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Developing Entry-to-Practice Nursing Informatics Competencies for Registered Nurses

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Abstract. Information and communication technologies (ICT) have brought about significant changes to the processes of health care delivery and changed how nurses perform in clinical, administrative, academic, and research settings. Because the potential benefits of ICT are significant, it is critical that new nurses have the knowledge and skills in informatics to provide safe and effective care. Despite the prevalence of technology in our day to day lives, and the potential significant benefits to patients, new nurses may not be prepared to work in this evolving reality. An important step in addressing this need for ICT preparation is to ensure that new graduates are entering the work force ready for technology-enabled care environments. In this paper, we describe the process and outcomes of developing informatics entry-to-practice competencies for adoption by Canadian Schools of Nursing.

Keywords. Competencies, entry-to-practice, nursing education

Introduction

Although today's nursing students may be familiar with ICTs, they still require specific knowledge and skills to ensure the appropriate use of these tools in clinical care environments. Furthermore, while the Canadian Nurses Association[1], the Canadian Nursing Informatics Association[2], and others[3,4] have recognized the need for inclusion of informatics in nursing education, schools have been slow to heed this call. In addition, a study of Canadian schools of nursing[2] found a majority of nursing faculty were not prepared to teach nursing informatics and expressed a lack of support for gaining this knowledge. It was recommended that building capacity within nursing faculty also needed to become a national priority.

In the spring of 2011, the Canadian Association of Schools of Nursing (CASN) received funding from Canada Health Infoway to establish an initiative that would

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address the respective ICT needs of students and faculty. The first stage of this project was to develop entry-to-practice nursing informatics competencies such that faculty might develop an awareness of the informatics knowledge and skills needed by nursing students upon program completion. The second stage focused on the development of a Faculty Resource and Toolkit to support curricular integration of the competencies. In order to advance the competency development process, CASN formed a Task Force with diverse geographical representation and constituted by nurse educators, practicing nurses, representatives from national nursing associations, students, and other health professions. The Task Force was provided with the mandate to oversee the two phases described above to influence informatics integration into nursing undergraduate curricula. In order to complete each of these tasks, two working groups were created with accountability to the Task Force.

This paper focuses on the activities of the Competency Development Working Group tasked with the delivery of the competencies. The development work was an iterative, multi-step process guided by a working group of nursing informatics experts from across Canada.

1. Methodology

Over the years, several authors have described a variety of frameworks to situate nursing informatics competencies in the context of nursing curricula[5,6], but upon review many of the existing competencies were deemed to be dated, not detailed enough, or not sufficiently aligned with the Canadian healthcare system and nursing education programs. CASN began the competency development process by engaging nurse educators with an interest in nursing informatics, presuming that their involvement from the outset would help to secure future implementation success. The process included some foundational research, the development of a working draft of competencies, efforts to build consensus, and continual refinement of the competencies with broad engagement of the nursing community across Canada.

1.1 Generation of Preliminary Competencies

The first stage of the process was to develop preliminary nursing informatics competencies. To support the generation of a first draft, CASN completed a literature review of existing nursing informatics competencies. This was an extensive review of both academic and grey literature from national and international sources. A search of peer reviewed literature was conducted using various online databases: PubMed, EBSCO, Ovid, and ScienceDirect. The search terms entered into the databases included "nursing informatics competencies", "nursing informatics in education", and "informatics competencies". Articles were included in this literature review if: 1) they listed specific nursing informatics competencies and/or listed nursing informatics elements that the authors felt should be included in nursing curriculum, or 2) they listed specific health informatics competencies. A targeted grey literature search for nursing informatics competencies was also completed by visiting the websites of relevant institutions, such as the Canadian Nurses Association, provincial/territorial regulatory bodies, Canada Health Infoway, and the Canadian Nursing Informatics Association. It was found that competency lists directed towards nurses in the area of informatics have been developed to target new nurses, experienced nurses, and specialized nurses. However, much of this work was found to be dated, and none of

these competency lists had been widely accepted within the Canadian nursing community[7].

