

What is Nursing Informatics and Why is it so Important?

Information is key to effective decision-making and integral to quality nursing practice. Much of what nurses do involves information – from assessing the health care needs of patients, to developing care plans, to communicating patient information to other health professionals, to analyzing staffing and budget reports – in fact, nurses work in an *information-intensive* environment.

Advances in information technology (i.e., computers and software) over the last 25 years have created significant opportunities for nurses to be aware of current information when making decisions. We have faster computers to process data, more sophisticated software to assist in the transformation of data into useful information, and powerful communication technologies such as the internet to enable the secure transmission of information among health service organizations and professionals.

Advances in information technology have accelerated efforts to implement information systems such as the electronic health record. The *electronic health record* (EHR) is a collection of all of an individual's interactions with the health care system that will be available *electronically* (subject to privacy, confidentiality and security guidelines and legislation) to health care professionals anywhere in the country. EHRs have the potential to enhance nurses' decision-making

regarding the delivery of care by supplying access to health information about clients, allowing data-entry, and offering electronic access to scientific knowledge. In Canada, much work remains to be done to make the EHR a reality.

Advances in information technology have created new roles for nurses, and

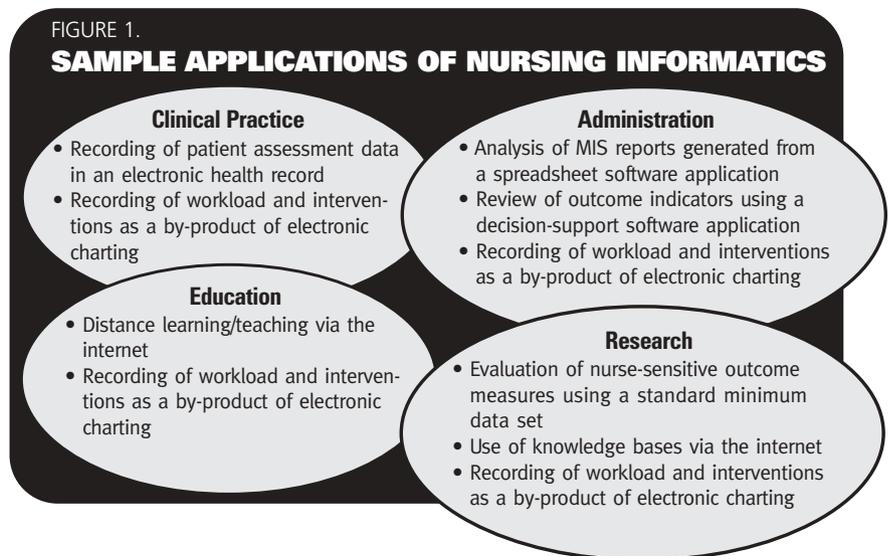
referred to as *nursing informaticians*.

Increasingly, however, there is a need for all nurses to integrate nursing informatics competencies into their practices.

While there is no standard definition for the concept of nursing informatics, the following definition was proposed in the 1999 National Nursing Informatics Project (NNIP) discussion paper:¹

Nursing Informatics (NI) is the application of computer science and information science to nursing. NI promotes the generation, management and processing of relevant data in order to use information and develop knowledge that supports nursing in all practice domains.

Applications of nursing informatics are illustrated in figure 1.



emphasized the need for all nurses to become more knowledgeable about health information concepts and the technology that is designed to manage and process information. Many nurses recognize *informatics*, derived from the French term *informatique*, as an area of nursing specialization. Nurses with expertise in informatics are often

Building blocks of nursing communications

The foundation of nursing informatics is based on the concepts of *data*, *information* and *knowledge*. Because information and knowledge are essential for nurses when interpreting data and making decisions, it is important to know the difference between these concepts.

