# Nursing Informatics Teaching Toolkit: Supporting the Integration of the CASN Nursing Informatics Competencies into Nursing Curricula

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## Supporting the Integration of the CASN Nursing Informatics Competencies into Nursing Curricula

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# Preamble

In 2011, the Canadian Association of Schools of Nursing (CASN) embarked on a mission to engage nursing faculty, students, and other key stakeholders in developing nursing informatics outcome objectives for undergraduate nursing curricula, and in building capacity among Canadian nurse educators to teach nursing informatics. The project was funded by Canada Health Infoway, a not-for-profit organization formed in 2001 to promote the transformation of healthcare through health information technology by developing a blueprint for electronic health records, fostering the adoption of electronic records for all Canadians, creating standards for technology and communication, and promoting clinician facility with health information technology. For an informatics transformation of health care to take root, new nurses and other health professionals entering the workforce must be prepared to use health information and communication technology in practice. To this end, *Infoway* created the Clinicians-in-Training Initiative, to support the preparation of future nurses who graduate and enter the workforce with the ability to practice in modern, technology-enabled clinical environments.

As a first step, CASN created *Nursing Informatics Entry-to-Practice Competencies for Registered Nurses*. Three national consensus based competencies and indicators were developed using an extensive consultation process involving key stakeholders across Canada. The competencies detail the core nursing informatics knowledge and skills that nursing students should possess upon completion of a baccalaureate nursing program in Canada. In order to assist faculty to integrate the competencies into undergraduate curricula, CASN conducted an environmental scan of nursing informatics resources to develop a *Nursing Informatics Inventory of Existing Teaching and Learning Resources*. Many gaps in resources, however, were evident. The *Nursing Informatics Teaching Toolkit* was created, therefore, to fill these gaps and augment the resources available to teach these competencies.

The *Nursing Informatics Teaching Toolkit* serves two purposes. First, it provides key concepts and key learnings summarizing information faculty should know to teach each competency; secondly, it provides faculty with teaching tools that they can easily integrate into pre-existing lesson plans. For each competency there is a case study, a PowerPoint presentation, and discussion/quiz questions that can be used in the classroom.

As CASN is a national organization of schools of nursing, the *Nursing Informatics Teaching Toolkit* was designed for use by nursing faculty. Many other individuals, however, may find this toolkit helpful, particularly faculty from other health science disciplines, nursing students, and practicing nurses.

# Section 1: Introduction to the Nursing Informatics Teaching Toolkit

## 1.0 Toolkit Organization and Use

This toolkit is organized according to the three CASN nursing informatics entry-to-practice competencies and their accompanying indicator set. The three entry-to-practice competencies are:

- Uses relevant information and knowledge to support the delivery of evidence-informed patient/client care.
- Uses information and communication technologies (ICTs) in accordance with professional and regulatory standards and workplace policies.
- Uses ICTs in the delivery of patient/client care.

There are four components under each competency:

1. **Key Concepts**
   This section defines key nursing informatics concepts that are components of the competency. Faculty should familiarize themselves with these concepts and include them in their teachings.
2. **Key Learnings**
   This section provides background information on the content of the competency. The purpose of the Key Learnings section is to increase faculty comfort in teaching topics related to the CASN competency.
3. **Presentation**
   Each presentation is a collection of slides that may be used and/or adapted as needed. Sample quiz or test questions are also included. The section starts with an overview of how the slides could be used, which slides could be removed to shorten the length of the presentation, and how they might be integrated into curricula.
4. **Case Study and Discussion/Quiz Questions**
   Each case study provides an example teaching strategy to support nursing informatics education. The case study is introduced with information on how it might be used, adapted, and integrated into a program. Sample quiz or discussion questions are included. Answers to the discussion/quiz questions are provided, along with references where faculty can find more information.

Various resources with general information and teaching resources that faculty may find helpful are highlighted in the background section of each competency and can be identified by pictures as outlined below:

**General Resources:**

This section provides articles, books, relevant websites and/or other sources of information related to a given topic.

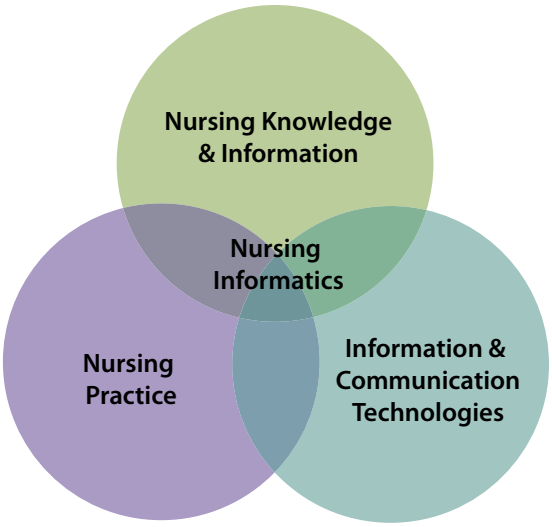
**Resources to Support Teaching:**

This section suggests articles, books, audio-visual tools and websites that that can facilitate teaching or provide insight on how to teach a particular topic.

## 1.1 Introduction

Scholes and Barber (1980) coined the term 'nursing informatics' defining it as "...the application of computer technology to all fields of nursing-- nursing services, nurse education, and nursing research" (p 73). A more recent definition that reflects current nursing practice comes from the International Medical Informatics Association (2009). It states that nursing informatics is "a science and practice [that] integrates nursing, its information and knowledge, and their management, with information and communication technologies to promote the health of people, families and communities worldwide".

Informatics became a specialty in Canadian nursing in the early 1980s with the introduction of health information systems (HIS) into hospitals. Information technology specialists were unable to operate these systems without the assistance of nurses because some of their functions required clinical knowledge for order entry and results reporting. As a result, Nursing Systems Coordinators (NSC) emerged as a specialized position within hospitals. NSCs would work alongside IT specialists until the HIS was implemented, and nursing staff were properly trained to use it (NNIP, 1999). In recent years, as health information technologies become a routine part of the practice landscape in healthcare workplaces, there has been a recognition that all nurses need competencies in nursing informatics, and indeed, should enter the workforce prepared to use health information and communication systems (Bond, 2009).




While nursing students, as part of the millennial generation, may have more experience with the technological component of nursing informatics than faculty, they lack the knowledge and skills to use the technology in the provision of patient care. A survey of 42 graduating nurses found that they rated themselves as having minimal or moderate skills on 43 nursing informatics competencies (Fetter, 2009). A study of Canadian schools of nursing paints a picture that suggests a majority of nurse graduates have received little preparation in nursing informatics. Although two-thirds of schools indicated that informatics was included in the curriculum, they were unsure of the specific content, where it appeared in the program, and how many hours were devoted to it. Moreover, many respondents conveyed a common misconception that the use of teaching technologies, such as PowerPoint, Blackboard or WebCT, constitute nursing informatics (Nagle & Clarke, 2004).

In 2012, CASN authored the *Nursing Informatics Entry-to-Practice Competencies for Registered Nurses* to provide Canadian nursing faculty with a resource that delineates the specific knowledge, skills, and attitudes in informatics that students will need to possess when they enter the workforce. The competencies that CASN identified are: 1) Uses relevant information and knowledge to support the delivery of evidence-informed patient/client care; 2) Uses information and communication technologies in accordance with professional and regulatory standards and workplace policies; and 3) Uses information and communication technologies in the delivery of patient/client care.

The *Nursing Informatics Teaching Toolkit* offers nursing faculty a second resource that supports faculty integration of the core nursing informatics competencies into curricula by providing background information on the competencies, as well as teaching and learning tools that educators can use in the classroom.

## 1.2 Background and Rationale

The effects of technology in healthcare are wide reaching, and have the potential to improve access, efficiency, research, and the overall quality of care delivery. The World Health Organization recognized these benefits, and recommended that member states establish long-term strategies to develop and implement e-health services (WHO, 2005). Canada has forged a path with many strategies to improve healthcare through the use of information and communication technologies (Aglukkaq, 2013).

A significant amount of money has been invested in Canada in developing and integrating electronic health records to attain greater efficiency in the current health system while maintaining or improving the quality of care. It is projected that their use will reduce health care costs over the long-term as cost-savings are expected to arise from a variety of resulting changes, including a reduction in paper and associated filing and storage, improved screening, earlier identification of health problems, and faster treatment (Ball et al., 2011; Marchildon & DiMatteo, 2011).

The use of information and communication technologies (ICTs) also offers the potential of improving patient safety by reducing errors. The Canadian Patient Safety Institute has identified paper-based methods as a poor mechanism for tracking errors because of factors such as the frequent illegibility of hand-written information, lost time or information as forms are passed through appropriate people, and difficulties in achieving a standard sized form to match descriptions of variable length. ICTs offer more effective tools for recording, tracking, and analyzing rates of adverse events in order to prevent the recurrence of common errors (Ball, Douglas, & Hinton Walker, 2011; White, 2007).

In addition to error reduction, ICTs can increase patient safety and improve patient outcomes by: 1) integrating evidenced-based recommendations and reminders/alerts into electronic records or clinical information systems (CIS) (Ball et al., 2011; Saba & McCormick, 2006); 2) improving the monitoring, screening, and early identification and treatment of disease (Ball et al., 2011); 3) supporting safer prescribing and administration of medications (Saba & McCormick, 2006); 4) facilitating communication between health care professionals, health settings, and geographic locations (Canada Health Infoway, 2012a; Canada Health Infoway, 2012b); and 5) engaging patients/clients in self-management (Canada Health Infoway, 2012b; Kupchunas, 2007).

ICTs provide greater opportunities for healthcare delivery and patient engagement. Telehealth for example, is important in improving access to health services (e.g. for those living in rural areas). With guidance from health professionals, internet access allows patients and families to retrieve quality information and supports their participation and management of health.

The multiple potential benefits of ICTs that have been identified depend on clinicians' abilities to make use of them. Pre-licensure education of health professionals in informatics is, therefore, a key component in bringing the potential benefits to fruition. Thus, nursing students need to be equipped to embrace and use evolving systems, and are more likely to do so if they have the confidence that they have developed the necessary skills for this. Building self-efficacy in low-stress and familiar situations such as class assignments, labs, and/or clinical

simulation learning experiences can help prepare students to use health information and communication technologies in higher-stress and unfamiliar clinical settings (Ball et al., 2011). Additionally, by using ICTs when practicing other nursing skills (e.g. assessment), students can learn and practice skills related to the technologies within the patient care context, and see how the technologies may result in improved patient outcomes. For example, a student working with a computer, smartphone app, or tablet while assessing a pressure sore can be cued to look for clinical practice guidelines to further inform the assessment and decision-making process (Ball et al., 2011). Moreover, learning about informatics and using ICTs in practice situations allows students to relate the technologies to other key nursing concepts such as confidentiality, evidence-informed care, documentation, and inter-professional collaboration (Williamson, Fineout-Overholt, Kent, & Hutchinson, 2011).

In summary, the rationale for integrating nursing informatics into nursing curricula is multi-faceted and has become an imperative for all undergraduate nursing programs. It is our hope that the materials, resources, and references provided in this toolkit will facilitate the learning of future nurses, and support the successful integration of core nursing informatics content into nursing education.

## 1.3 General Nursing Informatics Resources

Below is a list of general health/nursing informatics sources of information: websites, nursing informatics journals, online e-health courses, and academic literature on nursing informatics in baccalaureate education.

**General Resources:**

Agency for Healthcare Research and Quality:
- http://www.ahrq.gov/
- Example use: access the health IT evaluation forms

Canada Health Infoway:
- https://www.infoway-inforoute.ca/
- Example use: include available videos in lectures to help with teaching

Canada's Health Informatics Association (COACH):
- http://www.coachorg.com/en/
- Example use: read articles in their online journal related to health informatics

Canadian Institute for Health Information (CIHI):
- http://www.cihi.ca/CIHI-ext-portal/internet/EN/Home/home/cihi000001
- Example use: search for articles on health information and communication technologies by Canadian health care professionals

Centre for Health Evidence:
- http://www.cche.net/
- Example use: search for resources on using clinical practice guidelines with health technologies

Health Canada:
- http://www.hc-sc.gc.ca/index-eng.php, or http://www.hc-sc.gc.ca/index-fra.php
- Example use: search for national initiatives and updates related to health informatics in Canada

Registered Nurses' Association of Ontario (RNAO) eHealth Toolkit:

- http://rnao.ca/ehealth
- Example use: access to better understand the strategies and best practices for successful implementation of eHealth into health facilities and nursing practice

RNAO Nurse Educator eHealth Resource for the Integration of eHealth into Undergraduate Nursing Curricula:

- http://rnao.ca/ehealth/educator_resource
- Example use: access as a "practical guide" to information about how and where to integrate eHealth knowledge and skills into entry–level curricula using the CASN Competencies

Canadian Nursing Informatics Association (CNIA):

- http://www.cnia.ca
- Example use: network with nurse informaticians and access information about nursing informatics events

International Medical Informatics Association (IMIA) – Nursing Informatics Group

- http://imia-medinfo.org/ni/welcome
- Example use: access information for students and faculty on international initiatives in nursing informatics

International Council of Nurses – International Classification of Nursing Practice:

- http://www.icn.ch/pillarsprograms/international-classification-for-nursing-practice-icnpr/
- Example use: access detailed information on nursing data standards developments internationally

Journals:

*Computers, Informatics, Nursing*

- http://journals.lww.com/cinjournal/pages/default.aspx

*International Journal of Nursing Terminologies and Classifications*

- http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1744-618X/issues

*International Journal of Medical Informatics*

- http://www.journals.elsevier.com/international-journal-of-medical-informatics/

Free Online Courses offered by the Registered Nurses Association of Ontario (registration required):

- Nurses and Mobile Technology
  - Available at: http://rnao.ca/bpg/courses/nursing-and-mobile-technology
- eHealth for Every Nurse
  - Available at: http://rnao.ca/bpg/courses/ehealth-every-nurse

**Resources to Support Teaching:**

Ainsley, B. & Brown, A. (2009). The impact of informatics on nursing education: A review of the literature. *Journal of Continuing Education in Nursing, 40*(5), 228-232.

Brancato, V.C. (2006). An innovative clinical practicum to teach evidence-based practice. *Nursing Educator, 31*(5), 195-199.

De Gagne, J.C., Bisanar, W.A., Makowski, J.T., & Neumann, J.L. (2012). Integrating informatics into the BSN curriculum: A review of the literature. *Nurse Education Today*, *32*(6), 675-682.

Elder, B.L. & Koehn, M.L. (2009). Assessment tool for nursing student computer competencies. *Nursing Education Perspectives, 30*(3), 148-152.

Fetter, M.S. (2008). Enhancing baccalaureate nursing information technology outcomes: Faculty perspectives. *International Journal of Nursing Education Scholarship 5,* article 3.

Weiner, E.E. (2008). Supporting the integration of technology into contemporary nursing education. *Nursing Clinics of North America, 43*(3), 497-506.

Williamson, K. M., Fineout-Overholt, E., Kent, B., & Hutchinson, A. M. (2011). Teaching EBP: Integrating technology into academic curricula to facilitate evidence-based decision-making. *Worldviews on Evidence-Based Nursing, 8*(4), 247-251.

# Section 2: Information and Knowledge Management

## 2.0 Information and Knowledge Management Competency and Indicators

**Competency: Accesses and communicates 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 ICT (i.e. current, credible, and relevant) and with leveraging ICT 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.

## 2.1 Context

Nurses acquire the competencies in undergraduate education that prepare them for nursing practice. A significant component of what they need to learn is the understanding that they must continually inform their actions with evidence (CNA, 2010). Information is easily accessed through the internet. Nurses must be prepared, however, with the skills to find high quality sources of data that may be used as evidence.

Clients have the same widespread access to the internet and use it to research, share information, and find support in relation to their health. Clients also often require guidance in actively retrieving good quality health information to guide their health behaviours. Reliable, quality information can support patient/client participation in managing their health, whereas poor quality information can lead to negative patient/client outcomes such as buying unnecessary or harmful products, increased stress or fear, or delaying seeking care (Ball et al., 2011; Kupchunas, 2007).

*"Universities and similar institutions have to make the necessary adjustments to harness new forms of transformative learning made possible by the IT revolution, moving beyond the traditional task of transmitting information to the more challenging role of developing the competencies to access, discriminate, analyse and use knowledge" (The Lancet Commissions, 2010, p. 29).*

Advancements in technology have led to new ways of gathering, documenting, communicating, and retrieving data. Documenting nursing activities allows nurses and other health professionals to see the impact of nursing care on patient outcomes. Patient/client data can serve as evidence for nurses, other health professionals, and even policy makers. For example, the information and actions documented may provide data to determine the registered nurse to practical nurse ratio in a care facility (CNA, 2009).

## 2.2 Key Concepts

### Information Literacy

Information literacy is the ability to seek out information when there is a need, find high quality sources, and apply them appropriately. Ball et al. (2011) identifies the following information literacy skills as essential for nurses:

1. Identifying an information need
2. Accessing information relevant to the need
3. Evaluating the information for quality and applicability
4. Applying the information to the need
5. Evaluating the outcomes

### Health Literacy

Health literacy is the ability to access, understand, and act on information for health. Health professionals, such as nurses, play a key role in developing health literacy skills by providing clear and accurate information to clients (Health Literacy Council of Canada, 2011).

### Standardized Clinical Terminologies

Standardized Clinical Terminologies are common languages that are used to describe health conditions (e.g. symptoms, diseases, etc.) as well as treatment plans and interventions. Electronic health information systems that use standardized clinical terminologies allow nurses and other health care professionals to exchange information readily as theycoordinate patient care within and across various practice settings. This document contains information on two standardized clinical terminologies that are relevant to the Canadian nursing context:

- International Classification for Nursing Practice (ICNP)
- Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT)
- Canadian Health Outcomes for Better Information and Care (C-HOBIC)
- Other standardized nursing languages (SNLs) that may be used in specialty settings or that may be incorporated in vendor systems purchased for use in health care settings

### Standardized Nursing Data

Standardized nursing data refers to a uniform collection of nursing data from the patient record, which may include nursing diagnosis, interventions, outcomes, and the intensity of nursing care (Anderson and Hannah, 1993).

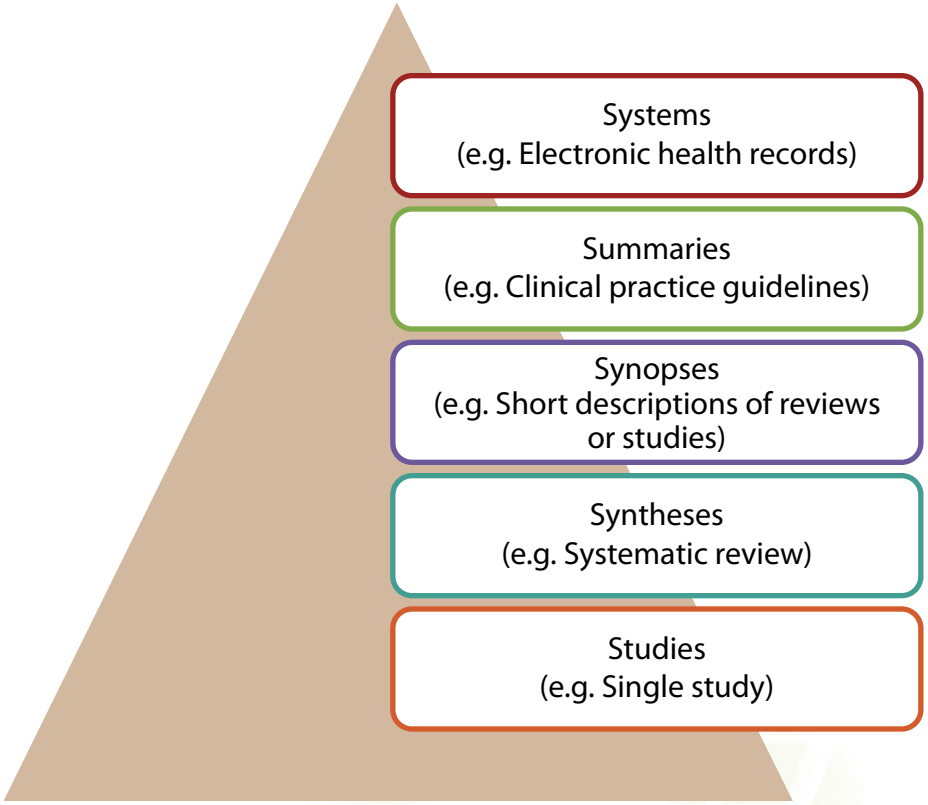
## 2.3 Key Learnings

### 2.3.0 Gathering, Assessing and Using Information and Knowledge for Evidence-Informed Nursing

ICTs give health care providers timely access to relevant sources of evidence in clinical, research, and other settings. Nurses must be equipped with information literacy skills to ensure the information is appropriate, of high quality, and applicable to nursing activities.

There are many different types of evidence that can be accessed using health communication technologies. Below is a five-level pyramid of sources of evidence for the delivery of evidence-informed care developed by Brian Haynes (Haynes, 2007).

***Haynes 5S Model***




Although online searches increase the quantity of information available to nurses, disadvantages include the potential lack of quality in websites and the time required to sort through the large volume (Ball et al., 2011). One means of retrieving high quality evidence is to use trustworthy websites such as Public Health Agency of Canada (http://www.phac-aspc.gc.ca/index-eng.php), and the Canadian Nurses Association's Nurse One Portal (http://www.nurseone.ca/). Using the search portals on these websites helps ensure the quality of retrieved evidence. Similarly, databases can be used to access evidence sources in certain subject areas. An example database is the Cumulative Index of Nursing and Allied Health Literature (CINAHL), which contains over three million records organized by Medical Subject Headings (MeSH). When using a database to collect information, it is still important to evaluate the quality of the research. Hierarchies are available to help nurses assess the quality of evidence for both quantitative and qualitative studies.

In the Haynes pyramid, single case studies appear at the lowest level (Haynes, 2007). Nurses may still need to use single case studies to inform them when they are presented with a unique situation. If the study is helpful to the unique situation, nurses should also consider whether applying the results is consistent with the agency's standards, whether the study's findings can be implemented (i.e. the health condition/demographic profile is similar to the patient's), the barriers to applying the study, and the strength of the research design.

