Nursing Informatics

Compiled & Designed by: Sonny C. Chiu, MA.Ed. CNU-Information T echnology Professor

Overview

- Nurses are becoming computer literate and the nursing profession is implementing practice students for its clinical care and data standards for its nursing information technology systems.
- " NI represents the *transition of data, information and knowledge* into ACTION."

What is Informatics?

- Informatics is the science and art of turning data into information (Bemmel and Musen, 1997).
- It is an adaptation of the French term *informatique*, which refers to "the computer milieu" (Saba, 2001).

What is Nursing Informatics?

- It is 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 and knowledge to support patients, nurses, and other providers in their decision-making in all roles and settings.
  - *American Nurses Association (ANA, 2001)*

Computer & Networks in NURSING

- Computer in nursing are used to manage information in patient care, monitor the quality care, and evaluate the outcomes of care.

- Networks are now used for communicating (sending/receiving) data and messages via the Internet, accessing resources, and interacting with the patients on the World Wide World (*www*).

The Evolution of Informatics & other Definitions

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How did it begin?

Computer Technology emerged in nursing in response to the changing and developing technologies in the health care industry and in nursing practice.

Nursing Informatics evolved in SIX TIMES Period:

i. Prior to the 1960's
ii. The 1960's
iii. The 1970's
iv. The 1980's
v. The 1990's
vi. Post- 2000

Prior to the 1960's

- Starting in the early 50's, and as the computer industry grew, the use of computer in the health care industry also grew.
- Only few experts who attempted to adapt computer to health care and nursing.
- As the image of nursing improved, nursing practices were expanding in scope and complexity. These events motivates the nursing professionals to embrace computers.

Prior to the 1960's

- Computers were initially used in the health care facilities for basic business office functions.
- The early computers used punch cards to store data and card readers to read computer programs, sort and prepare data for processing.

The 1960's

- During the early 60's, the use of computer technology in health care began to be questioned. "*Why computers?" and "What should be computerized?*"
- Studies were conducted to determine the effective utilization of the computer technology in health care industry and to identify the areas of nursing that needs to be automated.

The 1960's

- Hospital information systems (HIS) were developed primarily to process financial transactions and serve as billing and accounting systems.
- Vendor systems were beginning to enter the health care field and market software applications for various hospital function

The 1970's

- Nurses began to recognize the value of computer for their profession and see computer's potential in improving the documentation of nursing practices, the quality patient care, and the repetitive aspects of managing patient care.
- Giant steps were taken during this decade in both NURSING & COMPUTER Technology.

The 1970's

- Several mainframe HISs were designed and developed.
- Many of the early HISs were developed and funded by the contractor or grants from federal agencies (National Center for Health Service Research, 1980)
- Several states and large community health agencies developed and/or contracted for their own computer-based management information systems (MIS).

The 1980's

- During this decade, the field of informatics emerged in the health care industry and nursing. NI became an accepted specialty and many nursing experts entered the field. Technology challenged creative professionals and the use of computers in nursing became revolutionary.
- Many mainframe HISs emerged with nursing subsystems.

The 1980's

- Discharge planning systems were developed and used as referrals to community health care facilities in the continuum care.

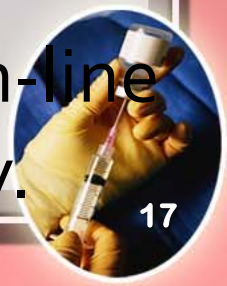
- Microcomputers/PCs emerged in this period, making more accessible, affordable, and usable by nurses and other health care providers.

The 1990's

- In the early 1990's, computer technology became an integral part of health care servicing, nursing practice and the nursing profession.
- Policies and legislation were adopted promoting computer technology in health care including nursing.
- In 1992, NI was approved by the American Nurses Association (ANA) as a new nursing specialty (McCormick et al., 1994).

