

An Analysis of Published Nursing Informatics Competencies

Heather CARTER-TEMPLETON^a, Ramona PATTERSON^b and Cynthia RUSSELL^c

^{a,b,c} *The University of Tennessee Health Science Center, College of Nursing
Memphis, Tennessee, United States*

Abstract. Nursing informatics competency lists can provide a clear picture of required skills, knowledge, and attitudes needed for today's nursing workforce in a high-tech environment. Many stakeholders such as employers and educators have a vested interest in defining nursing informatics competencies for nurses. The primary objective of this paper was to compare and contrast published nursing informatics competencies. A literature search was conducted using the terms "informatics competencies" and "nursing informatics competencies" via PubMed and CINAHL for relevant articles. The search captured 37 articles; however, only six met the inclusion criteria set prior to the search. These six competency lists were reviewed for audience, sample size, design, categories used to classify competencies and operational examples of competencies. Findings revealed that there is variation among published informatics competencies in regard to content, presentation, and audience. A general list of competencies that can be utilized by nurses at all levels is needed. As a result nurses could operationalize and measure the skills, knowledge, and attitudes necessary to execute safe and effective nursing care in today's health care setting.

Keywords: Computer Literacy, Evidence-Based Practice, Nurses, Nursing Education Research, Nursing Informatics

1. Introduction

Employers and educators within the nursing field are faced with the need to identify informatics competencies for nurses. Much of this need is a result of increased information systems and technology being used in the patient care setting [1]. In addition, nurses need to manage a great deal of complex data, making information skills and knowledge a requirement when providing patient care [2].

In the United States, the National Advisory Council on Nurse Education and Practice determined a National Informatics Agenda for Nursing Education and Practice. This agenda included: 1) Educating student nurses and workforce nurses in core informatics content, 2) Training nurses with specific informatics skills, 3) Use of informatics to enhance nursing practice and education, 4) Train nursing faculty in nursing informatics, and 5) Improve collaborations within nursing informatics [3].

In the last eight years, various authors have devoted work toward establishing informatics competencies within nursing [4-9]. This paper provides an in-depth look at nursing informatics competencies from a review of literature, and addresses similarities and differences among those competencies.

2. Materials and Methods

2.1 Search Strategies and Sample

A literature search was conducted on the topic of nursing informatics competencies via CINAHL and PubMed databases. Search terms included "informatics competencies" and "nursing informatics competencies." Inclusion criteria, [set prior to the literature review] required that the article: (a) contain a description of an informatics competency

study, (b) have an original list of informatics competencies specific to nursing, and (c) be written in English. A total of thirty-three articles were retrieved, and six were included in the competency analysis. The articles that were not used did not contain an original informatics competency list.

2.2 Synthesis of Literature

Descriptive findings are offered, with a summary presented in table 1. The authors, year of publication, information regarding specific competencies examples, level of practice addressed, study design, sample size, and conceptual categories used in competency lists are provided. The studies are arranged and presented in order of year of publication. Variations in categorization of concepts for nursing informatics are also summarized in table 1.

3. Results

3.1 Select Literature

McNeil & Odom [4] suggested specific computer competencies and informatics concepts that should be included in undergraduate nursing curriculum. The authors reviewed and presented previous work in the area of nursing informatics competencies and provided a substantial background on driving forces for nursing informatics competencies. Their list of competencies recognized computer technology and information technology with core informatics concepts including: informatics, computer technology, information processing, theory, information systems, life cycle of information systems, telehealth, careers/roles in health informatics, and issues. Specific operational definitions or descriptions of the competencies were not provided [4].

The work of Staggers, Gassert, & Curran [2,5] is probably the most recognized and widely cited in the area of informatics competencies. The intent of their major study was to produce a research-based master list of informatics competencies using a three round Delphi technique. Using knowledge from 72 experts, 281 competencies were identified, categorized into four levels of practice (beginning nurse, experienced nurse, informatics specialist, and informatics innovator), and classified as computer skills, informatics knowledge, and informatics skills. Their work provides a comprehensive list of competencies and frequently offers specific examples of competency performance [2,5].

