Informatics and Technology in Professional Nursing Practice

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Healthcare delivery largely depends on information for effective decision making. Every nursing action relies on knowledge based on information. The nursing process begins with obtaining and communicating information in the initial and ongoing assessment. Nursing informatics (NI) is the management of data, information, knowledge, and wisdom relevant to nursing (American Nurses Association [ANA], 2008). As we enter the era of the electronic health record (EHR), NI has become an indispensable element in the practice of nursing. All nurses utilize informatics skills in their practice.

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Nursing Informatics Defined

Nursing informatics (NI) is together a field of study and an area of specialization. In the mid-1900s, NI was first identified as the use of information technology

Learning Objectives

After completing this chapter, the student should be able to:

- 1. Define nursing informatics (NI).
- 2. Discuss influences and direction of the future of NI practice.
- 3. Discuss levels of nurse informatics competencies for professional nursing practice.
- **4.** Discuss principles to evaluate information on the Internet and websites.
- 5. Describe the use of electronic databases to obtain information.
- 6. Describe factors to consider when accessing and evaluating health information online.

- 7. Discuss and apply the privacy regulations of the Health Insurance Portability and Accountability Act (HIPAA) to NI.
- 8. Explain security and privacy issues for electronic health records.
- 9. Discuss social media, telehealth, and handheld devices with applications to nursing and NI.
- **10.** Envision future trends in healthcare technology.

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Key Terms and Concepts

- » Nursing informatics (NI)
- » HIPAA
- » Search engines
- » Databases
- » EBSCO Publishing
- » CINAHL
- » ERIC
- » Health Source
- » MEDLINE
- » PsycINFO
- » Electronic health record
- » Email
- » Listservs
- » Asynchronous
- » Social media
- » Telehealth
- » PDAs

COMPETENCY BOX 14-1

www.

Examples of Applicable Nurse of the Future: Nursing Core Competencies

Informatics and Technology:

Knowledge (K7) Describes the rationale for involving the interdisciplinary team in the design, selection, implementation, and evaluation of applications and systems in health care

Attitudes/Behaviors (A7) Values nurses' involvement in design, selection, implementation, and evaluation of information technologies to support patient care

Skills (S7a) Provides input to the design, selection, and application of information technologies to support patient care

Source: Massachusetts Department of Higher Education (2010, p. 24).

in nursing practice (Hannah, 1985). In 1992, the American Nurses Association (ANA) recognized NI as a nursing specialty. The original ANA *Scope and Standards of Nursing Informatics Practice* published in 2001 was revised in 2008 and defines NI as

a specialty that integrates nursing science, computer science, and information science to manage and communicate data, information, and knowledge in nursing practice. Nursing informatics facilitates the integration of data, information, knowledge, and wisdom to support patients, nurses, and other providers in their decision making in all roles and settings. This support is accomplished through the use of information structures, information processes, and information technology. (ANA, 2008, p. 92)

Informatics contributes to the discipline of nursing by connecting the art of nursing to the science of nursing (Saba, 2001). The specialty of NI is focused on developing and implementing solutions for the management and communication of health information pertinent to providing better quality patient/client care (Zykowski, 2003).

The definition of NI continues to evolve as technology is incorporated into health care. The updated ANA *Scope and Standards* (2008) for nursing informatics includes "redirecting the discussion on roles from job titles to functions that may be integrated into various NI roles and subspecializations" (p. 2). The roles or functions of an informatics nurse can include project manager, consultant, educator, researcher, budget manager, or distance learning developer. Instruction or management of telenursing, telehealth education, electronic health, the computerized patient record, and application of new or evolving technology are also integral roles. The informatics nurse contributes to selection, testing, and implementation of healthcare systems as well as maintenance and evaluation of the systems.

NI provides the support for information management for all of the nursing specialties. The American Nurses Association at www.nursingworld.org has a webpage focused on Health Information Technology (Health IT) Initiatives with current participation in listed initiatives and Health IT resources. The American Nursing Informatics Association website (www.ania.org) and the Alliance for Nursing Informatics website (www.allianceni.org) both offer information related to nursing in the digital world, including membership, conferences, and online resources.

Nursing Informatics: Direction for the Future

Can patient care be improved with information technology (IT)? Many forces are a part of reform of nursing education and nursing practice that include the integration of nursing informatics and health information

technology for improved outcomes in healthcare delivery. Some of these are as follows:

- American Association of Colleges of Nursing BSN Essentials, www.aacn. nche.edu
- American Nurses Association (ANA) *Scope and Standards*, www.nursingworld.org
- Carnegie Foundation Report *Educating Nurses: A Call for Radical Transformation*, www.carnegiefoundation.org/elibrary/educating-nurses-highlights
- Institute of Medicine (IOM) reports
- Joint Commission, Robert Wood Johnson Foundation Initiative on the Future of Nursing at the Institute of Medicine, www.jointcommission. org/assets/1/18/RWJ_Future_of_Nursing.pdf
- National League for Nursing (NLN) Position Statements, www.nln.org
- Quality and Safety Education for Nurses (QSEN), www.qsen.org
- Robert Wood Johnson Foundation Future of Nursing Campaign for Action IOM recommendations, thefutureofnursing.org/recommendations
- Technology Informatics Guiding Education Reform (TIGER) Initiative, www.tigersummit.com

American Association of Colleges of Nursing

Some of the informatics and technology-related outcomes suggested by the AACN for baccalaureate nursing graduates are the following:

- Demonstrate skills in using patient care technologies, information systems, and communication devices that support safe nursing practice.
- Apply safeguards and decision-making support tools embedded in patient care technologies and information systems to support a safe practice environment for both patients and healthcare workers.
- Understand the issues of Clinical Information Systems (CIS) to document interventions related to achieving nurse-sensitive outcomes.
- Use standardized terminology in a care environment that reflects nursing's unique contribution to patient outcomes.
- Uphold ethical standards related to data security, regulatory requirements, confidentiality, and clients' right to privacy.
- Recognize that redesign of workflow and care processes should precede implementation of care technology to facilitate nursing practice (American Association of Colleges of Nursing [AACN], 2008, pp. 18–19).

National League for Nursing

The National League for Nursing (NLN, 2008) position paper supports the "reform of nursing education to promote quality education that prepares a

workforce capable of practicing in a health care environment where technology continues to increase in amount and sophistication" (p. 2). With the charge to "prepare the next generation of nurses with the necessary informatics competencies to provide safe and quality care" (p. 2), the NLN recommends actions for faculty, administrator, members, and the NLN.