The 1990's

- This period brought the smaller and faster computers-*laptops and notebooks*- to the beside and all of the point-of-care settings.
- Workstations and local are network (LANs) were developed for hospital nursing units, wide are networks (WANs) were developed for linking care across health care facilities, an the Internet started to be used.
- The WEB became means of communicating on-line services and resources to the nursing community.



Post-2000

- Clinical Information Systems became individualized in the electronic patient record (EPR) or electronic health record
- Information Technologies continued to advance with mobile technology such as with wireless tablet computer, personal digital assistants (PDAs), and cellular phones.
- Internet has also provided a means for development of clinical applications, like *eICU*

Post-2000

- Home health care has also increasingly partnered with information technology for the provision of patient care.
- Telenursing, is increasing in popularity and providing patient care in an efficient and expeditious fashion.

Other Definitions of Informatics

Medical informatics

- May be used to refer to the application of information science and technology to acquire, process, organize, interpret, store, use, and communicate medical data in all of it forms in medical education, practice and research, patient care and health management or more broadly to the application of informatics to all of the health care disciplines as well as the practice of medicine.

Health Informatics

- The application of computer and information science in all basic and applied biomedical sciences to facilitate the acquisition, processing, interpretation, optimal use, and communication of health related data. The focus is the patient and the process of care, and the goal is to enhance the quality and efficiency of care provided.

Bioinformatics

- The application of computer and information technology to the management of biological information including the development of databases and algorithms to facilitate research.

Biomedical Informatics

- The science underlying the acquisition, maintenance, retrieval, and application of biomedical knowledge and information to improve patient care, medical education, and health sciences research.

Consumer Health Informatics

- Branch of medical informatics that analyzes consumer needs for information and methods for making information accessible and implements those methods modeling consumer preferences into medical information systems. (Eysenback 2000)

Dental informatics

- Application of computer and information sciences to improve dental practice, research, education, and management. (Schleyer and Spallek 2001)

Clinical informatics

- Multidisciplinary field that focuses upon the enhancement of clinical information management at the point of health care through improvement of information processes, implementation of clinical information systems, and the use and evaluation of clinical decision support (CDS) tools as a means to improve the effectiveness, quality, and value of services rendered.

Public Health Informatics

- Application of information and computer science and technology to public health practice, research, and learning.

Informatics in the Health Care Professions

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Data

- A collection of numbers, characters, or facts that are gathered according to some perceived need for analysis and possibly action at a larger point in time. (Anderson, 1992)

Information

- A collection of data that are arranged in a logical order.

Knowledge

- The synthesis of information derived from several sources to produce a single concept or idea. It is based on a logical process of analysis and provides order to thoughts and ideas and decreases uncertainty (Ayer 1966; Englehardt 1980)

Information Technology

- A general term used to refer to the management and processing of information, generally with the assistance of computers.