New opportunities exist for accessing clinical practice guidelines. For example, Registered Nurses Association of Ontario's BPGs are available in a condensed format for use on PDAs. Guidelines are available at: http://pda.rnao.ca/

Evidence based practice recommendations are embodied in clinical practice guidelines available on websites such as the Registered Nurses Association of Ontario's Best Practice Guidelines (available at http://rnao.ca/bpg) or Clinical Evidence (available at: http://www.clinicalevidence.org). Clinical practice guidelines, such as RNAO's, are strengthened by a rigorous development process (AGREE II, 2010) that involves a systematic review, and includes identification of the level of evidence for the recommendations according to a framework included in each guideline.

Systems are at the highest level in Haynes' 5S model due to the potential for a patient's/client's data to be linked with appropriate summaries (e.g. clinical practice guidelines) in an electronic system, such as an electronic health record. If guidelines are embedded into the electronic system, they can provide point-of-care information specific to the characteristics and context of the patient/client. Electronic health records and point-of-care information systems (e.g. hospital information systems or electronic medical records) are prime examples of systems that have the potential to provide clinical decision support at various levels of care (e.g. from the bedside, to the organization, to provincial/territorial and national levels). For example, computerized clinical decision support can be used to guide treatment and care of individual patients with diabetes, and can also be used as a tool to increase influenza vaccinations amongst a population residing in a specific health region.

At other times, performing a general search using a search engine such as Google may be necessary. Nursing students have a tendency to use a general internet search instead of a more trustworthy source (Flynn, 2001). Students should be encouraged to assess the quality of websites by evaluating:

- The source and its purpose
  - o Example: a company trying to sell its products or an organization aiming to support individuals with a certain health condition
- The credentials and potential bias of the author(s)
  - o Example: a pharmacist working for a pharmaceutical company or an explicit statement addressing any conflict of interest for the author
- Accurate and verified content
  - o Example: the information should be consistent with other sources, and may reference other sources
- Website and content maintained and updated with current information
  - o Example: a recent 'last updated' date at the bottom of the website

- Clear references
  - o Example: who is referenced? where/by whom was the reference published? how many sources are referenced? can the references be checked for their interpretation?
- Valid recommendations
  - o Example: are the recommendations clearly grounded in evidence?

### 2.3.1 Assisting Patients/Clients in Using Information and Communication Technologies in Managing Their Health

Widespread access to the internet via computers, tablets, smart phones, and other technologies has changed how people access health information. Although there is potential for increased capacity to self-manage health issues, from the common cold to chronic health conditions, there is also a potential increased risk for unintentional self-harm due to poor quality or inappropriate application of health information retrieved via the internet (Kuhns, 2009).

The degree to which people are able to retrieve, understand, and apply basic health information and resources is called 'health literacy' (Nielsen-Bohlman, 2004; Canadian Public Health Association, 2006). While literacy, or the ability to read written information, is a component of health literacy, the concept of health literacy is broader and includes the ability to use information and resources in all formats to inform health.

Health literacy in Canada is considered low. The results of a Canadian survey conducted in 2007 indicate that 60% of the adult population were health illiterate, and that low health literacy was associated with low levels of education and age, and varied by province/territory of residence (Murray, Rudd, Kirsch, & Grenier, 2007). The results of a recent survey of 103 hospitalized adults in Vermont support the Canadian findings that 60% of adults have low health literacy, and poor vision was the most commonly identified reason given for low literacy (Morris, Grant, Repp, MacLean, & Littenberg, 2011). These results are important considerations for nurses educating patients/clients in accessing good quality health information and present an opportunity in which information and communication technologies can be used to promote patient/client health (Canadian Public Health Association, 2006). Nurses can act to increase patient/client awareness of the available resources and teach them skills to use the internet to improve their health (Ball et al., 2011).

RNAO's Mobile Technology and Client Education highlights critical information for health care professionals in utilizing online resources for client-centered learning. Available at: www.rnao.org/elearning

There are multiple resources available on the internet that can be used to promote patient/client health. These include:

- Preventative and disease-oriented health information
- Social support, both informally through various forms of social media and formally through organized online support groups (e.g. Social Anxiety Support Community)
- Health management tools (e.g. online blood glucose logs)
- Health forums where people can post and answer health questions (Saba & McComick, 2006)

A variety of online tools exist to help people assess the quality of a website by guiding them through a step-by-step process. Depending on their level of health literacy, people may be directed to one of these online tools where they can learn how to evaluate a website on their own, be taught a series of steps to evaluate a website's quality (see criteria listed above), or be directed straight to a specific trustworthy website (e.g. Health Canada).

Some additional points to consider when teaching patients/clients how to access good quality health information include:

- Accessibility and comfort with use of the internet, and information and communication technologies
- Literacy
- Culture
- Language
- Physical barriers (e.g. vision or hearing issues)
- Cognitive status (Saba & McComick, 2006)

### 2.3.2 Nursing Data and the Advancement of Nursing Practice

Collecting patient data is not a novel concept in nursing, however collection of nursing-specific data that is documented electronically is not yet common. In Canada, the focus on pharmaceuticals and diagnostics desired by physicians has meant that nursing-specific standardized data collection has not received as much financial support. Thus, the outcomes of nursing actions remain invisible to nurses and other actors in electronic records and consequently the value of completing the collection and documentation is often lost on nurses (Hannah, 2009).

Various initiatives (discussed in the section below) have emerged to create and encourage standardized data collection and use of clinical terms that are nursing-specific. At all levels, including education, it is key to communicate the benefits of data collection for the advancement of nursing. The data collected in practice can inform future nursing practice – it is practice-based evidence. Documenting patient data relevant to professional nursing practice has the potential to create various positive outcomes:

- allows for trending of patient/client data and the identification of potential problems
- provides essential patient/client information during transitions in care (Canadian Nurses Association, 2012)
- facilitates the inclusion of nursing actions and outcomes in EHRs
- provides a wealth of data to support the development of nursing clinical practice guidelines
- provides data on time requirements to perform various nursing activities which can be used to organize nursing care
- provides information to decision makers (managers, executives, etc.) on the functionality and effectiveness of their unit
- provides information to policy makers on the effects of nursing activities on patient outcomes (Hannah et al., 2009)
- increases visibility of the contribution of nurses in patient/client care

Students need to learn to be aware of the inconsistencies in the collection and use of data in nursing. Some care facilities do not use electronic health records. Other facilities that do collect data and use electronic records are not necessarily using one of the standardized terminologies (see section below for further information on this topic).

### 2.3.3 The Current State of Standardized Clinical Terminologies

In the previous key learning, the importance of data collection to the advancement of the nursing profession was discussed. This section focuses on standardized clinical terminologies, what they are and why they are important to nursing and health care. The purpose of using standardized clinical terminologies is to facilitate the collection of uniform clinical data that

can be shared among health-care providers and aggregated to inform clinical practice, policy and research. Standardized terms are clear, often 'shorthand' statements of a client concern, a nursing action, or an outcome measure. Standardized terminologies fall into two categories: 1) interface terminologies and 2) reference terminologies (Sewell and Thede, 2013). Interface terminologies permit the clinician to document the concern, diagnosis, action or outcome in discipline-specific format. Reference terminologies work to receive the information sent into the record by professionals in all disciplines and serve to accept and cross-reference terms so that information accepted into the record can be understood within and across disciplines and across various interface terminologies used.

Currently, there is no consistent methodology to support uniform clinical documentation through the use of standardized clinical terminology in Canada. This dilemma is not uniquely Canadian. There are numerous standardized clinical terminologies in use in nursing across the globe, some are designed primarily to address the needs of a specific clinical context. Examples include the Omaha Home Health Care System and the Perioperative Nursing Data Set. The lack of standardization among these terminologies presents a significant challenge to the meaningful exchange and comparison of nursing data.

### *2.3.3.0 International Classification for Nursing Practice (ICNP)*

The task of trying to standardize nursing language has been attempted by many groups, some who addressed only specialty areas, some who addressed nursing diagnosis only, and others who only addressed interventions or outcomes. The International Classification of Nursing Practice (ICNP) was developed by the International Council of Nurses (ICN). ICNP is defined as a classification system comprised of nursing phenomena (diagnoses), nursing actions (interventions), and nursing outcomes that may be used to describe nursing practice. ICNP provides a unifying framework that allows for the cross-mapping of other nursing classifications and terminology languages. ICNP enables the sharing and comparison of nursing data within and across health-care organizations and geographical locations (ICN, 2010; Ball et al., 2011).

To access an FAQ about the International Classification for Nursing Practice, click here: http://www.icn.ch/pillarsprograms/international-classification-for-nursing-practice-icnpr/

ICNP terms can be linked in an electronic record so that one can track the statement of a nursing concern (nursing diagnosis) with the nursing interventions applied and the expected and actual outcomes of nursing care. Use of the ICNP in an electronic record system requires two conditions: 1) an electronic record system that accepts the coded terms of the ICNP and 2) use of a care planning tool within the record that permits the nurse to record assessment data resulting a statement of nursing concerns (as in a nursing diagnostic statement) with the care planning elements of stated interventions to address the nursing concern and expected and actual outcomes of the care (ICN, 2010).

As a truly unified language system, the ICNP can function as both an interface terminology and as a reference terminology. Use as an interface terminology is described above where the nurse uses the ICNP to document nursing assessment and care. As a reference terminology, the ICNP has ability to accept terms from other nursing language systems and, as described in the section below, some other nursing language systems are currently being mapped to the ICNP® for clarity and ease of use.

ICN envisions global adoption and integration of ICNP in clinical information systems and electronic medical records (ICN, 2010). ICNP is an integral component of the global information infrastructure. Its goals are to:

- Improve global health outcomes by informing health-care practice and policy.
- Clearly articulate nursing's contribution to global health outcomes.
- Serve as a unifying language to promote harmonization among other widely used nursing classifications and terminology languages.

The ICNP was endorsed by the Canadian Nurses Association for use in Canada in 2008, yet has not been fully implemented in current electronic systems in Canada. The ICNP, however, has been incorporated into documentation systems throughout the world, (Sansoni & Giustini, 2006; Coenen, Marin, Park, & Bakken, 2001; Lee, Lee & Joung, 2006).

The ICN recognizes that nursing diagnoses, actions, and outcomes change with new technologies and clinical practice guidelines, thus there is a provision within this terminology for regular updates. The current version is ICNP 2.0. Nurses worldwide are encouraged to submit new additions (ICN, 2010; Wake, 2006).

#### *2.3.3.1 Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT)*

SNOMED CT is a system of standardized clinical terms that is broader than ICNP in that it includes terminology used across multiple health disciplines, and provides relationships between terms (or concepts). At the time of developing this toolkit, there are over 300,000 concepts, 1 million descriptions, and almost 1.5 million relationships in the database. SNOMED CT is referred to as the global clinical terminology, and was adopted by Canada Health Infoway as the reference terminology to be used in pan-Canadian EHRs. SNOMED CT is available as a 'Core International Version' with additional 'Canadian Extensions' which address some of the differences across different geographic locations (e.g. a medication may be accessed by prescription in Canada but available over-the-counter in another country) (Benson, 2012; International Health Terminology Standards and Development Organization, 2012).

The Health Information Management and Systems Society hosted an 'Introduction to SNOMED CT for Nurses'. To access this webinar visit: http://www.himss.org/ResourceLibrary/GenResourceReg.aspx?ItemNumber=20798

The purpose of SNOMED CT is to record health data with codes behind the terms that are used by providers at the point of care. This means that, as a reference terminology, SNOMED-CT accepts terms from many standardized sets – such as the ICNP for nursing, the International Classification of Diseases (ICD-10) for medical disorders and diagnoses, the Diagnostic and Statistical Manual (DSM-IV-R or now the emerging DSM-V) for mental health and psychiatric disorders, the International Classification of Functioning (ICF) for physical therapy, and the International Dietetics and Nutritional Terminology (IDNT) for dieticians. The coding of data enables sharing of data (interoperability), provision of data for clinical decision support to guide safe and appropriate patient care (primary use of data), and provides de-identified aggregated health data to facilitate practice, program and health system identification of trends, support decision-making, and for research purposes to support the continuous improvement of health care (secondary use of data). Concepts include clinical findings, anatomical locations, procedures, specimens, and more. For example, a nurse may identify and record a clinical finding in a patient/client that resulted from a recent procedure. These related concepts can then be stored in the patient's/client's EHR and retrieved at a future point in time if the individual is scheduled to have that same procedure repeated.

The development of standardized terminologies is a large and complex task. Although SNOMED CT was selected as the reference terminology to be used in Canadian EHRs, ICNP is useful because it has a different purpose: it is specific to nursing and can be incorporated into a care planning module of an electronic record. A mapping of ICNP to SNOMED CT found that 80% of concepts could be matched (Park et al., 2010), this means that 80% of the nursing terms in the ICNP could find their way to be coded and stored in a system using SNOMED CT. Further work to map the ICNP to SNOMED CT is underway.

Concepts in SNOMED CT are updated based on requests from its members, so there is potential for nursing concepts to be added to SNOMED CT in the future. Nurses have an opportunity to act to ensure that terms used in nursing care are added to the terminology that will be used in Canadian EHRs.

#### *2.3.3.2 Canadian Health Outcomes for Better Information and Care (C-HOBIC)*

C-HOBIC is a Canadian initiative that permits nurses to capture and document nursing assessment data and nurse-sensitive clinical outcomes. Using C-HOBIC, a nurse collects relevant data during admission and then also collects data indicating progression toward discharge.

#### *2.3.3.3 Other Standardized Nursing Terminologies*

As mentioned above, there are other nursing languages in use throughout the world. Some have been developed for specialty nursing practice, such as the Perioperative Nursing Data Set (PNDS) and the Omaha System of terms used primarily in home and community care. Others are the NANDA-International taxonomy of nursing diagnoses and its companion classification systems of Nursing Interventions and Nursing Outcomes. The specialty terms are in use in various venues (perhaps a few in Canada) for the purpose of addressing the implementation challenges of using the ICNP in highly specialized areas. The NANDA-International system and the Nursing Interventions and Nursing Outcomes classifications (abbreviated as the NNN) are used widely in the US, parts of Europe, Asia and South America (primarily Brazil). While their uptake in Canada is unlikely, Canadian nurses should know that use of SNOMED CT in electronic records will ultimately permit cross-mapping of nursing care across international boundaries because of the ability of SNOMED CT to receive terms from many standardized systems and cross map from one language to another. Thus, the ultimate goal for nursing will be to use de-identified data from multiple systems to create better understandings of nursing and its contribution to healthcare worldwide.

### 2.3.4 Applying the Standardized Clinical Terminologies and Collecting Standardized Data in Nursing

#### *2.3.4.0 Canadian Health Outcomes for Better Information and Care (C-HOBIC) Project*

Students should be aware of how standardized clinical terminologies and standardized data are applied in nursing practice. The C-HOBIC Project shows how some Canadian nurses are using a standardized form of data collection and coding this data using a standardized language, and how these activities benefited nurses and their patients during the project.

The initial C-HOBIC project ran from 2007 to 2009 and aimed to capture nurse-sensitive clinical outcomes in acute care, complex continuing care, long-term care, and home care. Nurses at sites participating in the C-HOBIC initiative collected specific information during the admission assessment, discharge assessment, and, for those in long-term care, quarterly after admission or upon a sudden change in health status. Data were collected on the client's functional status, therapeutic self-care, symptom management (pain, fatigue, nausea, dyspnea), and safety outcomes (falls, pressure ulcers). These clinical outcomes have a concept definition, a valid and reliable measure, and empirical evidence linking them to nursing inputs

or interventions. Each concept has been mapped to ICNP, the standardized clinical reference terminology for nursing developed by the International Council of Nurses, (ICN); the C-HOBIC Data Set is published by ICN as a subset catalogue of ICNP under the title "Nursing Outcomes Indicators". In addition the C-HOBIC Data Set is currently being mapped to SNOMED-CT to support inclusion in EHRs. The data collected were recorded electronically at the point-of-care. The data are stored securely, and can be included in a client's EHR in the future (Ball et al., 2011; CNA, 2012).

Phase 2 of C-HOBIC (2012-2014) builds the C-HOBIC measures into assessment screens in Manitoba at St. Boniface Hospital. Using the C-HOBIC standardized clinical information, St. Boniface will make a synoptic report of C-HOBIC information available to support patients' transitions from acute care to other sectors of the health system. In Ontario, C-HOBIC standardized clinical information will also be used to generate a synoptic report that will be available on the Clinical Connect portal to support patients' transitions in two Local Health Integration Networks (LHIN) (CNA, 2012).

As part of the ongoing C-HOBIC initiative, standardized data reflective of nursing outcomes is collected.

To learn more about this project visit: http://community.hobic-outcomes.ca/

Nurses who participated in the C-HOBIC project found it beneficial to see how their input and interventions influence patient outcomes. For example, if a patient reported a lower level of pain on the 1 to 10 scale, the nurse could see an indication that an intervention had been effective. Wodchis et al. (2012) found that high therapeutic self-care scores (TSC) showed a consistent and significant protective effect for readmission to acute care at 7, 30, and 90 days. A one point improvement in TSC scores was associated with approximately a 10% reduction in the likelihood of readmission. They further found that high Discharge Scores for Nausea (greater nausea) were more strongly related to early readmissions (3, 7, and 30 days). Similarly, high Discharge Scores for dyspnea (greater dyspnea) were more strongly related to readmission at later stages (30 and 90 days). Jeffs et al. (2012) noted that, as a predictor of Alternate Level of Care (ALC) requirements and Length of Stay (LOS), C-HOBIC scores revealed that patients admitted to Acute Care with higher fatigue and dyspnea scores on admission were significantly more likely to have a longer length of stay. In addition, high scores for fatigue and falls and, to a lesser extent, a high ACL composite score on admission were more likely to be discharged to complex continuing care, long-term care homes or rehabilitation facilities than to be discharged home. The standardized collection of data also helped identify trends indicating areas that could be improved. One unit noticed an issue with skin breakdown trending in patients, which led to a focus on improving practice in this area. In the future, consistent use of standardized data to inform practice could influence organizational practices and policy makers (CNA, 2012).

#### *2.3.4.1 The Registered Nurses Association of Ontario (RNAO) Best Practice Guideline Nursing Order Sets*

RNAO's best practice guideline nursing order sets are another example of how ICNP is being used to standardize nursing practice in Canada. Since 1999 RNAO has been helping nurses provide the best care possible to their patients through development of evidence-based best practice guidelines (BPG). The guideline development process includes systematic reviews, use of an expert panel to develop evidence based practice, education, and policy recommendations and a broad stakeholder review. RNAO's published guidelines are impacting hundreds of health-care organizations – nationally and internationally that have implemented the BPGs. There are currently 48 BPGs; nine of which focus on healthy work environments, and 39 on clinical practice.

RNAO is highly involved in assisting organizations to implement BPGs and evaluate their impact. One way is through development and dissemination of nursing order sets that are specific evidence based, action-oriented nursing interventions, derived from the BPG practice recommendations that can be embedded within a clinical information system or paper-based tool. These order sets help to reduce the variation in care provided for a specific patient or client condition, such as pressure ulcers or pain. They also make it easier for nurses to access the best evidence to inform their practice, whenever and wherever they need it.

RNAO's nursing order sets are being cross-mapped to ICNP, to facilitate the collection of uniform nursing data. This standardized data makes it easier for researchers to study the effect of specific interventions on health outcomes, and to compare the results across health-care sectors and geographical areas. This information will be useful for both nurses and policy-makers.

RNAO's nursing order sets are important for several reasons which are outlined below.

- They aim to transform nursing practice by leveraging technology to promote knowledge translation and evidence-based decision making.
- The order sets incorporate intervention statements that are based on international terminology standards, specifically: ICNP and SNOMED CT.
- Nursing order sets will make the nurses' contribution to patient outcomes more visible to the interprofessional team.
- RNAO's nursing order sets will facilitate the evaluation of BPG implementations by providing a mechanism to link specific evidence-based interventions to clinical outcome indicators.

#### *2.3.4.2 SNOMED CT and pan-Canadian EHRs*

SNOMED CT was adopted for use in pan-Canadian EHRs, it is being used in both small and large-scale initiatives across Canada. Examples include: eHealth Ontario working towards implementing SNOMED CT for the standardization of diagnostic imaging in Ontario; Manitoba will be using SNOMED CT to identify vaccines in eCharts; public health surveillance through Panorama in BC and the Yukon will use SNOMED to identify agents, diseases, symptoms, etc. in the management of disease outbreaks (Canada Health Infoway, 2012).

Canada Health Infoway is tracking the adoption of SNOMED CT in Canada. For more information visit: SNOMED CT in use - www.infoway-inforoute.ca

### 2.3.5 Benefits of Standardized Clinical Terminologies to Nursing

The use of standardized clinical terminologies in nursing highlights the importance of collecting uniform nursing data, and provides a means of communicating the data in a way that can be understood across the system in all settings. The communication enabled by the use of these terminologies has had and will continue to have far reaching effects that benefit the nursing profession, patient outcomes, interprofessional patient care, and the international communication of nursing and health information. These benefits are discussed in detail below.

- Integration of clinical practice guidelines into EHRs
  - With standard terminology for health concepts and mapped relationships between concepts, clinical practice guidelines can be built into electronic systems (Ball et al., 2011).
  - Example: When a nurse documents the findings of her/his assessment in the patient's/client's EHR (poor sensation and weakness on left side of body, incontinence, non-weight bearing, poor appetite), this may trigger a rule or prompt based upon a clinical

algorithm built into the system to present a nursing order set (interventions) incorporating evidence-informed clinical practice guidelines for the prevention of pressure ulcers or simply provide a reference link to pressure ulcer prevention clinical practice guidelines.

- Improved interoperability of EHRs and communication both between nurses and across health care professions
  - With standard terminology, patient/client information can be shared between health settings and health care professionals (Ball et al., 2011). Patient/client transitions in care within and between health care settings (including patient's/client's home) can be safely facilitated and coordinated with access to essential patient/client information such as an integrated patient/client care plan that helps guide care no matter where the patient is in transition.
  - Example: The details of a complicated Caesarean delivery of a premature baby can be shared between an acute care hospital (e.g. surgeon notes, anaesthesiologist's report, nursing notes, etc.) and a public health facility (e.g. public health nurses making home visits to high-risk new mothers) using a shared language system.