Quality and Safety Education for Nurses

Sponsored by the Robert Wood Johnson Foundation, Quality and Safety Education for Nurses (OSEN) has the overall goal of "preparing future nurses who will have the knowledge, skills and attitudes (KSAs) necessary to continuously improve the quality and safety of the healthcare systems within which they work" (Quality and Safety Education for Nurses [QSEN], 2012). This initiative is directed to develop competencies of future nursing graduates in six key areas including patient-centered care, evidence-based practice, quality improvement, teamwork and collaboration, safety, and informatics. Phases I and II have been completed by a distinguished team. In Phases I and II, the competencies were defined and piloted in six nursing schools to develop strategies for implementation. Some of the goals of Phase III in 2009–2012 are innovative development of methods for assessment of student learning of KSAs of the six IOM/QSEN competencies and faculty expertise development in the QSEN competencies. Five of these competencies are from the IOM competencies (IOM, 2011). The application of informatics in nursing practice will be a vital component in the mastery of the defined KSAs.

Technology Informatics Guiding Education Reform Initiative

With key aspects of NI the focus, hundreds of practicing nurses and nursing students volunteered their time to work in nine collaborative teams on aspects of the Technology Informatics Guiding Education Reform (TIGER) Initiative. Forty nursing professional organizations also were a part of the input process. "The teams identified resources, references, gaps, and areas that need further development, and provide recommendations for the industry to accelerate the adoption of IT for nursing" (Technology Informatics Guiding Education Reform, 2008, p. 2). Awareness raising with nursing stakeholders focused on three key areas:

- Develop a U.S. nursing workforce capable of using electronic health records to improve the delivery of health care.
- Engage more nurses in the development of a national healthcare information technology (NHIT) infrastructure.
- Accelerate adoption of smart, standards-based, interoperable technology that will make healthcare delivery safer, more efficient, timely, accessible,

and patient-centered (Technology Informatics Guiding Education Reform, 2008, pp. 3–5).

Some of the recommendations for nursing practice include the development of the minimum set of nursing informatics competencies and standards with tutorials for nurses. A priority is to address the educational needs of the existing workforce and develop education programs with learners with different levels of computer use comfort. The ultimate focus involves the development of innovative ways to use technology to improve healthcare delivery. One example is development of virtual learning platforms for nurses to explore technologies. See www.tigersummit.com for more information. With the federal mandate for the adoption of all electronic health records by 2014 (White House Archives, 2004), the overall goals of the TIGER Initiative are timely and important.

Informatics Competencies

All nurses need competencies in informatics. Defined levels of competencies vary from beginning nurse, experienced nurse, informatics specialist, to informatics innovator (Hebda & Czar, 2009; McGonigle & Mastrian, 2009; Staggers, Gassert, & Curran, 2001). The beginning nurse entering practice is expected to have computer literacy and basic information management skills. Computer literacy skills include skills in use of word processing, healthcare database and spreadsheet applications, presentation software, and email. Information literacy skills enable a nurse to locate, access, and evaluate clinical data. Access includes the ability to perform bibliographic retrievals using the Internet and library-based resources (McNeil et al., 2003).

Important technology skills of the entry-level nurse include knowing how to use nursing-specific software such as computerized documentation; use of patient care technologies such as monitors, pumps, and medication dispensing; and information management for patient safety (AACN, 2008, pp. 19–20). The constructs of implementing and maintaining health policies focus on privacy, security, and confidentiality of client information such as mandated by the Health Information Privacy and Portability Act (HIPAA) and influence of all facets of NI.

Experienced nurses should be skilled in information management and computer technology to sustain their specific area of practice. These skills include making judgments based on trends of data in addition to collaboration with informatics nurses (IN) in the development of nursing systems.

An informatics nurse specialist (INS) has advanced informatics preparation at the graduate level and assists the practicing nurse in meeting his or her needs for information (ANA, 2008). The informatics innovator also has advanced informatics preparation and possesses skills for conducting informatics research along with theory development (Thede, 2003). Certification for NI became available in 1995 through the American Nurses Credentialing Center (2007). Information on eligibility and test content is available at www.nursecredentialing.org/Certification/NurseSpecialties/Informatics.aspx.

Internet Resources

Not since the invention of the printing press has the speed with which new information could be obtained changed so much as with the development of the Web. Search tools and **search engines** assist users in finding specific topics on the Web by compiling a database of Internet sites. Popular search engines are AltaVista, InfoSeek, WebCrawler, Yahoo, Northernlight, and

www CRITICAL THINKING QUESTION

Discuss how to locate online sources for more information on a new treatment or medication for a health condition you discussed in a nursing class or clinical this week.* Hotbot. All have different search features and produce somewhat differing results. In addition to search engines, there are metasearch engines. A metasearch engine conducts a search of a variety of search engines. Metacrawler (www. metacrawler.com), Google (www.google.com), and Dogpile (www.dogpile.com) are examples of metasearch engines. Each search engine queries different databases using differ-

ent search techniques (Bliss & DeYoung, 2002) and uses a range of engines for retrieval of information. Although a popular web source, Wikipedia.com is not considered an acceptable source for nursing reference.

Website Evaluation

The Web has grown rapidly since its beginning, and information can be published easily and inexpensively. An Internet site can be created by anyone with the ability to create a webpage. Many sites are for commercial

www CRITICAL THINKING QUESTION X

What is your role as a nurse in the evaluation of information on the Internet?*

purposes, and others simply publish the opinions of the website owner. Websites are under no guidelines or standards. Additionally, no official organization is responsible for site evaluation. As a result, a vast amount of information is available on the Web, but not all information is reliable. Applying these guidelines can assist you in evaluating a

resource on the Web (Thede, 2003; Thede & Sewell, 2010) and acquiring reliable information from the Web:

- Accuracy: Is the information accurate, reliable, and free from error? Spelling and punctuation errors can indicate an untrustworthy site.
- Authority or source: Look for the credentials of the author or the reputation of the hosting organization. A good indication of authority is peer review.

- Objectivity: What are the goals and objectives of the site? What biases are present? Is the site trying to present a specific or neutral point of view?
- Currency or timeliness: Look for publication and updated dates to determine if the information is current. Dead links can indicate old information.
- Coverage or quality: Is the subject matter presented on the site of appropriate quality for the intended audience?
- Intended purpose: Does the site have choices for users such as public, healthcare providers, students, or educators (Heba & Czar, 2009; Thede, 2003)?
- Usability: Is the site designed for easy navigation? Are there excessive graphics that require long download times? Are all links current and do they load easily?

