Nursing Informatics Entry-to-Practice Competencies for Registered Nurses

(Second Edition)

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Canadian Association of Schools of Nursing

Association canadienne des écoles de sciences infirmières

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Background

In 2010, the Canadian Association of Schools of Nursing (CASN) received funding from Canada Health Infoway to promote the development of a culture within nursing education in Canada that embraces the integration of nursing informatics in curricula and professional practice. The specific objectives of that project were to:

1. Promote a national dialogue among nurse educators, informatics experts, and nursing students on integrating nursing informatics into entry-to-practice competencies.
2. Increase the capacity of Canadian nurse educators to teach nursing informatics.
3. Engage nursing's key stakeholders in developing nursing informatics outcome-based objectives for undergraduate nursing curricula.

Following the release of the Nursing Informatics Entry-to-Practice competencies for Registered Nurses in 2012, CASN in collaboration with Canada Health Infoway led a series of projects to engage nurse educators in integrating these competencies in courses they teach and in the undergraduate curriculum. Examples of these activities included the Digital Health Faculty Peer Leader Network and the development of print and online resources (Consumer Health Resource, the Nursing Informatics Teaching Toolkit for Nurse Educators, the Digital Health Online Learning Resource).

Canadian researchers used the Nursing Informatics Entry-to-Practice competencies to develop the first validated instrument for measuring nursing informatics competency among registered nurses, the Canadian Nurse Informatics Competency Assessment Scale (C-NICAS—Version 1) (Kleib & Nagle, 2018 a, b). The scale was later adapted and validated to measure nursing informatics competency among nursing students (C-NICAS—Version 2) (Kleib et al., 2022). The C-NICAS was applied in other countries (Raghunathan et al., 2022) and translated to French (Frégeau et al., 2023).

Canadian researchers also led several studies to evaluate the dissemination and use of the nursing informatics competencies in Canadian schools of nursing (Nagle et al., 2020a; Nagle et al., 2020b), how nurse educators are supporting nursing informatics competency development among nursing students (Chauvette et al., 2022), perceived digital health readiness among nursing students (Kleib et al., 2022), experiences with digital health in the workplace from the perspectives of newly graduated nurses (Kleib et al., 2024a) and their mentors and supervisors (Kleib et al., 2024b).

In the last decade, there have been significant advances in the realm of digital health technology, including artificial intelligence (AI). Therefore, the current *Nursing Informatics Entry-to-Practice Competencies for Registered Nurses* required updating to reflect these current trends and needs. CASN recognizes that nurses should not only be aware of the changes in nursing informatics but also the broader field of digital health and associated Information and Communication Technologies (ICTs) that can influence and support all domains of nursing practice. The International Council of Nurses (ICN) 2023 position statement on digital health and the joint position statement on nursing practice in digitally enabled healthcare by the Canadian Nursing Association (CNA) and Canadian Nursing Informatics Association (CNIA) issued in 2024 clearly emphasize the critical role of nurses in leveraging digital health technologies (DHTs) to improve patient care and access to health care services.

Numerous terms exist that are specific to the informatics domain. **Nursing informatics** has been defined as the "science and practice [that] integrates nursing, its information and knowledge, with information

and communication technologies to promote the health of people, families, and communities worldwide" (American Medical Informatics Association, 2024, p. 1). Many definitions of digital health also exist. A commonly used definition by Snowdon (2020) states that:

> Digital health connects and empowers people and populations to manage health and wellness, augmented by accessible and supportive provider teams working within flexible, integrated, interoperable and digitally-enabled care environments that strategically leverage digital tools, technologies and services to transform care delivery. (p. 1)

Multiple DHTs (e.g., electronic health records, remote monitoring, AI, and ICTs [e.g., online web resources, social media, email]) are currently being used in health care services. In this document, DHT and ICT are used interchangeably.