The Competency Development Working Group was presented with the literature review to assist them in building a first draft of the nursing informatics entry-to-practice competencies for registered nurses. The Competency Development Working Group used the most current, comprehensive and relevant competency lists to guide the development of initial draft competencies. Key resources included competencies (informatics and others) published by Technology Informatics Guiding Educational Reform[5], Staggers, Gassert, and Curran[6], the Canadian Nurses Association[8], the American Association of Colleges of Nursing[9], and the College of Nurses of Ontario[10]. The literature review, along with the Working Group's knowledge of what would be required in the field of informatics, led to the emergence of 30 draft competency statements. The competencies were organized under three headings "behavioural", "cognitive", and "affective". The working group also drafted a list of basic ICT skills in device and application use that students entering nursing programs would likely have already acquired through life experience and their years of primary and secondary schooling.

1.2 Building Consensus

The second phase of the process focused on achieving consensus on the initial set of competencies drafted by the Working Group. In November 2011, CASN invited stakeholders to a national symposium which was held in Toronto, Ontario. The Symposium was attended by more than fifty educators, practice leaders, policy makers, employers, regulators, students, and front line nurses with knowledge in the area of nursing informatics. The Symposium participants were divided into eight small groups to discuss the draft competencies. The groups were created in advance to ensure a mix of perspectives based on experience, role, and geography within each. Each group presented their feedback on the basic ICT skills and draft competencies. Following presentations from each group, all participants engaged in a large group discussion. This large group discussion facilitated the achievement of consensus on recommendations for the next steps in the competency development process.

The key recommendations were as follows:

- The organization of the competencies under the headings "behavioural", "cognitive", and "effective" was deemed unclear and contributing to some repetition among the competencies. Participants suggested a different format be used, perhaps a matrix created, to organize the competencies in a different manner.
- Eliminate duplicate competency elements.
- Need for terms and concepts used in the document to be defined in the glossary of terms.
- Due to the inter-connectedness of the different competencies, there was a need to develop an over-arching competency. Participants recommended that the over-arching competency should demonstrate that technology and nursing are no longer separate entities, but rather, are integral to safe and effective nursing practice.
- The intended use of the competencies by educators needed to be made clearer in the preamble of the document.

These recommendations, in addition to numerous suggestions for wording changes, were subsequently reviewed and taken into consideration by the Working Group following the Symposium.

A second draft of the document emerged, consisting of 20 competency statements organized under the headings "information and knowledge management", "professional accountability", and "use of ICTs". The glossary of terms was expanded and the preamble re-worded to ensure clarity as to the purpose of the competencies. CASN sought further validation of the competency draft document, by soliciting feedback on this next draft from a wider audience. An invitation to participate in the draft review survey process was sent to the CASN Education Committee (9 members), the 50 Symposium participants, and the 91 Deans and Directors of CASN member schools for feedback. Fifty-three responses were received and the results indicated that overall the respondents were satisfied with the competencies as drafted at this point in time. Overall, a majority of respondents (83.3%) indicated that they would support the inclusion of the competencies in their undergraduate program curriculum.

The Competency Development Working Group used this feedback to create a third draft of the competencies. The competency statements were reviewed to ensure that they were measureable with the consistent use of action verbs at the beginning of each statement. The Working Group also worked to clarify the intent of the basic ICT skills including an explanatory paragraph to emphasize the fact that while many students will be quite computer literate, others might require remedial support that could be provided through a variety of college/university services. The document that emerged contained a revised preamble, description of the basic ICT skills, 19 revised competency statements and further additions to the Glossary of Terms. The final round consensus-building was conducted presenting the third draft to the Canada Health Infoway Nursing Reference Group (a cross-jurisdictional group of nurses representing various areas of nursing practice, education and policy) and to attendees at the 2012 CASN nursing research conference. The draft competencies were well-received by both groups and no major changes were suggested to the revised content and structure. After completing three rounds of feedback, CASN was confident that the draft informatics competencies reflected a broad national consensus on those needed by entry level nurses upon graduating from a Canadian school of nursing.

