disease registries to help facilitate close monitoring of patients</li> <li>• EHRs to streamline patient's data and prompt for missing data about patients</li> </ul>
Mitigate Error	<ul style="list-style-type: none"> <li>• EHRs</li> <li>• Electronic prescriptions (decrease misinterpretations of handwriting)</li> <li>• Flagging errors before they occur (adverse drug reactions)</li> <li>• Computer aided decision support system and online registries (i.e., diabetes, hypertension)</li> </ul>
Support Decision	<ul style="list-style-type: none"> <li>• Computerized decision support systems to help provider follow guidelines in regards to drug administration, dosing, prevention, monitoring, and EBP</li> </ul>

The TIGER initiative encourages educating nurse graduates about nursing informatics so they can provide safe quality care. The TIGER initiative is composed of more than 40 nursing professional organizations that created a three-year action plan to help nurses and graduates “fully engage in the unfolding digital era of health care” (The TIGER Initiative, 2007, p. 3). Recommendations for academic programs as outlined by the TIGER Initiative (2007) include the following:

- Adopt informatics competencies for all levels of nursing education (undergraduate/graduate) and practice (generalist/specialist).
- Encourage faculty to participate in development programs in informatics.

- Develop a task force or committee at each school to examine the integration of informatics throughout the curriculum.
- Encourage the Health Services Resources Administration's (HRSA) Division of Nursing to continue and expand its support for informatics specialty programs and faculty development.
- Measure changes from baseline in informatics knowledge among nursing educators, students, and among the full range of clinicians seeking continuing education.
- Collaborate with industry and service partners to support faculty creativity in the design, acceptance and adoption of informatics technology.
- Develop strategies to recruit, retain, and educate current and future nurses in the areas of informatics education, practice and research.

The goal of the RWJF funded QSEN project is to educate and prepare nurses with the knowledge, skills, and attitudes needed to provide safe and quality care. The six competencies developed included the IOM's five core competencies and safety (QSEN, 2007). The pilot schools and programs that are integrating these competencies report their work on the QSEN website.

With healthcare seeking new ways to increase quality and safety of care, there is an expectation for nurse educators to keep up with the demands of the healthcare industry (McNeil et al., 2006). Nursing educators must consider how to prepare nursing students for job placement while including the expanding role of information technology (McNeil et al.). "Technology has finally reached a point at which health behavior models can be integrated with computer generated interventions to provide consistent, continuous care"

(Overstreet et al., 2006, p. 22). The literature review conducted by Overstreet et al. revealed a lack of published outcomes on interventions focused on IOM competencies; however, there is increasing awareness and support for the IOM competencies. Overstreet et al. recommended that providers seek opportunities to include content on nursing informatics into curricula.

### Barriers to Incorporating Nursing Informatics Competencies into BSN Curricula

According to Skiba et al. (2008), nursing education programs and nurse educators have made efforts to incorporate nursing informatics into their curricula and to use technology to facilitate learning outcomes. With the changing population of students, it can be difficult to identify a teaching style that will maximize learning for all students regardless of age (Skiba et al.). Technologies that are becoming more popular are simulation, online programs, Web-based courses, wireless classroom, and audience response technologies (e.g., clickers in the classroom), but not all educators feel prepared to teach with these methods (Skiba et al.). With the various and sundry learning opportunities available, faculty must have the necessary preparation to teach in these ever-changing environments.

The level of faculty preparedness for using information technology tools and teaching nursing information technology content and skills was studied by McNeil et al. (2003). Using Benner's (1984) novice to expert framework, investigators found only two nursing programs that considered their faculty as experts in teaching and using information technology; 39% reported their faculty to be an advanced beginner level, and 18% reported faculty to be at the novice level (McNeil et al., 2003). Even with evidence from the study that faculty needs to be educated and trained to teach information

technology, 46% of programs reported “no future plans or no knowledge of future plans to offer information technology education or training in their region” (McNeil et al., p. 346).

It is not evident whether nursing faculty are teaching the required competencies even though the content and skills are included in the curricula (McNeil et al., 2003). “The data indicate a gap exists in the knowledge needed by nursing faculty to prepare nurses to be skilled in information technology and its use to manage clinical information in daily practice” (McNeil et al., p. 347). Faculty development opportunities are critical to ensure that faculty achieve the level of competence needed to prepare nursing students for practice. Lifelong learning must be continued by educators, given the technological changes that are occurring in the classroom and practice (Skiba, et al., 2008).

Findings of Fetter (2007) identified “nursing faculty as a significant barrier to curricula information technology initiatives” (p. 82). Other identified barriers included lack of faculty knowledge, skills, and motivation to integrate nursing informatics into curriculum. “Ongoing funding of baccalaureate nursing education, faculty development opportunities, and creative partnerships is critical to continue fostering innovations and new models of practice and education that promote integration of information technology solutions in all settings and make evidence-based practice possible” (McNeil et al., 2003, p. 348).

Although many educators agree with incorporating nursing informatics into curricula, research that gives specific examples seems to be limited (Fetter, 2007; Flood, Gasiewicz, & Delpier, 2010; Skiba et al., 2008). Flood et al. (2010) give specific examples of information literacy assignments for each level of student. In undergraduate

nursing curricula, the novice level focuses on accessing and evaluating information.

Intermediate level focuses on implementation of information and advanced focuses on role development.

Nursing education programs must include nursing informatics in the curriculum to prepare professional nurses. Ornes and Gassert (2007) describe the evaluation of nursing informatics content in a BSN curriculum. In this study, the course syllabi from 18 courses in a BSN program were analyzed to determine the extent to which nursing informatics material was present in each course. Investigators used nursing informatics competencies as described by Staggers et al. (2002). Results showed that no content was presented in the following areas: administration, documentation, or patient education. Basic desktop software and communication were used most often. Only small percentages of courses incorporated data access (11%), patient monitoring (6%), and systems (17%).

The findings from Ornes and Gassert (2007) supported that nursing faculty are the “greatest block to incorporating technology into curricula” (p. 78). The investigators agree that there is a need to increase faculty knowledge and motivation possibly by adding criteria about nursing informatics practice to faculty evaluations.

Recommendations from this study include development of workshops and mentoring programs, use of graduate faculty and students as mentors, collaboration with hospitals, and requiring students to have personal digital assistants for the entire program.