- Visibility of nurses' actions and their contribution to patient/client health outcomes
  - Nurses across multiple settings are able to record 1) their actions in a common language that can be understood by other health disciplines and 2) the resulting health outcomes in the patients/clients, demonstrating the value of nursing interventions (Ball et al., 2011).
  - Example: Nurses can document the actions taken to prevent falls in an elderly patient/client admitted to an acute care facility for a COPD exacerbation, and these interventions can be linked with the patient's/client's history of falls during his/her stay at the acute care facility.

- Collection of international data for analysis
  - The standard terms used internationally allow for health care data from multiple facilities, health settings, and geographic locations to be merged into a large and diverse data set that can be used to examine health trends, identify effective and ineffective interventions, identify side effects of medications and procedures, etc. The use of standard terminology may also be useful in relating individuals to research studies by linking the standard terms with study inclusion and exclusion criteria (Ball et al., 2011).
  - Example: The effectiveness of a medication for the treatment of a rare condition may be established more quickly with potential participants drawn from international locations with a reduced potential for language and dialect differences in documenting the clinical outcomes.

## 2.4 Information and Knowledge Management Case Study

### Case Study Overview and Use

In working through this case study, students will:

- Problem-solve to identify innovative ways of educating patients/clients on self-management skills.
  - Indicator: Assists patients and their families to access, review, and evaluate information they retrieve using ICTs (i.e. current, credible, and relevant) and leverage ICTs in managing their health (e.g. social media sites, smart phone applications, online support groups, etc.).

- Brain-storm on possible information and communication technologies to support patient/client health.
  - Indicator: 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.).
- Brain-storm on how to identify local and trustworthy online resources for patients/clients.
  - Indicator: Performs search and critical appraisal of online literature and resources (e.g. scholarly articles, websites, and other appropriate resources) to support clinical judgement, and evidence-informed decision making.
- Discuss how to document nursing interventions.
  - Indicator: 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.
  - Indicator: Articulates the significance of information standards (i.e., messaging standards and standardized clinical terminologies) necessary for interoperable electronic health records across the healthcare system.

Possible ways to use this case study:

- Present the case study at the end of class and ask students to come to the next class prepared with 1) innovative ways to teach a skill, like self-injecting insulin, 2) ways to use technology to help a newly diagnosed diabetic with self-management, and 3) physical and online resources in your city that could be recommended to a newly diagnosed diabetic and family (or tell students to form groups of three with each member responsible for one of the above tasks). Follow-up in the next class by asking students what resources they found, how they accessed these resources, and how they determined that they were reputable resources.
- Present possible ways to document the nursing interventions and have the students 1) rewrite the documentation but correct it for proper acronyms/abbreviations and terminology, and/or 2) point out the terminology that is unacceptable and how it should be corrected.
- Pair with Cases 3 (pg. 121), 4 (pg. 122), 5 (pg. 123-4), and 6 (pg. 125) from the RNAO Nurse Educator eHealth Resource (available from the RNAO website: http://rnao.ca/)

Ways to adapt this case study:

- add in the name of the hospital and school to reflect your local area
- change the type of patient/client: illiterate adult
- change the chronic condition and clinical skill (example: newly diagnosed with COPD, teach how to use an inhaler)
- re-format the discussion questions to reflect the multiple choice style of the NCLEX-RN

Possible teaching topics in which this case study could fit:

- Paediatrics
- Health teaching/promotion
- Chronic disease management
- Acute care

**Information and Knowledge Management Case Study**

*During your shift in the emergency department of _____ Hospital, 12-year old Zhuang Lin is brought in by ambulance from _____ school. He is 150 cms tall and weighs 35 kg. The school principle called 9-1-1 after Zhuang Lin collapsed during a cross-country competition. The principle told the paramedics that she was not aware of Zhuang having any health issues. Upon arrival to the ER, Zhuang is having trouble remembering what happened. He is extremely lethargic and complains of tingling in his hands and lips, shakiness, headache and exhaustion. He was diagnosed with type 1 diabetes mellitus three months earlier but otherwise his health history is unremarkable. His parents arrive and report that Zhuang had been having difficulty keeping his blood sugar in the range their family doctor advised, but would not let his parents help or see him injecting his insulin. They report that his blood glucose levels were high at breakfast, so he only took a light snack to eat before the competition. An IV is started and blood work ordered. Zhuang's blood glucose levels were 3.1mmol/L, but start to rise with treatment.*

**Information and Knowledge Management Case Study: Discussion Questions**

1. Before Zhuang is discharged, what are the issues that need to be addressed to prevent another hypoglycemic incident?
   - Explore what challenges he is experiencing with managing his diabetes
   - Review self-injection with Zhuang and direct him to resources he can review at home
   - Assess family information needs
2. Consider the following concepts derived from standardized nursing languages. Which ones do you think would help you to document the issues pertinent to Zhuang's care?
   - Self-management, chronic disorder
   - Limited self-care
   - Adherence to medical regime
   - Coping
   - Need for health education
   - Family processes, management chronic disorder
   - Parental role conflict
   - Others?
3. What teaching tools would you use to meet this patient's and his family's education needs?
   - examples: pamphlets, hands-on teaching with a syringe and insulin, etc.

   **Assuming that this case study is being used in a paediatric or other topic class, the students may not readily identify innovative patient/client teaching methods using health technologies without prompting, and may require being asked specifically:*
4. If the hospital policies allowed access to a tablet/laptop/smart phone and the internet, what teaching tools might you use?
   - If you have internet access in your classroom, consider searching for online videos, pamphlets, and tools that you could recommend and review them for their credibility.
     - o managing diabetes example: http://www.youtube.com/watch?v=GxNWCB90BVQ
     - o educating the family example: http://pardeehospital.kramesonline.com/106,S,W1650
     - o diabetes management tool example: http://www.diabetes.org/food-and-fitness/food/my-food-advisor/
   - If accessing the internet in your classroom is a problem, consider having students identify three online resources that they would recommend as a homework assignment

5. If the hospital policies do not allow nurses to access a tablet/laptop/smart phone and/or internet, what instructions would you give Zhuang and his family for accessing information?
   - Review ways of assessing the credibility of websites
   - Direct Zhuang to local Public Health or support group resources
6. How would you document your interventions?
   - The response to this will vary depending on what type of charts and documentation are used at your local facilities
7. Consider the following terms from standardized nursing languages, which interventions do you think could help you document your care
   - teaching
   - emotional support
   - support for social functioning
   - stress reduction
   - family support
   - nutritional counseling
8. What other health care professionals would you consider referring him to?
   - Dietician
   - Zhuang's family doctor
   - Social worker
   - Others?
9. What terms might you use for your anticipated outcomes of care?
   - Chronic disease management
   - Self-care
   - Health-promoting behaviours
   - Knowledge: diabetes management
   - Knowledge: diet
   - Social involvement
   - Activity tolerance
   - Family coping

## 2.5 Presentation on Information and Knowledge Management

**Presentation Overview and Use:**

**Disclaimer: This presentation is not meant to be used all in one lecture, but rather integrated into lectures in various classes as fitting with your curriculum.**

In this presentation, students will:

- Be exposed to the key concepts and key learnings of the information and knowledge management competency (see map to indicators below)
- Learn the background information needed to support their engaging in evidence-informed practice in their clinical experiences
- Work through several examples of assessing the applicability and credibility of evidence

Ways to use this presentation:

- This presentation is not meant to be used all in one lecture, but rather integrated into lectures in various classes as fitting with your curriculum.

- Depending on what information is already included in your curriculum, you may not need:
  - the overview of evidence-informed practice (slides 4-7),
  - the ideas for health teaching (slides 24-31)
- If the students in your class have laptops/tablets/smart phones with internet access, you can make this presentation more interactive by having students search for research articles, websites, clinical practice guidelines, etc.
- Depending on the lectures in which you plan on integrating the content of this presentation, you can adapt the examples and scenarios to various clinical settings (see below)

Ways to adapt this presentation:

- Depending on the class, the examples could be adjusted to public health, long-term care, home care, or acute care settings
- Although useful teaching tools, if pressed for time, many of the case study and visual slides could be removed:
  - Opening and closing scenario (slide 1, slide 48)
  - Research article example (slides 9-14)
  - Examples of credible websites (slides 19, 21-23)
  - Health consumer uses of the internet (slides 25-28)
  - Clinical practice guideline example (slides 33-34)
  - Example EHR (slide 40)

Possible classes/topics in which this presentation could fit:

- Professional nursing practice
- Research methods/critical inquiry
- Health promotion, community nursing
- Leadership
- Chronic disease management

Relevant care settings include:

- Public health - slides 9-15
- Acute care (e.g. health teaching before discharge) - slides 24-31, 49
- Home care - slides 24-31
- Long-term care - slide 1
- Research - slides 41-46 (e.g. research potential with C-HOBIC)

**Information and Knowledge Management Presentation – Slide Breakdown by Indicator:**

The table below shows the breakdown of slides related to the indicators for the Information and Knowledge Management Competency - Accesses and communicates relevant information and knowledge to support the delivery of evidence-informed patient/client care.

| Indicator | Slides |
|---|---|
| Performs search and critical appraisal of online literature and resources (e.g., scholarly articles, websites, and other appropriate resources) to support clinical judgement, and evidence-informed decision making. | 8-23, 32-36 |
| 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. | 42-48 |
| 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.). | 24-31 |
| 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. | 41-47 |
| Articulates the significance of information standards (i.e., messaging standards and standardized clinical terminologies) necessary for interoperable electronic health records across the healthcare system. | 36-38, 41, 46-48 |
| 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. | 42-46 |
| 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. | 8-23 |

**Examples of Quiz Questions**

1. List three ways that health consumers can use the internet to support their health.
   **Tests knowledge*

   Possible answers include:
   - accessing health information
   - formal and informal social support
   - health management tools
   - health forums

2. Define 'interoperability' and explain its importance in health care.
   **Tests knowledge and comprehension*

   Definition should mention: access or use by a variety of health care professionals and in a variety of health settings

   Importance to health care: improved inter-disciplinary communication

3. Explain the differences between ICNP, C-HOBIC, and SNOMED CT and how they work together to support nursing practice.
   **Tests analysis*

   ICNP - nursing-specific, captures nursing interventions, diagnoses, and outcomes
   C-HOBIC - nursing-specific, captures nursing assessment and outcome data with standardized terminology and stores it for analysis and use in an EHR

SNOMED-CT - includes medical and nursing terminologies, and concepts as well as descriptions and relationships, useful within an EHR or similar electronic system

These various standards work together to
(1) improve communication between nurses and across health disciplines,
(2) collect nursing and other medical data for analysis,
(3) give visibility to nursing actions, and
(4) improve team work by quick access to reports by other professionals

4. Would you use the following website as a source of information? Why or why not? *(have a good or bad website up on a screen or hand-out a hardcopy picture of the website for students to use)*
**Tests application*

   Example of potentially good quality websites: www.mayoclinic.com, www.lung.ca (or other credible association)

   Example of potentially poor quality websites: Wikipedia, newspaper articles such as the following article on antibiotics: http://www.thestar.com/news/canada/ article/1304559—antibiotics-do-more-harm-than-good-when-it-comes-to-chest-infections-study

5. A patient/client tells you that he 'Googled' his symptoms and thinks he might have gastrointestinal cancer. How would you handle this situation?
**Tests application*

   Answers should include: health teaching about accessing good health information online and may include mention of the uses and limitations of online resources (e.g. provide health information but are not a diagnostic tool), and reasons for seeking medical care

6. In what ways can ICTs improve patient safety?
**Tests synthesis*

   Possible answers include:
   - built-in clinical practice guidelines
   - improved communication between health care team members,
   - quicker access to health information (e.g. lab and imaging results, reports by other health care team members), and
   - improved access to health information for patients/clients

7. How would you decide whether your health organization is ready to adopt EHRs?
**Tests evaluation, synthesis*

   Possible answers include:
   - access to standard terminology for interoperability?
   - staff comfortable and knowledgeable in the use of health information and communication technologies?
   - staff willing to collaborate in the learning of a new charting system?
   - financial resources?
   - policies and technology available to protect patient confidentiality?

8. What do you think the pros and cons are for the use of tablets/smart phones by nurses in health care organizations?
   **Tests evaluation*

   Possible answers include:
   - Pros: quick access to health resources, use in patient/client teaching, point-of-care charting if EHRs are available, quick communication between team members, etc.
   - Cons: possible unprofessional appearance (e.g. may be perceived as playing a game or sending a social e-mail), cost, infection-control issues, etc.

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You are a student nurse and have arrived on a general surgery floor for your first shift. One of the clients/patients assigned to you is restricted to bed and has a stage II pressure ulcer on his buttocks. You notice that the nurse looking after this gentleman positioned him using a 'donut' to relieve pressure over the pressure ulcer, but seem to recall learning that 'donuts' only shift pressure to new areas of the body.

What would you do?

1

Providing Evidenced-Informed Nursing Care:

Gathering, Assessing and Using Information & Knowledge

2

## Agenda

- Overview of evidenced-informed care
- Reviewing evidence for quality and applicability
- Teaching patients/clients to assess online information quality
- The importance of standardized nursing data
- Creating common nursing and health languages

3

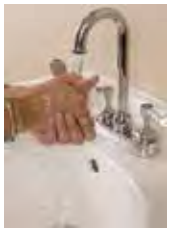
## Evidenced-Based Practice (EBP) [1]

- Definition: "the integration of best research evidence with clinical expertise and patient values"[2]
- EBP is NOT:
  - A formula for approaching all situations and all individuals, or
  - A replacement for nursing assessment of a situation or individual
- To reflect the importance of clinical expertise and patient values, the phrase "evidenced-informed practice" (EIP) is used

4

## Healthcare Before EIP [1]

- Prior to the movement towards EIP, clinical practice was guided by expert opinion, experience, trial and error, etc.



Examples:

•Hand-washing after childbirth

•Bloodletting

5

## Current Need for EIP [1]

- The need for EIP has never been greater due to:
  - New interventions, medications, and treatments
  - Focus on patient safety
  - Increased quantity of research

6

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## EIP and Nurses [1]

- Today's nurses are:
  - Caring for increasingly sick individuals with an increasing variety of interventions
  - Partnering with patient care assistants, RPNs, etc. and needing to delegate within team,

-AND having to keep updated on evidence related to their work.

**Learning how to effectively access information is critical!**

7

## Sources of Evidence [1]

| Source of Evidence | Where to Find |
|---|---|
| Research articles | Medical databases (e.g. CINAHL) |
| Websites | Internet search engines (e.g. Google) |
| Clinical practice guidelines/best practice guidelines | Nursing and health organizations |
| Electronic health records and other point-of-care systems | Hospital health information systems |
| Pre-printed orders, clinical pathways | Hospital charts |

8

## Research Article Example:

You work in public health on the smoking cessation team. One of your current tasks is designing a poster that will be used in your city to highlight the various options for people who want to quit smoking. You want to make sure that you design an effective poster, so you do a search in CINAHL and retrieve the following article:

9

Vogt, F. & Marteau, T.M. (2012, January). Perceived effectiveness of stop smoking interventions: Impact of presenting evidence using numbers, visual displays, and different timeframes. *Nicotine & Tobacco Research, 14*(2), pg. 200-208.

What do you think of it so far?

10

## Peer Reviewed?


A quick internet search for the journal brings you to a webpage with this information.

11

## Abstract

**Methods:**

This study entails two between-subjects experiments with smokers from the general population. In Experiment 1, U.K. smokers ($n$ = 318) viewed information about a stop smoking intervention that included (a) no effectiveness information, (b) standard numerical effectiveness information, or (c) numerical and visual absolute effectiveness information. In Experiment 2, U.K. smokers ($n$ = 320) viewed numerical and visual absolute effectiveness information about a stop smoking intervention showing either the short-term (1-month) or the long-term (12-month) quit rate with and without intervention. Outcome measures included perceived effectiveness of stop smoking interventions and intentions to use them.

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## Questions to Ask Yourself [1,3]

1. Is the study potentially helpful to your situation?
2. Would applying the results be consistent with your agency's policies and standards?
3. Is it reasonable to implement the study findings?
4. What are the benefits and barriers?
5. How strong is the research design?

13

## Using Websites to Retrieve Evidence [1,3]

- Pros:
  - Quick
  - Access to a large quantity of information
- Cons:
  - Potential lack of quality in evidence
  - Large quantity of sources to sort through

14

## Searching the Internet for Evidence [1,3]

- 2 ways:
  1. Identify credible websites and search those websites for evidence related to your topic, or
  2. Use a search engine (e.g. Google) to search your topic (e.g. smoking cessation), and then filter through the results for credible sources
- Both methods of searching require you to be able to <u>assess the quality of source</u>

15

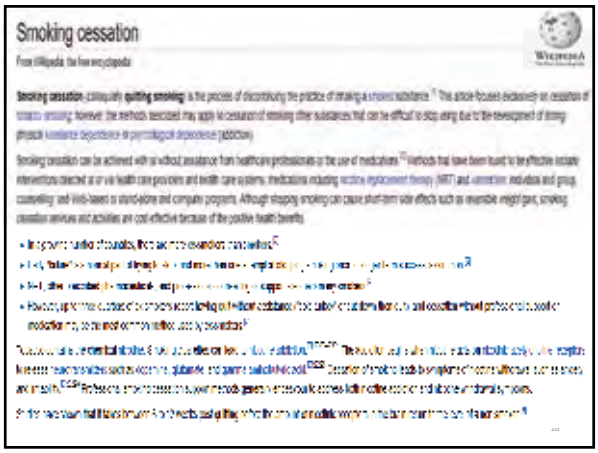
## Reviewing Websites for Quality [1,3]

- Organization and purpose
- Author credentials and bias
- Accurate and verified content
- Website and content maintained and current
- Clear references
- Valid recommendations

## Examples of Credible Websites [3]

- Public Health Agency of Canada – The Canadian Best Practices Portal for Health Promotion and Chronic Disease Prevention
- Canadian Nurses Association - NURSEONE Web Portal
- Registered Nurses Association of Ontario - Nursing Best Practice Guidelines Program

17


Smoking cessation

From Wikipedia, the free encyclopedia

**Smoking cessation**, colloquially **quitting smoking**, is the process of discontinuing the practice of inhaling a tobacco substance.[1] This article focuses exclusively on cessation of tobacco smoking; however, the methods described may apply to cessation of smoking other substances that can be difficult to stop using due to the development of strong physical dependence or psychological dependence (addiction).

Smoking cessation can be achieved with or without assistance from healthcare professionals or the use of medications.[2] Methods that have been found to be effective include interventions directed at one individual, group sessions and telephone counselling, pharmacotherapy such as nicotine replacement therapy (NRT) and bupropion, individual and group counselling, and Web-based and computer programs. Although stopping smoking can cause short-term side effects such as irritability, weight gain, smoking cessation services and activities are cost-effective because of the positive health benefits.

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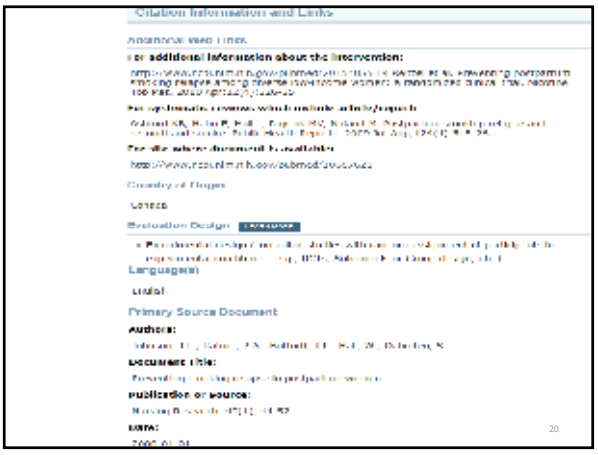
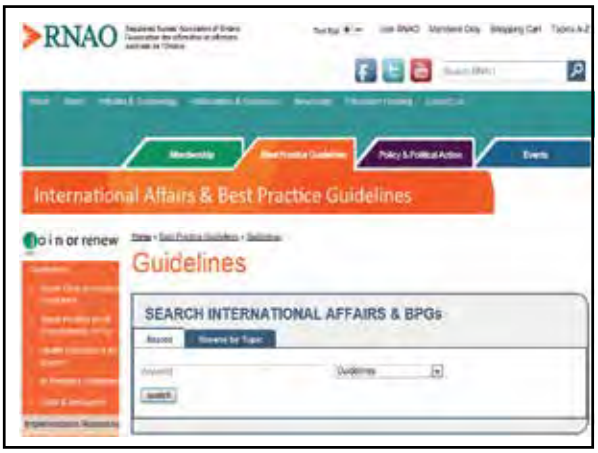
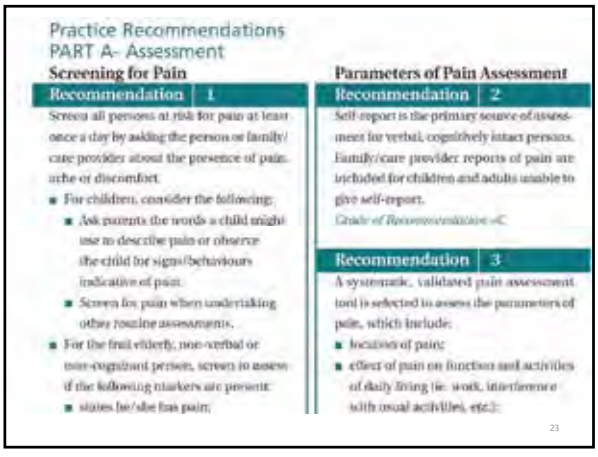



## Clinical or Best Practice Guidelines [1]

- Conducting a database or internet search for all clinical issues is generally not feasible
- Practice guidelines allow for quick retrieval of research information that has already been evaluated for quality and translated into clinical practice
- Many guidelines are available online and free of charge (e.g. Registered Nurses Association of Ontario)

21




## Patient Education – Health and the Internet [4]

- With widespread access, many individuals search the internet for health information or tools
  - Example: a Google search of "sore throat" retrieves over 18,000,000 results

- The common use of smart phones allows individuals to access the internet in a variety of settings

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## Health Literacy

- Nurses play a key role in developing health literacy skills in patients by:
  - Helping them assess the quality of information and tools
  - Increasing awareness of accurate sources of information and tools

25

## Education Tools [4]

- Online quality assessment tools
  - Canadian Public Health Association "Evaluating Health Information Online"
- Reputable organizations' websites
  - Ex. Health Canada

26

## Individual Characteristics to Consider [4]

- Accessing information online may not be appropriate for all individuals and may be complicated by:
  - Health literacy
  - Language barriers
  - Physical barriers (e.g. Blindness)
  - Cognitive barriers (e.g. Alzheimer's)

27

## Potential Internet Use: Accessing Health Information [4]


28

## Potential Internet Use: Support [4]


29

## Potential Internet Use: Health Management Tools [4]


30

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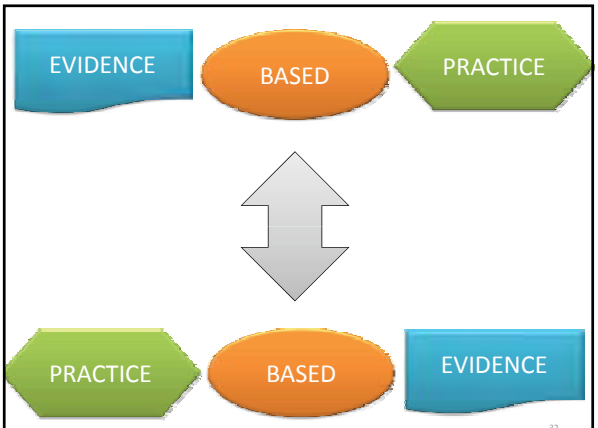
## Potential Internet Use: Health Forums


31




32

## Standardized Nursing Data[12]

- Standardized data offers many opportunities to:
  - Advance nursing practice
    - Increases visibility of nursing contribution in patient care
    - Support development of nursing practice guidelines
  - Improve patient outcomes
    - Easier to identify trends in patient data
    - Provides information to decision-makers

33

## Standardized Clinical Terminologies[4,11]

- Common languages that describe health conditions, treatment plans, and interventions
- Needed for interoperable EHRs
- Two examples used in Canadian nursing: ICNP and SNOMED CT

34

## International Classification for Nursing Practice (ICNP) [1,6]

- The task of trying to standardize nursing language was undertaken by the International Council of Nurses who produced the ICNP
- The ICNP includes nursing:
  - Interventions
  - Phenomena (or diagnoses), and
  - Outcomes

35

## Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT)[4, 11]

- Allows for clinical information to be communicated between health professionals and settings
- Facilitates inter-professional teamwork
- Collects international data for analysis

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## SNOMED CT and the ICNP in Canada[1,6]

- SNOMED CT will be used in pan-Canadian electronic health records
- ICNP is nursing specific, but can be integrated into inter-disciplinary systems (like SNOMED CT)

37

## How are the terminologies used in Canadian nursing practice?

- Canadian Health Outcomes for Better Information and Care (C-HOBIC) Project
  - This project ran from 2007 to 2010 and included a partnership between the Canadian Nurses Association and Canada Health Infoway Inc.