Informatics Competencies Vs. Basic Digital Literacy

In today's digital age, most Canadians are familiar with digital technologies having learned about these in elementary and secondary school (Government of British Columbia, 2022a, 2022b; Government of Ontario, 2024) or through everyday activities such as online banking, emailing, and engaging with social media.

A competency is a complex capability based on combining and mobilizing internal resources (knowledge, skills, attitudes) and external resources to apply appropriately to specific types of situations (Tardif, 2006). Competencies are accompanied by a list of indicators that are assessable and observable manifestations of the critical learning needed to develop the competency (Tardif, 2006). While nursing students may have strong digital skills, they need to acquire new or expanded competencies essential for safe and quality nursing practice in digitally enabled healthcare environments.

Informatics competencies reflect the abilities related to informatics that nursing students should possess by the end of their undergraduate nursing education. Competency indicators provide direction to nurse educators for curriculum development and revision. The intent is not to prepare nurses graduating from bachelor's programs to be experts in nursing informatics but rather to ensure that they have the level of informatic skills, knowledge and attitudes at a beginner level to provide safe care as well as build on this foundation to develop greater proficiency over time.

Various health-related professions have developed unique informatics competencies based on their specialization; however, there are areas of similarities between professions. In nursing, there are also other frameworks focused on informatics competencies such as the Technology Informatics Guiding Education Reform (TIGER) (Hübner et al, 2018), and Quality and Safety Education for Nurses (QSEN). To learn more about these frameworks and their applications, reviews by Kleib et al. (2021) and Nazeha et al. (2020) are recommended.

Advancing Nursing Informatics Competencies in Canada

Updating the Entry-to-Practice nursing informatics competencies for registered nurses in Canada based on a synthesis of the current literature is timely to ensure that graduates from undergraduate nursing programs are better prepared to confront global challenges facing society, including in healthcare, as a result of rapid advancements in technologies such as AI (Booth et al., 2021; ICN, 2023; Kleib et al., 2022). Nursing informatic competencies transcend the use of basic ICT skills and represent a sophisticated

amalgamation of knowledge, skills, and attitudes. These coalesce to enhance patient care and interprofessional collaboration in a complex healthcare environment. In addition to establishing the foundational skills for nursing students, nurse educators are in a unique position to assist nursing students to acquire the knowledge needed throughout their educational program to develop nursing informatics competencies and be practice-ready upon graduation. Supporting nursing informatics competency development among practicing and future nurses is critical for safe and quality digital health practice and for advancing nursing roles (CNA & CNIA, 2024).

Method

The CASN Digital Health Interest Group spearheaded the revision of the 2012 *Nursing Informatics Entry-to-Practice Competencies for Registered Nurses*, and CASN formed a Digital Health Advisory Committee to guide the project. During the initial meetings, the committee decided not to completely abandon the existing competencies and "start from scratch", but to revise them using current language, and add indicators that reflect the current and future state.

Coinciding with this goal, Dr. Charlene Chu, Yana Siganevich, and Simon Donato-Woodger from the University of Toronto conducted a comprehensive scoping review to guide the updating of the competencies. Their research questions were:

1. What are the current informatics competencies within undergraduate and graduate education/curriculum that have been identified in the last 10 years and how have they been integrated into nursing education?
2. What are recommended informatics competencies to be integrated within the nursing education/curriculum?

An information specialist guided the research team to search CINAHL, SCOPUS, OVID, Web of Science, and PubMed using the following inclusion and exclusion criteria:

Inclusion	Exclusion
Any type of research study	Not in English
Both academic and grey literature	Focused on groups other than nurse (e.g., allied healthcare providers only)
Year 2013 and onwards because since the last CASN competencies, there have been relevant technologies used in healthcare	Dissertations, theses, abstracts, conference abstracts, book chapter
Any settings (e.g., academia or teaching healthcare settings)	Focused on the efficacy or effectiveness of an intervention (e.g., technology, apps) without the evaluation of the competencies
Studies could include any level of nursing curricula (e.g., undergraduate, graduate)	Description of an application used by nurses but does not include an educational component