Faculty need to understand why and how to incorporate nursing informatics into curricula. The qualitative study conducted by McNeil et al. (2006) concluded that barriers to integrating nursing informatics into curricula are lack of qualified faculty, lack of resources, lack of perceived need, and lack of time in both classroom and clinical

environments. Faculty are not clear on what nursing informatics content should be included and how it should be incorporated into their teaching. There are also conflicting ideas about the need for nursing informatics in different environments. The study showed that 133 out of 266 respondents reported not having nursing informatics education available in the region, which lessens opportunities for faculty and students to learn more about nursing informatics competencies.

The NLN supports the reform of nursing education to encourage the preparation of nursing graduates to practice in the technology driven healthcare industry (NLN, 2008). To promote this, NLN supports initiatives for faculty development to ensure nursing education programs addresses informatics preparation (NLN, 2008). According to NLN (2008) the following are recommended for all nursing faculty and administrators:

- Participate in faculty development programs to achieve competency in informatics.
- Designate an informatics champion in every school of nursing.
- Incorporate informatics into curriculum.
- Incorporate ANA recognized standard nursing language and terminology into content.
- Identify clinical informatics exemplars, those drawn from clinical agencies and the community from other nursing education programs to serve as examples for the integration of informatics into the curriculum.
- Achieve competency through participation in faculty development programs.
- Partner with clinicians and informatics people at clinical agencies to help faculty and students develop competence in informatics.

- Collaborate with clinical agencies to ensure that students have hands-on experience with informatics tools.
- Collaborate with clinical agencies to demonstrate transformations in clinical practice produced by informatics.
- Establish criteria to evaluate informatics goals for faculty.

### Summary

In conclusion, the existing literature describes the importance of nursing informatics and what nursing students need to know in regard to nursing informatics. AACN (2008) has developed a list of informatics competencies that must be incorporated into nursing curricula to ensure preparation of professional nurses. The literature also includes the interpretation of nursing informatics competencies for educators as defined by the IOM (2003), TIGER Initiative (2007), and QSEN (2007). The last section of the literature review focused on barriers to incorporating nursing informatics competencies into BSN curricula. Although there are different opinions about the best way to include nursing informatics in curricula, the common goal is to educate tomorrow's nurses on use of technologies for safe, quality care.

## Chapter III

### METHOD

#### Introduction

The purpose of this study was to identify how AACN (2008) nursing informatics competency requirements are specifically being operationalized in undergraduate nursing courses and curricula. The study examined each course taught in the BSN nursing curriculum at one university to determine specific examples of nursing informatics competencies taught in the course. The intent was to use the findings to assist with program evaluation efforts, guide faculty development needs, and support curriculum revision.

#### Research Design

A mixed method research approach and descriptive analysis design were used for the study. Archival program evaluation data collected under the auspices of the Nursing Academic Committee (NAC) and the Technology Advisory Board were the sources of data for this study.

#### Sample and Setting

The setting was one undergraduate BSN nursing program in southern Georgia. The participants were selected for this study by using a non-probability, convenience sample. The sample consisted of 16 nurse faculty members who were responsible for courses taught in the newly revised curriculum initiated Fall 2009 at the participating

BSN program. The sample was targeted to generate course-level data from an undergraduate BSN nursing education program.

### Instrumentation

The study focused on AACN (2008) Essential IV which was entitled Information Management and Application of Patient Care Technology. There were 12 competencies listed under Essential IV. Data related to four additional AACN (2008) competencies were collected due to these other competencies being closely related to nursing informatics and to ensure important data were not disregarded. The instruments used in the study included a Participant Questionnaire (Appendix A), Data Collection Sheet for Interview Responses (Appendix B), and an AACN (2008) Baccalaureate Essentials Grid.

After a thorough literature review, the Participant Questionnaire (Appendix A) was developed by the researcher and was designed to elicit information about nursing informatics content included in courses and curriculum, as well as perceived barriers to implementation of nursing informatics competencies. The questionnaire was pilot tested with five nursing faculty to determine updates or changes. Following pilot testing, minor revisions included question five being updated to include the Smartphone as an example of a handheld devices used for decision support. Changes to the Participant Questionnaire were not substantial therefore did not require resubmission to the Valdosta State University Institutional Review Board (IRB) for review.

The Data Collection Sheet for Interview Responses (Appendix B) was created by the researcher as an instrument to record faculty responses during the face-to-face interview. Interviews were guided by the AACN (2008) Baccalaureate Essentials Grid which was created by the NAC at the participating nursing program (Appendix C). The

y-axis of the grid listed the AACN (2008) Baccalaureate Essential Informatics Competencies and the x-axis of the grid listed each course taught in the undergraduate nursing program at the participating school. The grid created by faculty in spring 2009, included check marks representing faculty perceptions of specific nursing informatics competencies integrated into the course. Although every course did not have to include all 16 competencies, the investigator-developed Participant Questionnaire (Appendix A) allowed faculty to provide specific examples of how information management and patient care technology were included in the course for the competencies that were germane to the course.

#### Data Collection and Procedure

IRB exemption was obtained from Valdosta State University under Category 1 (Appendix D). This exemption category states that research conducted in an established educational setting involving normal education practice are exempt under federal regulations. Site approval was granted from the Dean of Nursing within the participating college (Appendix E). Arrangements were made with the college and each nurse faculty member for data collection. Faculty were contacted by email and by flyers placed in faculty workroom mailboxes to set up appointments for data collection. Data collection took place between March 15, 2011, and May 10, 2011, in the College of Nursing at the participating program.

Quantitative data were collected using a Participant Questionnaire (Appendix A) which was completed prior to the start of an interview with nurse faculty members for each course with which they were associated. Qualitative data were collected by a face-to-face interview between the researcher and the nurse faculty member associated with

the BSN course. The researcher provided the nurse faculty member with a copy of the AACN (2008) Essentials grid which was used as a guide during the interview. The researcher then asked the nurse faculty member if he/she taught any of the 16 AACN (2008) nursing informatics competencies. If the faculty member reported “yes” then they were asked to give specific examples of each of the 16 competencies that were operationalized into the course. It was anticipated that not all 16 competencies would be included in each course. The responses were recorded by the researcher on the Data Collection Sheet for Interview Responses (Appendix B) but, no additional probing questions were used to develop additional data.