Data are discrete observations that are not interpreted, organized or structured. *Information* is data that has been interpreted, organized or structured to provide meaning to the data. And knowledge is the synthesis of information to identify relationships that provide further insight to an issue or subject area. When you think about it, these concepts are the building blocks of all nursing communications. Nurses collect data when assessing and monitoring the health of clients and record their observations in the client's chart; they exchange service requests to, and receive results from, the clinical laboratory and radiology departments; they receive and review admission data and discharge summaries; they review information on the results of clinical trials; they communicate client information between service providers; they summarize, calculate and interpret workload indices for their nursing unit for monitoring and management purposes; and they consult evidence-based clinical guidelines and protocols to guide their practice. As knowledge workers, nurses use sources such as these to influence decision-making.

Specific examples of data, information and knowledge relevant to nursing are provided below.

Data

- Age
- Number of home care visits
- Blood pressure
- Disease
- Weight
- Number of workload units of service

Information

- Prevalence of patient falls by nursing unit, by month – this year compared to last year
- Prevalence of stage 1-4 decubitus ulcers, by quarter
- % distribution of workload units of service and intervention by activity category, by nursing unit, by month

Knowledge

- Effectiveness of hip pads in preventing hip fractures
- Decubitus ulcers treatment protocols
- Relationship between different nurse-staff mix configurations, nursing interventions and client outcomes
- Care maps for specific health conditions

All three concepts can be stored in computers and software programs can be developed to assist in the interpretation of the data and the development of new nursing knowledge. While the concepts of data, information and knowledge are different, the concepts as a whole are typically referred to generically as *information*.

Common language for common concepts

The need for health information standards has never been greater. The International Organization for Standardization (ISO)² defines standards as: *documented agreements containing technical specifications or other precise criteria to be used consistently as rules, guidelines, or definitions of characteristics to ensure that materials, products, processes, and services are fit for their purpose*. Today, there are many different types of health information standards including technical standards for computer hardware and software, data standards to enable the development of quality and comparable information, and information exchange standards or protocols to facilitate the sharing of information.

The development and implementation of *computer health information systems* or *automated health information systems* requires some form of structured vocabulary or terminology with common definitions for common terms to enable the effective management and processing of data. This may seem simple but is quite a challenge when you consider the complexity of issues nurses have to deal with. In addition, nurses and other health professionals often use different terms and measurement instruments to describe the same thing. For example, functional status, decubitus ulcers, patient falls and patient self-care are often defined and measured differently.

To complicate matters further, the advent of multidisciplinary health programs, regionalization and integrated health systems has increased the need for integrated health information systems that cut across traditional boundaries. Concepts that are common

across disciplines and across the continuum of health services need to be structured and defined in a standard or common way – this means that not only do we need standards for common concepts but we also need standards that are *compatible* across information systems used by different health professions, across the continuum of health service delivery, and within and across provinces and territories.

Notwithstanding all the challenges, there has been significant progress over the last decade in the development of health information standards. Highlights of relevant work are provided here.

(a) Nursing Terminology

At the international level, the International Council of Nurses (ICN) is leading the development of a universal language for defining and describing nursing practice – the *International Classification for Nursing Practice* (ICNP®). The purpose of ICNP® is to provide a tool for describing and documenting key elements that represent clinical nursing practice. ICNP® provides nursing with a common framework that facilitates cross-mapping of existing nursing vocabularies and classifications to enable comparison of nursing data across organizations, health sectors, and countries. The alpha version of ICNP® was released in 1996 for review and feedback. A significantly revised beta version was released in 1999 and has been translated into more than 20 languages.

(b) Health Information: Nursing Components

In Canada, CNA's HI: NC (Health Information: Nursing Components) Working Group has continued to build on the work started in the early 1990s to develop a standardized minimum data set for nursing. There is now a national consensus that critical nursing care data elements include *client status, nursing intervention and client outcome*.

While nurses have reached a consensus on the kinds of data elements required, they now must begin moving these concepts to implementation by

ensuring that they are included within information systems. This involves nurses assessing the health needs of clients and collecting client-specific interventions in a standardized way in order to gain a better understanding of the impact of those interventions on client outcomes.

Many experts believe that *nursing resource intensity*³ and *unique nurse identifier* – a number or designation that could enable data from several sources to be linked anonymously to an individual – are also key to representing nursing practice within a larger system of client-centred health information. It is important for nurses to understand and be involved in discussions and activities around these concepts.

