

Competencies Related to Informatics and Information Management for Practicing Nurses and Nurses Leaders in Brazil and South America

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Abstract. Informatics and information management competency has an important role for nursing. However, these competencies in Brazil and South America lack definition, and are just beginning to develop in these regions with different realities. This chapter presents information related to the development of informatics competencies for nursing in these areas.

Keywords. Digital competencies, nursing professional practice, nursing education

1. Introduction

Nursing informatics competence is extremely important, considering its potential of different applications for health outcomes. However, with regards to training of nurses able to work in this area in Brazil and other countries in South America, the process has been slow. It is important to define what nurses need to know about health information technology, so they can practice autonomously, provide safer care and achieve better health indicators. The World Health Organization (WHO) has recognized the use of information and communication technologies (ICT) as a core competency of the 21st century healthcare workforce to support patient care [1]. Thus, professionals well-trained in the use of ICT are highly needed [2].

2. Overview of Brazil and South America

Brazil is the largest country in South America, the fifth largest country by both [area](#) and [population](#), and is the largest country to have [Portuguese](#) as an official language, the only one in the Americas. According to [Brazilian Institute of Geography and Statistics](#), Brazil has 206,030,000 habitants, which represents 2.81% of world population and covers almost half (47.3%) of the South American continent.

3. Development of Nursing Informatics

In Brazil, the first steps in nursing informatics started in 1985, when faculty of nursing from Federal University of Rio Grande do Sul presented their experience in the use of computers to teach nursing activities in home care [3]. In the next year, the Brazilian Society of Health Informatics (SBIS) was founded, and three years later, in 1990 during the third Congress of the Brazilian Health Informatics Society, a dedicated session for nursing informatics was organized. During the same year, the Nursing Informatics Group at the Federal University of São Paulo was established, and in 1991, the group hosted the Inter-American Symposium in Nursing Informatics with over 200 participants. At this seminar, Brazil became a member of the International Medical Informatics Association, Nursing Informatics, Special Interest Group (IMIA, NI SIG) [4]. Currently, similar groups at universities across the country and several schools of nursing have established nursing informatics as a discipline in the nursing curriculum and have organized nursing informatics research groups [5].

However, a growing research movement in this field can be observed with several groups having been established in the last years across the country. In 2002, SBIS granted the creation of the Nursing Informatics Working Group (SBIS-NI), integrating nurses from several states within the country, with the established goals: (1) develop a national strategy for NI education, research, management, and clinical practice, (2) determine priorities for implementing nursing informatics educational programs, (3) develop by consensus a definition of nursing informatics according to Brazilian education and professional regulations, (4) recommend NI competencies for clinical nurses, managers, faculty, and researchers, (5) develop innovative care models and standards balanced by human and technological resources, and (6) promote development of next generation electronic health records to facilitate patient-centric care at bedside, clinical research, and public health [5]. In November 2003, the SBIS-NI founded the TeleNursing Department at the Brazilian Telemedicine and Telehealth Council [5]. Over the last 13 years, nursing informatics and telenursing have advanced considerably in the Brazilian healthcare environment, following global trends. Some of the strategies defined by the nursing informatics groups continue to make contributions to the health of Brazilian populations. The primary focus of those strategies is to develop a safer healthcare environment and to stimulate research regarding redesign of professional practice according to the new technological trends [5].

Since 2006, an important ICT project named RUTE network (Telemedicine University Network) has been deployed in the country. The project was led by The Brazilian National Research and Educational Network and was funded by the Brazilian Ministry of Science and Technology through the Brazilian Innovation Agency's research and projects financing.

RUTE implements communication infrastructure in university and teaching hospitals in the largest 53 cities in Brazil, enabling the establishment of telemedicine and ehealth centers with investments on equipment, connectivity and ambience preparation. The goal of the project is allowing all participating hospitals to use the National Network for Education and Research in order to operate applications on telemedicine and telehealth, including video and webconference for exchanging information, talks, continuing education, formative second opinion and teleconsultation, in order to create a base for collaboration among hospitals and to train them for remote collaboration. Several special interest groups (SIGs) were created, and SIG-Telenursing was the first nursing group created in 2007, aiming the integration of

informatics and ehealth in intensive care and emergency, as well as research and education [6].