After data collection, the names of the participants were removed from the instruments and replaced with participant identification numbers (Appendix A and Appendix B). No identifying data were entered on computer files. Only participant identification numbers were used for analysis. All data were maintained in a secure locked location. The researcher maintained all data collection instruments in a locked cabinet in a locked office for safety. All data will be destroyed five years following initial publication. Confidentiality and anonymity of participants were maintained during this study. The potential benefits of the study include assisting with program evaluation efforts, guiding faculty development, and supporting curriculum revision.

#### Data Analysis

Quantitative data (Appendix A data) were coded for computer entry and analyzed using the Statistical Package for Social Services (SPSS) Version 17.0 (IBM Corporation, Armonk, NY). Course numbers associated with each questionnaire were entered into the database. Course numbers beginning with a 3 indicated a junior level course and courses

beginning with a 4 indicated a senior level course. The course setting in which the course was taught, was coded as: (1) didactic only; (2) lab only; (3) clinical only; (4) didactic and clinical; and (5) didactic, clinical, and lab. The week format was the length that the course was taught and was coded as 0 = 7 weeks and 1 = 15 weeks. Likert scale questions were coded as ordinal level data using a 5-point scale (1 = *strongly disagree* to 5 = *strongly agree*). For these Likert scale questions, higher numbers reflected more positive responses toward informatics. Questions four and five on Appendix A represented nominal level data and were coded 0 = *no* and 1 = *yes*. Data analysis was conducted at the course level using descriptive statistics and frequencies with results reported in frequencies and percentages and displayed using tables and graphs.

Qualitative responses from the face-to-face interview using the AACN (2008) essentials grid were coded as: (0) competency not operationalized in the course and no check mark on the AACN (2008) grid; (1) competency operationalized in the course and check mark on the AACN (2008) grid; (2) competency operationalized in the course and check mark should be added to the AACN (2008) grid; and (3) competency was not operationalized in the course and the check mark should be deleted from the AACN (2008) grid. The results for each competency were reported in frequency occurrences.

### Summary

The research approach utilized in this study was a mixed method process and descriptive analysis. The study was designed to identify and describe how nursing informatics competencies were specifically operationalized at the course level in relation to the AACN (2008) nursing informatics competencies. A convenience sample of nurse faculty in an undergraduate nursing program at one setting in southern Georgia

constituted the participants in the study. A face-to-face interview with each nurse faculty member and completion of a questionnaire by the nurse faculty member were utilized to collect data.

## Chapter IV

### RESULTS

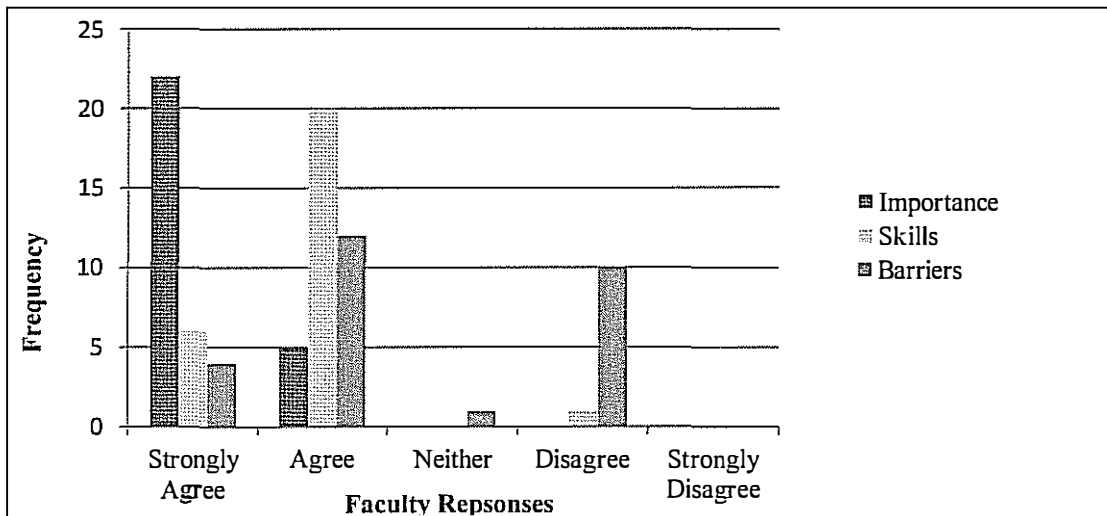
This mixed method descriptive study was intended to identify how AACN (2008) nursing informatics competencies were being implemented in an undergraduate college of nursing curriculum. The sample studied consisted of 27 course level responses collected from 16 nurse faculty members who were responsible for the courses taught at the participating nursing program during the academic year 2010-2011. Quantitative data were collected by using the Participant Questionnaire (Appendix A). Qualitative data were collected by a face-to-face interview as guided by the AACN (2008) grid and the Data Collection Sheet for Interview Responses (Appendix B).

The research questions identified for this study were:

1. How are AACN (2008) and IOM (2003) requirements for nursing informatics competencies operationalized in courses in a BSN curriculum?
2. What, if any, are potential barriers to operationalization of AACN (2008) and IOM (2003) recommendations for nursing informatics competencies at the course and curriculum levels for a BSN program?

In this study, data from 14 junior-level courses and 13 senior-level courses were analyzed. The setting for courses taught were indicated as: (a) didactic only (n = 6); (b) lab only (n = 4); (c) clinical only (n = 10); (d) didactic and clinical (n = 6); and (e) didactic, lab, and clinical (n = 1). Of the 27 responses, 67% were reported from courses taught in a 7-week format and 33% from courses taught in a 15-week format.

All of the participants responded that it was important to integrate nursing informatics competencies into the BSN curriculum with 82% responding strongly agree and 18% responding agree (Figure 1). The majority of the participants responded that they possessed the necessary skills to incorporate nursing informatics competencies into their courses with 22% reporting strongly agree, 74% reporting agree, and only 4% reporting disagree. When participants were asked if barriers were experienced that inhibited implementation of these competencies, 59% reported experiencing barriers.



*Figure 1.* Frequency of faculty responses for Likert scale questions pertaining to: (a) including nursing informatics competencies in BSN curricula; (b) necessary skills to incorporate nursing informatics competencies; and (c) barriers that inhibit implementation of nursing informatics competencies into courses (N = 27).

### Research Question One

Univariate level quantitative data were analyzed and the results are shown in Table 4 and Figure 2. Research question one attempted to identify specific examples of how nursing informatics competencies were being operationalized into BSN courses and curriculum. The results are summarized to show the frequencies of informatics

competencies as operationalized into BSN courses in classroom, clinical, lab, and simulation.