Roles of a Nurse

- Data gatherer
- Information user
- Knowledge user
- Knowledge builder

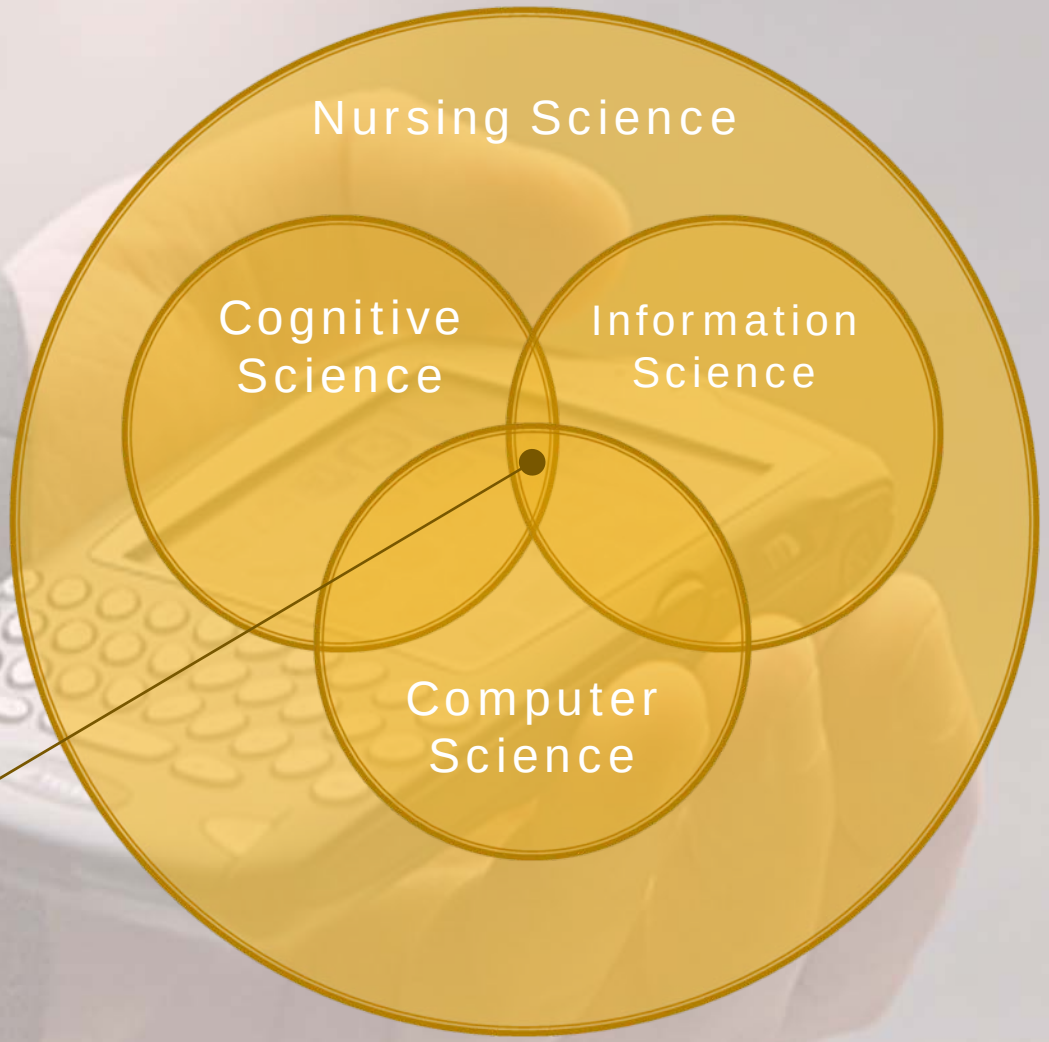
Nursing Informatics

- Broadly defined as the use of information and computer technology to support all aspects of nursing practice, including direct delivery of care, administration, education and research.

Categories (ANA)

- Definitions with an information technology focus
- Conceptually oriented definitions
- Definitions that focus on roles

Nursing Informatics Model



Four levels of informatics competencies for nurses

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The Beginning Nurse

- Has fundamental information management skills
- Can use information systems

The Experienced Nurse

- Is proficient in his/her area of specialization and highly skilled in the use of IT and computers to support that area of practice.
- Sees the relationship between data elements and makes judgments based on observed trends and patterns.
- Uses information systems and works with the informatics specialist to enact improvements in information systems.

The Informatics Nurse Specialist

- Has advanced preparation in information management.
- Focuses on informatics applications to support all areas of nursing practice.
- Uses skills in critical thinking, data management and processing, decision making, and system development and computer skills.

The Innovator Nurse

- Is educationally prepared to conduct informatics research and generate informatics theory.
- Holds the vision of what is possible and has the ability to make things happen.
- Is creative in developing solutions, possessing a sophisticated level of understanding and skills in information management and computer technology.