Some websites that feature webinars and online programs have closed captioning (CC) and copies of the scripts available on demand for these programs. Language options are available on some websites for print and audible programs. If the website is a health resource, privacy considerations with easily understandable statements and meeting of accepted privacy standards should also be evaluated (Thede & Sewell, 2010). Nurses can consider assisting clients by educating them on how to evaluate web-based information.

In addition, site users can gain insight into domain ownership to verify the domain registration. Is the authorship or sponsor identified? One domain registration verification source is easywhois.com.

Electronic Databases

An increasing number of **databases** are available on the Internet and can be accessed through local libraries or by subscription from a vendor such as **EBSCO Publishing**, which provides access to online databases and e-journals. Most of the databases allow keyword searches and are capable of limited or advanced searching as well as limited to full text. Some of the most beneficial databases to nursing include the following:

- **CINAHL** (Cumulative Index of Nursing and Allied Health Literature) is the authoritative resource for nursing and allied health professionals, students, educators, and researchers. This database provides indexing and abstracting for more than 1,700 current nursing and allied health journals and publications dating back to 1982, totaling more than 880,000 records.
- Cochrane Library is an online collection of six databases with "independent high-quality evidence for healthcare decision making" (The Cochrane Collaboration, 2012). This is available at academic institutions and is also funded for free access in many countries and regions of the world.

COMPETENCY BOX 14-2

Examples of Applicable Nurse of the Future: Nursing Core Competencies

Informatics and Technology:

Skills (S2b) Evaluates information and its sources critically and incorporates selected information into his or her own professional knowledge base; (S5f) Assesses the accuracy of health information on the internet

Source: Massachusetts Department of Higher Education (2010, p. 22).

- **ERIC**, the Educational Resource Information Center, is a national information system supported by the U.S. Department of Education, the National Library of Education, and the Office of Educational Research and Improvement. It provides access to information from journals included in the Current Index of Journals in Education and Resources in Education Index. ERIC provides full text of more than 2,200 digests along with references for additional information and citations and abstracts from more than 1,000 educational and education-related journals.
- Google Scholar (googlescholar.com), launched in 2004, contains some full-text peer-reviewed journals, abstracts, links to subscription journals, and articles for purchase as well as technical reports, theses, and books.
- Health Source, the Nursing/Academic Edition, provides more than 550 scholarly full-text journals, including more than 450 peer-reviewed journals focusing on many medical disciplines, including nursing and allied health.
- **MEDLINE**, created by the National Library of Medicine, is the largest biomedical literature database that provides authoritative medical information on medicine, nursing, dentistry, veterinary medicine, the health-care system, and preclinical sciences. In MEDLINE, users can search abstracts from more than 4,600 current biomedical journals. Included are citations from Index Medicus, International Nursing Index, Index to Dental Literature, PREMEDLINE, AIDSLINE, BIOETHICSLINE, and HealthSTAR.
- **PsycINFO** contains nearly 2 million citations and summaries of journal articles, book chapters, books, dissertations, and technical reports, all in the field of psychology. It also includes information about the psychological aspects of related disciplines such as medicine, psychiatry, nursing, sociology, education, pharmacology, physiology, linguistics, anthropology, business, and law.

Web access to government organizations and nonprofit organizations is also available. The U.S. National Library of Medicine (www.nlm.nih.gov/ hinfo.html) offers a wealth of health information websites. PubMed and MedlinePlus permit searches of multiple retrieval systems and provide excellent information. The evaluation guidelines discussed earlier should be applied to all Internet sites before using the information in patient teaching (Thede, 2003; Thede & Sewell. 2010).

Health Information Online

The number of people accessing health information online continues to grow. This increase in numbers demonstrates the critical importance that healthcare websites provide reliable and credible information. Nurses are responsible for

COMPETENCY BOX 14-3

Examples of Applicable Nurse of the Future: Nursing Core Competencies

Informatics and Technology:

Knowledge (K9) Describes general applications available for research

Attitudes/Behaviors (A9) Values technology as a tool for generating knowledge

Skills (S9a) Conducts on-line literature searches

Source: Massachusetts Department of Higher Education (2010, p. 25).

assisting the public in evaluating health information available on the Web. Additionally, nurses are in the ideal position to provide health promotion education to their patients and to the public at large.

Whether nurses are developing online materials or using existing online information, it is important for them to understand what makes the information accessible to all people (Thede, 2003) and to be able to make informed recommendations about websites to individuals with disabilities (Carmona, 2005; Smeltzer, Simmerman, Frain, DeSiltes, & Duffin, 2003). Contents of sites should be presented in a way that people with disabilities and with low-end technology are able to navigate and use. Websites displaying the "Bobby Approved" icon (www.accessible.org/bobby-approved.html) have been screened for accessibility by individuals with disabilities, and the icon is an indication of the site's appropriateness for patient use.

Vulnerable populations and underserved populations, which include persons with lower socioeconomic status, with lower reading levels, in rural areas, or with disabilities, have issues with access to care and access to information about health care. For persons in these populations, the term *digital divide* has typically been used to describe decreased access to information technologies, particularly the via the Internet (Chang et al., 2004, p. 449).

As the Internet continues to gain in popularity, more people are using the Web for finding health information. Web-knowledgeable nurses need to assist patients and their families in evaluating the quality of Web resources. The Health on the Net Foundation (HON), founded in 1995, is a nonprofit organization dedicated to assisting people in obtaining reliable health information on the Web. The HON Code of Conduct (HONcode) is available at www.hon.ch/HONcode/Conduct.html (Health on the Net Foundation, 2009). To obtain certification, a website applies for registration. The site is evaluated and, if approved, qualifies to display the HONcode seal. The site is randomly checked for compliance. From HON website, the HON toolbar can be downloaded and added to your Web browser. The seal is illuminated when a certified site is accessed.

Another organization that can be used as a resource is the Hardin MD (Hardin Meta Directory) at www.lib.uiowa.edu/hardin/md. The site is maintained by Hardin Library for the Health Sciences at the University of Iowa and lists several directors for health and medicine. MedlinePlus (available at www.nlm.nih.gov/medlineplus) is a consumer-oriented site that combines information from the National Library of Medicine (NLM), the National Institutes of Health (NIH), and other government agencies and health-related organizations. The site is maintained by the National Library of Medicine.