Table 4

*Specific Examples of Nursing Informatics Content Included in BSN Courses (N = 27)*

Examples of Nursing Informatics Content	<u>Frequency</u>		<u>Percentage</u>	
	Yes	No	Yes	No
Electronic Medical Records (EMRs)	17	10	63%	37%
Documentation Systems	15	12	56%	44%
Computerized Physician Order Entry (CPOE)	7	20	26%	74%
Barcode medication scanner	11	16	41%	59%
Handhelds for decision support	12	15	44%	56%
PDA	6	21	22%	78%
Smartphone	6	21	22%	78%
iPad	0	27	0%	100%
iPhone	1	26	4%	96%
Nursing Careplan Software	10	17	37%	63%
Literature Search	16	11	59%	41%
Ethical use of information systems	16	11	59%	41%
Evaluating Data From Internet	12	15	44%	56%
Online Databases	8	19	30%	70%
Email	25	2	93%	7%
Internet	24	3	89%	11%
Audience Response Systems "clickers"	1	26	4%	96%
Telehealth	0	27	0%	100%

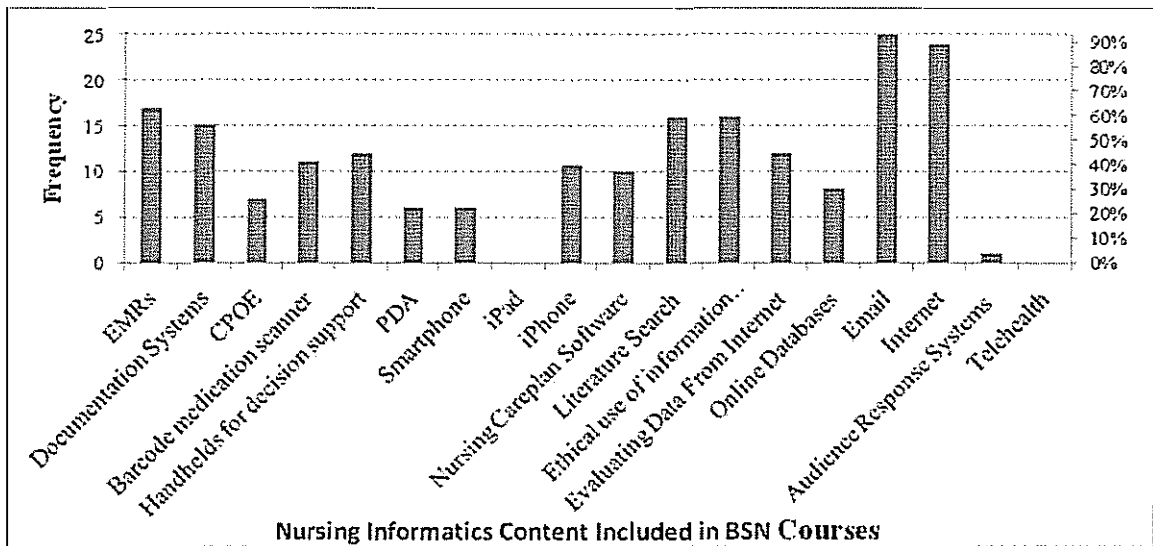


Figure 2. Frequency of “yes” responses by participants for nursing informatics content included in BSN courses (N = 27).

The data show that nursing informatics content most frequently reported as being included in the curriculum is email (93%), Internet (89%), EMRs (63%), literature searches (59%), ethical use of information systems (59%), and clinical documentation systems (56%). Nursing informatics content not frequently being utilized in courses included iPads (0%), telehealth (0%), and iPhone (4%). Audience responses systems (4%) were only being utilized in one course. Computerized Physician Order Entry (CPOE) was reported as used in 7 courses (26%) and handhelds for decision support were used in 12 courses (44%). Barcode medication scanners were used in 11 courses (41%) and nursing careplan software was incorporated into 10 courses (37%). Data access in the form of using online databases was included in eight courses (30%) and evaluating data from Internet sources were included in 12 courses (44%).

Responses from qualitative data (Appendix B) were coded as: (0) competency not operationalized in the course and no check mark on the AACN (2008) grid; (1)

competency operationalized in the course and check mark on the AACN (2008) grid; (2) competency operationalized in the course and check mark should be added to the AACN (2008) grid; and (3) competency was not operationalized in the course and the check mark should be deleted from the AACN (2008) grid. Frequency occurrences were reported for the 16 AACN (2008) nursing informatics competencies (Appendix F) that were being included into BSN courses (Table 5).

Competency 1.4, which was using emerging technology methods to communicate, was reported as included into 23 courses (85%). Competency 4.8 stated that students should uphold ethical standards with regard to data security and patient's rights and was reported as incorporated into 22 courses (81%). Both competency 3.4 (evaluating the credibility of sources of information) and competency 4.1 (using patient care technologies, information systems, and communication devices for safe nursing practice) were being included into 21 courses (78%). Only two courses (8%) incorporated competency 4.12, which discussed evaluation of information systems in practice settings by using policy and procedure. Competency 4.2 included using telecommunication technologies in a variety of healthcare settings was reported as being included in nine courses (34%). Competency 4.11, which was recognizing that redesign of workflow should precede implementation of care technology to facilitate nursing practice was reported as being incorporated in eight courses (30%).

Table 5

*AACN (2008) Nursing Informatics Competencies Included in BSN Courses (N = 27)*

Competency	Frequency	
	Included	Not Included
1.3	19	8
1.4	23	4
3.4	21	6
4.1	21	6
4.2	9	18
4.3	13	14
4.4	13	14
4.5	18	9
4.6	20	7
4.7	15	12
4.8	22	5
4.9	15	12
4.10	14	13
4.11	8	19
4.12	2	25
7.6	13	14

*Note.* AACN (2008) competencies included in this study are listed in Appendix F.

### Research Question Two

Quantitative data were analyzed and the results are shown in Table 6 and Figure 3. Research question two was designed to identify barriers, if any, to operationalization of AACN (2008) and IOM (2003) recommendations for nursing informatics competencies at the course and curriculum levels for a BSN program. The data were summarized using descriptive statistics to show the frequencies of faculty perceived barriers inhibiting implementation of nursing informatics competencies into BSN courses and curriculum.