The Canadian Institute for Health Information (CIHI) is currently working with nursing stakeholder groups to determine the feasibility of implementing a unique identifier for nurses. CIHI completed a discussion paper on unique service provider identifiers that is posted on its web site (www.cihi.ca).

Improved workload measurement systems that come closer to measuring accurately the intensity of nursing resources consumed by different types of patients or health programs are critical for allocating resources appropriately. CIHI plans to establish an expert working group to review many of the issues relating to nursing workload measurement systems and to make recommendations regarding future developments and implementation efforts.

(c) Classification Standard for Health Interventions

CIHI completed the development of a new Canadian Classification for Health Interventions (CCI) that is currently being implemented in a number of provinces. The CCI was developed to be consistent with concepts and terminology contained in the ICNP®. The classification contains a comprehensive list of diagnostic, therapeutic, support and surgical interventions, allowing for the

standardized collection of health interventions, regardless of the service provider or service setting.

(d) Classification Standard for Health Conditions

To accompany the CCI, CIHI also enhanced the new version of the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision for Canadian use (ICD-10-CA). An example of codes in ICD-10-CA that are relevant to nursing is presented below:

ICD-10-CA

L89 Decubitus Ulcers (DU)
L89.0 DU limited to erythema only (redness) without skin breakdown (stage 1)
L89.1 DU limited to breakdown of skin (stage 2)
L89.2 DU with fat layer exposed (stage 3)
L89.3 DU with depth involving muscle (stage 4)
L89.4 DU with depth involving bone (stage 5)
L89.5 DU with joint space involvement (stage 6)
L89.6 DU with necrosis involving muscle/bone (stage 5)
L89.9 DU without mention of severity

Nurses provided input to the development of both the CCI and ICD-10-CA. CIHI plans to maintain both classifications on an ongoing basis to ensure their continued relevancy and utility to the field. Nurses should play a key role in ensuring that changes and enhancements to the classification are relevant to their information needs.

(e) Client Outcomes

With regard to the identification of client outcomes that are relevant to the work that nurses do, the Ontario Nursing and Health Outcomes Project has done significant work in identifying client outcomes that are sensitive to nursing. The client outcomes that have been identified to date include: functional status, self-care, symptom control (dyspnea, nausea, fatigue, pain), patient satisfaction with nursing care, adverse occurrences such as nosocomial infections, patient falls and decubitus ulcers. Future plans include developing pilot projects in acute, long-term and community care.

Privacy, confidentiality and security of health information

Nurses have identified the protection of personal health information as a critical issue in the context of rapidly evolving health information technologies.⁴ This comes as no surprise since nurses, more than any other health profession, use, collect and record health information extensively in the delivery of care. Individuals and organizations responsible for the development of systems designed to collect, process, store, and share health information have a responsibility to ensure that these systems are secure in order to maintain the integrity and confidentiality of personal information. Without this respect for protecting the privacy of an individual's health information, the public would lose confidence in the critical role that health information plays in our health care system. At the same time, appropriate access to health information and data may have important benefits for individual Canadians and for the health system as a whole.⁵

With rapid advances in information technology, nurses need basic knowledge of concepts relating to *privacy*, *confidentiality* and *security* of health information, especially if they are involved in the development of health information systems. While related, these concepts are very different.

Privacy in relation to health information is the right of an individual to determine, when, how and to what extent they will share information about themselves with others. *Confidentiality* on the other hand, refers to the obligations of one person to protect the personal information of another person. The protection of the confidentiality of personal health information has always been a fundamental principle of our health care system. *The Code of Ethics for Registered Nurses* (CNA, 1997) states that *nurses safeguard the trust of clients that information learned in the context of a professional relationship is shared outside the health care team only with the client's permission or as legally required*. Finally, *security* refers to the procedures and technologies that are used to restrict access to, and maintain the integrity of health information.