Several sites with the Office of the National Coordinator of Health Information Technology (ONC, 2011a) of HIT such as HealthIT.gov at www.healthit.gov/patients-families/types-e-health-tools have information on e-health

www. CRITICAL THINKING QUESTIONS >

Discuss issues of the digital divide. Explore resources in your city and county for the general public to have free Internet access and assistance. What other technologytype resources are available for underserved populations?* tools for the public to review and use. Sites such as Health 2.0 Developer Challenge (2012) at www.health2con.com/devchallenge hold innovation competitions and community action programs to address solutions for key challenges in health information technology.

Confidentiality, Security, and Privacy of Healthcare Information

Protecting an individual's personal and private information from others has historically been a significant issue for nursing. Healthcare information is a collection of data relating to acutely personal aspects of an individual's life. Improper disclosure can cause devastating consequences. Many people depend on the understanding that information provided to a healthcare provider will not be disclosed. It is possible for patients not to disclose certain types of information essential to their care if they believe the information would not continue to be confidential. The introduction of electronic documentation and communication has increased the difficulty of maintaining privacy. Improved access to healthcare information can and does increase efficiency and improve patient care, but accompanying the benefits are greater difficulties in maintaining privacy and confidentiality. Preserving security of the information system becomes critical because unauthorized access to the computerized healthcare information system compromises the privacy and confidentiality of personal records.

Protection against unauthorized access can be achieved by implementing a login process that verifies that the user has permission to use the system. The majority of systems rely on a user ID and password for verification. Passwords must be changed frequently to protect against breach of security. Users should never divulge or share passwords. Healthcare agencies have written policies regarding the penalties of misuse of the system. Consequences are usually severe and can result in termination of the employee (Thede, 2003).

Health Insurance Portability and Accountability Act

In 1996, Congress passed the Health Insurance Portability and Accountability Act (HIPAA) to improve the efficiency and effectiveness of the healthcare system by encouraging the development of a health information system. Several areas are addressed by the act, including simplifying healthcare claims, developing standards for data transmission, and implementing privacy regulations. The privacy regulations protect clients by limiting the ways that health plans, pharmacies, hospitals, and other entities can use clients' personal medical information. The regulations protect medical records and other individually identifiable health information, whether it is communicated orally, on paper, or electronically.

Accompanying the privacy regulations are specific security rules that protect health information in electronic form. To be in compliance, agencies must ensure the confidentiality

and integrity of all electronic health information that is created, received, transmitted, or stored; protect against threats to security; protect against disclosures of information; and ensure compliance of its employees (Garner, 2003). HIPAA, when fully implemented, will contribute to a "fully integrated healthcare system" (Thede, 2003, p. 327).

Electronic Health Records

In 2004, President George Bush, as part of the National Health Information Infrastructure, established a technology agenda authorizing the development of an **electronic health record** for all Americans by 2014 (Healthcare IT, 2004). Information on this agenda can be found at the U.S. Department of Health and Human Services website: georgewbush-whitehouse.archives.gov/ news/releases/2004/05/print/20040527-2.html.

Electronic information systems contribute to more effective communication and collection of patient information, resulting in more effective patient care (Thede, 2003). The electronic information system can maximize the time nurses spend on direct patient care, improve the accuracy of documentation, decrease medication errors, and promote patient safety. Why automate nursing and healthcare documentation? Up-to-date, accurate information of each step of the nursing process is the power behind safe, high-quality patient-centered care.

"The goal of nursing informatics (NI) is to improve the health of populations, communities, families, and individuals by optimizing information management and communication" (ANA, 2001, p. 17). Information management is integral to providing high-quality health care cost-effectively. To provide this level of care, it is important to have accurate clinical information. The health information system or electronic health record (EHR) represents multiple systems that interface to share data and are networked to support information management and communication within a healthcare organization.

EHRs have numerous advantages compared with traditional paper records. They can store large amounts of data that are accessible from remote sites by many people at the same time. Information can be accessed more easily and quickly, allowing more time for patient care. The EHR can provide clinical alerts and reminders, identify abnormal parameters of laboratory and assessment data, and prompt clinicians on important tasks and protocols (Heba & Czar, 2009; Young, 2000).

www, CRITICAL THINKING QUESTION *

What is your role as a nurse in protecting patient healthcare information?*

COMPETENCY BOX 14-4

Examples of Applicable Nurse of the Future: Nursing Core Competencies

Informatics and Technology:

Knowledge (K6) Describes patients' rights as they pertain to computerized information management

Attitudes/Behaviors (A6) Values the privacy and confidentiality of protected health information in electronic health records

Skills (S6ba) Discusses the principles of data integrity, professional ethics, and legal requirements; (S6c) Describes ways to protect data

Source: Massachusetts Department of Higher Education (2010, p. 24).

Thede (2003) identifies the following types of information systems used within healthcare organizations:

- Admission, discharge, and transfer: This system collects and tracks patient information, such as demographics, hospital number, relatives, and primary physician. All patient contacts are connected to the information in this system.
- Financial systems: This system is responsible for the fiscal operations of an organization.
- Order entry: From a computer screen, a clinician places an order for a specific service. The system is capable of scheduling, reporting, and billing. The system might have the potential of programmed patient safety functions that identify and report potential errors.
- Ancillary systems: Ancillary applications permit sharing of information among multiple systems and specialty areas such as those of radiology, laboratory, physical therapy, and pharmacy.
- Clinical documentation: This system enables the EHR, or chart, to be accessed at any time.
- Scheduling applications are used for staff, patients, supplies, and procedures.
- Acuity applications attempt to predict the resources necessary for patient care. They are integrated with other systems such as staffing to create adequate staffing.
- Specialty systems are found in specialized units within the healthcare setting. Examples include monitoring equipment in intensive care units that automatically measure and record physiologic data, generate trends, sound alarms for abnormalities, and interact with other information systems within the patient environment.
- Communication systems such as email and Internet accessibility facilitate communication among various disciplines within the organization.
- Critical pathways, generated by information systems, identify specific patient outcomes and make documentation by different disciplines possible. This promotes cost-effective care through effective communication.

Thede (2012) reports a "cardinal rule in informatics is one entry of a piece of data, many uses" (p. 2). As data are entered into the system, the application can prompt the clinician for additional information that might be missed. The same data can be used in a variety of reports, leading to decreased redundancy of charting. Data such as pulse rate or blood pressure can be collected directly from monitors attached to the client and fed into the system (Hunter, 2002). Clinical documentation systems have the advantage of collecting data to use in planning and research.