Table 6

*Perceived Barriers that Inhibit Robust Implementation of Nursing Informatics Competencies into BSN Courses (N = 27)*

Perceived Barriers	Frequency		Percent	
	Yes	No	Yes	No
Equipment	15	12	56	44
Supplies	9	18	33	67
Support Staff	11	16	41	59
Infrastructure	16	11	59	41
Insufficient Prep Time	9	18	33	67
Insufficient Class Time	7	20	26	74
Insufficient Knowledge Skills	5	22	19	81
Lack of Motivation	1	26	4	96
Low Quality Training	1	26	4	96
Negative Attitude	0	27	0	100

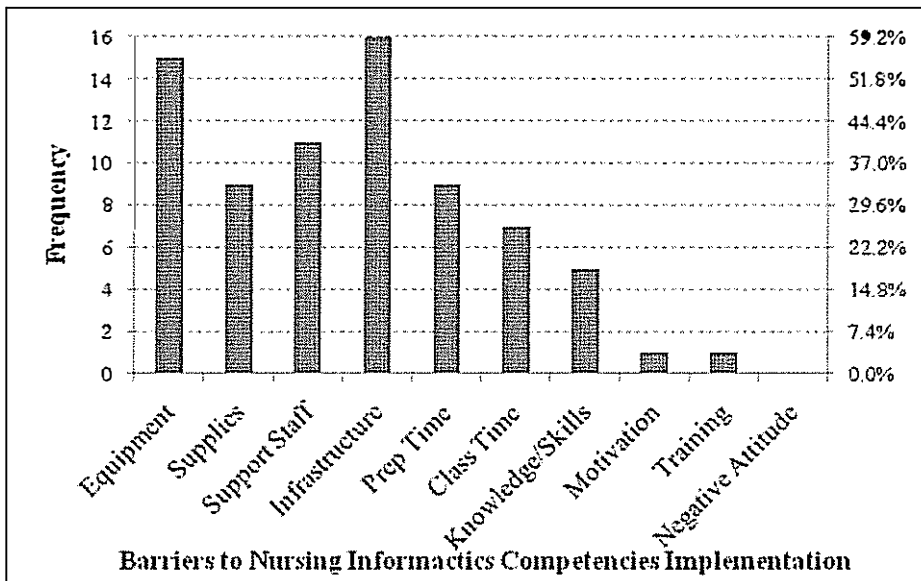


Figure 3. Frequency of “yes” responses by participants for each perceived barrier to implementation of nursing informatics competencies into BSN courses (N = 27).

Infrastructure (i.e., wireless capacity and available electrical outlets) was the leading perceived barrier at 59% followed by equipment (i.e., hardware and software) at

56%, and support staff (i.e., teaching assistance, secretarial help, and technology helpdesk) at 41%. Both supplies and lack of preparation time were considered as barriers by 33% of respondents. Lack of classroom time was reported as a barrier by 26% and insufficient knowledge or skills was reported by 19%. Lack of motivation (4%), low quality training (4%), and negative attitudes (0%) were not considered significant barriers by faculty. Other barriers reported by faculty included “students not as adapt [sic] as expected, lack of time, students not as IT adapt [sic] as I expect sometimes and tech skills need to be used to implement care.”

### Summary

Quantitative data were reviewed and analyzed using descriptive statistics to determine frequencies. Data related to research question one revealed specific examples of how nursing informatics competencies were being operationalized in BSN courses and curriculum. Analysis of quantitative data show that nursing informatics content most frequently reported as being included in the curriculum are email, Internet, EMRs, literature searches, ethical use of information systems, and clinical documentation systems. Analysis of quantitative data related to research question two revealed participants’ perceived barriers to implementation of nursing informatics competencies into BSN courses. Participants reported infrastructure and equipment as the leading barriers to implementation of nursing informatics competencies into their courses and curriculum.

Although the data collection and the analysis plans were robust, qualitative data were unable to be fully analyzed due to problems implementing the interview data collection methods. The qualitative data obtained during the interview process was

intended to be analyzed to identify emerging themes. The AACN (2008) essentials grid was used as a guide during the interview with faculty responses being recorded by the researcher. When participants answered “yes” to the questions, the researcher asked for specific examples but no further probing questions were asked. When the participant answered “no” to the interview questions, the researcher failed to ask any additional probing questions. Since the data collection technique was not used accurately, suitable qualitative data were not available. Additional analysis of the qualitative data could not be performed as planned.

## Chapter V

### DISCUSSIONS

With federal initiatives recommending the use of EHRs in all healthcare arenas by the year 2014 (NLN, 2008) and with the nursing shortage impacting health care, nursing graduates must be adequately prepared for the workforce. AACN and IOM recognize the significance that technology and nursing informatics have on healthcare (AACN, 2008; IOM, 2003). Although many initiatives are in place to facilitate nursing programs in including nursing informatics competencies in their curricula, (AACN, 2008; ANA, 2008; IOM, 2003; NLN, 2008) studies that evaluate these endeavors are limited.

The purpose of the mixed method study was to identify how AACN (2008) nursing informatics competencies were being included into undergraduate college of nursing courses and curriculum. This investigation also sought to determine what barriers, if any, existed that inhibited implementation of these nursing informatics competencies. Previous research has been conducted to analyze the importance of nursing informatics competencies but few studies give specific examples of how nursing programs are including nursing informatics competencies (Hart, 2008; McDowell & Ma, 2007; Ornes & Gassert, 2007; Staggers, Gassert, & Curran, 2002).

The research questions identified for this study were:

1. How are AACN (2008) and IOM (2003) requirements for nursing informatics competencies operationalized in courses in a BSN curriculum?

2. What, if any, are potential barriers to operationalization of AACN (2008) and IOM (2003) recommendations for nursing informatics competencies at the course and curriculum levels for a BSN program?

For this study, faculty unanimously agreed that it is important to integrate nursing informatics competences into BSN curriculum. Of the respondents, 4% reported lacking the necessary skills to incorporate nursing informatics competencies into the course they teach. Ornes and Gassert (2007) reported that there is the need to increase faculty skills, knowledge, and understanding of nursing informatics. Our participants may not have realized that they did not possess the necessary skills or understand which skills are needed to incorporate nursing informatics competencies into their courses. When asked if barriers were experienced that inhibited implementation of nursing informatics competencies into courses, 15% of our participants strongly agreed and 44% agreed that they experienced barriers. Specific faculty barriers and how they compare to the literature will be discussed in more detail under the discussion of results for research question two.