Curran [6] further developed the work of her fellow authors [2,5] to address the specific nursing informatics competency needs of nurse practitioners (NP). Her work offers a preliminary list of competencies essential for the education and practice of NPs. Curran employed the help of two informaticists and six NPs in the development of the proposed competencies. She included some competencies from earlier works [2,5] and proposed additional competencies specific to the role of a NP. Like her earlier work with Staggers, Gassert, & Curran [2,5] she classified competencies as computer skills, informatics knowledge, and informatics skills.

The study conducted by Jiang, Chen, & Chen [7] aimed to identify nursing informatics competencies necessary for nurses in Taiwan. This study utilized the Delphi technique with a sample of 29 experts. Competencies were classified into seven categories (Concept of Hardware, Software, and Networks; Principles of Computer Applications; Skills in Computer Usage; Program Design; Limitations of the Computer; Personal & Social Issues; Attitudes toward the Computer). Experts contributing to the study also

attempted to identify when a student or nurse should be educated on a specific skill making it helpful in curriculum design [7].

Garde, Harrison, & Hovenga [8] developed a web-based questionnaire and surveyed 82 Australian nurses to collect information on the preferred knowledge and skills of health informatics professionals. The survey was based on the International Medical Informatics Association's (IMIA) recommendations for education. The authors' results revealed lists of competencies categorized into five groups (Specific Health Informatics Knowledge & Skills; Information Technology Knowledge & Skills; People & Organizational Knowledge & Skills; Clinical, Medical and Related Knowledge & Skills; Various Other Knowledge & Skills). They suggest repeating this survey in other countries in order to develop an international educational agenda in the area of nursing informatics [8].

Members of the Quality and Safety Education for Nurses (QSEN) group are credited with developing competencies in many areas (patient-centered care, teamwork and collaboration, evidence-based practice, quality improvement, safety, and informatics) based on the Institute of Medicine's recommendations to assist in developing nurses with the competencies required to provide quality and safety in the health care setting. The specific set of competencies developed for informatics were broadly written and categorized into knowledge, skills, and attitudes [9].

3.2 Variations in Competency Sources

Although each of the competency lists were directed specifically towards nurses, there are variations related to the particular level of nurses. Some authors specifically stated the level of nursing for which their competencies were intended while others do not. For example, some lists addressed the needs of nursing curricula [4,7], others addressed the needs of practicing nurses at various levels [5], some specifically addressed advanced practice nurses [6,8] and one addressed the needs of nurses at all levels [9].

Another obvious difference between these competency lists is the categorization of nursing informatics competency concepts. Staggers, Gassert, & Curran [2] noted that some authors do not agree on categorization of nursing informatics competencies. Some authors refer to one or more of the following: computer literacy skills, information literacy skills, patient-centered skills, and curricula integration techniques. During the literature review presented in this paper, findings revealed from three to eight different categories used by the authors for the six reviewed competency lists. Table 1 highlights this variation by identifying the specific nursing informatics category concepts used by the authors. Findings revealed a fundamental difference between competency lists where some offered specific details related to competencies [5-7] and others were broadly written [4,8,9].

3.3 Similarities Between Competency Sources

Despite the differences in content, there are similarities. All sources specifically addressed the issues of privacy or ethics, information seeking or evidence-based practices, patient care documentation or health care information systems, and nurses' or health care professionals' role in planning and evaluating information systems. Further, all authors of the competency lists stated that they were generated as a result of a need for a framework for nursing education.

4. Discussion

Although nursing faculty members recognize the importance of information technology, they remain unaware of what and how to teach informatics concepts. From the standpoint of quality and safety, it has been suggested that nursing faculty must make an effort to engage in learning more about informatics competencies to prepare a workforce that is ready to practice in a modern healthcare system [9].

Work in this area continues to develop and there is currently not a single combination of competency lists for nurses at all levels. Various professional nursing informatics groups are now working to identify competencies. One example is the Technology Informatics Guiding Education Reform (TIGER) Initiative. This is a multidisciplinary, multispecialty group working to incorporate technology related competencies into nursing education. Currently, TIGER's recommended competency list is organized into four categories: Basic Computer Competencies, Information Literacy Competencies, Information Management and Informatics Competencies, and Attitudes and Awareness Competencies [10].

