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# Integrating informatics into the BSN curriculum: A review of the literature

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SUMMARY

Even though health informatics (HI) education is an essential component of the undergraduate nursing curriculum, it remains controversial with no clear consensus on which knowledge and skills should be integrated in a baccalaureate nursing program. The purpose of this review article is to integrate literature on HI education in the nursing curriculum by examining previous and current literature on this topic, synthesizing the findings, and recommending guidelines and future directions for nurse educators. The computerized databases of CINAHL, MEDLINE, ERIC, Academic Search Premier, and Google Scholar were used to generate relevant literature. Nineteen studies published between 2000 and 2010 on HI education were included in this review, and from the critical and synthesis of those reports emerged four overarching themes: (a) lack of consensus on HI education; (b) impact on patient care outcomes; (c) faculty development through organizational collaboration; and (d) global disparities in HI education. Implications for nursing education and patient outcomes in clinical practice are also discussed. Further studies are warranted to promote the understanding and awareness of HI education in undergraduate nursing curriculum.



## Introduction

In this millennium, every health-related discipline can benefit from the knowledge of informatics and appreciation of the advances occurring in the healthcare system. Barton (2005) maintained that nurse educators must integrate the available knowledgebase and skill training into the curriculum so students can develop and maintain competence related to professional responsibilities. The American Nurses Association (2001) argued that new graduates, regardless of their nursing specialty or practice setting, are expected to possess technology literacy and fluency along with health information management skills. The National Advisory Council on Nurse Education and Practice (NACNEP, 2010) contended that students must acquire knowledge of and expand mastery of competencies in managing large amounts of information during the nursing school years. Curriculum development and implementation is one of the important processes in which every nurse educator must participate to meet such demands, ensuring quality education and outcomes (Keating, 2006).

Over the century, nurse educators called for a unified approach to curriculum development; they must strive to improve the curriculum to bridge the gap between new graduates' skills and those required in early-career employment (Keating, 2006). As addressed in the Carnegie report (Benner et al., 2010), better patient outcome is closely related to a greater proportion of nurses with a Bachelor of Science in Nursing (BSN) degree. In the past, researchers were concerned about the education–practice gap which, to this day, still challenges nurses' ability to translate academic experience into practice. Currently, the situation has shifted as nurse administrators are more worried about the practice–education gap as an obstacle for new graduates who must keep pace with rapid advances in new technologies; BSN programs must be improved to narrow the practice–education gap (Benner et al., 2010).

Health informatics (HI) education remains controversial with no clear consensus on which knowledgebase and skill sets should support how students are taught in a BSN program (Thompson and Skiba, 2008). HI education is an essential component of the undergraduate nursing curriculum (American Association of Colleges of Nursing, 2008; National League for Nursing, NLN Board of Governors, 2008). Not only has the curriculum in place been lacking adequate preparation for actual nursing practice (Thompson and Skiba, 2008), but many nursing programs have not provided HI education to students (Cronenwett et al., 2007; Fetter, 2009a). These gaps can be addressed by analyzing the content and components appropriate for the BSN curriculum.

The healthcare system in the United States (U.S.) has become increasingly complex. Research indicates that the use of healthcare information technology (HIT) is expected to grow considerably as all prospective healthcare professionals must develop strategies for managing continuing changes. Unquestionably, nurse educators must be up-to-date on recent developments and changes of the

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healthcare system to prepare graduates for the needs of the public (Benner et al., 2010; Keating, 2006; NACNEP, 2010). A literature review was undertaken to provide systematic and comprehensive evidence related to contents of informatics in a BSN curriculum with which to provide an understanding of critical elements necessary in a BSN program. Therefore, the purpose of this paper is to discuss an integrative review of findings from studies on the topic of interest, *HI incorporation into BSN curricula*. The primary objective of the review was threefold: (a) to examine previous and current research and theoretical literature of HI in the nursing curriculum, (b) to synthesize the findings integrated into the curriculum, and (c) to recommend guidelines and propose future directions for nurse educators to deliberate when developing HI content and skills in the BSN curriculum.

### *Definition of Health Informatics (HI)*

Coiera (2003) defines HI as "the study of information and communication systems in healthcare with a focus on understanding the fundamental nature of these systems, developing interventions that can improve upon these systems, and evaluating the impact of these interventions" (p. xxii). As much ambiguity surrounds the field of HI in BSN programs, determining the true definition in these articles proved difficult. Articles by Jetté et al. (2010), Ragneskog and Gerdnert (2006), and Thompson and Skiba (2008), as well as others', leaned toward a nursing informatics perspective while others used the term *health informatics* without defining it. However, it is important to discern that HI is not only applicable to nursing but also to biology, medicine, genomics, public health, clinical laboratory, pharmacy, and many others. These fields are all intertwined to improve patient care under the umbrella of HI (Shortliffe and Cimino, 2006). We have chosen to define and use the term *health informatics* because in modern health care, a nurse functions as part of a multidisciplinary team. Graduates of a BSN program need to be aware of information systems that have implications for more than just nurses, including physicians, pharmacists, therapists, and other clinicians.