#### Research Question One Discussion

Quantitative results for research question one support that nursing informatics content most frequently reported as being included in the curriculum was email (93%), Internet (89%), EMRs (63%), literature searches (59%), ethical use of information systems (59%), and clinical documentation systems (56%). Computer literacy skills include email and clinical documentation systems. Information literacy includes Internet, literature searches, and ethical use of information systems. EMRs would be considered information literacy only if the students were learning to interpret and use the data on the EMRs to base their decisions. A study by McNeil et al. (2003) of 266 nursing programs

concluded that baccalaureate nursing programs are focusing on computer literacy skills rather than information literacy skills. Unlike the literature, the courses in the current study incorporated both computer literacy and information literacy skills. Although registered nurses need to have computer literacy skills, the focus is on information literacy skills to ensure nurses can access, utilize and evaluate data sources to provide high quality, safe patient care. Our study did show that information literacy skills such as Internet (89%), literature searches (59%), and evaluating online sources (44%) were being included in courses which are important factors to help students learn to find evidence-based information to use in practice.

High rates of the use of email, Internet, and literature searches could be related to students being exposed to these skills in core courses. The findings from the current study mirror the literature in regard to using email and basic computer skills. McDowell and Ma (2007) stated that “by 2005, nearly all nursing students are entering nursing programs with basic computer skills in word processing, email, and the WWW” (p. 34). Email was being used as a way of communicating using technology but finding ways to utilize telehealth could be explored. Telehealth was not reported as being included in the current study most likely due to lack of available resources.

The qualitative study by McNeil et al. (2006) reported on computer competencies needed to prepare nurses for future practice (N = 105). Some of the findings included software applications (n = 11), equipment (n = 4), PDAs (n = 3), and electronic records (n = 7). Our data is consistent with the literature in that all of the above computer competencies were being included in courses. Improvements could be made to increase the number of courses that incorporate these competencies. When looking at data from

the current study, the nursing informatics content that is not frequently included into courses, several speculations may be made. First, only 4% reported using audience response systems “clickers” in the classroom. This could be due to lack of equipment such as hardware or software in the classroom that is required to utilize audience response systems. Second, the use of nursing careplan software was reported to be used by 37% of the courses. Low rates of implementation in the present study could be due to the fact that not all students were required to purchase the software package. Third, the use of handhelds (44%), PDAs (22%), Smartphones (22%), iPhones (4%), and iPads (0%) may be reported as lower percentages in our sample because of the regulations set forth by clinical institutions. Some hospitals do not allow employees or students to use any personal electronic devices. In addition, some hospitals do not allow students to access EMRs or to document on EMRs. Although 63% of the courses reported EMRs as being included in courses, it was not specified if students were actively using EMRs or if students were just exposed to discussion about EMRs.

Our data show that all of the 16 AACN (2008) nursing informatics competencies that were included in this study are being incorporated into at least one BSN course. Of the 27 responses analyzed, the following AACN (2008) competencies were most frequently reported: (a) using technology to communicate (85%); (b) ethical standards related to data security and regulations (81%); (c) evaluating online sources (78%); and (d) safe practice using patient care technologies, information systems, and communication devices (78%). Some faculty were incorporating nursing informatics technology more than others but, this could be a result of different course objectives, length of the course taught (i.e., 7 weeks or 15 weeks), or whether the course was

didactic, clinical, or laboratory based. This analysis was outside the scope of this study. Based on remarks made by faculty during data collection, some faculty may think that it is easier to incorporate nursing informatics into clinical courses and therefore do not initiate teaching this content in didactic courses.

### Research Question Two Discussion

Findings from the current study for research question two show that lack of resources such as infrastructure (59%), equipment (56%), support staff (41%), and supplies (33%) were the leading barriers. McNeil et al. (2006) concluded that barriers to including nursing informatics competencies into curricula are lack of qualified faculty, lack of resources, lack of perceived need, and lack of time. There are mixed results between the findings in the current study and those in the literature pertaining to barriers.

Our findings differ from the literature (McNeil et al., 2006) in that only 19% of our sample reported insufficient knowledge and skills as barriers to implementing nursing informatics competencies. Of the respondents, 100% reported agree or strongly agree when asked about the importance of integrating nursing informatics competencies into the BSN curriculum. McNeil et al. (2006) stated that there was mixed beliefs about the need for nursing informatics depending on familiarity of the respondents with the implications of nursing informatics. Due to AACN (2008) and IOM (2003) nursing informatics requirements, the participants in this study were aware of the importance of nursing informatics.

In agreement with the literature (McNeil, et al., 2006), our data suggest that lack of resources and time are considered barriers. Resources such as infrastructure, equipment, support staff, and supplies could be barriers due to the limited funds available

by institutions. Some faculty seemed to have an external locus of control meaning that they feel that control over resources available or purchased is out of their control. Some faculty may not feel that it is appropriate to ask for costly equipment or supplies with the recent state-wide budget cuts. Currently at this college of nursing there is active lobbying for a new health science building which could eliminate infrastructure as a barrier. Some faculty perceived lack of preparation time (33%) and lack of classroom time (26%) as barriers. Lack of time as a perceived barrier could depend on the format of the course (i.e., 7 weeks or 15 weeks). Some faculty may be reluctant to change course content to include nursing informatics. If the course content stays the same each semester and no change occurs, time may not be a barrier for that participant.

By using Lewin's (1951) change theory, potential behaviors that inhibit implementation of nursing informatics competencies may be identified and understood. Instead of being proactive to improve equipment and infrastructure to help alleviate barriers, participants may be content with their current educational environment. According to Lewin's (1951) change theory, some participants may be resistant to change. With this resistance, the faculty may not change to ensure nursing informatics competencies are being included in curriculum.

There are inconsistencies with faculty knowledge, skills, and motivation between the literature (Fetter, 2007; Ornes & Gassert, 2007) and the results of this study. Fetter (2007) and Ornes and Gassert (2007) describe faculty as being the leading barrier and that there is the need to increase faculty motivation, knowledge, and skills. Results from the current study show that only 4% of faculty reported lack of motivation as a barrier. When asked about specific perceived barriers that inhibit implementation of nursing

informatics competencies into their courses, 19% of our participants reported insufficient knowledge or skills. The participants in the current study may not have been clear on what nursing informatics content should be included in their courses or what specific skills are needed to do so. Another issue is that participants may have been unfamiliar with informatics terms therefore making the questions confusing. Although the results of data collection are anonymous, participants may have been afraid to admit if they had barriers such as lack of motivation or insufficient knowledge or skills. Another explanation for the results could be the validity of the researcher-developed questionnaire which could have led to participants not understanding the questions as written.

