

NURSING INFORMATICS

CHAPTER 1

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OVERVIEW OF NURSING INFORMATICS

CHAPTER OBJECTIVES

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1. Define nursing informatics (NI) and key terminology.
2. Explore NI Metastructures, concepts and tools
3. Reflect on the sciences underpinning NI
4. Describe phenomena of nursing

CHAPTER INTRODUCTION

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- Nurses are expected to provide safe, competent, and compassionate care in an increasingly technical and digital environment
- A major theme in this new healthcare environment is the use of information systems and technologies to improve the quality and safety of patient care
- Nurses are directly engaged with information systems and technologies because they are the foundation for:

- Evidence-based practice
- Clinical-decision support tools
- The electronic health record (EHR)
- Unfortunately, not all nurses are fully prepared to use these tools to support patient care.
- A new specialty, called **Nursing Informatics**, has emerged over the past 20 years to help nurses fully use information technology to improve the delivery of care.

- Nursing informatics supports the collection, storage, analysis, retrieval, communication and use of information to help nurses to:
 - A. CARE** for patients to the highest quality
 - B. SHARE** data, information and knowledge
 - C. COMPARE** theory and practice to advance nursing knowledge and practice.

WHAT IS NURSING

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The American Nurses' Association (ANA, 2003) Definition of Nursing:

Nursing is the protection, promotion, and optimization of health and abilities; prevention of illness and injury; alleviation of suffering through the diagnosis and treatment of human response; and advocacy in the care of individuals families communities and populations

Components of ANA Definition of Nursing

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- The focus of nursing is on the human responses to actual or potential health problems, and advocacy for various clients
- Nurses must possess the following skills:
 1. **Technical Skills:** to manage equipment and perform procedures
 2. **Interpersonal skills:** to interact appropriately with people

3. **Cognitive skills:** to observe, recognize and collect data, analyze and interpret data and reach a reasonable conclusion that forms the basis of a decision
4. **Information Intensive Skills:** Nursing is an information intensive profession

Nursing Science:

The ethical application of knowledge acquired through education research and practice to provide services and interventions to patients in order to maintain enhance or restore their health; to advocate for health and to acquire process generate and disseminate nursing knowledge to advance the nursing profession

Nursing Theory:

Concepts propositions and definitions that represent a methodical viewpoint and provide a framework for organizing and standardizing nursing actions

PHENOMENA OF NURSING

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- The metaparadigm of nursing comprises four key concepts:
 1. The Nurse
 2. The Person
 3. The Health
 4. The Environment.
- Nursing actions are based upon the inter-relationships between these concepts and are related to the values nurses give to them

- The characteristic of the nursing decision has two sides:
 - a. The quality of the decision
 - b. The impact of the actions resulting from those decisions on individuals and communities
- The process of decision-making in nursing is guided by the concept of critical thinking.

Nurses' decision making:

Is described as a collection of decisions that include specific behaviors, and cognitive processes surrounding a group of issues

Critical thinking:

Is the intellectual process of actively and skillfully using knowledge

Wisdom:

Is the ability to apply valuable and practical knowledge, experience, understanding and insight while being careful and sensible. It is focused on our own minds and the synthesis of our experience, insight, understanding and knowledge.

Wisdom in informatics:

Is the ability of the Nurse Informatics to evaluate the documentation drawn from a ***Health Information System (HIS)*** and the ability to adapt or change the system settings or parameters to improve practice and decision making of the nurse

- Nurses make decisions about potential problems presented by an individual and about appropriate recommendations for addressing those problems.
- Computer applications designed to facilitate human decision making processes.
- In Nursing Informatics nurses use Decision Support Systems (DSS)

Decision support system (DSS):

Usually DSS are rule-based, using a specified knowledge base and a set of rules to analyze data and information and provide recommendations typically through the use of a knowledge base and rules to make recommendations to users

INTRODUCTION TO NI

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- Nursing Informatics supports consumers, patients, nurses, and other providers in their decision-making in all roles and settings.
- The goal of NI is to *improve the health of populations, communities, families, and individuals* by optimizing information management and communication.
- NI has become well established within nursing since its recognition as a specialty for registered nurses by the American Nurses Association (ANA) in 1992.

Nursing Informatics:

Is a specialty that integrates nursing science computer science cognitive science and information science to manage and communicate data, information, knowledge, and wisdom, 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.

- This support is accomplished through the use of information structures, information processes, and information technology; synthesis of nursing science, information science, computer science and cognitive science to facilitate the management of healthcare data for the improvement of patient care and advancement of the nursing profession.
- Because information and knowledge are essential for nurses when interpreting data and making decisions, it is important to know the difference between these important concepts

- Nurses collect data when assessing and monitoring the health of patients and record their observations in the patient's chart
- Nurses exchange service requests to, and receive results from, the clinical laboratory, radiology and other departments
- Nurses receive and review admission data and discharge summaries
- Nurses review information on the results of clinical research and clinical trials

- Nurses communicate patients' information between service providers
- Nurses summarize, calculate, and interpret workload indices for their nursing units for monitoring and management purposes
- Nurse consult evidence-based clinical guidelines and protocols to guide their practice
- As knowledge workers, nurses use concepts such as these to influence decision making