Inclusion	Exclusion
Must list or discuss nursing informatics competencies	Letter to the editor/editorials
Must list or discuss how nursing competencies were integrated into the curriculum (e.g., lectures, workshops)	Focus on basic foundation computer skills (e.g., checking email, Google search)
Competency documents developed by nursing organizations are identified in the search of grey literature	Descriptive articles about the need for qualifications of a particular position (i.e., credentials required for a nurse manager, leader)
The sample must include an evaluation of nursing students, practicing nurses or nursing leadership	
Discusses teaching informatics	

The combined searches produced 8240 results and after duplicates were removed, the team screened 5318 titles and abstracts. Then, 1042 full-text articles were screened, and 155 of these studies focused on nursing informatics at the undergraduate level and were included in the review. 30 of the studies were from Canada. Based on their findings, the team suggested revisions that were subsequently discussed by the Digital Health Advisory Committee.

Several highlights from the scoping review in these updated competencies include:

- Patients' use of technologies
- Importance of considering cultural values and beliefs
- Role of artificial intelligence in healthcare
- Issues related to social justice, health equity and social determinants of health
- Use of social media
- Remote care
- Expanded nursing role in the evolving digital health ecosystem

Using these findings, the CASN digital health Advisory Committee met several times to carry out the indicator review process. In addition, a smaller Working Group (see asterisk beside names on page 1) from the Advisory Committee met frequently and as necessary to ensure continuous development and revisions. In total, the work required 30 hours of meetings and involved the following activities: 1) review and edit the three core competencies and 19 indicators of the first edition, and 2) prepare a validation survey to receive feedback on the initial draft of the revised competencies, and 3) make revisions following the feedback received.

In the validation survey, a technique commonly used by CASN to obtain feedback from a national perspective, nurse educators were asked to respond, "Yes, No or Unsure", and to provide any comments, to the following question regarding the three competencies and 40 indicators: "Is the competency/indicator important for undergraduate nursing education?" Based on the responses

provided by 45 participants to the environmental scan, members of the smaller group met several times to review the wording of the indicators, as well as contributing to ongoing iterations asynchronously. This phase was done by triangulating the feedback received from the environmental scan, the empirical data extracted from the scoping review process, and by comparing with the indicators from the first edition of the competency framework. A synthesis effort was also conducted to reduce the number of indicators for each competency by combining or removing indicators. At the end of this process, 26 indicators were selected for this edition and are presented in the next section.

Nursing Informatics Entry-to-Practice Competencies for Registered Nurses (Second Edition)

Competency 1	Integrates relevant data, information and knowledge into the delivery of evidence-informed patient care
Overarching Competency	Integrates information and communication technologies into practice to support information synthesis in accordance with professional and regulatory standards in the delivery of patient/client care.
Domain	Data, Information and Knowledge Management
Indicators	1. Explains the critical role of nurses in advancing digital health initiatives, emphasizing their integral contributions to system design, technology selection, implementation, and evaluation to enhance patient care and healthcare outcomes. 2. Explains the importance of standardized terminologies and information standards in ensuring the accurate capture and exchange of nursing and health data for enhanced interoperability across the healthcare system. 3. Explains the necessity of appropriate data and information for quality improvement, enhanced care performance, health promotion, resource planning, and patient safety. 4. Describes the benefits and limitations of informatics and technologies and their impact in all domains of nursing (i.e., administration, clinical care, education, policy, and research), and health service delivery. 5. Discusses the social and technical challenges associated with integrating digital health technologies into clinical and nursing workflows. 6. Evaluates digital and non-digital data sources to support clinical judgment, evidence-informed decision-making, and the delivery of nursing care. 7. Supports patients and their families to safely access, review and evaluate digital health information to ensure that the information they use is current, credible, and relevant.