### Limitations

A limitation of this study is the small sample size (N = 16). The use of single site analysis, along with small sample size, restricts generalizability of the findings to other similar baccalaureate nursing programs. Another limitation was the researcher developed data collection instruments. Validity of the questionnaire was not externally established and some questions may have been confusing to participants. Additionally, being a novice researcher, qualitative data were not accurately collected by the researcher and data analysis could not be performed to identify emerging themes from interview field notes.

### Recommendations for Nursing Practice

Based on the findings of this study, it has been determined that evaluation of nursing informatics competencies taught should be performed on hire to ensure that new graduates are fully prepared for the workforce. Nursing practice should work towards the development of a list of nursing informatics competencies that novice nurses should

possess. This could help facilitate nursing programs in ensuring graduates are educated and prepared to work as novice registered nurses from the IT perspective.

### Recommendations for Nursing Education

Several recommendations can be made based on the results of this study. First, the results of this research indicated that BSN nursing programs should analyze and evaluate nursing informatics competencies being incorporated into nursing curriculum as set forth by AACN (2008) and IOM (2003) mandates. Second, barriers of implementation must be identified by the faculty and addressed by administrators. Third, nursing education programs must acknowledge the need to be proactive in changing the curriculum to ensure nursing informatics competencies are being taught to adequately prepare undergraduate nursing students for the workforce.

Specific recommendations for the participating nursing program include assisting with program evaluation efforts and supporting curriculum revision. Faculty consensus should be obtained to address the following:

- 1) Clarify each nurse competency so that there is consistency as to what adequately constitutes that the competency is being integrated into courses.
- 2) Should certain courses incorporate specific nursing informatics competencies?  
This could be accomplished by the faculty re-evaluating the AACN (2008) grid.
- 3) Currently the program is incorporating computer literacy and information literacy skills. What specific computer literacy skills (i.e. email, computer documentation systems, and word processing) are students expected to possess on admission to the nursing program? The nursing program should ensure that information literacy such as Internet, literature searchers, evaluation of online resources, and ethical

use of information systems is included in courses so that students can access, utilize, and evaluate data for EBP.

- 4) The participating program should conduct a needs assessment of available equipment including hardware, software, and infrastructure needed to support the application of nursing informatics competencies.
- 5) Continuous evaluation of the implementation of nursing informatics competencies should be integrated into the program evaluation plan. Adjustments may need to be made in the curriculum to ensure nursing informatics competencies are intentionally included in course objectives.
- 6) A comprehensive plan for faculty development should be developed to include nursing informatics, equipment needed to support implementation, and integration into the classroom. Developing partnerships with clinical agencies could help provide faculty development and keep faculty current on innovations in healthcare settings.

By following the steps in Lewin's (1951) change theory any resistance can be identified, change can occur and new habits formed. With the changes that are continuously occurring in healthcare, it is essential that nursing education curriculum changes as well.

Incorporating nursing informatics competencies into BSN courses should be initiated by all faculty regardless of the course they teach.

#### Recommendations for Future Research

Based on the findings of this study, the recommendations for future research are as follows:

- 1) Researchers are encouraged to replicate this study or conduct similar multi-site studies with larger sample size.
- 2) Qualitative techniques may allow more understanding of how nursing informatics competencies are being incorporated into curriculum and potential barriers to implementation of these competencies.

### Conclusions

This study was a starting point to analyze which nursing informatics competencies were being incorporated into BSN courses and to give specific examples of nursing informatics content being taught. Before identifying what needs to be changed in the curriculum, an assessment of the current curriculum had to be completed.

With the increased demand for the use of technology in healthcare, the effort must start with nursing education programs to ensure graduates are ready for professional practice. Nursing education must continually strive for appropriate methods to operationalize nursing informatics competencies into courses and curriculum. Barriers to implementation of nursing informatics competencies should be identified. Only through program evaluation efforts and continuous improvement will nursing graduates have appropriate opportunities to develop necessary skills for success in the workplace.

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## Appendix A: Participant Questionnaire



**Directions:** Read the following questions and choose all answers that apply.

4. What are your perceived *barriers* that inhibit implementation of nursing informatics competencies into your courses? Choose all that apply.
- No perceived barriers
  - Insufficient resources
    - Equipment (i.e., hardware, software)
    - Supplies and materials (i.e., batteries, etc.)
    - Support staff (i.e., teaching assistant, secretarial help, IT helpdesk)
    - Building infrastructure (i.e., wireless capacity, available outlets)
  - Insufficient preparation time
  - Not enough classroom time
  - Insufficient knowledge or skills
  - Lack of motivation
  - Low quality training
  - Negative attitude toward informatics
  - Other: \_\_\_\_\_
5. Which of the following are you incorporating into the newly revised BSN courses you teach? Your teaching setting can include classroom, clinical, lab, simulation, etc.
- Electronic medical records (EMRs) --patient's legal medical record stored in digital format which can include the following :
    - Clinical documentation systems
    - Computerized physician order entry
  - Barcode medication administration
  - Handhelds (for decision support)
    - PDA
    - Smart Phones, IPAD, IPHONE
    - Other \_\_\_\_\_
  - Data access
    - Nursing care plan software
    - Literature searches
    - Ethical use of information systems
    - Evaluate information from internet
    - National Health Data Databases
  - Electronic communication devices
    - Email
    - Internet
    - "Clickers"
    - Telehealth
    - Other \_\_\_\_\_

## Appendix B: Data Collection Sheet for Interview Responses

*Appendix B*

Data Collection Sheet for Interview Responses

Name:



Data Collection Sheet for Interview Responses  
(One per course)

Participant Identification Number:

Course Number:

Course Name:

Which of the following describes this course?

- Didactic
- Lab section
- Clinical course

Is this course taught in 7-week or 15-week format?

Responses will be recorded below in reference to the 12 informatics competencies listed on the AACN (2008) BSN essentials grid in reference to each course taught. For each 'check-mark' on the grid, specific examples will be recorded.