Although there are references to the field of informatics dating back to the 19th century, it was in 1949 that the term *informatik* was used in Germany to describe the first professional organization for informatics, currently known as the Deutsche Gesellschaft fur Medizinische Dokumentation, Informatik und Statistik by Gustav Wagner (New York University Center for Health Informatics and Bioinformatics [NYU CHIBI], 2011). Across Europe and Asia, countries such as the Soviet Union, France, Holland, and Belgium subsequently began to use a version of this term (Collen, 1995). Medical informatics as the term *Informatique Médicale* was used in France during the 1960s to describe the study of the application of information technology to medical science (New York University Center for Health Informatics and Bioinformatics [NYU CHIBI], 2011).

During the late 1960s and early 1970s, a transition from manual to electronic methods began to take place in the medical informatics community in the form of mainframes, data processing systems, and laboratory systems (Protti, 2004). However, it was not until 1976 that the English language formally defined the general field of informatics in the *Supplement to the Oxford English Dictionary* (Collen, 1995). During that period of time, the advent of hospital information systems to provide more efficient processing of patients and lab specimens took place (Protti, 2004). During the 1980s, early telemedicine defined as "the practice of medical care using audio, visual, and data communications" emerged to provide "healthcare delivery, diagnosis, consultation, treatment, education, and the transfer of related data" (Mandil, 2005 p. 19,).

HI became more widely known with the independent establishment of the International Medical Informatics Association (IMIA) in 1979 and the renaming of Healthcare Information and Management Systems Society (HIMSS) in 1986 (Protti, 2004). The 1990s and early 2000s were times in which HI evolved into an electronic health record (EHR) orientation with the use of more integrated decision support systems, clinical data repositories, and networks (Protti, 2004). Recently, HI has continued to prove integral to healthcare providers and researchers so they can more effectively adopt HIT to provide better patient care. HIT involves the use of computer hardware and software in the retrieval and sharing of patient information with providers, patients, and insurers, as well as for the integration with other healthcare information systems (Blumenthal, 2009). Reducing health errors, improving care quality and access, and minimizing healthcare costs are three priorities of HIT (Fetter, 2009b).

Recent legislation has opened the door to an ever-expanding number of facilities utilizing electronic documentation and other technologically advanced tools to improve patient care. A significant part of the American Recovery and Reinvestment Act (ARRA) aimed to expand the amount of meaningful HIT by instituting goals of increased use of telemedicine, internet, software, and computers in the healthcare delivery system, and by guiding the development of a framework to maintain growth momentum (Recovery gov, 2009). These goals resulted from evidence that technologies available and currently in development will improve healthcare quality, efficiency, and availability to the public (Blumenthal, 2009). Patient safety was the main focus, and available technological tools such as electronic documentation were expected to assist in reduction of errors.

### *The Need for a Review and Its Significance*

Student nurses are being increasingly exposed to technology in the workplace after graduation with the growing numbers of electric health records (EHRs), handheld computers, barcode scanner medication dispensing systems, and automatic capture of patient data such as vital signs (Lee, 2007). Many previous articles have reiterated the importance of student exposure to these technologies. Studies have shown that educators are reticent to incorporate technology education within the curriculum due to personal unfamiliarity with such technology or lack of buy-in by the institution (Bakken et al., 2004; Connors et al., 2002; Fetter, 2009a).

Continuing education for faculty regarding recent technological advances is of great importance (Curran, 2008; McNeil et al., 2003). Other organizations have recognized such need. Nurse leadership organizations such as American Nurses Association (ANA), National League for Nursing (NLN) and American Association of Colleges of Nursing (AACN) have published supportive statements and calls to action (American Association of Colleges of Nursing, 2008; American Nurses Association, 2001; National League for Nursing, NLN Board of Governors, 2005). It is understood that upon entering the workforce, beginning nurses are expected to perform tasks that require technological skills to care for patients. Exposure to advanced technology before graduation would prepare new nurses to not only perform basic tasks using technology but to utilize these technologies to their advantage. Nurses are expected to have the knowledge and skills necessary to practice in saturated, technologically-advanced healthcare settings.

McNeil et al. (2003) identified information literacy as the ability to find, analyze, and evaluate information. This skill set includes the ability to conduct bibliographic retrievals and evaluate information while addressing privacy, confidentiality, and security of patient information (McNeil et al., 2003). The American Library Association Standards (2000) discussed the difference between information technology (IT) and information literacy, stating that the majority of college students are considered versed in technology competence while lacking knowledge and skills in managing and using information.

Recent movements such as the Institute of Medicine (2003), Technology Informatics Guiding Educational Reform (TIGER) (2007), the TIGER Informatics Competencies Collaborative (TICC) Final Report (2009), and Quality and Safety Education for Nurses (2011) offer informatics competencies pertinent to the BSN curriculum development. However, HI education is not currently nationally standardized in the BSN curriculum. In fact, while BSN programs have