Applications of Nursing Informatics

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Nursing Practice

- Work lists to remind staff of planned nursing interventions
- Computer-generated client documentation including discharge instructions and medication information
- Monitoring devices that record vital signs and other measurements directly into the client record
- Computer-generated nursing care plans and critical pathways

Nursing Practice

- Automatic billing for supplies or procedures with nursing documentation
- Reminders and prompts that appear during documentation to ensure comprehensive charting
- Quick access to computer-archived patient data from previous encounters
- Online drug information

Nursing Administration

- Automated staff scheduling
- Online bidding for unfilled shifts
- Electronic mail for improved communication
- Cost analysis and finding trends for budget purposes
- Quality assurance and outcome analysis
- Patient tracking and placement for case management

Nursing Education

- Online course registration and scheduling
- Computerized student tracking, and grade management
- Computer-assisted instruction
- Course delivery and support for Web-based education
- Remote access to library and internet resources
- Teleconferencing and Webcast capability
- Presentation software for preparing slides and handouts
- Online test administration
- Communication with students

Nursing Research

- Computerized literature searching
- The adoption of standardized language related to nursing terms
- The ability to find trends in aggregate data, which is data derived from large population groups
- Use of the internet for obtaining data collection tolls and conducting research
- Collaborate with other nurse researchers

Current Status of Health Care Delivery

- Patient safety and medication errors
- Nursing shortage
- Consumer demands for cost-effective, quality care based on best practices, managed care, economic survival, and pressure to implement IT solutions that include computerized physician order entry with decision support, bar code medication administration, electronic or computerized patient records, and e-prescribing.

Benefits of Nursing Informatics for Other Health Care Professionals

Specific Benefits of Electronic Medical Records

- Improved access to information
- Error reduction and improved communication
- Decreased redundancy of data entry
- Convenience
- Decreased time spent in medication administration and documentation
- Increased time for client care
- Facilitation of data collection for research

Specific Benefits of Electronic Medical Records

- Improved quality of documentation
- Improved compliance with regulatory requirements
- Improved record security
- Improved quality of care and patient satisfaction
- Decreased administrative costs for location and maintenance of client records
- Creation of a lifetime clinical record facilitated by information systems.

The Role of the Informatics Nurse

- Theory development
- Analysis of information needs
- Selection of computer systems
- Design of computer systems and customizations
- Testing of computer systems
- Training users of computer systems
- Education of users on information policies
- Evaluation of the effectiveness of computer systems

The Role of the Informatics Nurse

- Ongoing maintenance and enhancements
- Identification of computer technologies that can benefit nursing
- Compliance with regulatory requirements for information handling
- Project management
- Research

The Future of Nursing Informatics

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Richards (2001)

- The new generation of nurses will bring their familiarity with technology and information literacy to exert their power and influence in health care. The new generation of nurses will understand and exercise their power to transform research into practice. They will also exhibit their creativity, innovation, and practical know-how in the way they use IT.

Hardware, Software and the Roles of Support Personnel

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Definitions

- Computer
- Hardware
- Software
- Input devices
- Central Processing Unit
- Read-Only Memory (ROM)
- Random Access Memory (RAM)
- Secondary storage devices
- Output devices

Categories of Computers

- Supercomputers
- Mainframe computers
- Minicomputers
- Microcomputers (PCs)
- Laptop or notebook computers
- Tablet computers
- PDAs and other handheld devices

Peripheral Hardware Items

- Monitors
- Keyboards
- Terminals
- Mouse and other pointing devices
- Secondary storage devices
- Backup systems
- External modems
- Printers
- Scanners
- Digital and web cameras (webcams)
- Multifunction devices

Networks

- Local Area Networks
- Metropolitan Area Network
- Wide Area Network
- Thin client technology

Equipment Selection Criteria

- The types of applications required
- The program execution time and computer capacity needed to process jobs
- The number of workers who need computer access at any one time
- Storage capacity
- Backup options
- Budget considerations
- Maintenance considerations