In addition, RUTE handles the multiprofessional integration in the healthcare of the community, and this infrastructure has improved access to healthcare and health information for the populations that live in regions that are remote and difficult to reach. The RUTE project also opened an ongoing channel for the development of research studies and interchange of specialized health knowledge, that has resulted in the growth of scientific collaboration, increased enrollment in healthcare training courses, and improved access to continuing education with the introduction of the e-learning, m-learning, and the integrated evolution of telenursing procedures on a national level [5].

4. Curricular Guidelines for Nursing Undergraduate Courses

The practice of nursing is based on the collection, storage, retrieval and use of data, information, and knowledge. Nurses must be competent in these areas in order to provide safe and effective patient care. Often times, technologies are used in practice to help with the management of information and clinical decision making. The development, implementation, and use of technology are integral to the practice of nursing. However, the use of technology in practice creates new educational needs for nurses in regards to possessing knowledge, behavior, and skills for practice [7]. It is important that nursing professionals and other healthcare providers are educated and competent in the proper use of technology as it applies to the various disciplines in healthcare.

To be competent means to possess specific behaviors, knowledge, skills, and/or capacity within defined areas [8, 9, 10]. Nurses, especially, must possess competence in nursing practice to provide safe and effective care.

In Brazil, curricular structures of Higher Education Institutions are organized according to the Curricular Guidelines for undergraduate nursing education. These guidelines establish a profile of graduated professionals who are capable of knowing and intervening in the most prevalence health-disease problems/situations in the national epidemiological profile [11].

Decision making in Brazil is highlighted in the National Curriculum Guidelines of Nursing Undergraduate Courses as one of the general competencies that determine the training of nurses, composed of clinical and managerial activities [12]. The same guideline proposes that health workers' practice must be based on the capacity for decision making, be them clinical or managerial. To that end, these professionals must possess competencies and abilities to assess, systematize and decide the most adequate actions, based on scientific evidence. Article 5 of the guideline also states that one of the objectives of nursing education is to provide students with the knowledge required to practice competences and skills for the adequate use of new information and communication technologies [13, 14]. Nursing informatics therefore challenges the faculty to produce nurses who are prepared to use information technology to improve the patient care process and change health care [15].

In this context, since 2001, the field of ICT is a core competence, listed on the National Curriculum Guidelines for undergraduate courses in Nursing [12]. In the document, the item "expertise and skills" states that nurses should "properly use new technologies, both information and communication, as tip for the care of nursing."

More than a decade later, we see yet little emphasis on the development of this competence in undergraduate nursing courses in Brazil, at public or private universities [16]. Recently, in a research about computer education in nursing graduate courses in public educational institutions in Brazil [17], it was noted that are offered few informatics courses. In fact, less than half (41.1%) of the federal institutions and less than a third (27.3%) of state institutions offered courses related to information and communication technologies in the curriculum.

Another study [16] verified the knowledge of nursing freshmen and senior students regarding their ability to use informatics resources. The results revealed a low rate of informatics knowledge among the freshmen. However, regarding the applications that students had the most difficulty to operate, between the two periods, seniors had the worst performance, which shows it is necessary to include computer classes in the preparation of these new professionals, in order to prepare them for the work market.

5. Nursing informatics competency development and professional nursing practice

As competence may be defined as the possession of behavior, knowledge, skill, and/or capacity, consequences to competence within the scope of nursing include safe care and safe practice, the ability to create and implement appropriate interventions, and knowing one's limitations: knowing when to ask for assistance [18].