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## C-HOBIC [1,7]

- It's goals were to:
  1. Standardize Canadian nursing terminology with the ICNP,
  2. Systematically capture nurse-sensitive clinical outcomes (e.g. Pain intensity, falls, pressure ulcers), and
  3. Store the data for use in EHRs and databases.

39

## C-HOBIC [1,7]

- Nurses at sites participating in C-HOBIC collected routine information during:
  - the admission assessment,
  - discharge assessment,
  - and, if in long-term care, on a regular basis or after a significant health event (e.g. a fall)
- Nurses assessments were standardized to include: functional status, self-care, pain, nausea, fatigue, dyspnea, pressure ulcers, and falls

40

## Subsequent C-HOBIC Projects [8,9]

- Mapping and publishing of nursing outcome categories to the ICNP
  - Outcome categories: functional status, therapeutic self-care, symptom management, patient safety, and patient satisfaction with nursing care
- Developing of synoptic reports
  - Electronic charting with built-in cues of what to document and where to document it

41

## C-HOBIC Data and Care Outcomes

- Prevent re-admissions
- Nursing interventions and patient outcomes
- Improved transitions (e.g. acute care to long-term care facility)

42

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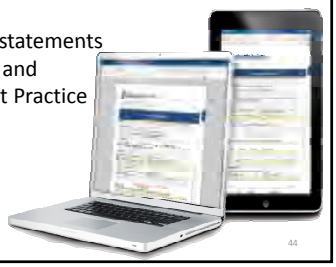
## Uses of C-HOBIC Data [1,7]

- Generating nursing practice guidelines based on the evidence for nursing interventions collected in the project, and
- Care planning based on the nursing resources (e.g. time) required to perform these interventions
- Designing EHRs with standardized clinical terms to describe nursing interventions

43

## How are the terminologies used in Canadian nursing practice?[9]

- Registered Nurses Association of Ontario – Nursing Order Sets
  - Clear intervention statements based on the ICNP and SNOMED CT in Best Practice Guidelines.



44

## Scenario: a patient/client needs a heparin drip

- Which health care professionals need to be able to communicate?
- What electronic documents may be used in which standard clinical terminology would be important?

45

You are a student nurse and have arrived on a general surgery floor for your first shift. One of the clients/patients assigned to you is restricted to bed and has a stage II pressure ulcer on his buttocks. You notice that the nurse looking after this gentleman positioned him using a 'donut' to relieve pressure over the pressure ulcer, but seem to recall learning that 'donuts' only shift pressure to new areas of the body.

What would you do?

46

## Review of Main Points

- Evidence may be retrieved from a variety of sources and may be of varying levels of strength and credibility
- People need to be educated on how to use online information and tools wisely
- Nursing data can inform nursing practice and improve patient outcomes
- Using a common, standardized language between nurses and across health professionals is key to communicating information electronically

47

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2. Straus SE, Richardson WS, Glasziou P, & Haynes, RB. (2010). Evidence-based Medicine: How to practice and teach EBM (4th ed). London, Edinburgh: Churchill Livingston.
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4. Saba VK, & McCormick, KA. (2006). Essentials of nursing informatics (4th ed). United States of America: McGraw-Hill Companies, Inc.
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10. Canadian Nurses Association. (2011). *New advances in patient safety through new advances in nursing assessments in electronic health records.* Retrieved January/3, 2013, from http://www.cna-aiic.ca/en/new-advances-in-patient-safety-through-nursing-assessments-in-electronic-health-records/
11. Canada Health Infoway. (2012). Retrieved from https://sl.infoway-inforoute.ca/content/_dispPage.asp?cw_page=snomedct_e
12. Hannah, K., White, P., Nagle, L., and Pringle, D. (2009). Standardized Nursing Information in Canada for the Inclusion in Electronic Health Records: C-HOBIC. *Journal of American Medical Informatics Association*. 16(4), 524-530.


**Special Thanks to the Centers for Disease Control and Prevention, Amanda Mills, Grace Emori, Richard Duncan, and James Gathany, for providing the pictures used in this presentation.**

## 2.6 Resources Related to the Information and Knowledge Management Competency

**General Resources:**

- This article outlines some online sources of clinical guidelines:
  Blackburn, S. (2012). Internet resources. *Journal of Perinatal & Neonatal Nursing, 26*(3), 200-201.
- This website provides detailed information on nursing data standards developments internationally:
  International Council of Nurses – International Classification of Nursing Practice. Available at: http://www.icn.ch/pillarsprograms/international-classification-for-nursing-practice-icnpr/
- This website provides more information about C-HOBIC and the inclusion of nursing-related patient outcomes in electronic health records:
  C-HOBIC (2010). *About C-HOBIC*. Available at: http://www2.cna-aiic.ca/c-hobic/about/default_e.aspx
- This document provides an overview of SNOMED CT:
  Canada Health Infoway. (2012). *Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT)*. Available at: https://www.infoway-inforoute.ca/index.php/programs-services/standards-collaborative/pan-canadian-standards/systematized-nomenclature-of-medicine-clinical-terms-SNOMED CT
- This presents an overview of nursing students' tendency to access resources using the internet rather than using databases such as CINAHL:
  Flynn, M. B. (2001). Nursing and informatics: Implications for critical care practice. *Critical Care Nurse, 21*(4), 8, 10, 14, 16.
- This is an example of patient/client use of health information and ommunication technology:
  Frazetta, D., Willet, K. & Fairchild, R. (2012). A systematic review of smartphone application use for type 2 diabetic patients. *Online Journal of Nursing Informatics (OJNI), 16* (3). Available at: http://ojni.org/issues/?p=2041.
- This article provides an overview of information literacy in nursing and an example of how these skills can be integrated into first year nursing courses:
  Hossain, D., Perrin, C., & Cumming, K. (2012). Information literacy and its application in nursing education. *I.J. Modern Education and Computer Science, 10*, 1-8.
- This article provides an overview of the ICNP as applied to nursing practice in Canada:
  Kennedy M.A. & Hannah, K. (2007). Representing nursing practice: evaluating the effectiveness of a nursing classification system. *Canadian Journal of Nursing Research, 39*(1), 58-79.

- This is an example of the process of integrating standardized terminologies into an electronic record:
  Klehr, J., Hafner, J., Spelz, L. M., Steen, S. & Weaver, K. (2009). Implementation of standardized nomenclature in the electronic medical record. *International Journal of Nursing Terminologies and Classifications*, *20*(4), 169–180.
- This is an overview of health-seeking patterns and the nurses role:
  Kuhns, K. (2009). Do you know what your patients are learning online? *Pennsylvania Nurse*, *64*(1), 4-8.
- This is example of facilitating use of evidence in practice using the web:
  League, K., Christenbery, T., Sandlin, V., Arnow, D., Moss, K., & Wells, N. (2012). Increasing nurse's access to evidence through a web-based resource. *Journal of Nursing Administration, 42*(11), 531-535.
- This article highlights how nurses tend to ask their colleagues for practice recommendations instead of searching for evidence:
  Marshall, A. P., West, S. H. and Aitken, L. M. (2011). Preferred information sources for clinical decision making: Critical care nurses' perceptions of information accessibility and usefulness. *Worldviews on Evidence-Based Nursing*, *8,* 224–235.
- This is an example of nurses participating in developing standardized terminology:
  Minthorn, C. & Lunney, M. (2012). Participant action research with beside nurses to identify NANDA-International, Nursing Interventions Classification, and Nursing Outcomes Classification categories for hospitalized persons with diabetes. *Applied Nursing Research, 25*(2), 75-80.
- This article highlights some the factors involved in determining whether hospitals (and other agencies) use clinical practice guidelines to inform their work:
  Ouimet, M., Landry, R., Amara, N., & Belkhodja, O. (2006). What factors induce health care decision-makers to use clinical guidelines? Evidence from provincial health ministries, regional health authorities and hospitals in Canada. *Social Science & Medicine, 62*(4), 964-976
- This is an overview and more information on ICNP, C-HOBIC, and SNOMED CT, as well as information on RNAO's Best practice Guidelines Nursing Order Sets, and NQuIRE, a nurse sensitive outcomes data base:
  Registered Nurses Association of Ontario. (2012). Nurse Education eHealth Resource. Available at: http://rnao.ca/ehealth/educator_resource.
- This RNAO Best Practice Guideline provides evidence-based recommendations for Registered Nurses, Registered Practical Nurses and other health-care providers to facilitate client centred learning that promotes and enables clients to take action for their health:
  Registered Nurses' Association of Ontario (2012). *Facilitating Client Centred Learning.* Toronto, Canada: Registered Nurses' Association of Ontario.

- This article highlights the challenges for nurses in utilizing research evidence:
  Scott, S., Estabrooks, C., Allen, M., & Pollock, C. (2008). A context of uncertainty: How context shapes nurses' research utilization behaviours. *Qualitative Health Research*, *18*(3), 347-357.
- This presents an overview of technology used to support self-management of chronic diseases and the effect of technological support on the nurse-patient/client relationship:
  Smith, C. (2008). Technology and web-based support. *American Journal of Nursing, 108*(l9), 64-68.

**Resources to Support Teaching:**

- This article highlights the effectiveness of using peers to practice health teaching skills and boost self-efficacy:
  Goldenberg, D., Andrusyszyn, M., & Iwasiw, C. (2005). The effect of classroom simulation on nursing students' self-efficacy related to health teaching. *Journal of Nursing Education*, *44*(7), 310-314.
- This article provides an overview of HOBIC and ideas for using it in nursing education:
  Orchard, C., Reid-Haughian, C., & Vanderlee, R. (2006). Health outcomes for better information and care (HOBIC): Integrating patient outcome information into nursing undergraduate curricula. *Nursing Leadership, 19*(3), 28-33.
- This is an overview of the use of smart phones for nursing students to access evidence:
  Phillippi, J.C. & Wyatt, T.H. (2011). Smart phones in nursing education. *Computers, Informatics, Nursing, 29*(8), 449-454.
- This article outlines ideas for teaching students about health literacy:
  Sand-Jecklin, K., Murray, B., Summers, B., & Watson, J. (2010). Educating nursing students about health literacy: from the classroom to the patient bedside. *Online Journal of Issues in Nursing*, *15*(3), 1.
- This presents an overview of using technology to access evidence and the roles that nursing leaders can take in improving this access and use:
  Thomson, T.L. (2012). The use of evidence in clinical practice decision-making. *Clinical Nurse Specialist, 26*(5), 237-238.
- This article trends new graduate use of research to inform practice:
  Wallin L., Gustavsson, P., Ehrenberg, A., & Rudman, A. (2012). A modest start, but a steady rise in research use: a longitudinal study of nurses during the first five years of professional life. *Implementation Science, 7*, 19.
- This article presents ideas for including evidence-based practice in curricula:
  Williamson, K. M., Fineout-Overholt, E., Kent, B. and Hutchinson, A. M. (2011). Teaching EBP: Integrating technology into academic curricula to facilitate evidence-based decision-making. *Worldviews on Evidence-Based Nursing*, *8*(4), 247–251.

# Section 3: Professional and Regulatory Accountability

## 3.0 Professional and regulatory accountability competencies and indicators

**Competency: Uses information and communication technologies in accordance with professional and regulatory standards and workplace policies.**

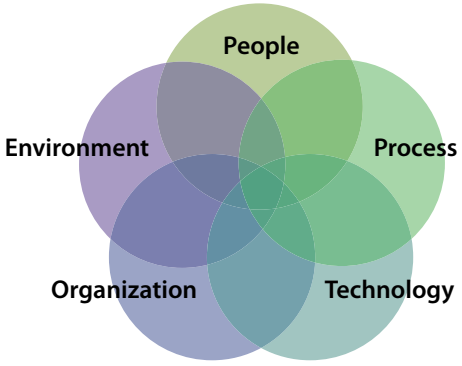
**Indicators:**

- 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.

## 3.1 Context

Advancements in technology have created many tools to support nursing practice and improve patient safety. However, the implementation of new technologies gives rise to the possibility of adverse effects on patients. Adverse events can come from many sources – from the technology itself, issues arising from the policies and process that govern the use of technologies, or user errors (Institute of Medicine, 2011). Continuous efforts of many actors mitigate technology-induced errors: Simulations and ethnographies to identify errors in health information systems pre and post implementation are being conducted (Borycki & Keay, 2010), hospitals are working with vendors to develop systems that will fit Canadian healthcare organizations, and regulation and legislation related to healthcare technologies are being further developed (Kushniruk et al., 2013).

**Sociotechnical system underlying health-IT related adverse events**




Source: Adapted from IOM, 2011

Clinical judgement is needed in evaluating the use of health information and communication technologies on individual and organizational levels. Nurses must be on the lookout for any errors that may arise when using healthcare technologies; a common example is dispensing the wrong medication or an incorrect dosage. Nurses must also follow up by reporting these errors, as this plays a key role in future improvement of these technologies. Health technologies that are well designed, tested, implemented, maintained, and evaluated have the potential to increase patient safety (Institute of Medicine, 2011).

Information collected, stored, and used in healthcare is both extremely personal and significant. Globally, security and privacy of EHRs have been identified as presenting multiple policy concerns including:

- confidentiality
- patients'/clients' access to their health information
- data protection and security
- malpractice
- intellectual property
- product liability and jurisdictional problems
- risk management
- licensing (Scott et al., 2004)

Outside of regulated health system information, ICTs that nurses might use present ethical dilemmas. Social media is one of the most prevalent examples - Facebook, Twitter, etc. may be vehicles to gain knowledge, advocate for nursing, and participate in other professional activities, but there have also been cases of nursing use of social media that resulted in a privacy breach. Recently, two American nurses violated the privacy of a client by posting the client's x-rays on Facebook (Hader & Brown, 2010). The need for access (e.g. ability to add and retrieve health data) must be balanced with the need to protect the individual's health information; the need to share information across countries must be guided by the need to protect intellectual property or data.

Another major challenge is the development of policies, recognized internationally, to allow for global use and sharing of health information (Salzberg et al., 2012; Scott et al., 2004). Nurses need to be aware of all the legislation, regulations, and policies that guide their use of ICTs. They must also recognize that legislation, regulations, and policies will vary at the provincial/territorial and organizational level.

A report evaluating improvements in health information systems and patient safety in Canada (Kushniruk et al., 2013) recommended that healthcare professionals receive education and training to use healthcare technologies. As clinical environments employ a variety of different systems, it would be difficult to have specific training at the undergraduate nursing level. New nurses should be aware, however, of how technologies increase patient safety, possible adverse effects of the technology, the legislation and regulations that govern privacy and the use of health technologies in Canada, and most importantly, that clinical judgement is the most important tool to inform decisions made in nursing practice.

## 3.2 Key concepts:

### Information Privacy

Information privacy is the right of individuals to determine how, when, to whom, and for what purposes any personal information will be divulged (CRNBC, 2010).

### Privacy Breach

A breach of privacy occurs when there is "unauthorized access to or collection, use, or disclosure of personal information. Such activity is "unauthorized" if it occurs in contravention of applicable privacy legislation, such as PIPEDA, or similar provincial privacy legislation. Some of the most common privacy breaches happen when personal information of customers, patients, clients or employees is stolen, lost or mistakenly disclosed…" (Office of the Privacy Commissioner, 2011).

**Security**

Security in the health information context means that "a health information custodian shall take steps that are reasonable in the circumstances to ensure that personal health information in the custodian's custody or control is protected against theft, loss and unauthorized use or disclosure and to ensure that the records containing the information are protected against unauthorized copying, modification or disposal" (Office of the Privacy Commissioner, 2011).

**Technology-induced Errors**

Technology-induced errors can be defined as those errors that have their origins in "a) design and development, b) implementation and customization of a technology, and c) interactions between the operation of a new technology and the new work processes that arise from a technology's use" (Borycki & Kushniruk, 2008, p. 154). They also include errors that arise from poor exchange of information between health technologies such as health information systems (e.g. clinician order entry systems and electronic medication administration systems) and interfacing between health information systems and devices that are used in the process of patient care (e.g. electronic medication administration systems and bar code readers) (Borycki & Kushniruk, 2008; Koppel et al., 2008; Kushniruk et al., 2013). Technology-induced errors typically do not arise until health technologies are used in real-world healthcare settings and situations involving health professionals and patients (Magrabi et al., 2012). Technology-induced errors may arise from the design, development, implementation, and maintenance of health information technologies, but are not detected until they are being used in complex real-world environments (Kushniruk et al., 2005).

## 3.3 Key Learnings:

### 3.3.0 Awareness of Legislation and Policies that Regulate the Use of ICT in Nursing Practice

#### *3.3.0.1 Federal and Provincial Health Privacy Policies and Standards*

Current policy for the protection of individuals' personal information is shared across federal and provincial/territorial jurisdictions. Federally, three acts govern the collection, access, and use of personal information:

1. *Privacy Act* - use of information by the federal government and related agencies
2. *Access to Information Act* - use of information in government records
3. *Personal Information Protection and Electronic Documents Act* (PIPEDA) - use of information in the private sector

Because of the variation across provinces and territories, faculty will need to familiarize themselves with the Acts relevant to their setting.

Provinces that have developed an act considered 'substantially similar' to PIPEDA can be exempt from it. At present, British Columbia, Alberta, Québec, Ontario, New Brunswick, and Newfoundland and Labrador have their own provincial regulation.

For example, Ontario has the Personal Health Information Protection Act (PHIPA) which outlines the information that must be protected; practices to be followed by those accessing, collecting, or disclosing personal health information; and individuals' rights to access their personal health information (Office of the Privacy Commissioner of Canada, 2012).

#### *3.3.0.2 Nursing Health Privacy Policies and Standards*

Nursing professional associations and regulatory bodies have been involved in the development of policy governing the collection, use, and disclosure of personal health information. They have delineated standards related to the federal and provincial policies protecting individuals' health information that nurses must adhere to.

Nationally, the Canadian Nurses Association defined the ethical conduct required of nurses with regards to the privacy of personal health information in the 2008 release of the 'Code of Ethics for Registered Nurses' (Canadian Nurses Association, 2008). Complimentary to this code, each provincial/territorial nursing regulatory body has its own professional and/or practice standards.

#### *3.3.0.3 Organizational Policies*

Although federal, provincial/territorial, and nursing policies guide nurses in the acceptable use, collection, and dissemination of personal health information, how these policies are enacted vary. For example, the steps taken to protect health information contained in hard-copy medical charts differ from those taken to protect electronic health information. It is the responsibility of the organization to develop the policies necessary to follow the applicable health privacy acts and standards, and to train employees to adhere to them.

Some general policy areas that organizations need to address include:

- compliance with the applicable legislation, regulations, and standards
- outline of information considered to be private
- passwords and other security measures
- systems and processes for handling and protecting health information (e.g. backing-up electronic health information in the event of a system error)
- e-mail and use of the internet
- special circumstances where breaching of confidentiality is necessary
- access
- inappropriate or unauthorized access
- off-site access
- 'go-to' people in case of problem
- penalties for failing to comply with the policies (Benson, 2012)

### 3.3.1 Information and Communication Technologies and Patient Safety

Although health information and communication technologies have the potential to decrease errors made by the individual, they may also introduce new types of errors (Borycki & Kushniruk, 2008).