1.3 Refining the Competencies

In the final stage of refinement, a fourth draft of the competencies was returned to the Task Force for final review and revision. This process began by ensuring the competencies were congruent with Tardif's[11] framework for competencies. The Tardif[11] framework is familiar to nursing faculty as it has been widely used to guide the development of other competency areas (e.g., Competencies for Palliative Care). According to Tardif, a competency is a complex know-act based on combining and mobilizing internal resources (knowledge, skills, and attitudes) and external resources to apply appropriately to specific types of situations (p.22). After much discussion, a decision was made to transform the 19 competencies into indicator statements reflective of the major domains that were already being used to categorize the document: 1) information and knowledge management, 2) professional and regulatory accountability and 3) use of ICTs. Indicators are defined by Tardif as assessable and observable manifestations of the critical learnings needed to develop a competency [p.4].

This decision essentially reduced the overall number of competencies to three major statements that could be measured by virtue of the associated indicators. This reframing of the competencies also makes it more likely that faculty would find it easier to integrate them into their curricula. It should be noted that aside from the consolidation into three broad competency statements, the content of the document did not change. Following this reorganization of the competencies, CASN compared the education-specific nursing informatics competencies that were developed to the *National Competencies in the Context of Entry Level Registered Nurse Practice*[9]. The working group found that the CASN competencies aligned well with the relevant competencies produced by the 10 provincial regulators. Final revisions to the competencies were completed by the full project Task Force. The final document consisted of one over-arching competency statement reflective of the three competency domain statements and their associated indicators (see Table 1).

Table 1. Nursing Informatics Entry-to-Practice Competencies for Registered Nurses

Overarching competency: Uses information and communication technologies to support information synthesis in accordance with professional and regulatory standards in the delivery of patient/client care.	
Information and Knowledge Management	
Competency: **Uses relevant information and knowledge to support the delivery of evidence-informed patient/client care.**	*Indicators:* • Performs search and critical appraisal of on-line literature and resources (e.g., scholarly articles, websites, and other appropriate resources) to support clinical judgement, and evidence-informed decision making. • Analyses, interprets, and documents pertinent nursing data and patient data using standardized nursing and other clinical terminologies (e.g., ICNP, C-HOBIC, and SNOMED-CT, etc.) to support clinical decision making and nursing practice improvements. • Assists patients and their families to access, review and evaluate information they retrieve using ICTs (i.e. current, credible, and relevant) and with leveraging ICTs to manage their health (e.g. social media sites, smart phone applications, online support groups, etc.). • Describes the processes of data gathering, recording and retrieval, in hybrid or homogenous health records (electronic or paper), and identifies informational risks, gaps, and inconsistencies across the healthcare system. • Articulates the significance of information standards (i.e. messaging standards and standardized clinical terminologies) necessary for interoperable electronic health records across the healthcare system. • Articulates the importance of standardized nursing data to reflect nursing practice, to advance nursing knowledge, and to contribute to the value and understanding of nursing. • Critically evaluates data and information from a variety of sources (including experts, clinical applications, databases, practice guidelines, relevant websites, etc.) to inform the delivery of nursing care.
Professional and Regulatory Accountability	
Competency: **Uses ICTs in accordance with professional and regulatory standards and workplace policies.**	*Indicators:* • Complies with legal and regulatory requirements, ethical standards, and organizational policies and procedures (e.g. protection of health information, privacy, and security). • Advocates for the use of current and innovative information and communication technologies that support the delivery of safe, quality care. • Identifies and reports system process and functional issues (e.g. error messages, misdirections, device malfunctions, etc.) according to organizational policies and procedures.