Sensmeier (2008) offers ways to improve nursing practice with technology, including seeking nursing input related to workflow, investing in IT training, promoting IT excellence, and working for a staged approach to adopting a paperless EHR. Thede (2008) suggests that nursing professionals must engage in discussion to decide how documentation data will be utilized. The profession must consider which data are to be included in the EHR and the acceptable terminology used when recording the data. Nursing informatics provides the tools and skills to assist health care to move ahead in the ever-changing world.

Communication Online

Email

Email (electronic mail) can be sent to anyone in the world who has an email address. This allows many healthcare providers to be able to communicate with patients. In moments, messages can be sent across time zones, allowing instant communication. For several reasons, attention must be paid to the content of messages sent by email. Someone other than the intended recipient can access a message while it is transmitted over the Internet. Also, messages containing sensitive information can accidentally or purposefully be forwarded. Protected health information (PHI) is covered under HIPAA. Privacy of email is a legal and ethical issue (Thede, 2003). Although email can be a way of facilitating direct communication between consumers of health care and healthcare providers, precautions must be taken to ensure that only the intended recipient receives health-related email messages.

To send and receive email, a person must have an individual address that consists of two main parts separated by an at (@) sign. The first part is called a login name or a user ID. The part after the @ is the name of the computer used to access the Internet. The characters after the last dot in an email address indicate the domain or main subdivision of the Internet to which the computer belongs. Addresses must be accurate for the message to be sent. Appropriateness of address must be considered when selecting your login name. Professionals should not use suggestive or insensitive wording for their login names.

Email is a special form of communication and carries its own form of etiquette. Pagana (2007) suggests nurses follow these guidelines when sending a business or professional message:

- Don't use all uppercase letters. Typing in all caps is deemed shouting.
- Include a specific subject line.
- Sign your messages with text that includes your email address and contact information.
- Use the "reply to all" function appropriately because not everyone is interested in receiving your comments.
- Avoid forwarding chain letters, and delete all unnecessary information from forwarded messages.

COMPETENCY BOX 14-5

Examples of Applicable Nurse of the Future: Nursing Core Competencies

Informatics and Technology:

Knowledge (K5) Describes the computerized systems presently utilized to facilitate patient care

Attitudes/Behaviors (A5) Values the importance of technology on patient care

Skills (S5a) Applies technology and information management tools to support safe processes of care and evaluate impact on patient outcomes; (S5b) Accesses, enters, retrieves data used locally for patient care

Source: Massachusetts Department of Higher Education (2010, p. 23).

- Do not send confidential information, and check for correct recipients before sending.
- Use the spell-check and grammar functions.
- Do not use email for thank-you correspondence.

Listserv Groups and Mailing Lists

Mailing lists and **listservs** are forms of group email that provide an opportunity for people with similar interests to share information. Subscribing to a list is usually free. Once subscribed, you can send and receive messages to and from the list. The communication is **asynchronous**, meaning it does not occur in real time. Someone posts a question or comment to the list, and other members reply in time. List groups are usually layperson oriented or professional oriented. There are numerous groups devoted to the topic of nursing. To find a list, ask friends and colleagues or visit L-Soft, a searchable database that can be accessed at www.lsoft.com/catalist.html.

Most listservs provide specific instructions on subscribing. Every listserv has two addresses. One address is used to join, and the second is used to send messages that can be read by the group. Listserv groups can be open to anyone, or you might have to have permission to join.

It is important to remember that messages sent to the listserv are read by everyone subscribed to that listserv. Posting a personal message to an individual on a listserv is generally not considered appropriate. Do not send attachments to the list. The list might have hundreds of members, and some will not have computers that support sophisticated graphics or large files. Additionally, viruses can be transmitted in attachments.

The ability for multiple people to send and receive messages in multiple places is having a direct impact on health care. For example, through the use of email nurses can easily and efficiently facilitate a virtual support group for families and patients with chronic conditions or limitations in accessing health care. The lists connect the participants to individuals with similar health concerns so that they can share experiences, receive advice on difficulties, and alleviate the feeling of isolation (Mendelson, 2003).

Social Media

Social media are "Internet-based applications that enable people to communicate and share resources and information" (Lindsay, 2011). Examples of social media are YouTube, Facebook, LinkedIn, Twitter as well as blogs, wikis, and chat rooms. The many choices of how users can "share" information can be found on the American Nurses Association website (www.nursingworld.com). The drop-down menu on the Share button lists the various options available for users. Growing participation in social networking sites poses challenges for nursing. Although social networking aids with personal and professional knowledge exchange and prompts interaction with others, it comes with risks. Personal and patient privacy issues (i.e., HIPAA requirements) can be raised. Some networking discussions might be viewed as "fact" and not validated. ANA has adopted the Principles for Social Networking, which include the following:

- Nurses must not transmit or place online individually identifiable patient information.
- Nurses must observe ethically prescribed professional patient-nurse boundaries.
- Nurses should understand that patients, colleagues, institutions, and employers might view postings.
- Nurses should take advantage of privacy settings and seek to separate personal and professional information online.
- Nurses should bring content that could harm a patient's privacy, rights, or welfare to the attention of appropriate authorities.
- Nurses should participate in developing institutional policies governing online contact (ANA, 2011a, 2011b).

The National Council of State Boards of Nursing has also adopted guidelines related to the responsible use of social media and has endorsed the principles adopted by ANA. The guidelines from the NCSBN (National Council of State Boards of Nursing [NCSBN], 2011) are available at www.ncsbn.org/ Social_Media.pdf and address issues of confidentiality and privacy, common myths and misunderstandings related to social media, possible consequences in the use of social media including consequences with board of nursing implications, and how to avoid problems. The guidelines also include seven scenarios related to social media use by nurses with board of nursing implications.

According to the NCSBN (2011) white paper, depending on the jurisdiction, the board of nursing might investigate reports of inappropriate disclosures related to the use of social media on the grounds of the following: unprofessional conduct, unethical conduct, moral turpitude, mismanagement of patient records, revealing a privileged communication, and breach of confidentiality. If allegations are found to be true, the nurse could face disciplinary action by the board of nursing that can include a reprimand, sanction, assessment of a fine, or the temporary or permanent loss of licensure. In addition, improper use of social media might violate state and federal laws, resulting in civil or criminal penalties that carry with them fines or jail time.

Social networking can have both positive and negative consequences. Negative consequences can affect not only nurses' personal reputations but also their professional standing. Nurses should consider that current or future employers might view their personal social media pages.