Technology-induced errors and malfunctions may arise during the piloting and/or use of a new or existing health technology. Patients/clients must be protected through prompt identification and reporting of such issues by nurses. Koppel et al. (2005) describe the ways in which nurses and other clinicians, having identified technology-induced errors, developed "work-arounds" or quick fixes that temporarily correct the issue. Although these quick fixes may work in the moment, they neither address the issue nor start the process of having it corrected (Borycki & Kushniruk 2005; Borycki et al., 2009). It is important that nurses understand their role in patient safety by reporting such errors and following the appropriate national regulatory and workplace policies related to technology-induced errors and malfunctions.

The World Health Organization outlined a 'life-cycle' of medical devices that starts with 'research and development' and flows through to 'management.' The 'management' stage of the life-cycle highlights the continuing role of nurses in identifying and reporting errors and

malfunctions of health technologies (World Health Organization, 2011). After these technologies have been designed and implemented, they require on-going maintenance to ensure safe clinical practice (e.g. re-calibration of glucometers, updates to electronic health record systems, and nurse decision support systems). Nurses need to be involved in identifying and reporting technology-induced errors involving health information technologies and devices, and follow national reporting requirements as well as the organization's policies specifying how and when such issues should be reported.

### 3.3.2 Information and Communication Technologies and the Nurse's Clinical Judgement

Despite advances in health information and communication technologies, there remains no replacement for nurses' clinical judgement. Clinical judgement is needed in evaluating 1) the use of health information and communication technologies, 2) patient/client data made available through these technologies, and 3) the application of evidence.

As noted above, health information and communication technologies are not infallible; they require piloting and revision, updating, and regular maintenance. Thus, nurses need to use clinical judgement when interpreting the patient/client data supplied and recorded by these technologies (Dumpel, 2005). On an organizational level, nurses need to apply clinical judgement in evaluating the potential effects of health information and communication technologies on patient/client care. They must promote the technologies that will improve their capacity to provide safe care (Procter & Woodburn, 2012).

There are multiple ways in which health information and communication technologies can support clinical judgement including:

- providing point-of-care patient/client data to support decision-making
- trending data to highlight subtle changes over time
- allowing comparison of current assessment data with older assessments to identify changes (HIMSS Nursing Informatics Awareness, 2007)

In addition to increasing access to patient/client data, health information and communication technologies increase access to clinical practice guidelines. Clinicians use professional judgement as they review and select clinical practice guidelines that meet international standards for guideline development (AGREE II, 2010). Nurses strive to provide evidence-based, client centred care, recognizing that there may be times when there is incongruence between the technology- enabled treatment plan, and the client's wishes. In such situations, nurses use their professional judgement to act as advocates for their clients, as well as teachers, and coordinators of care so that the best possible evidence based care is delivered respecting the clients need for information and their preferences and value set.

### 3.3.3 Nurses as Advocates for Health Information and Communication Technologies

With evidence supporting the role of health information and communication technologies in improving the safety and quality of care, nurses need to advocate for their use on behalf of their patients/clients. Ways in which nurses may act as advocates include:

- documenting use of health information and communication technologies and related outcomes
- teaching use and applications of health information and communication technologies in schools of nursing and on-the-job training

- reporting availability issues or requests for innovative equipment to the appropriate managers (e.g. request for additional computers to facilitate quick access to online resources, request that tablet computers be made available for health teaching purposes)
- participating in updating nursing terminologies (e.g. ICNP) so that nursing actions can be appropriately documented, recorded, and analyzed
- sitting on organizational committees focused on health informatics, quality control, or other related topics, and participating in organizational decision-making such that the needs and views of nurses are heard
- being innovators and early adopters of new health information and communication technologies introduced to their organization
- balancing the use of technology and patient/client-centered care (Ball et al., 2011; Dumpel, 2005; Saba & McCormick., 2006)
- participating in the development of nursing business/functional requirements and user acceptance testing of new health information and communication technologies

> *"Nurses providing direct patient care should be involved in setting and evaluating institutional, organizational, and public policy related to technologies" (Powell-Cope, Nelson and Patterson, 2008, p.12).*

There are multiple ways in which nurses can contribute to research and/or act as researchers using health information and communication technologies on personal, organizational, and broader levels.

On an organizational level, nurses can act as researchers by leading or being involved in:

- quality-control studies to identify issues within their organization that could be addressed through the use of health information and communication technologies, e.g. old technologies that need to be updated
- evaluation of health information and communication technologies introduced in their organization from a nursing perspective
- literature searches to identify clinical practice guidelines applicable to their patients/clients that are integrated into electronic systems (Ball et al., 2011; Saba & McCormick, 2006)

On a broader level, the integration of health information and communication technologies presents multiple opportunities for nursing research including (but certainly not limited to):

- the effect of nursing interventions on patient outcomes as documented in EHRs
- the effect of these technologies on nursing outcomes, nurse-patient/client relationships, care planning, use of clinical practice guidelines, etc.
- literature reviews identifying barriers, facilitators, and recommendations for implementation and use of information and communication technologies in health and other sectors or settings
- evaluations of the cost-benefit ratio of specific technologies (Ball et al., 2011; Powell-Cope, Nelson, & Patterson, 2008; Saba & McCormick, 2006)

In addition to new research areas, health information and communication technologies present opportunities for nurse researchers in data collection, storage, analysis, dissemination, and translation into clinical practice (Ball et al., 2011; Saba & McCormick, 2006).

## 3.4 Professional and Regulatory Accountability Case Study

**Case Study Overview and Use**

In working through this case study, students will:

- Problem-solve one of the issues that can arise with the use of health information and communication technologies
  - Indicator: Identifies and reports system process and functional issues (e.g. error messages, misdirections, device malfunctions, etc.) according to organizational policies and procedures.
- Think through how they would handle a situation where a health information and communication technology was not functioning properly.
  - Indicator: Maintains effective nursing practice and patient safety during any period of system unavailability by following organizational downtime and recovery policies and procedures.
- Identify the role of nurses in complying with policy regulating use of health information and communication systems.
  - Indicator: 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.).
  - Indicator: Complies with legal and regulatory requirements, ethical standards, and organizational policies and procedures (e.g., protection of health information, privacy, and security).

Possible ways to use this case study:

- Work through the case study as a class 1) at the end of a lecture on common neurological conditions or safe administration of medications to integrate elements of nursing informatics into courses on nursing care, or 2) at the start of a lecture on policy to highlight the relevance of policy to every day nursing practice.
- Use this case study as a project where students are responsible for identifying policy issues and write potential policy points to address the issues they identified.
- Divide the class into groups and have them discuss the first question (what would you do and why?) of this case study, and then have a representative from each group report to the class what course of action they decided to follow.
- Pair with Cases 1 (pg. 119), 2 (pg. 120), and 3 (pg. 121) of the RNAO Nurse Educator eHealth Resource (available from the RNAO website: http://rnao.ca/).

Ways to adapt this case study:

- add in the name of the hospital to reflect your local area
- change the type of patient/client and infection: adult receiving chemotherapy in a cancer clinic, newborn with pneumonia, ICU patient with sepsis, etc.
- change the medication to fit a condition or patient type appropriate to a specific class
- change the type of technology:
  - oximeter that reads 98% oxygen saturation but nursing assessment reveals shortness of breath, tightness in chest, headache, and nausea
  - glucometer that flashes “LOW” when testing a patient’s/client’s blood but the nursing assessment finds no symptoms of low blood sugar
  - clinical health system that is not displaying the blood work results needed to titrate a heparin drip
- re-format the discussion questions to reflect the multiple choice style of the NCLEX-RN

Possible teaching topics in which this case study could fit:

- Medication administration
- Neurology
- Microbiology
- Policy
- Acute care
- Professional practice

**Professional and Regulatory Accountability Case Study**

*You work on a neurology unit at _____ hospital. Namid Akiwenzie, a 35-year-old woman, was admitted after presenting with a severe headache, stiff neck, fever, and photophobia. The results of her lumbar puncture are consistent with bacterial meningitis, and the strain is sensitive to gentamicin sulfate. You have to administer Gentamicin Sulphate 168mg IV q8h. Namid weighs 68 kilograms and has normal renal function. The dose strikes you as being high for someone of her weight. To reduce medication errors, your facility has an 'app' on their tablet computers that checks the dosing of medications. Using the app, you select gentamicin sulfate IV, enter Namid's weight and click on 'calculate dose.' The app proceeds to an error screen. One of your colleagues notices the error screen and comments that he had the same problem earlier in his shift and so he went online and found a different dose calculator.*

**Professional and Regulatory Accountability Case Study: Discussion Questions**

1. What would you do and why?

   Leading questions (if necessary):
   - Would you use the other dose calculator?
   - Would you give the dose and ignore your initial reaction that it seems high?
   - Where else could you check for the recommended dose?

2. What is wrong with your colleague's attempt to 'fix' the problem of the app not working?
   - The malfunctioning app has not been reported to the appropriate authority
   - The calculator he used may not take into consideration Canadian dosing which may be different from that in other countries
   - Without notice, other staff will waste their time using an app that is known to be malfunctioning

3. How could this situation have been dealt with differently?
   - The malfunction should have been reported to the appropriate authority
   - Notice should have been given to staff of the malfunctioning app with recommendations for what tools to use until the app has been fixed
   - By the various health care professionals involved double-checking the dose: prescribing doctor, dispensing pharmacist, and the nurse

4. What policy should be in place to guide nursing actions in these types of situations?
   - A clear guide of who to contact in instances of app malfunctions and how to give notice to the various employees using the app
   - A regularly scheduled check of app function and whether it is up to date
   - An outline of how to proceed in the event of a malfunction

5. What safeguards could be built into a clinical health system like an electronic health record to prevent these types of errors?
   - A built in dose calculator
   - A warning sign/alert if prescribed dose is higher than recommended for the patient's/client's weight

6. What information should the nurse document to support safe administration of gentamicin in any future infection?
   - Correct dose ranges
   - Any adverse events
   - Side effects
   - Allergic reactions

## 3.5 Presentation on Professional and Regulatory Accountability

**Presentation Overview and Use:**

**Disclaimer: This presentation is not meant to be used all in one lecture, but rather integrated into lectures in various classes as fitting with your curriculum.**

In this presentation, students will:

- Be exposed to the key concepts and key learnings of the professional and regulatory accountability competency (see map to indicators below)
- Learn about the policy challenges in designing and integrating clinical systems like electronic health records generally and in Canada
- Learn about federal, provincial/territorial legislation and regulation and nursing organizational policies for the protection of personal health information
- Learn about how federal policies for the protection of personal health information applies to the individual Canadian and see an example of how health information and communication technologies can be used in health teaching
- Work through examples of a potential of breech of a federal *Act*
- Learn the various ways in which nurses are active in advocating, researching, error-reporting, and using clinical judgement with health information and communication technologies
- Consider the importance of clinical judgement when using new health information and communication technologies to inform nursing care

Ways to use this presentation:

- This presentation is meant to be a tool to support your teaching. Its slides are meant to be used, adapted, and integrated into various classes as fitting with your curriculum.
- Depending on your province/territory, you can integrate specific provincial guides for the protecting of personal health information instead of using the PIPEDA examples
- This presentation could be included in a lab preparing nurses for their clinical practicum and paired with the teaching of documentation skills

Ways to adapt this presentation:

- Insert slides outlining some of the details of your provincial/territorial *Acts* and local facility's policies that govern the use of personal health information
- Use real or created examples of a breach of personal health information at a local health care facility and (as homework, a project, or class discussion) have the students suggest

ways the situation could have been avoided, and policies that could be used to prevent future similar breaches

- Although useful teaching tools, if pressed for time, many of the case study and visual slides could be removed:
  - Video on how PIPEDA applies to individuals (slide 6)
  - Example of potential federal policy breech (slide )
  - Example of how PIPEDA applies to nurses (slide 8)
  - Video on potential privacy issues with health information and communication technologies (slide 12)
  - Balance of evidence and patient/client preferences (this is an important point, but could be highlighted using only slide 14) (slide 15)
  - Many forms of nurse researchers (slide 18)
  - Example of current nursing research on health information and communication technologies (slide 21)
  - Discussion question (slide 24)

Possible classes/topics in which this presentation could fit:

- Professional nursing practice
- Professional relationships
- Leadership
- Skills lab on documentation
- Nursing research
- Decision-making

Relevant care settings include:

- All settings in which personal health information is used (e.g. acute care, long-term care, home care, public health - infectious diseases & sexual health, etc.)

**Professional and Regulatory Accountability Presentation – Slide Breakdown by Indicator:**

The table below shows the breakdown of slides related to the indicators for the Professional and Regulatory Accountability competency: Uses information and communication technologies in accordance with professional and regulatory standards and workplace policies.

| Indicator | Slides |
|---|---|
| Complies with legal and regulatory requirements, ethical standards, and organizational policies and procedures (e.g., protection of health information, privacy, and security). | 3-12 |
| Advocates for the use of current and innovative information and communication technologies that support the delivery of safe, quality care. | 18-22 |
| Identifies and reports system process and functional issues (e.g., error messages, misdirections, device malfunctions, etc.) according to organizational policies and procedures. | 15-17 |
| Maintains effective nursing practice and patient safety during any period of system unavailability by following organizational downtime and recovery policies and procedures. | 15-17 |
| 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.). | 18-19 |
| Recognizes the importance of nurses' involvement in the design, selection, implementation, and evaluation of applications and systems in health care. | 22-28 |

**Examples of Quiz Questions**

1. Identify and explain two of the policy challenges with implementing electronic health records (or other clinical systems involving personal health information) in Canada.
   **Tests knowledge and comprehension*

Possible answers could include:

- Variation in health priorities between provinces and territories
  - Explanation could include mention of: designing an electronic system that is both standardized between provinces and territories and allows for each province and territory to be able to adapt the system to meet their specific health priorities, challenges, and needs
- Engaging the right people
  - Explanation could include mention of: engaging front-line workers such as Registered Nurses is important to ensure that electronic health records/systems are user-friendly and can accurately capture clinical practice, but identifying and then engaging the right stakeholders in the process of policy development is challenging

2. List four levels of policy protecting the collection and/or use of personal health information in Canada and give an example of each.
   **Tests knowledge*

Answers and sample examples:

- Federal (e.g. PIPEDA)
- Provincial/territorial (e.g. *Act* substantially similar to PIPEDA)
- Nursing organizations (e.g. CNA's code of ethics)
- Organizational (e.g. policy outlining off-site access of personal health information)

3. Explain how Registered Nurses working on a general surgery unit, the unit's nurse manager, and a nurse researcher at an affiliated university can all participate in complimentary research activities piloting the use of a new health information and communication technology in the unit.
   **Tests application*

Answers could include:

- Registered Nurse working on the unit: using the new device in practice, documenting use and outcomes of using the device, providing feedback on the experience of using the device and suggesting changes to improve usability, etc.
- Nurse manager: searching the literature for recommendations on successful integration of new health information and communication technologies in clinical settings, conducting a quality improvement study to capture the effect of using the new device, etc.
- Nurse researcher: synthesizing the results of multiple quality improvement studies to investigate the effect of using the new device, exploring the effect of the device on the nurse-patient/-client relationship from both clients/patients and Registered Nurses perspectives, etc.

4. What is the relationship between clinical judgement, clinical practice guidelines, and health information and communication technologies?
   **Tests analysis*

Possible answers could include:

- Health technologies - these help link clinical practice with research evidence and support communication, both of which help inform the nurses' clinical judgement

- Clinical practice guidelines - summarize the evidence and provide recommendations for nursing interventions in specific situations and settings, these help support nurses' clinical judgement and guide (rather than dictate) nursing care
- Clinical judgement - uses the guidelines and technologies as tools to support clinical judgement, rather than replace it

5. Describe two ways that health information and communication technologies could potentially pose a risk to patient safety.
   **Tests analysis*

   Answers should include: poorly handled device mal-functions, compromising of the protection of personal health information without the proper safeguards, too much emphasis on the use of devices instead of clinical judgement, imbalance between consideration of clinical practice guidelines and patient/client preferences for care

6. Defend why nurses should be involved in the integration of electronic health records/clinical health systems?
   **Tests evaluation and analysis*

   Possible answers include: importance of EHRs in patient safety, need to advocate on behalf of patients/clients for optimal care, need to ensure that EHRs capture nursing interventions and their effect, etc.

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## Using Technology in Nursing Practice:

Complying with Policy
&
Optimizing Practice

## Agenda

- Considerations for policy-makers
- Policy for the protection of personal health information:
  - National, provincial/territorial, nursing association, organizational
- Nursing care with ICTs:
  - Patient safety, using clinical judgement, advocacy, research

2

## Policy Challenges [1-2]

- Who should be able to access patient/client information?
- How can or should that information be used?
- How can personal health information be transported electronically without compromising its safety?

- How can personal health information be stored electronically in a safe and secure way?

3

## Considerations for Canadian Policy-makers[1]

- Addressing:
  - Variation in health care policies between different provinces and territories
  - Variation in the electronic health records and clinical systems used across various provinces/territories and settings
- Outlining policies in detail, but not stifling creativity
- Engaging the right people

4

## Federal Legislation [3]

1. Privacy Act
   -regulates use of information by the federal government
2. Access to Information Act
   -regulates use of information stored in government records
3. Personal Information Protection and Electronic Documents Act (PIPEDA) *
   -regulates use of information by the private sector

*provinces and territories with privacy legislation considered 'substantially similar' to PIPEDA may be exempt

5

## Video: Overview of PIPEDA for Individuals

- The following video outlines what PIPEDA means for individuals
- It is an educational tool created by the Canadian Association of the Deaf - highlighting the educational opportunities that health information and communication technologies present for nursing

Insert video at:
http://www.youtube.com/watch?v=5ePNbYJP7k4 (for English) or
http://www.youtube.com/watch?v=HjUkkaUWHa8 (for French)

6

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## Real Life Example: Federal Legislation 4

- **PIPEDA Case Summary #2003-119: Employer's practice of collecting personal medical information to support a transfer request deemed appropriate**
- **Complaint:** An employee of a telecommunications company complained that his employer was attempting to collect more personal information about him than necessary in order to determine if he could be accommodated in another position for medical reasons.

Why does PIPEDA apply to this case?

What is your conclusion about the collection and use of personal health information in this situation?

7

## Nursing Example: Provincial Legislation 5

A registered nurse works for a private company involved in the manufacture of goods using chemicals that can be toxic to individuals after prolonged exposure. The nurse has been hired to regularly test employees of the company for levels of various toxins to determine whether it is safe for the employees to continue working under conditions where they are exposed to these chemicals. Once certain levels of toxins are detected in their blood, employees are transferred to other divisions of the company where there is no exposure to these chemicals. On a monthly basis, the nurse provides a report to the management of the company specifying whether it is safe for each employee to continue working under conditions of exposure. The information obtained by the nurse from testing of the employees is used for no other purpose.

Is the nurse subject to the *Act* [Ontario's version of *PIPEDA*]*?*

8

## Provincial/Territorial Nursing Standards 6

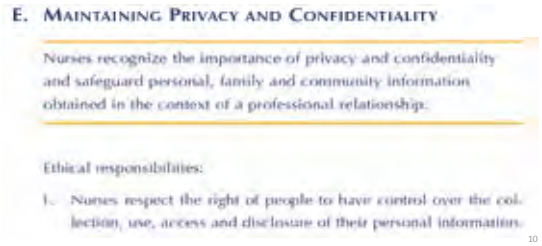
- Each provincial and territorial licensing body has its own standards which outline the necessity of nurses maintaining confidentiality
- Example: Saskatchewan Registered Nurses Association: 'Standards and Foundation Competencies for the Practice of Registered Nurses': Standard III: Ethical Practice

"80. Understands ethical and legal considerations in maintaining client confidentiality in all forms of communication: written, oral, and electronic."

9

## National Nursing Standards 7

- Canadian Nurses Association:
  - Code of Ethics for Registered Nurses (2008)



E. MAINTAINING PRIVACY AND CONFIDENTIALITY

Nurses recognize the importance of privacy and confidentiality and safeguard personal, family and community information obtained in the context of a professional relationship.

Ethical responsibilities:

1. Nurses respect the right of people to have control over the collection, use, access and disclosure of their personal information.

10

## Organizational Policies 8

- Each organization will have to develop their own policies to ensure that they are meeting the national and provincial/territorial standards
- Policy points include:
  - Definition of 'personal'
  - Protecting access
  - Off-site access
  - E-mail of information

## Video: Privacy & Policy

- Insert video at: http://www.youtube.com/watch?v=Jq_fqDLgHxc

(real-life examples used to identify privacy issues with health information and communication technologies)

12

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Nursing Care and the use of Health ICT

1. Patient Safety
2. Using clinical judgement
3. Advocacy
4. Research

13

"It is a professional and ethical imperative for nurses to prevent or minimize harm".

- Canadian Nurses Association, 2012

14

## Technology-induced errors[11]

- Technology-induced errors and malfunctions may arise during the piloting and/or use of a new or existing health technology. However, patients/clients can be protected through prompt identification and reporting of such issues by nurses.

15

## Nurses in Error Reporting [12]

•'work-arounds' → a term coined by Powell-Cope and colleagues to describe the quick fixes that nurses invent to temporarily solve the problem of a device malfunction or error

•Although `work-arounds' are an attractive way of dealing with technological issues, they can pose serious threats to patient care and safety

•Nurses needs to report malfunctions and errors as per their organization's policies

16

## Creating Safer ICTs [13]

- New technologies require an on-going process of design, piloting, evaluation and re-design to meet changing needs
- On-going maintenance is a critical part of reducing errors at the individual-technology level

17

Will technology replace nurses?