5. Conclusion

Use of multiple competency lists can become cumbersome and confusing, especially for those unfamiliar with the nursing informatics specialty area. Many could benefit from the development of a widely accepted list of nursing informatics competencies addressing nurses at all levels [1]. Competency lists that offer specific examples of competency demonstration are often easier for the reader to understand. Otherwise, a great deal of interpretation is left to the reader regarding how the competencies are to be understood and operationalized in the life of a practicing nurse. For example, specific information technology skills are explicitly addressed and examples are provided in the Staggers, Gassert, & Curran [5] competency list. An understanding of the depth and breadth of these competencies supports the formation of a general list of competencies that can be utilized by nurses at all levels, and subsequently allow for nurses to operationalize and measure the competencies necessary to function in today's health care setting.

Table 1 -Published Nursing Informatics Competencies Summary Table

| Author/ Year | Specific Competency Examples Provided | Levels of Practice Addressed | Design | Sample | Categories Used |
|------------------------------------|--|--|----------------------------------|--------|--|
| McNeil & Odom, 2000 | No | Student Nurses | Review of Previous Work | N/A | Informatics; Computer Technology; Information Processing; Theory; Information Systems: Practice, Education, Administration, and Research; Life Cycle of Information Systems; Telehealth; Careers/Roles in Health Informatics; Issues |
| Staggers, Gassert, & Curran, | Yes | Beginner, Experienced, Informatics | Delphi Study | 72 | Computer Skills, Informatics Knowledge, Information Skills |

| Author/ Year | Specific Competency Examples Provided | Levels of Practice Addressed | Design | Sample | Categories Used |
|---|--|---|-----------------------------|---|---|
| 2001/2002 | | Specialist, Informatics Innovator | | | |
| Curran 2003 | Yes | Nurse Practitioner | Based on Delphi Study | 2 nurse infor- maticists and 6 NP's | Computer Skills, Informatics Knowledge, Information Skills |
| Jiang, Chen, & Chen, 2004 | Yes | Student Nurses | Delphi Study | 29 | Concept of Hardware, Software, and Networks; Principles of Computer Applications; Skills in Computer Usage; Program Design; Limitations of the Computer; Personal & Social Issues; Attitudes Toward the Computer |
| Garde, Harrison, & Hovenga, 2005 | No | Health Informatics Specialists | Survey | 82 | Specific Health Informatics Knowledge & Skills; Information Technology Knowledge & Skills; People & Organizational Knowledge & Skills; Clinical, Medical and Related Knowledge & Skills; Various Other Knowledge & Skills |
| Cronenwett, et al., 2007 | No | All Levels | N/A | N/A | Knowledge, Skills, Attitudes |

References

- [1] American Nurses Association. *Nursing informatics: scope & standards of practice*. Silver Spring, MD: Nurses Books; 2008.
- [2] Staggars N, Gassert, C, Curran, C. A delphi study to determine informatics competencies of nurses at four levels of practice. *Nurs Res.* 2002;51[6]:383-90.
- [3] Skiba D, Carty, B, & Nelson, R. Information technology: The foundation for educating nurses as clinical leaders. In: C Weaver CD, P Weber, & R Carr editor. *Nursing and informatics for the 21st century: An international look at practice trends and the future*. Chicago: Healthcare Information and Management Systems Society; 2006. p. 35-44.
- [4] McNeil B, Odom, S. Nursing informatics education in the United States: proposed undergraduate curriculum. *Health Informatics J.* 2000;6:32-8.
- [5] Staggars N, Gassert C, Curran C. Informatics competencies for nurses at four levels of practice. *J Nurs Educ* 2001;40[7]:303-316.
- [6] Curran C. Informatics competencies for nurse practitioners. *AACN Clin Issues.* 2003;14[3]:320-30.
- [7] Jiang W, Chen, W, Chen, Y. Important computer competencies for the nursing profession. *J of Nurs Res.* 2004;12[3]:213-25.
- [8] Garde S, Harrison, D, Hovenga, E. Skill needs for nurses in their role as health informatics professionals: A survey in the context of global health informatics education. *Int J Med Inform.* 2005;74:899-907.

- [9] Cronenwett L, Sherwood, G, Barnsteiner, J, Disch, J, Johnson, J, Mitchell, P, Sullivan, D, Warren, J. Quality and safety education for nurses. *Nurs Outlook*. 2007;55:122-31.
- [10] TIGER Initiative. The TIGER Initiative [Online]. 2007-2008 [cited 2008 Sep 27]. Available from: URL: <http://www.tigersummit.com>

Email address for correspondence: hcartert@utm.edu