The establishment of various standards related to privacy, confidentiality and security have evolved over the years. Figure 2 presents the relationship between these concepts and relevant standards.⁶

Figure 2. Matching Concepts and Standards – Privacy, Confidentiality, and Security

PRIVACY	Legislation e.g., Bill C-6
CONFIDENTIALITY	Operational Guidelines e.g., CSA Model Code
SECURITY	Technical Standards e.g., standards relating to digital signatures, passwords, firewalls

Federal/provincial/territorial laws and regulations uphold privacy and the protection of personal information. Because these laws and regulations vary in terms of scope and comprehensiveness across the country, federal/provincial/territorial officials are currently working toward the development of a harmonized framework for the protection of health information in Canada.

Operational guidelines are required to ensure that an appropriate level of confidentiality of health information is met. Within Canada, governments and various organizations and agencies have developed guidelines to assist in the implementation of legislative frameworks that are very

broad by nature. By implementing recognized operational guidelines, health organizations can demonstrate to the public and others their commitment to the protection of personal information.

Examples of operational guidelines in Canada that are relevant to the health system include: the recently updated *Guidelines for the Protection of Health Information* produced by COACH – Canada’s Health Informatics Association – and the Canadian Standards Association’s *Model Code for the Protection of Personal Information*.

The COACH guidelines address practical issues related to the protection of health information and the maintenance of data integrity and information system security and are used as a guide by health organizations across the country. The CSA model code is a voluntary national standard for the protection of personal information that was approved by the Standards Council of Canada in 1996. The CSA standard addresses two broad issues: the way organizations collect, use, disclose and protect personal information; and the right of individuals to have access to personal information about themselves, and, if necessary, to have the information corrected. Ten interrelated principles relating to accountability; identifying purpose; limitations on data collection; limitations on use and disclosure of information; consent;

accuracy; security safeguards; openness; individual access; and challenging compliance form the basis of the standard.

Finally, in implementing operational guidelines, various procedures and security systems are used, each based on specific technical standards. There are just too many technical standards related to information systems security to discuss here; however, a few examples that are relevant to nurses include technical standards relating to:

- the identification (e.g., *passwords*) and authentication (e.g., *digital signature*) of users of health information;
- the provision of audit trails or records of access activity relating to health information; and
- the protection from unauthorized access (e.g., *firewall*) to health information.

Where can I get more information?

Watch CNA’s web site! Articles focusing on *electronic health record, classification of data and nursing resource intensity* will be published on the web site (www.cna-nurses.ca) starting in the fall 2001. Also listed are several other resources on the topics of nursing informatics and informatics in general.

Provincial/territorial nursing associations and the Canadian Nursing Informatics Association, listed on CNA’s web site, are excellent sources for up-to-date information on nursing informatics.

¹ The NNIP was sponsored by the Canadian Association of University Schools of Nursing, the Registered Nurses Association of British Columbia, the Academy of Canadian Executive Nurses, the Nursing Informatics Special Interest Group of COACH, and CNA. One goal was to develop consensus on a definition of nursing informatics for Canada. A discussion paper was developed to elicit feedback from stakeholders in national nursing organizations, educational institutions, and nursing employers. Most respondents were in favour of the proposed definition.

² The International Organization for Standardization (ISO): <http://www.iso.ch/>

³ A combination of the amount of care and the skill level at which the care is provided. (Thomson, J. D. 1984. The measurement of nursing intensity. *Health Care Financing Review*, 6, 47-54). *The intensity of the nursing response to the conditions in patients that create the demand for nursing care.* (O’Brien-Pallas, L., Irvin, D., Peereboom, E., Murray, M. 1997. Measuring nursing workload: Understanding the variability. *Nursing Economics*, 15[4], 171-182).

⁴ In March 2000, a workshop (Vision 2020 Workshop on Information and Communications Technologies in Health Care from the Perspective of the Nursing Profession) was held to discuss information and communication technologies in the health sector from the nursing perspective. A report from the workshop is available at the Office of Health and the Information Highway (OHIH) web site: <http://www.hc-sc.gc.ca/ohih-bis/>

⁵ Canadian Nurses Association position statement: *Privacy of personal health information.* (2001).

⁶ Based on similar figure in Background Document (1997). Working Group 3: Privacy, Confidentiality, Data Integrity, and Security of the Partnership for Health Informatics/Telematics. Canadian Institute for Health Information. Ottawa, ON.

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