User Needs

- Ergonomics – the study and design of a work environment that maximizes productivity by reducing operator fatigue and discomfort.
- Repetitive Stress Injuries (RSIs) or Repetitive Motion Injuries – result from using the same muscle groups over and over again without rest (carpal tunnel syndrome)

Measures to Ensure Good Ergonomics When Using a Computer-Work Station

- Determine how a workstation will be used.
- Determine the length of time the use will be at the workstation.
- Configure work areas for specific types of equipment.
- Select sturdy surfaces or furniture with sufficient workspace.
- Provide chairs with good lumbar support.
- Educate all workers on the need for good body mechanics when working with computers.
- Position monitors just below eye level approximately one arm's length away.

Measures to Ensure Good Ergonomics When Using a Computer-Work Station

- Adjust screen resolution and font size as needed.
- Periodically look away from the monitor to distant objects.
- Minimize screen glare
- Take frequent breaks
- Avoid noisy locations.
- Place the workstation in a well-ventilated area.
- Use ergonomic devices with caution.

Examples of Ergonomic Devices

- Glare Filter
- Negative Tilt Keyboard
- Document Holder
- Ergonomic Mouse
- Lumbar Support
- Wrist Rests
- Support Braces/Gloves
- Ergonomic Keyboards
- Foot Rest

Mobile & Wireless Computing

- Mobile Computing – devices that can be carried or wheeled from place to place. May not have the capability to receive and transmit information while mobile.
- Wireless Devices – are equipped with a special card enabling it to broadcast and receive radio or cellular signals that reach the network via access points.

Advantages

- Both technologies bring computing to the bedside
- Cost
- Improved data collection
- More efficient work processes
- Error reduction

Concerns

- Theft and loss
- Threats to data security
- Battery life
- Data loss
- Memory limitations
- Limited ability to display and see information
- Dead zones
- Lack of a means to readily exchange data between hospital information systems and handheld devices

Software

- Operating Systems
- Application Systems
- Utility Programs

Roles of Support Personnel

Super user

- Additional computer experience over the average employee and serves as a local resource person.

Call Desk and Help Desk Personnel

- First line of user support within an organization.

Microcomputer or PC Specialist

- Provides users with PC information and training, enabling them to perform routine tasks.

Analyst

- Health care information system analysts are responsible for a wide range of activities related to the successful automation of information management.
- Interview staff, determine user needs, write specifications for software performance, participate in some computer programming and debugging, implement new automated functions, and document program specifications and changes.

Clinical Liaison

- Clinicians who represent the interests and need of the users and work with the information system team to address these issues during system design and implementation.

Programmer

- Write the code, or instructions, that tell the computer what to do. Often lack a clinical background.

Network Administrator

- Responsible for planning, management, and expansion of networks.

Trainer

- Responsible for educating clinical users in one for more applications and may also be required to define and monitor user competences.

Security Officers

- Responsible for ensuring that measures exist to protect information privacy.

Chief Information Officer

- Should have a broad view of the needs of the institution and the design, implementation, and evaluation of information systems. Responsibilities include strategic planning, policy development, budgeting, information security, recruitment, and retention of information services staff, and overall management of the enterprises' information systems.

Webmaster

- Responsible for the design, maintenance, and security of materials placed on the Internet, intranet, and/or extranet.

Chief Privacy Officer

- Protects the personal health information of patients. This includes paper and electronic information.

Chief E-health Officer

- Exists in organizations that are expanding their use of the Internet beyond Web sites that provide information to a strategy that includes interactive services.

Compliance Officer

- Designated to ensure that state and federal regulations and accrediting requirements are met both via paper and automated records and systems.

Disaster Planning & Recovery Officer

- Designated to ensure that plans are up-to-date and that all contingencies have been covered. Coordinates and update plans for natural and man-made disasters, including acts of terrorisms.

Interface Engineer

- Ensures that information is exchanged between disparate systems and isolates and corrects problems behind the scenes invisible to the users of the individual systems.