18

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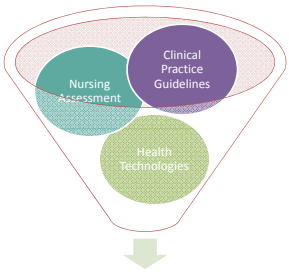
## Technology & Clinical Judgement (14)




Clinical Judgement

- Health information and communication technologies should:
  - Be a tool that supports nurses' clinical judgement
  - Not a replacement for it

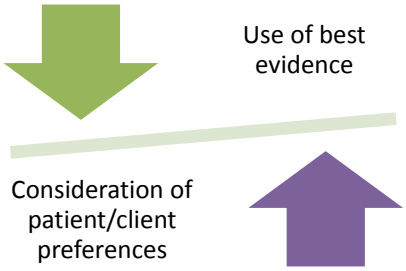
19

## Nurses as Advocates 9-10

- Nurses act as advocates for their patients/ clients in working for their best possible health outcomes as defined by the individual
- Health information and communication technologies present two ways for nurses to act as advocates:
  1. Supporting individualized care
  2. Facilitating integration of these technologies

20

## Nurses as Advocates 9-10




21

## Nurses as Advocates (9-10)

- In light of the evidence that health information and communication technologies can improve patient safety, nurses need to be advocating for their use

What could you do as a nurse in your current or most recent clinical setting to advocate for the use of health technologies?

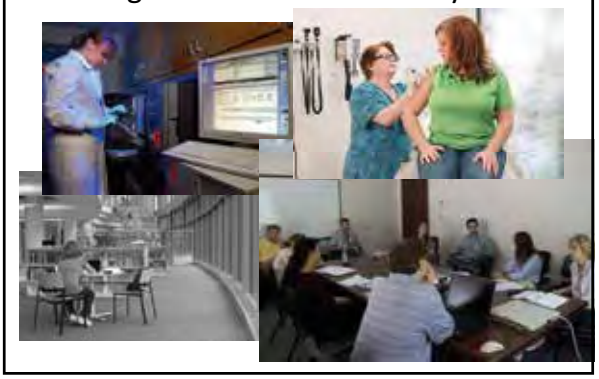
22

## Nurses as Researchers 9-10

- Nurses can act as researchers on personal, organizational, and broader levels .
- Acting as a researcher includes participation in research (e.g. collecting data, participating in focus groups, etc.) as well as designing and conducting studies.

23

## Nursing research can take many forms:



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## Nurses as Researchers … 9

- In order to be able to act as researchers, nurses need information literacy skills:
  - Identifying an information need
  - Accessing information relevant to the need
  - Evaluating the information for quality and applicability
  - Applying the information to the need
  - Evaluating the outcomes

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## Nurses as Researchers 9-10

- On an organizational level, nurses can:
  - Participate in quality-control studies involving health information and communication technologies
  - Participate in piloting and evaluating the potential use of technologies in their workplace
  - Recommend best practice guidelines for integration into clinical health systems that reflect the patients/ clients care for at the facility

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## Nurses as Researchers (9-11)

- On a broader level, priority areas for nursing research include:
  - The effect of nursing interventions on patient/ client outcomes as documented in EHRs
  - The effect of using health information and communication technologies on the patient-/client-nurse relationship, use of clinical practice guidelines, etc.
  - Identifying recommendations for the integration and use of health information and communication technologies based on literature reviews
  - Identifying the cost-benefit ratio of specific technologies to support advocacy actions

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## Example Research:

- Poe, S. (2011). Building nursing intellectual capital for safe use of information technology: a systematic review. *Journal Of Nursing Care Quality*, *26*(1), 4-12
- Results identified threats to patient safety, competencies, and supports needs for use

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## Review of Main Points

- New technologies present/legal and ethical issues that need to be addressed by policy
- Legislation and policies relevant to privacy and health information have been created by the federal and provincial governments, nursing regulators and employers
- Technologies present opportunities to increase patient safety and nurses have a large role to play in ensuring this occurs

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## 3.6 Resources Related to the Professional and Regulatory Accountability Competency

**General Resources:**

- This is a summary of nursing research related to informatics and patient safety:
  Bakken, S. (2006). Informatics for patient safety: A nursing research perspective. *Annual Review of Nursing Research, 24*, 219-54
- This website contains the electronic health record patient safety report:
  Canada Health Infoway. (2012). *Patient Safety*. Available at: https://www.infoway-inforoute.ca/index.php/resources/reports/patient-safety?limitstart=0.
- This document provides an overview of privacy issues related to the use of electronic records:
  Canadian Registered Nurses Protective Society, InfoLAW. (2009) Privacy and Electronic Medical Records. Available at: http://www.cnps.ca/upload-files/pdf_english/privacy_emr.pdf
- This is an example of a nursing licensing body's Nursing Practice Standards for protecting health information:
  College & Association of Registered Nurses of Alberta. *Privacy Guide*. Available at: http://www.nurses.ab.ca/privacy/
- This is an example of some of the regulatory concerns and recommended guidelines around privacy and health information and communication technologies:
  Cronquist, R., & Spector, N. (2012). Nurses and Social Media: Regulatory Concerns and Guidelines. *Missouri State Board of Nursing Newsletter*, *14*(2), 6-7.
- This is a commentary on the challenge of ensuring security of electronic personal health information:
  Halamka, J.D. (2009). E-health security is a delicate balance. *Computerworld, 43*(30), 34.
- This article overviews nurses' roles in representing nursing and advocating for health information and communication technologies:
  Houston, S.M. (2012). Nursing's role in IT projects. *Nursing Management, 43*(1), 18-19.
- This article is an example of nursing research using informatics:
  Hyun, S., Bakken, S., Douglas, K., & Stone, P. W. (2008). Evidence-based staffing: Potential roles for informatics. *Nursing Economics, 26*(3), 151-8, 173.
- This document provides an overview of PIPEDA and its use:
  Industry Canada (2009). PIPEDA Awareness Raising Tools (PARTs) Initiative for the Health Sector. Available at: http://www.ic.gc.ca/eic/site/ecic-ceac.nsf/eng/h_gv00207.html

- This article outlines some of the negative consequences of using health information and communication technologies:
  McCartney, P.R. (2012). Unintended consequences of health information technology. *American Journal of Maternal Child Nursing, 37*(4), 273.
- This is an outline of technology as a 'partner' for nurses' clinical expertise:
  Moore, A. & Fisher, K. (2012). Healthcare information technology and medical-surgical nurses: the emergence of a new care partnership. *Computers, Informatics, Nursing, 30*(3), 157-163.
- This document outlines the definition of 'substantially similar' legislation for PIPEDA:
  Office of the Privacy Commissioner of Canada. (2012). *Legal information related to PIPEDA: Substantially similar provincial legislation.* Available at: http://www.priv.gc.ca/leg_c/legislation/ss_index_e.asp
- This article provides an overview of the roles of nurses in supporting patient safety:
  Powell-Cope, G., Nelson, A. L., & Patterson, E. S. (2008). Patient care technology and safety. In R. G. Hughes (Ed.), *Patient safety and quality: An evidenced-based handbook for nurses*. Rockville, MD: Agency for Healthcare Research and Quality (AHRQ Publication No. 08-0043).
- This website contains the World Health Organization policies:
  World Health Organization. (2011). *Development of medical device policies - WHO medical device technical series.* Available at: http://whqlibdoc.who.int/publications/2011/9789241501637_eng.pdf

**Resources to Support Teaching:**

- College of Registered Nurses of Alberta Privacy Guide (audio modules) Available at: http://www.nurses.ab.ca/privacy/
- Online lecture from Infoway on privacy – Available at: http://www.youtube.com/watch?v=g0p42xjasMQ

# Section 4: Use of Information and Communication Technologies

## 4.0 Use of Information and Communication Technologies competencies and indicators

**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 ICT 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.

## 4.1 Context

The evolution of information and communication technology use in health care is transforming care delivery and communication between health professionals and between nurses and patients. Information of different forms may be communicated to multiple providers and patients across settings, in real-time over short and long distances. Canada Health Infoway was created with the goal of having EHRs set up for all Canadians by 2016. In conjunction with the development of the core elements of EHRs by each province and territory, best or clinical practice guidelines can be integrated into the systems for quick access. If, for example, a nurse documented an ischemic stroke in an EHR, the EHR would prompt the administration of recommended medications, assessment of vital signs at specific intervals, body positioning, etc. (Office of the Auditor General of Canada, 2010). Information entered into EHRs is securely stored and can be instantly shared with the appropriate healthcare professional(s) (Ball et al., 2011).

In addition to EHRs, ICTs change the ways in which patients interact with nurses. An example of this can be seen in the Ottawa Hospital's increasing use of iPads to provide more efficient care for patients. The Ottawa Hospital has created an application for the iPad that aids in managing patients' pain. When nurses are assessing patients for pain, they incorporate the iPad into their practice activities, asking patients to use the iPad to locate the pain by touching the spot on a "human body atlas" and indicating the level of pain intensity using a color grid. This provides the nurse with valuable information to direct the care, and records the assessment. At high levels of pain, the device alerts the physician or anesthesiologist (Raths, 2011).

Although the new generation of nurses have grown up in a technologically advanced environment and are adept at utilizing technology, they need to understand how technology may be adapted for clinical use, and be able to comment on its clinical relevance.

Innovations in ICTs are creating more opportunities to deliver care virtually. Virtual health care delivery establishes opportunities for communicating health information between patients/clients and health care providers. For example, when patients are released from hospitals, follow up visits may be done virtually (PriceWaterhouseCoopers, 2013). Virtual care initiatives such as telehealth and telehomecare are especially important in situations where there is limited access to health information and services (e.g. those living in rural areas) (Saba & McCormick, 2006).

## 4.2 Key Concepts

**Information and Communication Technologies (ICTs)**

ICTs are defined as the collective of tools that facilitate communication and the management, processing and transmission of information by electronic means. ICTs for health refers to the technology mediated interaction between patients and health service providers, institution-to-institution transmission of data, or peer-to-peer communication between patients and/or health professionals. Examples include: point-of-care systems such as electronic medical records, electronic health records, telemedicine services, wearable and portable monitoring devices, health portals and many other tools assisting disease prevention, diagnosis, treatment, health monitoring, and lifestyle management.

**Point-of-Care Systems**

Point-of-care systems are systems used to enter and view patient health care information within an organization. Examples of point-of-care systems include:

- Hospital information systems (HIS)
- Community care information systems (commonly used in home care)
- Long-term care information systems (commonly used in nursing homes/long-term care facilities)
- Pharmacy management systems (commonly used in community pharmacies)
- Public health management systems

**Electronic Medical Records (EMRs)**

An EMR is a point-of-care system commonly used in primary care and ambulatory settings. An EMR contains what has been traditionally included in an individual's hardcopy medical chart, so this may include documentation by selected health care professionals at one health facility, current medications, and diagnostic test results but is generally related to a specific provider or health facility.

**Electronic Health Records (EHRs)**

An EHR differs from a point-of-care system in that it is a secure and private lifetime electronic record of a person's health history and health care services received across more than one point of service. An EHR system stores and shares information such as lab results, medication profiles, allergies, clinical reports including hospital discharge summaries, diagnostic images and immunization history affording access to authorized users. This information originates from many different health care providers within various health care settings (Canada Health Infoway, 2012).

**Consumer Health Applications**

A consumer health application is an electronic solution that enables the consumer (patient/client) to collect, retrieve, manage, use and share personal information and other health-related data. One example of a consumer health application is a Personal Health Record (PHR). PHRs are similar to EHRs and EMRs, but information can also be added by the patient (e.g. a patient monitoring blood pressure could log this information into their PHR) (Canada Health Infoway, 2012). Other examples of consumer health applications include patient portals or self-management systems.

**Interoperability**

Interoperability is the ability of two or more systems or components to exchange information and to use the information that has been exchanged (Institute of Electrical and Electronics Engineers, 1990). Interoperability of ICTs is highly reliant upon the adoption of clinical and technical data and communication standards (e.g. consistent codification of terminology for data sharing between and within systems).

## 4.3 Key Learnings

### 4.3.0 The Introduction of Electronic Health Records in Canada

In Canada, Electronic Health Records (EHRs) are being integrated into provincial and territorial healthcare systems. A blueprint for the development of EHRs was created in 2003 and updated in 2006 by Canada Health Infoway (Infoway, 2006). This blueprint provides guidance to each province and territory in developing an EHR that is specific to their unique needs but also allows information to be shared within provinces/territories and eventually across Canada.

The three fundamental components of EHRs that allow the sharing of pertinent health information electronically include:

#### *4.3.0.0 Point-of-care Systems*

As mentioned above, these are systems used by health care organizations to enter and view patient health care information within and, as appropriate, beyond a single provider organization. Common examples include Hospital Information systems (HIS) or Clinical Information Systems (CIS) and Electronic Medical Records (EMRs). Before authorized health care providers can connect to electronic health record systems, point-of-care systems need to be in place in practice settings where patients receive care.

#### *4.3.0.1 Functionality*

Electronic health record databases are being built by the provinces and territories to store pertinent health information that will be made available to authorized clinicians. Designed by provinces and territories to meet local needs, the intent over time is generally to include:

1. **Client registries** that contain identifying information unique to each patient, ensuring the right information is linked to the right patient
2. **Provider information** that securely links patient information to authorized health care providers
3. **Diagnostic imaging systems** that store X-rays, MRIs, and CT scans digitally, allowing health care providers to view these images from various locations
4. **Laboratory test results** securely stored in databases that are accessible to authorized health care providers, reducing the number of repeated tests

5. **Medication Profiles** tracked by drug information systems, to help prevent harmful drug interactions
6. **Clinical reports** such as immunizations, allergies, consults, operative notes, and hospital discharge reports

### *4.3.0.2 Interoperability*

As defined in the Key Concepts section, interoperability refers to the exchange and use of information between systems. In the context of EHRs, interoperability allows for a complex variety of pertinent patient information to be retrieved and contributed by authorized clinicians from a variety of practice settings when they are treating a patient. Standardized clinical terminologies, as previously mentioned, contribute to the interoperability of EHRs and other point-of-care systems.

EHRs not only store information about the patient, they also have functional applications such as electronic Medication Administration Records (eMARs). Medication orders appear in a patient's EHR (or other electronic chart). Nurses can access this information, scan the bar code of the medication and administer to the patient. EMARs can help to reduce errors as a warning will appear if the medication scanned is not correct or through alerts to the nurse if the medication is not administered on time. EHRs can also be used to order tests (laboratory, imaging), and to communicate test results between the appropriate health professionals (DesRoches, Donelan, Buerhaus, & Zhonghe, 2008). Below is an example of what an EHR might look like.

*Example EHR*

**Help**

Logout

**Patient Record:**
Lab Results
Diagnostics
Images
Details
Notes

**Patient Details**

1234567
Smith, Carolyn

**Sex:** Female
**DOB:** 01/May/1946
**Next of Kin:** John Smith
**Phone:** 365-423-9007
**Address:** 19 Provincial Rd. Edmonton, AB, T6M 1R7

**Alerts:**
Allergy – Sulfa drugs
Pap smear due
AtC above target

| Diagnoses (Date) | Status |
|---|---|
| Hypertension (1989) | On-going |
| Diabetes (1996) | On-going |
| C-section (1967) | Resolved |

**GP Details**

**Name:** Jones, Evans **Phone:** 365-423-9886
**Address:** 11 Terrance Ave, Edmonton, AB, T6M 1N5

**Other Health Care Providers**

| Name | Specialty | Contact | Acces |
|---|---|---|---|
| Diaz, Ellen | Cardiology | 365-423-5545 | Y |
| McDonald, Janice | RN | 365-423-9886 | Y |
| Cohen, Richard | Dermatology | 365-423-5123 | Y |

**Medications**

| Name | Started | Last Filled |
|---|---|---|
| Hydrochlorothazide 25 mg | 12/1989 | 01/2013 |
| Glyburide 5 mg | 06/1996 | 12/2012 |
| Metformin 500 mg | 12/1996 | 12/2012 |
| Cloxacillin 500 mg | discontinued | |

**Encounter History**

| Name | Specialty | Facility | Reason |
|---|---|---|---|
| Jones, E | GP | | annual physica |
| Cohen, R | Dermatology | Skin clinic | mole removal |
| McDonald,J | RN | | DM teaching |

Adapted from: Office of the Auditor General of Canada (2010)

## 4.3.1 Nursing and Electronic Health Records

Nurses play an important role in contributing and accessing information within the EHR to provide safe and effective care. As such, Canada Health Infoway recognized the strategic importance of proactively identifying key EHR business and functional elements for nurses. In 2010, a pan-Canadian working group spearheaded by Canada Health Infoway, was established to develop an appropriate methodology and to leverage existing nursing standardized assessment tools and best practices to support the inclusion of nursing data in the EHR. It was acknowledged that the EHR needs to enable appropriate and efficient patient information flows between the EHR and other information and communication point-of-care systems. For example, the working group identified that nurses need to know the sources of patient information to support decision-making. The clinical requirements are to know who entered the data, their role, and where and when they entered the data. The following functional elements of the EHR were identified: Display sources of data upon request; Provides data details (e.g. time entered, person entering data, etc.); High-lights patient-entered information; Ensures correct data for correct patient are transmitted to the correct recipient – provider, health service delivery, organization, etc. (Infoway, 2012).

## 4.3.2 Comparing the Electronic Health Records, Electronic Medical Records, and Personal Health Records

### *4.3.2.0 Electronic Health Records (EHRs)*

The introduction of EHR systems presents both opportunities and challenges for health care professionals. Nurses need to utilize EHR systems to improve interdisciplinary communication and ultimately patient/client safety.

EHRs are considered to be patient/client-centred. Potential benefits for patients/clients include:

- Quick access to health information during medical emergencies
- Improved management of chronic disease through trending of information and improved communication between multiple health care professionals
- Shorter waiting times through improved communication about wait-lists for diagnostic testing and interventions
- Reduction of unnecessary repetition of diagnostic tests by improved flow of information between health care professionals and health sites
- Better diagnostic and treatment capabilities due to quick access and sharing of health information
- Improved health care access for rural and remote groups via telehealth (Canada Health Infoway, 2012b).

To learn more about how EHRs are being designed by nurses, for nurses, visit www.infoway-inforoute.ca to access the *Pan-Canadian Nursing EHR Business and Functional Elements Supporting Clinical Practice.*

### *4.3.2.1 Electronic Medical Records (EMRs) and Other Point-of-Care Systems*

Potential advantages of EMRs and other point-of-care systems (compared to hardcopy medical charts) include:

- Easy and quick documentation via a computerized device versus hand-writing information
- Improved access to information electronically versus having to physically retrieve a hardcopy chart

- Improved monitoring of patient/client health through trending of results and integrated alerts and reminders for follow-up assessment, repeat of diagnostic or screening tests, checking rest results for titration of medications, etc.
- Increased access to clinical practice guidelines and other tools (e.g. CPS, calculator) through integration of tools and guidelines with the electronic system to improve patient/client safety and outcomes
- Improved health teaching by showing patients/clients' results of diagnostic tests, trends in measurements such as blood pressure or weight, etc. (Edworthy & Simkus, 2004)
- Improved ability to conduct quality control and care planning research (Ball et al., 2011; Saba et al., 2006)

#### *4.3.2.2 Personal Health Records (PHRs)*

Potential uses of PHRs and other consumer health applications/solutions include:

- Support patient/client self-care through integrated reminders and trending (e.g. patients/clients with diabetes may record glucometer results and receive alerts if potentially harmful trends or values are detected)
- Improve communication between patients/clients and their health care professionals (e.g. patients/clients can record dietary supplements and natural remedies with prompts for names, doses, etc. instead of having to remember to bring all the bottles to a health care visit)
- Allow for personalized health teaching based on the information that patients/clients enter (e.g. information on ways to prevent low blood sugar in active individuals with diabetes for patients/clients) (Canada Health Infoway, 2005; Kupchunas, 2007)

Nurses and other health care professionals can play a major role in assisting patients learn how best to use the PHR for immediate and ongoing benefit. For example: assessing and supporting health literacy (see section 1), providing teaching on how to interpret the information contained in the PHR, and basic education on the use of health ICTs as appropriate (e.g. telehomecare monitoring devices) (Kupchunas, 2007; Noblin, Wan, & Fottler, 2012)

### 4.3.3 Optimizing the Delivery of Patient Care

This document has already shown how ICTs support nursing practice through information and knowledge management, and by increasing patient safety. This section provides information on the tools, in addition to electronic records, that nurses may use to optimize the delivery of care.

A 2003 survey of nurses found that the most common technological devices used by nurses were remote monitoring devices (e.g. heart monitor), online consumer health information (e.g. accessing and evaluating health information online resources that may be used by patients), and handheld computers for point of care documentation and/or information access (McNeil et al., 2003). Ten years after the McNeil et al. study, ICTs have developed significantly, and there are more opportunities for nurses to improve patient care. Below are some examples of the ways in which ICTs can be used to deliver care, improve documentation, increase decision support at the point-of-care, prevent gaps in care, and improve inter-professional care.

#### *4.3.3.0 Harnessing Information and Communication Technologies for the Delivery of Care*

ICTs allow nurses and other clinicians to deliver care and collaborate across distances. Telehealth has become a common practice, as it reduces the need for patients/clients to travel to receive care, and presents opportunities for communicating health information to and from patients/clients with limited access to health information and services (e.g. those living in rural areas) (Infoway, 2011). Telehealth refers not only to discussing care on a telephone or mobile device, it includes written information such as that contained in a personal health

record, health information measured and transmitted by monitoring devices such as a blood pressure monitor, and visual information that can be transmitted live via cameras. This electronic format of information can be facilitated by health information and communication technologies that can securely store and instantly share this information with the appropriate health care professional(s) (Ball et al., 2011).

New concepts have emerged to describe care delivery using ICTs:

- Mobile health refers the use of wireless devices to deliver and access health information
- Virtual health the ability of healthcare providers to deliver care and collect patient/client data from a different location (PriceWaterhouseCoopers, 2013).

A recent study of Canadians' viewpoints on mobile health and virtual health indicated that Canadians would be willing to communicate with health professionals using secure email to renew prescriptions and/or view test results, to use virtual health tools (e.g. smartphone apps for self-management of type 1 diabetes), and to receive some care virtually (PriceWaterhouseCoopers, 2013). Although these methods for delivery of care are emerging, and patient/client safety and confidentiality must be at the forefront, it is clear that ICTs present new ways of connecting with patients/clients.

#### *4.3.3.1 Improved Documentation*

Well-designed and interoperable clinical information systems offer the potential for improved documentation by nurses and other health care professionals. Nurses are responsible for 1) clearly documenting their assessments and interventions, and 2) including patient preferences in documentation.