COMPETENCY BOX 14-6

Examples of Applicable Nurse of the Future: Nursing Core Competencies

Informatics and Technology: Skills (S6b) Maintains pri-

vacy and confidentiality of patient information

Source: Massachusetts Department of Higher Education (2010, p. 24).

On the other hand, social media can be used in disasters as a means of disseminating information and as an emergency management tool. Social media can be a source of information in a crisis situation as well as part of a plan to mobilize responders. In disaster preparation, social media sites can be

www CRITICAL THINKING QUESTIONS >

What needs of populations in your region or state could be addressed by telehealth? What ideas can you envision to assist in the access to and delivery of healthcare services where you live or work?* used to publicize training events and dates (Lindsay, 2011). Future challenges of social media include the use of the technology for the delivery of accurate and pertinent information by experts and healthcare providers and by peers and the lay public. Health care provider's uses of social media technology may include public education related to sources of information and monitoring the impact of social media on health outcomes.

Telehealth

Telehealth is defined as "using electronic communication for transmitting healthcare information such as health promotion, disease prevention, professional or lay education, diagnosis, or actual treatments to people located at different geographical locations" (Thede, 2003, p. 129). Hardware and software such as personal digital assistants, pagers, cellular phones, laptop computers, and mobile hardware peripherals are being used by clinicians in increasing numbers. Healthcare providers can monitor and send messages to patients in their homes regarding changes in health status. Information and images can be communicated digitally for consultation with other healthcare providers. This form of healthcare promises to provide many solutions for patient care in the future (Newbold, 2003).

Almost a decade ago, Nelson (2003) proposed the following ideas for the future of health care: The traditional office visit will be replaced with the virtual appointment through the use of videophones and monitoring equipment. Shopping malls will have ambulatory surgery centers and health booths providing access to healthcare providers. Treatment information obtained by email will be common practice for patients and caregivers. Online communities and support groups will assist patients in self-care and disease management. Patients will be able to download personal physiologic data from any site. Wearable technology will monitor, detect, and send data wirelessly to health facilities. It will be possible to predict disease as a result of technology installed in the home or worn on the person. Think of how many of these predictions today are a part of the everyday healthcare environment:

• Home health, hospice, and primary care NPs in the home setting use tablets or notebook computers to document and communicate information to main or branch offices. Supplies can be ordered online immediately following the visit.

- Computers on Wheels (COWs) are used in clinical settings for point-ofuse documentation.
- Webcams in computers are used for two-way communication with patients in home settings.
- For pay home alert services are available to aid with safety in the home setting.
- Practitioners in remote areas can connect to large hospital emergency room staff or referral content experts for consultations and second opinions.
- From a motor vehicle crash site, the emergency medical system (EMS) response field team can transmit information and documentation to the emergency room for care direction and in preparation for arrival.
- Mobile disaster response units dispatched at the site of a disaster can bring computer-based registration and tracking systems and an information reference database. This disaster response system can include a two-way linkup with consultation applications to discuss specific patient needs with other HCPs at another site.
- Patients with home use of continuous positive airway pressure (CPAP) machines can bring in the unit's memory file to the HCP for review of effectiveness of the intervention of sleep apnea episodes since the last visit.
- The monitoring of maternal preterm contractions has advanced in the home setting.
- The use of interactive conferencing by interdisciplinary health professional teams is expanding.
- Patients' can maintain and carry a personal copy of their personal health records (PHRs) on a flash drive.

Patient privacy is protected by HIPAA regulations, and variances in state regulations also exist. Considerations for the future include discussion of HIPAA privacy protection if the patient's primary care location and the telehealth practitioner are in different states.

Handheld Devices

Personal digital assistants (**PDAs**) are handheld devices that have wireless connectivity and can synchronize data and information between the PDA and a computer. Use of the PDA is becoming widely popular in health care and nursing. The devices can be used as a digital reference for obtaining drug information, dosage calculations, and diagnostic test results, as well as decision protocols for administration. They are useful tools for data collection and management of patient outcomes. PDAs can be interfaced with the electronic medical record to obtain and update vital patient information. Immediate access to the Internet allows the healthcare provider to obtain valuable information through national and international resources. HIPAA regulations must be strictly followed when using PDAs and other wireless technology (Thompson, 2005). The use of PDAs in the clinical setting must be compliant with HIPAA rules and regulations. Faculty and nursing students must be advised and taught about security and storage of patient information (Mastrian, McGonigle, Mahan, & Bixler, 2011).

Hybrid devices have a combination of capabilities, such as a cell phone that is also an Internet-enabled PDA with an MP3 player and camera that includes text messaging capabilities, maps and directions assistance, and interactive voice assistance. Available options can vary with different service plans, coverage areas, and memory size. Upon employment and when there are any corporate policy changes, nurses must review the healthcare facility policies on the use of handheld devices while at work.

Present and Future Trends

Beginning in 2012 an initiative of the Centers for Medicare and Medicaid Services (CMS), the Hospital Value-Based Purchasing (VBP) Program, will affect performance and quality of care in determining how much the hospital is

www, CRITICAL THINKING QUESTIONS

Discuss your nursing role in early detection, reporting, and surveillance of emerging threats in your geographical area. Identify what sources are available and note how current these are.* paid for services. Many specific measures of patient care by nurses will be reported. Some process measures include discharge instructions, serum glucose levels for postoperative cardiac patients, and several other specific measures for the patient undergoing surgery. Some measures of patient experiences of care have benchmarks for communication with nurses, communication about medicines, responsiveness of the hospital staff, and discharge information (CMS, 2012).

Education, surveillance, reporting, and communication of VBP measures for the nursing and hospital staff will be a priority role for informatics nurses.

The Office of the National Coordinator for Health Information Technology (ONC) at www.HealthIT.gov is a source of information for healthcare providers, patients and families, as well as policy researchers (Murphy, 2011; ONC, 2011a). The Medicare and Medicaid EHR Incentive Programs have the focus of the "meaningful use" of certified EHR technology in achieving health goals. Financial incentives are attached to these goals. There are five patient-driven domains: to "improve quality, safety, efficiency; engage patients & families; improve care coordination; improve public and population health; ensure privacy and security for personal health information" (ONC, 2011b). Fifteen core objectives are described and linked to the domains. Resources about questions to explore and measures are linked for each objective. The use of HIT presently and in the future will be vital in evolving healthcare programs and delivery systems. It is essential to have a qualified workforce to meet the demands of these programs. Clearly, computerized technology will shape the future of health care. Recognizing this fact, the former Healthy People 2010 objectives (U.S. Department of Health and Human Services [DHHS], 2000) call for increasing the number of households with access to the Internet. Health communication and health information technology is noted as an objective of Healthy People 2020 with the goal to improve healthcare quality and safety (U.S. DHHS, 2012). Many healthcare organizations and public service agencies use the Internet as the main avenue for information delivery. Thus, having access to the Internet will be essential to acquiring health information and services. Changes in delivery of patient care are common in clinical facilities in many areas of the country. Nurses and healthcare providers have become accustomed to computerized order entry for medical directives and point-of-care technology for patient care, automated medication dispensing, physiologic monitoring systems, and "smart" infusion pump delivery systems (Saba & McCormick, 2006).