Competency 1.3

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Competency 1.4

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Competency 3.4

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Competency 4.1

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Competency 4.2

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Competency 4.3

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Competency 4.4

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Competency 4.5

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Competency 4.6

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Competency 4.7

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Competency 4.8

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Competency 4.9

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Competency 4.10

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Competency 4.11

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Competency 4.12

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Competency 7.6

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## Appendix C: Sample AACN Essentials Grid

Appendix C

AACN BSN Essentials (October 2008)	Core	PND I - Values Roles	Pharmacology	Lifespan I: Health Promotion	Health Assess	Older Adults	Mental Health	Lifespan II: Acute & Chronic	PND II - Research	Women & Children	Lifespan III: Multisystem	Community	PND III Leadership & Management	Professional Nursing Practice
<b>Essential IV: Information Management and Application of Patient Care Technology</b>														
1. Demonstrate skills in using patient care technologies, information systems, and communication devices that support safe nursing practice.														
2. Use telecommunication technologies to assist in effective communication in a variety of healthcare settings.														
3. Apply safeguards and decision making support tools embedded in patient care technologies & information systems to support a safe practice environment for both patients & healthcare workers.														
4. Understand the use of CIS systems to document interventions related to achieving nurse sensitive outcomes.														
5. Use standardized terminology in a care environment that reflects nursing's unique contribution to patient outcomes.														
6. Evaluate data from all relevant sources, including technology, to inform the delivery of care.														
7. Recognize the role of information technology in improving patient care outcomes and creating a safe care environment.														
8. Uphold ethical standards related to data security, regulatory requirements, confidentiality, and clients' right to privacy.														
9. Apply patient-care technologies as appropriate to address the needs of a diverse patient population.														
10. Advocate for the use of new patient care technologies for safe, quality care.														
11. Recognize that redesign of workflow and care processes should precede implementation of care technology to facilitate nursing practice.														
12. Participate in evaluation of information systems in practice settings through policy and procedure development.														

## Appendix D: Institutional Review Board Exemption Report

*Appendix D*

IRB Exemption Report



***Institutional Review Board (IRB)  
for the Protection of Human Research Participants***

**PROTOCOL EXEMPTION REPORT**

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**PROTOCOL NUMBER:** IRB-02711-2011

**INVESTIGATOR:** Crystal Callahan

**PROJECT TITLE:** Nursing Informatics Competencies in Undergraduate Nursing Curriculum

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**DETERMINATION:**

- This research protocol is exempt from Institutional Review Board oversight under Exemption Category(ies) 1. You may begin your study immediately. If the nature of the research project changes such that exemption criteria may no longer apply, please consult with the IRB Administrator ([irb@valdosta.edu](mailto:irb@valdosta.edu)) before continuing your research.
  - Exemption of this research protocol from Institutional Review Board oversight is pending. You may **not** begin your research until you have addressed the following concerns/questions and the IRB has formally notified you of exemption. You may send your responses to [irb@valdosta.edu](mailto:irb@valdosta.edu).
- 

**ADDITIONAL COMMENTS/SUGGESTIONS:**

Although not a requirement for exemption, the following suggestions are offered by the IRB Administrator to enhance the protection of participants and/or strengthen the research proposal. If you make any of these suggested changes to your protocol, please submit revisions so that IRB has a complete protocol on file.

Appendix E: Site Approval Letter

*Appendix E*

Site Approval Letter

Crystal Callahan  
2661 Devandrene Ave  
Waycross, GA 31503  
August 19, 2011

Dr. Anita Huff  
Dean of Nursing  
Valdosta State University  
S. Walter Martin Hall  
1300 North Patterson St.  
Valdosta, GA 31698

Dear Dr. Huff:

I am in the Masters of Science in Nursing program at Valdosta State University and currently working on completing my thesis. The topic of my study is Nursing Informatics Competencies in Undergraduate Nursing Curriculum. Dr. Schlairet is serving as Chair of my Thesis Committee.

The purpose of this study is to identify how American Association of Colleges of Nursing's (2008) nursing informatics competencies are specifically being operationalized in undergraduate college of nursing courses and curriculum. I am requesting permission to access Program Evaluation Committee data collected from VSU College of Nursing faculty under the auspices of the Nursing Academic Committee and the Technology Advisory Board during spring 2010 as data to be analyzed for my thesis.

If permission is granted, all data will be kept confidential and reported in aggregate. Participant identification numbers will be used instead of names and no other personal identifiers will be used. The data will be kept in a secure location which consists of a locked cabinet in a locked office. VSU Internal Review Board approval will also be obtained for this study. A copy of the research findings will be provided to the CON once my thesis is completed.

If you need any additional information, please do not hesitate to contact me by mail, email or phone.

Thank you in advance for your cooperation. I look forward to hearing from you.

Sincerely,

*Crystal Callahan*

Crystal Callahan RN, BSN  
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*Approved*  
*Anita Huff*  
*8/23/11*

## Appendix F: AACN (2008) Nursing Informatics Competencies Included in Study

## *Appendix F*

### AACN (2008) Nursing Informatics Competencies Included in Study

Competency 1.3	Use skills of inquiry, analysis, and information literacy to address practice issues.
Competency 1.4	Use written, verbal, non-verbal, and emerging technology methods to communicate effectively.
Competency 3.4	Evaluate the credibility of sources of information including but not limited to databases and Internet resources.
Competency 4.1	Demonstrate skills in using patient care technologies, information systems, and communication devices that support safe nursing practice.
Competency 4.2	Use telecommunication technologies to assist in effective communication in a variety of healthcare settings.
Competency 4.3	Apply safeguards and decision making support tools embedded in patient care technologies and information systems to support a safe practice environment for both patient and healthcare workers.
Competency 4.4	Understand the use of computer information systems to document interventions related to achieving nurse sensitive outcomes.
Competency 4.5	Use standardized terminology in a care environment that reflects nursing's unique contribution to patient outcomes.
Competency 4.6	Evaluate data from all relevant sources, including technology, to inform the delivery of care.
Competency 4.7	Recognize the role of information technology in improving patient care outcomes and creating a safe care environment.
Competency 4.8	Uphold ethical standards related to data security, regulatory requirements, confidentiality, and client's right to privacy.
Competency 4.9	Apply patient-care technologies as appropriate to address the needs of a diverse patient population.
Competency 4.10	Advocate for the use of new patient care technologies for safe, quality care.

- Competency 4.11 Recognize that redesign of workflow and care processes should precede implementation of care technology to facilitate nursing practice.
- Competency 4.12 Participate in evaluation of information systems in practice settings through policy and procedure development.
- Competency 7.6 Use information and communication technologies in preventive care.