Potential advantages in documentation for nurses include:

- Improved detail included as a result of a documentation template that prompts nurses and other health care professionals to enter pertinent information (Ball et al., 2011)
  - o Example: If a nurse is prompted to include nausea in a patient/client assessment, then he/she could be prompted to document administering a PRN dose of dimenhydrinate, re-assess for nausea 30 minutes after administering the dose, and record any adverse reactions reported by the client/patient.
- Improved accuracy by allowing for point-of-care documentation, with time and date of documentation data captured automatically (Ball et al., 2011; Canada Health Infoway, 2012a)
  - o Example: A nurse who is able to document her/his assessment at the point of care may be less likely to experience an interruption or other event that would lengthen the time between assessment or intervention and documentation, and increase the likelihood of forgetting to document some of the details.
- Decreased redundant documenting due to auto-populating of fields with information previously entered (Ball et al., 2011; Canada Health Infoway, 2012a)
  - o Example: A patient's/client's weight entered by the nurse could automatically appear in a medication calculator for deciding on the appropriate dose instead of the health care professional having to first find where weight was documented and then manually enter it into an equation.
- Decreased documentation time (Poissant, Pereira, Tamblyn, & Kawasumi, 2005)
  - o Example: A nurse can document interventions at the point of care concurrent with a dietician documenting a change in diet based on the daily weights entered in the record rather than one or other of the health professional having to wait for the hardcopy chart to be available.

### *4.3.3.2 Decision Support at the Point-of-Care*

As ICTs used are at the point of care, they provide nurses with a variety of tools to support them in determining appropriate interventions. In order to ensure quick access to information, nurses may be responsible for 1) familiarizing themselves with how to access and trend various types of information available in the EHR or clinical health system used at their facility, 2) using critical thinking in each situation about what information to access and how to use it to inform their care, and 3) advocating for the integration of relevant clinical practice guidelines. Below are descriptions of some of the decision support tools nurses may use at the point-of-care:

*Infoway* created a short video clip on the benefits of decision support at the point-of-care. To watch, click here: https://www.infoway-inforoute.ca/index.php/progress-in-canada/knowing-is-better-for-clinicians/benefits-to-clinicians

- With the use of EHRs and other clinical health systems, nurses are able to access a wealth of information needed to inform decisions about care including: medication administration records, blood work results and trends, imaging results, health history, advanced directives, clinical guidelines, organizational policies, etc. (Canada Health Infoway, 2012a; Saba et al., 2006)
  - o Example: A nurse who checks on a patient/client and finds him/her drowsy and difficult to rouse may be able, at the point of care, to trend blood work and glucometer test results, check which medications the patient/client has been administered, review the health history for any similar events, identify when the patient/client was last documented as being alert, and identify which members of the health care team are responsible for this patient's/client's care.
- Improved access to evidence via integration of clinical practice guidelines into the clinical health system (Ball et al., 2011)
  - o Example: A nurse who documents the finding of a pressure ulcer in his/her assessment may have the appropriate clinical practice guideline automatically appear for review and assessment of whether use of the guideline is appropriate for this patient/client.

### *4.3.3.3 Preventing Gaps in Patient Care*

To ensure continuity and prevent gaps in care, nurses may be responsible for 1) clearly documenting their assessments and interventions for review by other health care professionals, 2) using reminders and alerts to support, not replace, their clinical judgement, and 3) advocating for the integration of relevant clinical practice guideline reminders and alerts into the clinical system.

- With the interoperability of EHRs, health care professionals are able to better communicate their assessments and interventions so that all the patient's/client's issues are addressed. Moreover, complex health conditions often require management by multiple health care professionals. Health technologies facilitate communication among the team and allow for timely sharing of information such as images and test results (Canada Health Infoway, 2012a; Saba et al., 2006)
  - o Example: A nurse engaging in health teaching for a new mother and newborn who are going to be discharged later that day can document concerns about family dynamics and nutrition that will record pertinent information for social workers and public health nurses who will be providing care to this family after discharge.

- Preventing gaps in care as patients move through the continuum of care services
  - o Example: Nurses in acute care settings participating in the C-HOBIC initiative (discussed in section 1) capture standardized patient data, which can be accessed by clinicians in long-term or home care via a portal when the patient is transferred (CNA, 2012).
- EHRs and other clinical health systems may include alerts and reminders based on patient/client information that match a clinical practice guideline, documentation in the chart, or received from physiological, hemodynamic, or other monitoring devices (Canada Health Infoway, 2012a; Saba et al., 2006)
  - o Example: A nurse looking after a patient/client with increased intra-cranial pressure may be alerted to high levels of pressure detected by an intra-ventricular catheter and recorded in the EHR or clinical health system.
- Improved ability to assess quality control (Ball et al., 2011)
  - o Example: Nurses may repeatedly document pain and the need for a PRN analgesic following a procedure generally thought to be painless. This gap in care may be identified by reviewing patient/client needs following the procedure and influence policy and practice about the routine ordering of a PRN analgesic after this procedure.
- Ability to consult with other nurses or other health professionals with expertise in certain areas
  - o Example: Nurses working in long-term care facilities may be able to use an online consultation tool to document patient data and images, which could be accessed remotely by wound care experts for recommendations about the care plan (Hammet et al., 2007).

#### *4.3.3.4 Improvements to Inter-professional Patient Care*

Communication errors lead to errors in care giving and reduce patient safety. Advances in technology can lead to clearer communication within and between healthcare teams, as well as opportunities to collaborate on pertinent issues across professionals and geographical distances. To ensure continuity and prevent gaps in care, nurses may be responsible for 1) clearly documenting their assessments and interventions for review by other health care professionals, and 2) consulting other health care professionals as appropriate to prevent gaps.

> *"Nurses bear a large burden in both managing and implementing the interdisciplinary team's plan for the patient…" (Keenan, Yakel, Tschannen and Mandeville, 2008, p.1).*

Examples of how ICTs present opportunities to improve inter-professional patient care include:

- Improved communication between health care team members as a result of 'real-time' and legible documentation that allows information documented by one health care professional to be immediately available to all team members (Ball et al., 2011; Canada Health Infoway, 2012a)
  - o Example: A nurse's documentation that a client/patient is beginning to develop intolerable side effects from a recently prescribed and administered medication can be immediately shared with the prescribing practitioner and followed-up.
- Increased quality and accuracy of information transferred between teams of health professionals
  - o Example: Computerized sign out systems help physicians and nurses on the following shift create a high-quality plan of care for the patient (Sidlow & Katz-Sidlow, 2006).
- Online communities of practice allow for inter-professional collaboration across large geographical areas

- Example: Evidence to Excellence brought clinicians and administrators from across British Columbia together in an online forum to focus on a clinical topic (sepsis) and an operational topic (triage) with the goal of improving emergency services in BC. The Evidence to Excellence online community of practice used webinars, discussion forums, and the sharing of electronic resources to determine best practices, barriers, and solutions (Mardsen et al., 2012).

### 4.3.4 Ensuring that Information and Communication Technologies Support the Nurse-Patient Relationship

Health information and communication technologies must be used with caution to ensure that nurse-patient/client relationships are optimized rather than hampered. Two important aspects of protecting the therapeutic relationship have already been addressed in this toolkit: in the section on competency one, the potential for health teaching around accessing credible online information and tools was highlighted, and in the section on competency two, the importance of advocating for the preferences of the patient/client was emphasized. Nurses may be responsible for 1) teaching patients/clients about specific health or disease self-management activities appropriate to their health status, 2) providing on-going support as challenges and barriers to self-management occur, and 3) recommending a visit to a health professional in instances where a patient/client is facing a situation that requires additional assistance to resolve. For example, a community care access centre nurse caring for a family with a young child who is severely physically and cognitively challenged may follow the mother's documentation in the child's personal health record and note that the child is presenting with symptoms consistent with a bladder infection, and recommend to the mother that the child see his/her physician or nurse practitioner for diagnosis and treatment.

*Use of trending and integrating EHRs with PHRs allows for increased participation of the patient/client in their health.*

Nurses should be aware of the possible communication barriers presented in the use of ICTs. Examples of these barriers are:

- interrupted nurse-patient/client conversation due to looking at a screen (L. H. Baker, Reifsteck, & Mann, 2003)
- overly standardized patient/client-nurse interactions (Petrovskaya, McIntyre, & McDonald, 2009)
- distracted interactions, as the nurse must comply with documentation principles during the interaction (Petrovskaya et al., 2009)
- objectifying of patients/clients through applying electronic labels to them (Petrovskaya et al., 2009)
- absence of important patient/client information due to lack of appropriate standardized terminology (Petrovskaya et al., 2009)

Baker et al. (2003) made recommendations for supporting the nurse/patient relationship in assessments using EHRs. Though they are specific to EHRs, they may also be applied to the use of other ICTs. The recommendations are as follows:

- *Connect* with the patient/client before acknowledging the technology supporting the EHR
  - This may include introductions, initial assessment questions, teaching about the EHR and information privacy, and keeping the screen visible to the patient/client so as to include them in the assessment.
- *Collaborate* with the patient/client during the interaction
  - This may include telling or showing the patient/client what is being recorded in the EHR, asking permission to type notes during the interaction, explaining how the infor-

mation being viewed in the EHR relates to the interaction, using the information on the screen to encourage opinions and thoughts, and making at least intermittent eye-contact.
- *Close* the interaction reinforcing the information already shared
  - This may include reminding the patient/client about the 'logout' function to ensure the privacy of the newly recorded information, reviewing the main findings or topics of the interaction, and finishing the interaction with eye-contact.
- *Avoid* complaining about the system in front of patients/clients (L. H. Baker et al., 2003)

## 4.4 Use of Information and Communication Technologies Case Study

**Case Study Overview and Use:**

In working through this case study, students will:

- Think through the uses and advantages of electronic records
  - Indicator: 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.
  - Indicator: Describes the benefits of informatics to improve health systems, and the quality of inter-professional patient care.
  - Indicator: 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.
- Think through how they would use an electronic record to support the nurse-patient/client relationship
  - Indicator: Uses ICTs in a manner that supports (i.e. does not interfere with) the nurse-patient/client relationship.
- Identify potential characteristics that can act as barriers to the use of personal health records
  - Indicator: 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.
- Work through potential privacy issues that can arise with the use of electronic records as a teaching tool
  - Indicator: 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.

Possible ways to use this case study:

- Work through the case study (1) as a class at the end of a lecture on electronic records or health teaching to integrate elements of nursing informatics into courses on nursing care, or (2) use this case study as the basis for a small project or as a homework assignment and allow time for discussion in the following class

Ways to adapt this case study:

- add in the name of the hospital to reflect your local area
- change the age of patient/client, type of chronic health condition, and/or health setting: teenager with herpes simplex 1showing up with her mother in primary care, adult with hyperthyroidism discharged from acute care, etc.

Possible teaching topics in which this case study could fit:

- Health teaching
- Chronic disease management
- Nurse-patient/client relationships
- Patient confidentiality
- Primary care
- Professional practice

**Use of Information and Communication Technologies Case Study**

Margot van Lieshout is an 80-year widow who lives in an apartment in town with her daughter. She was diagnosed with COPD at age 55 years and is followed by her primary health care team. She reports that she has recently been having trouble with shortness of breath, especially when outdoors breathing in the cold winter air. The nurse practitioner prescribes a higher dose of her regular inhaler and a new rescue inhaler. A follow-up assessment is booked in two months time.

**Use of Information and Communication Technologies Case Study: Discussion Questions**

7. What advantages would there be in using an electronic medical record? Electronic health record? Personal health record?
    - Electronic medical record - track exacerbations during Margot's time receiving care from this team to look for triggers, examine assessments and interventions by other members of the health care team, view lab results ordered by/copied to the health facility, etc.
    - Electronic health record - identify triggers by using the health information stored in the record to look for trends associated with exacerbations, review what medications have worked to treat past exacerbations, document assessment and interventions so that the follow-up staff have a clear understanding of whether the new medications have improved the patient's/client's health status, check whether Margot has received her flu shot at the local Public Health agency, look at recent diagnostic tests from the respiratory clinic or emergency room visits, etc.
    - Personal health record - Margot could record symptoms and use of the rescue inhaler to assess whether the medications improve symptoms, personal health teaching could be integrated such as addressing when the patient/client should seek emergency care, use and effectiveness of alternative/complimentary/non-pharmaceutical treatments (e.g. inhaling steam, regular exercise) may be recorded, follow-up of health care professionals to ensure that Margot's symptoms are being relieved by the new medications before her next visit, etc.
8. You have the opportunity to do some health teaching with Margot on the use of her medications. How would you use the EHR or EMR to facilitate this interaction?
    - Focus on keeping eye-contact
    - Ask about her experience of the symptoms listed in the record
    - Explain what information you are viewing and how it is helpful for this interaction
    - Ask permission to document during the interaction
    - Keep the screen in full view of Margot
    - Use the information stored in the electronic record to teach Margot about her condition

9. Margot has access to a PHR, but has not been using it. What questions would you ask Margot to understand why she is not using it?
    - Ask Margot why she has not been using it
    - Assess health literacy by asking Margot whether she has trouble understanding the information
    - Ask about access to a computer and the internet
    - Ask about familiarity with a computer and the PHR
10. What teaching would you give Margot to help her use the PHR to manage her COPD?
    - Explain what information will help the health care team in making decisions about how to best manage her symptoms
        - Specifically: how often she needs to use the rescue inhaler to manage symptoms, describing when and where she experiences trouble breathing, use and effectiveness of additional interventions (e.g. inhaling steam), possibly related symptoms such as fever, increased mucus, lethargy, swelling in her ankles and feet, etc.
    - Show how to access health teaching integrated into the system
    - Teach basic computer skills if needed
11. What health teaching topics would you want integrated into her PHR?
    - When to seek emergency care
    - Recommended lifestyle changes
    - How to be physically active with COPD
    - How to use an inhaler
    - Breathing techniques to control shortness of breath
12. If Margot's daughter came with her to this appointment, how would you address the daughter wanting to see the health information in the EHR, EMR, and/or PHR?
    - Ask the daughter to leave the room so that you can ask Margot if she wants her daughter to join the interaction and/or be able to view the information on the screen
    - Document Margot's preferences for future interactions
    - Discuss with Margot how she would like to approach explaining her preferences to her daughter

## 4.5 Presentation on the Use of Information and Communication Technologies

**Presentation Overview and Use:**

**Disclaimer: This presentation is not meant to be used all in one lecture, but rather integrated into lectures in various classes as fitting with your curriculum.**

In this presentation, students will:

- Be exposed to the key concepts and key learnings of the use of information and communication technologies competency (see map to indicators below)
- Learn the differences and uses of the three main types of electronic records
- Learn about the potential advantages that difference electronic records offer to both patients/clients and nurses
- Test their understanding of the differences between electronic health records and electronic medical records
- Learn about personal characteristics that may make an individual more or less likely to use a personal health record and the nurses role in addressing these characteristics

- Learn about potential advantages of using health information and communication technologies and identify the nurses role in realizing these advantages
- Learn general principles to guide the use of health information and communication technologies in supporting the nurse-patient/-client relationship

Ways to use this presentation:

- Depending on the health facilities in which your students have their clinical practicum, you may want to include specific examples or pictures that depict the types of electronic records that they will be using
- Parts of this presentation could be included in a lab focused on practicing documentation or health teaching skills
- Parts of this presentation could be combined with parts of the Competency 1 and 2 presentations to form new presentations as needed. For example:
  - In a lecture on health teaching or empowering patients/clients to be active in their health, the slides on teaching patients/clients how to identify credible sources of health information from the information and knowledge management competency presentation could be combined with the slides on personal health records from this presentation.
  - In a lecture on electronic health records, the overview of their integration in Canada from the professional and regulatory accountability presentation, advantages of their use from the this presentation, and their potential as a means of supporting evidence-informed care from the information and knowledge management presentation could be combined.

Ways to adapt this presentation:

- Ask students about what type(s) of electronic records are used at the health facilities in which they do their clinical practicum, and about their experience using them
- Include other videos to show real-life examples of how electronic records are being used (e.g. Video on documenting and using electronic health records (this is a long visit, but clips from it could be used depending on which topics you want to address: http://www.youtube.com/watch?v=IcMVExoUvTY)
- Although useful teaching tools, if pressed for time, many of the case study and visual slides could be removed:
  - Videos on the advantages of electronic health records for individuals (slide 6)
  - Game testing understanding (slides 9-11)
  - Overview slides (slides 3 and 15)
  - Discussion questions (slide 23)

Possible classes/topics in which this presentation could fit:

- Professional nursing practice
- Roles of the nurse
- Inter-disciplinary collaboration
- Skills labs on documentation or health teaching
- Decision-making and critical thinking
- Patient/client safety
- Chronic or acute disease management
- Nursing assessment, diagnosis, planning, interventions, and/or evaluation

Relevant care settings include:

- All settings in which personal health information is or could be recorded (e.g. acute care, long-term care, home care, public health - infectious diseases & sexual health, etc.)
- Examples used in the presentation could be modified to reflect one practice setting but currently include a drowsy patient/client (appropriate for acute, chronic, long-term or home care), health teaching before discharge (appropriate for acute care), intra-cranial pressure (intensive care), and a physically-challenged child with an infection (appropriate for community and home care).

**Use of Information and Communication Technologies Presentation – Slide Breakdown by Indicator:**

The table below shows the breakdown of slides related to the indicators for the competency - Uses information and communication technologies in the delivery of patient/client care.

| Indicator | Slides |
|---|---|
| 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. | 3-7, 12-20 |
| Uses decision support tools (e.g., clinical alerts and reminders, critical pathways, web-based clinical practice guidelines, etc.) to assist clinical j udgment and safe patient care. | 5, 8, 28 |
| Uses ICTs in a manner that supports (i.e., does not interfere with) the nurse-patient relationship. | 13, 32-35 |
| Describes the various components of health information systems (e.g., results reporting, computerized provider order entry, clinical documentation, electronic Medication Administration Records, etc.). | 4-5, 12-13, 16-17 |
| 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. | 6-11, 15-18 |
| Describes the benefits of informatics to improve health systems, and the quality of inter-professional patient care. | 5, 8, 12-14, 21-31 |

**Examples of Quiz Questions**

1. List and explain the main differences between electronic health records, electronic medical records, and personal health records.
   **Tests knowledge and comprehension*

Possible answers include:

- EHRs - the most comprehensive in breadth of information (across the life span and all health settings) and most accessible due to interoperability
- EMRs - information is limited to one setting or one event (e.g. primary care) and access is limited to those individuals working at the setting (e.g. health care team)
- PHRs - less comprehensive than the EHR, contains information relevant to the individual's health experience and needs, accessible to the patient/client and some health care professionals

2. How can the use of personal health records change chronic disease management in primary and home care?
   **Tests application*

Possible answers include:

- improved communication between the individual and health care professionals
- increased participation on the part of the patient/client in their own health
- facilitate access to personalized health information for the patient/client

3. Explain three way that electronic records can improve patient safety.
   **Tests synthesis*

Possible answers include:

- access to information for faster decision-making and intervention
- built-in alerts for medication doses out of the normal range, allergies, etc.
- improved communication across disciplines and health settings

4. Do you think that the use of electronic records helps or hinders the nurse-patient relationship? Why?
   **Tests evaluation*

Possible answers include:

- Helps - can be used as a teaching tool, can be used to communicate patient/client preferences to the health team, etc.
- Hinders - can reduce eye-contact, can lead to over-dependence on standardized recommendations instead of considering the patient's/client's preferences, etc.

5. A nursing peer comes to you and asks for tips on how she/he can provide health teaching to a patient/client without letting the EHR on a computer screen disrupt the interaction. What are three tips you would give him/her?
   **Tests application*

Possible answers include:

- start with eye-contact and personal introductions
- explain why the computer screen with the EHR is there and ask permission to document
- position the computer screen so that the patient/client can view it

6. Predict what changes in documentation would occur within the health care team with the introduction of an EHR or EMR to replace hardcopy charts.
   **Tests comprehension*

Possible answers include:

- improved legibility
- decreased time to document
- decreased time to locate important health information
- fewer forgotten assessment details

7. Identify one type of electronic record, one health information and communication technology, and the health teaching that you would provide to address this situation (assume that your health facility uses every type of electronic record and health information and communication technology)
   **Synthesis - this could also be a homework assignment or small project*

   Jessica Martins is an 45-year high school teacher who has recently been diagnosed with hypertension. Her blood pressure readings have been creeping up over the past five years and now meets the criteria for high blood pressure. She has just been recommended to try lifestyle changes to control her blood pressure. A follow-up assessment is booked for six months from now.

Possible answers include:

- Electronic records:
  - Electronic health record - identify any medications or health conditions (e.g. hyperthyroidism, white coat syndrome, etc.) that may be influencing blood pressure readings, related symptoms (e.g. headache, lethargy, malaise, etc.), other chronic diseases or issues influencing health recommendations, documentation of assessment findings and recommendations, etc.
  - Personal health record - record blood pressure readings at home, use of the recommendations (e.g. attempts to decrease salt, weekly exercise, etc.), tracking of related symptoms, integrate personal health teaching (e.g. common high-salt foods) etc.
- Health information and communication technology:
  - Cardiac monitor to test blood pressure, pulse, oxygen saturation, etc.
  - Electronic records as a teaching tool to show increasing blood pressure readings and ideal ranges
  - Online teaching tools to help with tracking salt intake and physical activity
- Health teaching: important information to track (e.g. actual daily/weekly exercise), when to seek emergency care, future treatment options (e.g. medications) how to use a personal health record, etc.