Advances in technology might make vaccines for cancer and medications to prevent vascular disease available someday. New organs and body parts that correct or improve function might be commonly accessible. It is conceivable that bloodless surgery will be performed and drugs without side effects will be developed. Computer programs and clinical simulators will be used universally for practice in health education. Robotics will perform nursing support services for patient care through providing medica-

tion administration and physiologic monitoring.

Informatics technologies will have roles in protection and response for bioterrorism and national security. These capabilities will include emergency response systems, health alert networks, automated access to governmental support networks, and enlistment of workforce solutions. Informatics nurses will be called upon to establish, implement, and evaluate these initiatives.

In the future, work must be done to refine and implement standardized nursing terminologies (SNTs) that better express nursing care. As SNTs become unique to nursing, some benefits include better communication, improved patient care, and uniform style for nursing data collection to aid in evaluation of nursing care outcomes (Thede & Schwiran, 2011).

Conclusion

Nursing informatics provides the solution to many of the challenges that health care is facing—from easing the strain of the nursing shortage to improving patient safety. "Between the health care we have and the care we could have lies not just a gap, but a chasm" was reported in the IOM (2001)

www. CRITICAL THINKING QUESTIONS >

Explore online sources and discuss: What services utilizing robotics are available in a 1-hour radius from your home? Which populations can benefit from these services? How many persons by age groups potentially could need these services in the next 10 years?* landmark report. Nurses must embrace technology and integrate it into their nursing practice. Technology will not go away. It will continue to transform healthcare delivery systems. Because of technology, individuals and groups

Nursing informatics provides the solution to many of the challenges that health care is facing-from easing the strain of the nursing shortage to improving patient safety.

communicate in new ways, the methods with which we teach and learn have changed, and the way health care is delivered and acquired has changed. Nursing must continue to take a leadership role in the incorporation of technology in health care. Nursing informatics will provide the tools and skills to assist health care to move ahead in the everchanging world. The baccalaureate-prepared nurse should continue to strive to explore and practice the constructs of NI competencies to improve population health outcomes and healthcare quality.

Classroom Activity 1

• xplore key words a nurse would use to locate more information about aspects ⊿of a health issue topic or a population

of interest of your choice. Report what single or combination of key words yielded the best results for your topic or population.

Classroom Activity 2

xplore possible Web sources to locate support groups available for individuals ⊿needing services in your area, county or

parish region, and state.



Classroom Activity 3

ocate two consumer-focused listservs that you can suggest as resources for the healthcare consumer.

Classroom Activity 4



Classroom Activity 5

video is available at www.ncsbn. org/2930.htm

References

- American Association of Colleges of Nursing. (2008, October 20). The essentials of baccalaureate education for professional nursing practice. Retrieved from http:// www.aacn.nche.edu/education-resources/BaccEssentials08.pdf
- American Nurses Association. (2001). Scope and standards of nursing informatics practice. Washington, DC: Author.
- American Nurses Association. (2008). Nursing informatics: Scope and standards of *practice*. Washington, DC: Author.
- American Nurses Association. (2011a). *Fact sheet. Navigating the world of social media.* Silver Springs, MD: Author.
- American Nurses Association. (2011b). 6 *tips for nurses using social media*. Silver Springs, MD: Author.
- American Nurses Credentialing Center. (2007). Informatics nurse certification exam. Retrieved from www.nursecredentialing.org/Certification/NurseSpecialties/ Informatics.aspx
- Bliss, J. B., & DeYoung, S. (2002). *Working the Web: A guide for nurses*. Upper Saddle River, NJ: Prentice Hall.
- Carmona, R. H. (2005, July 26). A call to caring: Remarks at press conference to launch. The Surgeon General's Call to Action to Improve the health and Wellness of Persons with Disabilities. Retrieved from http://www.surgeongeneral.gov/news/ speeches/07262005.html

- Centers for Medicare and Medicaid. (2012). Hospital value-based purchasing. Retrieved from http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/hospital-value-based-purchasing/index.html?redirect=/ Hospital-Value-Based-Purchasing/
- Chang, B. L., Bakken, S., Brown, S. S., Houston, T. K., Kreps, G. L., Kukafka, R., Safran, C., & Stavri, P. Z. (2004). Bridging the digital divide: Reaching vulnerable populations. *Journal of the American Medical Informatics Association*, 11(6), 448–457.
- Garner, J. C. (2003). Final HIPAA security regulations: A review. *Managed Care Quarterly*, 3(11), 15–27.
- Hannah, K. (1985). Current trends in nursing informatics: Implications for curriculum planning. In K. Hannah, E. J. Builenmin, & D. N. Corkin (Eds.), *Nursing uses* of computer and information science. Amsterdam, Netherlands: North-Holland.
- Health on the Net Foundation. (2009). HON code of conduct. Retrieved from http:// www.hon.ch/HONcode/Pro/intro.html
- Health 2.0 Developer Challenge. (2012). Developer challenge. Retrieved from http:// www.health2con/devchallenge/
- Healthcare IT. (2004). President Bush continues HER push, sets national goals. Retrieved from http://www.healthcareitnews.com/news/president-bush-continuesehr-push-sets-national-goals
- Hebda, T., & Czar, P. (2009). *Handbook of informatics for nurses and healthcare professionals* (4th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.
- Hunter, K. M. (2002). Electronic health records. In S. Englebardt & R. Nelson (Eds.), *Health care informatics: An interdisciplinary approach* (pp. 209–230). St. Louis, MO: Mosby.
- Institute of Medicine. (2001). *Crossing the quality chiasm: A new health system for the 21st century*. Retrieved from http://www.nap.edu/catalog/10027.html
- Institute of Medicine. (2010). *Future of nursing: Leading change, advancing health*. Washington, DC.: National Academies Press. Retrieved from http://www.nap.edu/ catalog.php?record_id=12956
- Lindsay, R. (2011). Social media and disasters: Current uses, and future options, and policy considerations. Congressional Research Service, 7-5700. CRS Report R41987. Retrieved from www.crs.gov
- Massachusetts Department of Higher Education. (2010). Nurse of the future: Nursing core competencies. Retrieved from http://www.mass.edu/currentinit/documents/ NursingCoreCompetencies.pdf
- Mastrian, K.G., McGonigle, D., Mahan, W. L., & Bixler, B. (2011). *Integrating technology in nursing education. Tools for the knowledge era.* Burlington, MA: Jones & Bartlett Learning.
- McCannon, M., & O'Neal, P. V. (2003). Results of a national survey indication information technology skills needed by nurses at time of entry into the work force. *Journal of Nursing Education*, 42(8), 337–340.
- McGonigle, D., & Mastrian, K. (2009). Nursing informatics and the foundation of knowledge. Sudbury, MA: Jones and Bartlett.
- McNeil, B. J., Elfrink, V. L., Bickford, C. J., Pierce, S. T., Beyea, S. C., Averill, C., & Klappenbach, C. (2003). Nursing information technology knowledge, skills, and preparation of student nurses, nursing faculty, and clinicians: A US survey. *Journal* of Nursing Education, 42(8), 341–349.