Competency 2	Integrates Information and Communication Technologies into practice in accordance with professional and regulatory standards and workplace policies.
Overarching Competency	Integrates information and communication technologies into practice to support information synthesis in accordance with professional and regulatory standards in the delivery of patient/client care.
Domain	Professional Responsibility and Regulatory Accountability
Indicators	1. Identifies the legal, ethical, and social issues around the use, privacy and security of data. 2. Describes strategies for responding professionally to negative interactions, such as online harassment or abuse when using digital technologies to provide care or interact with other individuals. 3. Describes the potential biases and ethical implications introduced by artificial intelligence (AI) on the quality and accuracy of information retrieved, documented, and communicated in nursing care. 4. Complies with legal and regulatory requirements, ethical standards, and organizational policies and procedures to safeguard privacy and confidentiality when using technologies. 5. Recognizes the influence and impact of digital health technologies on the environment and planetary health, emphasizing strategies to mitigate harm. 6. Integrates principles of social justice, health equity, digital health equity, and social determinants of health in the context of any digital health technology. 7. Describes how nurses contribute to quality improvement initiatives and innovations through the cycle of designing, developing, selecting, implementing, and evaluating applications and systems in healthcare. 8. Identifies functional issues (i.e., malfunctions) with digital health technologies, ensuring appropriate reporting according to organizational policies and procedures. 9. Maintains effective nursing practice and patient safety during any period of system unavailability by following organizational downtime and recovery policies and procedures. 10. Supports the appropriate and safe use of digital information and innovative technology to improve quality of care for patients, families, and communities. 11. Advocates for the responsible use of digital health technologies to promote health, well-being, and disease prevention.

Competency 3	Integrates information and communication technologies that support nursing practice and the delivery of patient-centered care.
Overarching Competency	Integrates information and communication technologies into practice to support information synthesis in accordance with professional and regulatory standards in the delivery of patient/client care.
Domain	Information and Communication Technologies
Indicators	1. Uses digital health technologies in ways that support a respectful and compassionate nurse-patient relationship. 2. Demonstrates respect for cultural values, worldviews, and other belief systems of patients and their families when using digital health technologies. 3. Demonstrates effective communication and digital professionalism with patients and other healthcare professionals, maintaining safety, privacy, and confidentiality. 4. Assists patients and their families in the use of digital health technology to promote health, wellness, and self-care (e.g. wearable devices, personal health records). 5. Uses digital health technologies for appropriate documentation of clinical care and nursing practice in accordance with professional standards and organizational policies. 6. Uses clinical judgement to assess outputs from artificial intelligence and decision-support tools, ensuring their safe and effective application in patient care. 7. Integrates electronic patient data and information (accessing, collecting, retrieving and analyzing) into clinical decision-making and nursing practice. 8. Demonstrates the ability to adapt the delivery of nursing care across various modalities, including virtual care to promote accessibility, equity, and continuity of care.

Concluding Thoughts and Way Forward

Academic institutions have a responsibility to advance nursing informatics competencies to reflect the reality of the healthcare system. Furthermore, approaches to educating the next generation of nurses must evolve and engage the various disciplines working in a digital health environment. This will help develop a collective capacity in the healthcare workforce and enable all care providers to leverage the benefits of digital health technologies and services to improve health outcomes.

Similar to the first edition, the second edition of the Nursing Informatics Entry-to-Practice Competencies for Registered Nurses is intended to facilitate the education of undergraduate students, so they are practice-ready upon graduating. Therefore, systematic curricular content integration of competency indicators, and supporting nursing educators in embracing them in their theoretical and clinical teaching practice, must be prioritized.

Nursing informatics and digital health are integral to nursing roles in any practice setting. Registered nurses currently in practice are encouraged to cultivate these competencies through continuing education and professional development to advance nursing roles and contribute to the development of future nurses (e.g., mentoring nursing students around digital health).

Finally, the work carried out to produce this second edition was based on recent empirical and grey literature that supported the need for expanding nursing informatics competency requirements to reflect the changing landscape of digital health. Further development in the future is recommended to keep pace with ongoing advancement in the field.

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