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## Agenda

- Three main types of electronic systems
  - Point-of-care (e.g. electronic medical records)
  - Electronic health records
  - Consumer health solutions (e.g. personal health records)
- Optimizing Care Delivery using ICT
  - Virtual & Mobile healthcare
  - Documentation
  - Decision support at the point-of-care
  - Improving inter-professional care
  - Supporting the nurse-client/-patient relationship

2

## 3 Types of Electronic Systems [1]

1. Point-of-care systems (e.g. EMR)
   - allow entry and viewing of data within an organization
2. Electronic Health Records
   - allow data entry and viewing across multiple services and across a lifetime
3. Consumer health solutions (e.g. PHR)
   - enables the patient/client to enter, review, and share personal health information

3

## Electronic Medical Records (EMRs) [2-3]

- Same idea as a patient's/client's hardcopy medical chart
- Used within one health care facility (e.g. An acute care hospital) or team (e.g. primary care team)
- Include documentation, medical history, medications, and diagnostic and imaging reports related to one facility or team

4

## Benefits of EMRs [3-4]

- Easy and quick documentation and access to patient/client information
- Improved monitoring by trending and tracking health information

- Access to clinical guidelines and tools
- Tool for health teaching
- Research opportunities: quality improvement and care planning

5

## Electronic Health Records (EHRs) [5-6]

- Definition: "an electronic record that provides each individual in Canada with a secure and private lifetime record of their key health history and care within the health system." (Canada Health Infoway Blueprint, p. 5)
- These records allow nurses, pharmacists, therapist, doctors, and other members of the health care team to view and update a patient's/client's health record
- Currently, Canadian stakeholders are working towards implementing electronic health records for each province and territory

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## Basic EHR Components 5-6

- Point-of-care system for data entry and retrieval
- Functionality
  - Client registry (e.g. personal information)
  - Provider registry (e.g. home care nurse)
  - Diagnostic imaging system (e.g. x-ray)
  - Drug information system (e.g. current meds)
  - Laboratory information system (e.g. blood-work)
  - Medication profiles
  - Clinical reports (e.g. discharge summary)
- Interoperability

7

## Advantages of EHRs 5-7

- Legibility
- Availability
- Ease of updating
- Storage
- Improved patient safety

8

## Challenges of EHRs 5

- Upfront costs
- Collaboration of expertise
- Protecting privacy

## EHRs in Canada

- Show video available at: http://www.youtube.com/watch?v=b74_jcyqkM4

10

| Help | Patient Details | GP Details |
|---|---|---|
| Logout |  1234567 Smith, Carolyn<br>**Sex:** Female<br>**DOB:** 01/May/1946<br>**Next of Kin:** John Smith<br>**Phone:** 365-423-9007<br>**Address:** 19 Provincial Rd. Edmonton, AB, T6M 1R7 | **Name:** Jones, Evans **Phone:** 365-423-9886<br>**Address:** 11 Terrance Ave, Edmonton, AB, T6M 1N5 |
| **Patient Record:**<br>Lab Results<br>Diagnostics<br>Images<br>Details<br>Notes | **Alerts:**<br>Allergy – Sulfa drugs<br>Pap smear due<br>AtC above target | **Other Health Care Providers**<br>Name / Specialty / Contact / Access<br>Diaz, Ellen — Cardiology — 365-423-5545 — Y<br>McDonald, Janice — RN — 365-423-9886 — Y<br>Cohen, Richard — Dermatology — 365-423-5123 — Y |
| | **Diagnoses (Date) / Status**<br>Hypertension (1989) — On-going<br>Diabetes (1996) — On-going<br>C-section (1967) — Resolved | **Medications**<br>Name / Started / Last Filled<br>Hydrochlorothazide 25 mg — 12/1989 — 01/2013<br>Glyburide 5 mg — 06/1996 — 12/2012<br>Metformin 500 mg — 12/1996 — 12/2012<br>Cloxacillin 500 mg — discontinued |
| | | **Encounter History**<br>Name / Specialty / Facility / Reason<br>Jones, E — GP — — annual physical<br>Cohen, R — Dermatology — Skin clinic — mole removal<br>McDonald,J — RN — — DM teaching |

11

## Nursing Opportunities with EHRs 5

- EHRs provide nurses with an opportunity to:
  - Work with other health professionals towards optimal, collaborative patient/client care, and
  - Systematically document their interventions and the resulting outcomes
- In order to do this, nurses need to use standardized nursing and clinical terminologies

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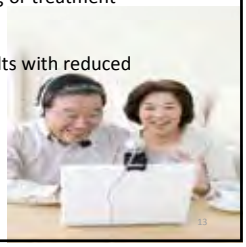
## Patient/Client Benefits with EHRs 5-6

- care during medical emergencies
- monitoring and management of chronic diseases
- wait times for diagnostic, screening or treatment procedures
- use of diagnostic or screening results with reduced unnecessary repetition
- diagnosis and treatment with information sharing
- access for rural groups



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*Show videos on Canada Health Infoway website:

https://www.infoway-inforoute.ca/index.php/progress-in-canada/knowing-is-better/knowing-is-better-for-canadians/knowing-the-benefits

14

## Let's Play 'Jeopardy'

Possible questions include:

"What is an EMR/Point-of-Care System?"

Or

"What is an EHR?"

*adapted from Canada Health Infoway Jeopardy Quiz: EMR or EHR?

15

1. **I can only see the medications prescribed in my facility for this client/patient.**
2. **I can see the laboratory test results ordered by my acute care facility and those ordered at the patient's/client's primary care facility.**
3. **I see the condition and problem lists from all the clinicians in the patient's/client's circle of care.**
4. **I can view my clinical notes for all encounters the patient has had with me as a nurse.**
5. **I can view all of the current medications by all clinicians prescribed for this patient.**

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6. **I can see the patient's diagnostic imaging report and the image.**
7. **I can see a history of the patient's encounters with the healthcare system.**
8. **I can see the laboratory test results ordered at my facility or copied to my facility.**
9. **I can see consultant reports as a result of an e-referral I made to spiritual care.**
10. **I can see discharge reports from prior hospital admissions that the hospital sent to my facility.**
11. **I can see a history of a patient's hospitalizations and discharge reports.**

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## Personal Health Record (PHR) 3,8-9

- Includes information added by the individual
- Less comprehensive than an EHR, similar in scope to an EMR but includes different health information
- May be an isolated document, but ideally is integrated and overlaps with an EHR

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## Assessment and Teaching for PHRs [3,8-9]

- Health literacy
- Health teaching :
  - understanding the information contained in the PHR
  - what information is important to document in the PHR
- Basic teaching about how to access and use a PHR

*Some barriers cannot be directly changed such as socioeconomic and health statuses.

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## Benefits of PHRs [3,8-9]

- Supporting self-management
- Improves communication between a patient/client and health care professionals
- Allows for personalized health teaching

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## Using ICTs to Optimize Patient Care [2,4]

- Mobile/virtual care delivery
- Improved documentation
- Decision support at the point of care
- Preventing gaps in patient care
- New opportunities for inter-professional care

21

**Virtual Health:**
**Health professionals deliver care from a different location than the patient**

Mobile Health:
The use of wireless tools to deliver and access virtual care and/or health information

## Mobile Health [10]

- Nurses can use devices to communicate, share information and monitor health
- Patients receive convenient care and increase their role in managing health
- Examples of mobile health
  - Email for perscription renewal
  - Health-related apps (e.g. bant app)

"There's an app for that!"

23

## Virtual Health [10]

- Has the potential to replace in-person visits (e.g. follow up visits after a medical procedure completed using mobile device)
- Manner of providing care in remote locations
- Cost saving and convenient

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## Telehealth [3,11]

- Uses telecommunication devices to provide patient/client care, education, and health administration to remote sites

- 3 main solutions:

1. Live conferencing
2. Store-and-forward
3. Telemonitoring

## Advantages of Documentation in EHRs [2,4]

- Improved detail by having documentation templates prompt information to be added
- Improved accuracy of documenting by point-of-care access
- Decreased redundant charting due to auto- populating of fields with pre-entered data

## Advantages of Documentation in EHRs [2,4]

- Ability to assess gaps in care
- Decreased nursing time

- Increased communication via real-time and legible documentation

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## Decision Support at the Point-of-Care [2,4]

•Nurses are able to access a wealth of information at the point-of-care to support critical thinking and decision-making

•In order to realize this advantage, nurses should:

(1) Become familiar with how to access and manipulate (e.g. trend) information

(2) Use critical thinking to plan care and act based on all the information available

(3) Advocate for the integration of relevant clinical practice guidelines

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## Prevent Gaps in Care [2,4]

- Due to interoperability, clinical findings and concerns can be recorded and viewed by all authorized health team members
- In order to improve continuity of care, nurses should:

(1) Clearly document their clinical findings and concerns

(2) Consulting other health care professionals to address concerns

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## Decreased Missed/Late Assessments or Interventions [2,4]

- Alerts or reminders may be included in EHRs based on clinical guidelines, medication record, or monitoring devices (e.g. Cardiac monitor)
- In order to prevent missed or late actions, nurses should:

(1) Include patient/client preferences

(2) Use alerts/reminders to support (not replace) critical thinking

(3) Advocate for the addition of alerts or reminders that would improve patient/client care

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## Interprofessional Patient Care[14]

- Improved communication between team members
- Increased quality and accuracy of information
- Increased opportunity for interprofessional collaboration

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## EHRs and Therapeutic Relationships [12-13]

- There is potential for clinical systems like EHRs to both support and hinder the nurse-patient/-client relationship

What are ways that EHRs can hinder this relationship?

What are ways that EHRs can support this relationship?

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## Increase or Support Patient/Client Involvement in Care [2,4]

- Use of trending and integrating EHRs with PHRs allows for increased participation of the patient/client in their health

- In order to support this involvement, nurses should:

(1) Teach specific self-management activities

(2) Provide on-going support as challenges arise

(3) Recommend seeking professional care when a health concern requires professional intervention

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## Recommendations to Support the Therapeutic Relationship [12]

- Connect
  - Use eye-contact, names, ask about symptoms instead of relying on what has been recorded, etc.
- Collaborate
  - Ensure the screen is not hidden, ask permission to document during the interaction, explain what you are doing when you access information in the EHR, ask the patient/client for their thoughts on the information, etc.
- Close
  - Remind the patient/client about privacy of information, review main findings, finish with eye-contact, etc.

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## Review of Main Points

- Point-of-care systems, EHRs, and consumer health solutions are 3 different types of electronic systems that vary in scope, access, and advantages
- ICT devices provide opportunities to improve access to health resources in remote locations
- ICTs can be delivery of patient care through:
  - Mobile/virtual care delivery
  - Improved documentation
  - Decision support at the point of care
  - Preventing gaps in patient care
  - New opportunities for inter-professional care

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## 4.6 Resources Related to the Use of Information and Communication Technologies Competency

**General Resources:**

- This resource is a fact sheet on the electronic health records blueprint:
  Canada Health Infoway. (2009). *EHRS Blueprint: An enterprise architecture for sharing electronic health records*. Available at: https://www.infoway-inforoute.ca.
- This document contains information on how nurses can contribute to EHR design:
  Canada Health Infoway. (2012) *Pan-Canadian Nursing EHR Business and Functional Elements Supporting Clinical Practice.* Available at: https://www.infoway-inforoute.ca/index.php/resources/guides-workbooks/doc_download/567-pan-canadian-nursing-ehr-business-and-functional-elements-supporting-clinical-practice
- This article outlines nurse use of Twitter:
  Chinn, T. (2012). How nurses can use social media professionally. *Nursing Times, 108*, 12-3. Available at: http://search.proquest.com/docview/1037042349?accountid=6180
- This article presents some of the advantages and disadvantages of health information and communication technologies:
  Clearly M., Walter, G., & Matheson, S. (2008). What is the role of e-technology in mental health services and psychiatric research? *Journal of Psychosocial Nursing & Mental Health Services, 46*(4), 42-48.
- This article outlines the advantages and challenges of personal health records:
  Demeter, D., Bloomrosen, M.; Raymond, B., & Tang, P. (2008). Integrated personal health records: Transformative tools for consumer-centric care. *BMC Medical Informatics and Decision Making,* 8, 45.
- This case study highlights the complexity of interoperability of electronic records:
  Fetter, M. S. (2009). Using Case Studies to Define Nursing Informatics Interoperability. *Issues in Mental Health Nursing*, 30(8), 524-525.
- This is an example of using health information and communication technology in nursing decision-making and care:
  Giles, L.C., Whitehead, C.H., Jeffers, L., McErlean, B., Thompson, D., & Crotty, M. (2006). Falls in hospitalized patients: Can nursing information systems data predict falls? *Computers, Informatics, Nursing, 24*(3), 167-172.
- This is an example of a nursing decision-support tool:
  Harrison, R.L. & Lyernla, F. (2012). Using nursing clinical decision support systems to achieve meaningful use. *Computers, Informatics, Nursing*. *30*(7), 380-385.

- This article outlines how personal health records can be used to support the nurse-patient/client relationship:
  Hebda, T., & Patton, C. (2012). Application of the relationship-based care model to improve health outcomes via the electronic personal health record. *Creative Nursing, 18*(1), 30-33
- This article describes how the patient/client sees the use of health information and communication technology:
  Lee, T.T. (2007). Patient's perceptions of nurses' beside use of PDAs. *Computers, Informatics, Nursing, 25*(2), 106-111.
- This article outlines the different skills required to provide similar care in person compared with via telehealth:
  Oudshoorn, N. (2009). Physical and digital proximity: Emerging ways of health care in face-to-face and telemonitoring of heart-failure patients. *Sociology of Health & Illness*, *31*(3), 390-405.
- This article reviews the challenges balancing the need for standardization with the need for patient/client-centred care:
  Petrovskaya, O., McIntyre, M., & M., McDonald, C. (2009). Dilemas, tetralemmas, reimagining the electronic health record. *Advances in Nursing Science, 32*(3), 241-251.
- This is a review of studies assessing whether the use of electronic health records reduce documentation time for nurses and physicians:
  Poissant, L., Pereira, J., Tamblyn, R., & Kawasumi, Y. (2005). The impact of electronic health records on time efficiency of physicians and nurses: a systematic review. *Journal of The American Medical Informatics Association*, *12*(5), 505-516.
- This fact sheet is an example of health teaching that can support the patient/client-nurse relationship:
  Registered Nurses Association of Ontario. *Nurses and the Use of Computer Technology.* Available at: http://rnao.ca/bpg/fact-sheets/nurses-and-use-computer-technology
- This resource provides sample phrases and recommendations for supporting the patient-/client-nurse relationship:
  Registered Nurses Association of Ontario. *Integrating eHealth in Your Practice.* Available at: http://rnao.ca/sites/rnaoca/files/_eHealth_Etiquette_Tips_for_Nurse_bookmark.pdf
- This article outlines a study that highlights the potential gains in patient/client safety due to the alerts integrated into electronic records:
  Schnipper, J., Gandhi, T., Wald, J., Grant, R., Poon, E., Volk, L., & … Middleton, B. (2012). Effects of an online personal health record on medication accuracy and safety: a cluster-randomized trial. *Journal of The American Medical Informatics Association*, *19*(5), 728-734.

- This is an example of how clinical health systems can be used to improve interdisciplinary communication:
  Sidlow, R., & Katz-Sidlow, R. (2006). Using a computerized sign-out system to improve physician-nurse communication. *Joint Commission Journal on Quality & Patient Safety*, *32*(1), 32-36.
- This article outlines the importance of accompanying PHRs with health teaching:
  Wagner, P., Dias, J., Howard, S., Kintziger, K., Hudson, M., Seol, Y., & Sodomka, P. (2012). Personal health records and hypertension control: a randomized trial. *Journal of The American Medical Informatics Association*, *19*(4), 626-634.
- This article outlines the development and use of a PHR used to support chronic disease self-management in rural groups:
  Weinert, C., Cudney, S., & Kinion, E. (2010). Development of My Health Companion© to Enhance Self-Care Management of Chronic Health Conditions in Rural Dwellers. *Public Health Nursing*, *27*(3), 263-269

**Resources to Support Teaching:**

- This article presents an overview of teaching strategies for documentation:
  Mahon, P., Nickitas, D. M., & Nokes, K. M. (2010). Faculty perceptions of student documentation skills during the transition from paper-based to electronic health records systems. *Journal of Nursing Education*, *49*(11), 615-621.
- This is an example of teaching electronic documentation in a lab setting:
  Newman, K. & Howse, E. (2007). The impact of a PDA-assisted documentation tutorial on student nurses' attitudes. *Computers, Informatics, Nursing, 25*(2), 76-83.
- This article provides an overview of the use and barriers to health information and communication technology use experienced by nursing students:
  Ward, R. & Moule, P. (2007). Supporting pre-registration students in practice: A review of current ICT use. *Nurse Education Today, 27*(1), 60-67.
- This resource contains five short videos (3-5 minutes each) highlighting nursing uses of PDAs and RNAO resources in public health, acute care, mental health, long-term care, and home care:
  Videos available at: http://rnao.ca/bpg/pda
- This website contains educational resources including power point presentations, FAQs, and short videos explaining the benefits of EHRs and clinical uses:
  Resources available at: www.knowingisbetter.ca

# Section 5: Glossary of Terms

| TERM | DEFINITION |
|---|---|
| Canadian Health Outcomes for Better Information and Care (C-HOBIC) | An initiative to introduce systematic, structured language to admission and discharge assessments of patients receiving acute care, complex continuing care, long-term care, or home care. This language can be abstracted into local and provincial databases or EHRs. |
| Clinical Judgement | Decision at which a nurse arrives following a process of observation, reflection, and analysis of observable or available information or data. |
| Clinical Information System (CIS) | General term often used interchangeably to describe a computerized clinical application, electronic health record system, or departmental clinical system (e.g. laboratory information system). |
| Competency | A complex know-act based on combining and mobilizing internal resources (knowledge, skills, attitudes) and external resources to apply appropriately to specific types of situations. |
| Decision Support Tools | Tools used for enhancing health-related decisions and actions with pertinent, organized clinical knowledge and patient information to improve health and healthcare delivery. |
| Electronic Health Record (EHR) | The systems that make up the secure and private lifetime record of a person's health and health care history. These systems store and share such information as lab results, medication profiles, key clinical reports (e.g. hospital discharge summaries), diagnostic images (e.g. X-rays), and immunization history. The information is available electronically to authorized health care providers. |
| Electronic Medical Record (EMR) | A computerized record of care that clinicians maintain on all clients who receive care within a specific setting (e.g. primary care, hospital, home care agency). The record details patient demographics, clinical encounters, medical and drug history, referrals, consults, and diagnostic information such as laboratory and imaging results. It is often integrated with other software that manages activities such as billing and scheduling. |
| Evidence-informed Decision-making | A continuous interactive process involving the explicit, conscientious, and judicious consideration of the best available evidence to provide care in nursing practice. |
| Health Information Systems (HIS) | A combination of vital and health statistical data from multiple sources, used to derive information and make decisions about the health needs, health resources, costs, use, and outcome of health care. |
| Health Literacy | The ability to access, understand, and act on information for health. Health professionals, such as nurses, play a key role in developing health literacy skills by providing clear and accurate information to clients (Health Literacy Council of Canada, 2011). |
| Indicators | Assessable and observable manifestations of the critical learnings needed to develop the competency. |

| | |
|---|---|
| Information and Communication Technologies (ICTs) | Technologies that facilitate communication and the management, processing, and transmission of information by electronic means. ICTs for health refer to the interaction between patients and health service providers, institution-to-institution transmission of data, or peer-to-peer communication between patients and/or health professionals. Examples include health information networks, electronic health records, telemedicine services, wearable and portable systems that communicate, health portals, and many other technology-based tools assisting disease prevention, diagnosis, treatment, health monitoring, and lifestyle management. |
| Information Literacy | The ability to seek out information when there is a need, find high quality sources, and apply them appropriately. |
| International Classifications of Nursing Practice (ICNP) | A unified nursing language system. It is a compositional terminology for nursing practice that facilitates the development of, and cross-mapping among, local terms and existing terminologies. |
| Interoperability | The ability of two or more systems or components to exchange information and to use the information that has been exchanged. |
| Messaging Standards | Standards for the exchange, integration, sharing, and retrieval of electronic health information in a consistent manner to support clinical practice and the management, delivery, and evaluation of health services. |
| Mobile Health | The use of wireless tools to deliver and access virtual care and/or health information. |
| Nursing Informatics | A science and practice [which] integrates nursing, its information and knowledge, and their management, with information and communication technologies to promote the health of people, families and communities worldwide (IMIA-NI, 2009). |
| Personal Health Record (PHR) | A complete or partial health record under the custodianship of a person(s) (e.g. a patient or family member) that holds all or a portion of the relevant health information about that person over their lifetime |
| Privacy | The right of individuals to determine how, when, to whom and for what purposes any personal information will be divulged. |
| Privacy Breach | Occurs when there is "unauthorized access to or collection, use, or disclosure of personal information". Such activity is "unauthorized" if it occurs in contravention of applicable privacy legislation, such as PIPEDA, or similar provincial privacy legislation. Some of the most common privacy breaches happen when personal information of customers, patients, clients, or employees is stolen, lost, or mistakenly disclosed. |
| Security | In the health context refers to "a health information custodian shall take steps that are reasonable in the circumstances to ensure that personal health information in the custodian's custody or control is protected against theft, loss and unauthorized use or disclosure and to ensure that the records containing the information are protected against unauthorized copying, modification or disposal" (Office of the Privacy Commissioner, 2011). |

| | |
|---|---|
| Standardized Nomenclature of Medicine Clinical Terms (SNOMED CT) | A systematically organised, computer processable collection of clinical terms providing codes, terms, synonyms, and definitions covering diseases, findings, procedures, microorganisms, substances, etc. It allows a consistent way to index, store, retrieve, and aggregate clinical data across specialties and sites of care. |
| Standardized Clinical Terminology | Terminology required directly or indirectly to describe health conditions (e.g. symptoms, complaints, illness, diseases, disorders, etc.), and healthcare activities. Used in medical records, clinical communication, and medical science. |
| Standardized Nursing Data | A uniform collection of nursing data from the patient record, which may include nursing diagnosis, interventions, outcomes, and the intensity of nursing care. |
| Standardized Nursing Terminology | A classification system that allows for the standardized collection of essential nursing data. The collected data are meant to provide an accurate description of the nursing process used when providing nursing care. This allows for the analysis and comparison of nursing data across populations, settings, geographic areas, and time. |
| Technology-induced Errors | Errors that have their origins in the (a) design and development, (b) implementation and customization of a technology, and (c) interactions between the operation of a new technology and the new work processes that arise from a technology's use. |
| Telehealth | The use of information and communication technologies to deliver care by distance. |
| Virtual Health | Health professionals deliver care from a different location than the patient using information and communication technologies. |

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