- Mendelson, C. (2003). Gentle hugs: Internet listservs as source of support for women with lupus. Advances in Nursing Science, 26(4), 299–306.
- Murphy, J. (2011). Engaging patients and families in eHealth. *Nurse Informatics*, 29(6), 339–341.
- National Council of State Boards of Nursing. (2011). White paper: A nurse's guide to the use of social media. Retrieved from https://www.ncsbn.org/Social_Media.pdf
- National League for Nursing. (2008). Position statement. Preparing the next generation of nurses to practice in a technology-rich environment: An informatics agenda. Retrieved from http://www.nln.org/aboutnln/PositionStatements/ informatics_052808.pdf
- Nelson, A. (2003). Using simulation to design and integrate technology for safer and more efficient practice environments. *Nursing Outlook*, *51*(3), S27–S29.
- Newbold, S. K. (2003). New uses for wireless technology. *Nursing Management*, 34(10 Suppl.), 22–23, 32.
- Office of the National Coordinator of Health Information Technology. (2011a). Health IT. Retrieved from http://www.healthit.gov
- Office of the National Coordinator of Health Information Technology. (2011b). How to implement EHRs. Retrieved from http://www.healthit.gov/providersprofessionals/ehr-implementation-steps/step-5-achieve-meaningful-use
- Office of the National Coordinator of Health Information Technology. (2012). Type of e-health tools. Retrieved from http://www.healthit.gov/patients-families/types-e-health-tools
- Pagana, K. D. (2007). E-mail etiquette. American Nurse Today, 2(7), 45.
- Quality and Safety Education for Nurses. (2012). About QSEN. Retrieved from http:// www.qsen.org/about_qsen.php
- Saba, V. K. (2001). Nursing informatics: Yesterday, today and tomorrow. *International Nursing Review*, 48, 177–187.
- Saba, V. K., & McCormick, K. A. (2006). *Essentials of nursing informatics* (4th ed.). New York, NY: McGraw-Hill.
- Sensmeier, J. (2008, September). Deep impact: Informatics and nursing practice. Nursing Management, 2, 4, 6. Retrieved from http://journals.lww.com/ nursingmanagement/Fulltext/2008/09001/Deep_impact__Informatics_and_ nursing_practice.1.aspx?WT.mc_id=HPxADx20100319xMP. doi:10.1097/01. NUMA.0000357564.51644.42
- Smeltzer, S., Simmerman, V., Frain, M., DeSiltes, L., & Duffin, J. (2003). Accessible online health promotion information for persons with disabilities. OJIN: The Online Journal of Issues in Nursing. Retrieved from http://nursingworld.org/ MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/ Volume92004/No1Jan04/ArticlePreviousTopic/AccessibleInformation.html
- Staggers, N., Gassert, C. A., & Curran, C. (2001). Informatics competencies for nurses at four levels of practice. *Journal of Nursing Education*, 40(7), 303–316.
- Technology Informatics Guiding Education Reform. (2008). The TIGER initiative. Collaborating to integrate evidence and informatics into nursing practice and education: An executive summary. Retrieved from http://www.tigersummit.com
- The Cochran Collaboration. (2012). The Cochrane Library. Retrieved from http:// www.thecochranelibrary.com/view/0/index.html
- Thede, L. (2008, August 18). The electronic health record: Will nursing be on board when the ship leaves? *OJIN: The Online Journal of Issues in Nursing*, 13(3). doi:10.3912/OJIN.Vol13No03InfoCol01

- Thede, L. (2012, January 23). Informatics: Where is it? OJIN: The Online Journal of Issues in Nursing, 17(1). doi:10.3612/OJIN.Vol17No1InfoCol01
- Thede, L,. & Schwiran, P. (2011, February 25). Informatics: The standardized nursing terminologies: A national survey of nurses' experiences and attitudes—survey I. OJIN: The Online Journal of Issues in Nursing, 16(2). doi:10.3912/OJIN. Vol16No02InfoCol01
- Thede, L. Q. (2003). *Informatics and nursing: Opportunities and challenges* (2nd ed.). Philadelphia, PA: Lippincott Williams & Wilkins.
- Thede, L.Q., & Sewell, J. P. (2010). Informatics and nursing competencies and applications. Philadelphia, PA: Wolters Kluwer Lippincott Williams & Wilkins.
- Thompson, B. W. (2005). HIPAA guideline for using PDAs. Nursing, 99(35), 24.
- U.S. Department of Health and Human Services. (2000, November). *Healthy People* 2010 With understanding and improving health and objectives for improving health (2nd ed., 2 vols.). Washington, DC: U.S. Government Printing Office.
- U.S. Department of Health and Human Services. (2012). *Healthy People 2020*. Retrieved from http://healthypeople.gov/2020/topicsobjectives2020/overview. aspx?topicid=18
- White House Archives. (2004). Fact sheet: Transforming health care for all Americans. Retrieved from http://georgewbush-whitehouse.archives.gov/news/releases/2004/05/20040527-2.html
- Young, K. M. (2000). *Informatics for healthcare professionals*. Philadelphia, PA: F. A. Davis.
- Zykowski, M. E. (2003). Nursing informatics: The key to unlocking contemporary nursing practice. AACN Clinical Issues, 14(3), 271–281.