A critical area of nursing competency is that of Nursing Informatics, which can be defined as possessing the appropriate knowledge, behavior, and skills required for nurses to collect, store, retrieve, and process information. In order for nurses to effectively manage patient care, they must understand how to appropriately manage information; thus, possessing informatics competency is elemental to practicing as a professional nurse. Many lists and guidelines exist to identify the specific informatics competencies needed for nurses to provide effective patient care [7].

Informatics competencies are essential for nursing practice, and are critical to providing safe and effective patient care. As a profession that depends on the use of technology, the need for appropriate collegiate and continuing education programs in nursing with a focus on informatics competency is crucial to the development and maintenance of safe and effective practice [7, 19].

To possess competence in nursing informatics, one must possess the ability to obtain, store, retrieve, and communicate data, information, knowledge, and wisdom, which is essential to nursing practice. Many various lists and guidelines exist to address the distinct competencies that nurses must possess; however, very few resources are available to assess the degree to which one is competent in a specific area. The interaction of one's knowledge, experience, environment, and motivation shapes the development of competency within the personal domain, depending on the profession in which one works [7].

In support of competency development, a variety of educational programs exist, ranging from university degrees, continuing education programs, and professional education initiatives such as the TIGER initiative [20]. However, despite the variety of educational programs, in Latin America there is still a lack of educational programs in the area.

Opportunities to build NI competencies are not restricted to formal academia. The United States' Technology Informatics Guiding Educational Reform [21] initiative developed a national informatics education strategy for its existing nursing workforce.

At NI 2012 Conference held in Montreal, TIGER launched its new internationalization phase, complete with an international board including representation from Canada, Asia, South America and Europe. See section B chapter 3 for a description of the TIGER initiative.

Another strategy is the International Network of Nursing Informatics, created in 2008 within the Pan American Health Organization (PAHO) and WHO, a network of technicians and nurses from Latin American countries and the Caribbean. It is based on a strategy for coordination and scientific and technical cooperation for the development and exchange of experiences, information and knowledge that in a voluntary and supportive way with information technology and communications support works based on the universal health coverage. The International Network of Nursing Informatics, uses ICT and the development of specialized virtual networks for information and knowledge exchange, permanent training, research and development of good practice, contributing to human resources and integrated services of excellence in health care. Latin-American countries like Argentina, Brazil, Chile, Colombia, Peru, Uruguay and Venezuela are members of this network, together with Mexico, Cuba, El Salvador and Spain.

Nursing informatics competence is an essential element of nursing practice, especially in the provision of care [7] and ranges from simple clinical skills to complex application based knowledge. Competence in nursing informatics can be defined as the knowledge, behavior, and skills required for nurses to collect, store, retrieve, and process and use information [22]. Nursing informatics is facilitated through the use of technology, and competence in this technology is required for effective nursing practice. With the integration of technology and information science into the field of nursing, there is an increased need for the existence of nursing informatics competencies; thus, nursing informatics competence is a key element to the professional nurse's body of knowledge.

In Brazil, there are few publications that assess skills in the use of ICT by teachers in undergraduate nursing courses. Peres and Kurcgant in a study at a Brazilian federal education institution [23] mention difficulties to use ICT in academic activities by teachers, as they come from a generation that has not grown in touch with the digital technologies.

Since the initial activities in nursing informatics in Brazil, nurses have faced many challenges. Nursing informatics is not completely integrated into the nursing curriculum and the nursing informatics competencies are not established at national level [24].

In a study to identify and analyze the nursing informatics competencies regarding their relevance to the Brazilian reality on Nursing Informatics [25] competencies should be classified accordingly to the level of nursing informatics practice: novice, expert, specialist and innovator. According to this study, validated nursing informatics competencies are divided into the following nursing practice areas: information, data , education, impact , privacy and security , research, regulation, systems, data access , management, usability, project management, communication, monitoring, quality improvement, basic software, fiscal management, simulation, analysis, design and development, evaluation , data structure, management , programming, testing, training, maintenance, implementation, role, practice, system selection systems and requirements. These competencies include skills for computers use, computer knowledge and computer skills [26].