	• Maintains effective nursing practice and patient safety during any period of system unavailability by following organizational downtime and recovery policies and procedures. • Demonstrates that professional judgement must prevail in the presence of technologies designed to support clinical assessments, interventions, and evaluation (e.g., monitoring devices, decision support tools, etc.). • Recognizes the importance of nurses' involvement in the design, selection, implementation, and evaluation of applications and systems in health care.
Information and Communication Technologies	
Competency: **Uses information and communication technologies in the delivery of patient/client care.**	*Indicators:* • Identifies and demonstrates appropriate use of a variety of information and communication technologies (e.g., point of care systems, EHR, EMR, capillary blood glucose, hemodynamic monitoring, telehomecare, fetal heart monitoring devices, etc.) to deliver safe nursing care to diverse populations in a variety of settings. • Uses decision support tools (e.g. clinical alerts and reminders, critical pathways, web-based clinical practice guidelines, etc.) to assist clinical judgment and safe patient care. • Uses ICTs in a manner that supports (i.e. does not interfere with) the nurse-patient relationship. • Describes the various components of health information systems (e.g., results reporting, computerized provider order entry, clinical documentation, electronic Medication Administration Records, etc.). • Describes the various types of electronic records used across the continuum of care (e.g., EHR, EMR, PHR, etc.) and their clinical and administrative uses. • Describes the benefits of informatics to improve health systems, and the quality of interprofessional patient care.

2. Discussion

Overall, the iterative, consensus-building process used to create the nursing informatics competencies was deemed to be extremely effective. The competencies were strengthened by involving a large number and diverse group of nurses in the consensus-building process. By hosting a National Stakeholder Symposium and creating an online questionnaire, the Working Group ensured that opinions from educators, regulators, clinical leaders, front line nurses, national nursing associations, policy makers, students, and other health professionals were considered in crafting the document. Although the iterative process was arduous, it became clear in the later drafts that the amount of feedback decreased, and that more and more stakeholders agreed with the content of the competencies. Another positive outcome of involving so many stakeholders in shaping the competencies was the creation of an awareness of the emerging document. Many stakeholders involved in the competency development process articulated a desire to share the final product with colleagues. Upon publication CASN brought the competencies to the Canadian Nurses Association Biennial Convention (Vancouver, June 2012) and the International Nursing Informatics Congress (Montreal, June 2012) for dissemination. Many attendees were aware that the creation of the competencies had been in progress, presumably because one of the stakeholders involved in the feedback process had informed them. Anecdotally, international informatics nurse colleagues were keen to hear about our Canadian informatics competency development process and to have an opportunity to review the final product. Clearly, the challenge

to integrate informatics into undergraduate nursing curricula is shared with nurse educators world-wide.

The experience of iterative consensus building in developing the competencies led to some key lessons learned. Firstly, it is important to allocate sufficient time for review of drafts by stakeholders, and adequate time to review and incorporate feedback into the document. At times the volume of feedback for the Competency Development Working Group to consider was unexpected and required more engagement of the members. Consequently, the group found the need for more meetings within a shorter timeframe, resulting in a greater workload than anticipated for the working group members. The short timelines also negatively impacted the number of responses to the online questionnaire. If time had permitted more effort might have been directed to increasing participation in the survey. Using regional focus groups instead of an online survey might have also solicited more feedback on the competencies.

3. Conclusion

Canadian schools of nursing have been slow to integrate nursing informatics into undergraduate curricula. As nursing practice is increasingly enabled by technology, it is essential that basic nursing programs embrace nursing informatics[12]. The national development of entry level nursing informatics competencies has been a key step to ensuring this will occur. The next steps of the CASN project will help foster the integration of these competencies into nursing school curricula across the country. CASN is developing an inventory of nursing informatics resources, a one-stop shop of resources that faculty and students alike can use. The resources will help faculty who may not be comfortable teaching informatics and provide them with tools and guidelines for course integration. These tools are expected to be available for use in early 2014. In sum, the resultant output of the action research described herein is intended to support the advancement of informatics competency among nurses for today and the future.

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