The curriculum content and definition of informatics competences in nursing has been discussed in scientific literature. Although the importance of these competences has been recognized globally, they have not been widely incorporated into undergraduate or graduate nursing curricula in different countries [25]. It was identified that subjects about informatics in undergraduate nursing programs at Brazilian public education institutions are mostly offered as an elective discipline (57%) in the first and second year (80%), with an average workload of 47 classroom hours. The low supply of this undergraduate subject goes against job market trends and the National Curriculum Guidelines for Undergraduate Nursing Programs [17].

In Brazilian studies, several authors describe that faculty and students' knowledge on informatics resources remains deficient, impeding them from using information and communication technologies in the different dimensions of nursing relations, in teaching, research, management and care delivery [27, 28].

According to Yang et al [29], several studies have presented necessary informatics competencies for nurses and nursing students. The first study to present a master list of informatics competencies for nurses to span four levels of nursing practice (beginning nurse, experienced nurse, informatics specialist, and informatics innovator) was proposed by Staggers et al [26] and cover competencies in computer skills, informatics knowledge, and informatics skills; many researchers have used this master list. In a study that proposed a list of nurse practitioner competencies, some competencies related to evidence-based practice were added, and some items were extracted [30]. To determine if informatics competencies were included in the curriculum of a baccalaureate program, the master list was also used by [31].

One study focused on an emerging "avant-garde executive leadership competency" recommended for today's health leaders to guide health system transformation [32]. Specifically, this competency is articulated as "state of the art communication and technology savvy", and it implies linkages between nursing informatics competencies and transformational leadership roles for nurse executive. The study proposes that distinct nursing informatics competencies are required to augment traditional executive skills to support transformational outcomes of safe, integrated, high-quality care delivery through knowledge-driven care. International trends involving nursing informatics competencies and the evolution of new corporate informatics roles, such as chief nursing informatics officers (CNIOs), are demonstrating value and advanced transformational leadership as nursing executive roles that are informed by clinical data [32].

NI competencies are not necessarily new. The American Nurses Association (ANA) in 1995 was one of the first nursing professional bodies to endorse NI through a formal certification program and a published NI scope and standards of practice [33]. Chapter 7a provides a complete description of the ANA NI specialty certification and standards development. NI competencies are increasingly recognized as a new essential skill set, enabling contemporary nurse executives to support and advance healthcare system transformation evidenced by a number of nursing and health professional associations that endorse NI and health informatics competencies [21, 33, 34]. Understanding the distinction between generic health informatics competencies and NI competencies is necessary for all nursing executives to recognize points of alignment, but also the points where nursing is unique and specifically requires a nursing perspective [32].

Different authors [35, 36, 37] recommended that studies about NI competencies must offer examples of their insertion in nursing practice, making their use more

visible, and help faculty to become aware of the real use of them and guide their students with efficiency. Overall, authors recommend that faculty in educational institutions must focus on the development of competencies in informatics, and that competencies should be grouped by complexity throughout the nursing curriculum [37].

There is still a continued interest in NI competencies today, explained by the transition and the concern that nurses must be prepared to perform effectively in safety-focused, integrated and patient-centered environments, in which they are being requested not only to register, retrieve data, search quality information, but also to use technology as an important resource for planning, making informed decisions, and transforming nursing practice [38]. Nursing education programs and their faculty must be able to prepare nursing students, in all levels, to respond to this demand.

6. Next Steps to improve informatics and information management competencies for nurses

In Latin-America there are few leaders and educators with NI skills. It is necessary to invest in NI training for our leaders and educators in the different South America countries. In order to make that happen, it is important to increase awareness in the nursing schools regarding the importance of nursing informatics courses in undergraduate and graduate programs. The use of ICT to connect different regions of Latin-American to regular courses with skilled teachers, including those from areas where NI is more developed, may improve and increase the faculty number, and encourage new professionals.

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