- Nursing Informatics (NI) centers on the concepts of:
 1. **DATA**
 2. **INFORMATION**
 3. **KNOWLEDGE**
 4. **WISDOM**
- These concepts are known as **Metastructures** in Nursing Informatics

- **Data:** Raw facts which lacks meaning and described objectively without interpretation: such as
 - Age 15, 19, 23, 60, 70, 190, 110
 - Number of patients in ward: 20, 40, 50
 - Blood pressure: 120/80, 190/110
 - Disease: DM, Hypertension
 - Weight: 50 KG, 80 KG
 - Height: 160 CM, 170 CM

- **Information:** Data that are interpreted, organized, or structured. Data that is processed using knowledge. Data made functional through the application of knowledge: such as
 - Prevalence of patients falls per nursing ward per month – this year compared to last year
 - Prevalence of stage 3 Cancer patients per year on an Oncology Unit
 - Percentage (%) of staff absenteeism on surgical ward among staff nurses per month

- **Knowledge:**

Processed information that helps to clarify or explain some aspects of our environment or world that we can use as a basis for action or upon which we can act

- **Nursing knowledge:**

Is defined as information that has been synthesized so that interrelationships are identified and formalized resulting in decisions that guide nursing practice such as:

- Effectiveness of Patient Monitoring Program in the prevention of patients falls on surgical wards
- Cancer treatment Protocols
- Relationship between surgical wards nurse absenteeism and work load and work stress
- Care plans for specific health conditions

Decisions: such as

- A diagnosis of Hypertension or DM
- Using stage 3 Cancer protocol to treat this patient
- Refer to hospital management records to identify staff working loads

History of Nursing Informatics

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- Healthcare began to use computers in the 1950's.
- Computers, in this era, were typically used in the business office.
- In the 1970's, nursing began to realize the importance of computers to the nursing profession and became involved in the design, purchase, and implementation of information systems.
- In the 1980's, medical and nursing informatics specialties emerged.
- 1995 saw the first certification exam for NI.

- The post-2000 era saw an unprecedented explosion in the number and sophistication of both computer hardware and software.
- Telemedicine became possible and was recognized as a specialty in the late 1990's.
- NI has experienced rapid growth in the last 40 years which does not appear to be slowing.

Nursing and Knowledge

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Nurses are:

- 1. Knowledge workers:** working with information and generating information and knowledge as a product
- 2. knowledge acquirers:** providing convenient and efficient means of capturing and storing knowledge
- 3. knowledge users:** individuals or groups who benefit from valuable, viable knowledge.

4. **Knowledge engineers:** designing, developing, implementing and maintaining knowledge.
5. **Knowledge managers:** capturing and processing collective expertise and distributing it where it can create the largest benefit.
6. **Knowledge developers or generators:** changing and evolving knowledge based on the tasks at hand and information available.

Important Points to Remember about Metastructures

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- Data, which are processed into information and then into knowledge, may be obtained from individuals, families, communities, and populations.
- Knowledge focuses on what is known but Wisdom focuses on the appropriate application of that knowledge.

- If the study of NI was limited to what the computer can process, then it could not fully appreciate the interrelationships that exist between nursing science, practice and information, science, technology.
- The appropriate use of knowledge involves the integration of empirical, ethical, personal and philosophical knowledge in the process of implementing actions.

- NI is now concerned with the use of information technology to improve the access and quality of health care that is delivered to individuals, families and communities.

Sciences Underpinning NI

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- NI is a combination of ***nursing science***, ***information science***, and ***computer science*** to manage and process nursing data, information, and knowledge to facilitate the delivery of health care.
- The combination of sciences creates a unique blend that is greater than the sum of its parts, a unique combination that creates the definitive specialty of NI.

- Computer and information science applied in isolation will have less impact than when they are applied within a disciplinary framework.

Structured Language as a Tool for NI

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- Many different languages and ways of organizing data, information and knowledge exist based on different concepts.
- Nursing knowledge is gained by the ability to extract data that specifically defines nursing phenomena
- The ANA has formalized the recognition of these languages/vocabularies through a review process of the *Committee on Nursing Practice Information Infrastructure (CNPII)*.

- **Examples of languages and vocabularies are:**
 1. Perioperative Nursing Data Set (PNDS)
 2. Patient Care Data Set (PCDS)
 3. North American Nursing Diagnostic Association (NANDA)
 4. Nursing Interventions Classification (NIC)
 5. Nursing Outcome Classification (NOC)
 6. Nursing Management Minimum Data Set (NMMDS)
 7. Systematized Nomenclature of Medicine

Concepts and Tools from Information Science and Computer Science

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- Informatics tools and methods from computer and information sciences are considered fundamental elements of NI.
- Information technology includes **computer hardware, software, communication, and network technologies**, derived primarily from computer science.
- Information structures organize data, information, and knowledge for processing by computers.

- Information management is an elemental process within informatics in which one is able to **file**, **store**, and **manipulate** data for various uses.
- The use of information technology distinguishes informatics from more traditional methods of information management.

Human-Computer Interaction

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- Elements of this interaction are rooted in ***psychology, social psychology*** and ***cognitive science***
- Usability issues address the ***efficiency*** and ***effectiveness*** of an application.

- **Human Computer Interaction (HCI):**

The processes, dialogues and actions that a user employs to interact with a computer; also the study of interaction between people (users) and computers; deals with people, software applications, computer technology and the ways they influence each other.

- **Informatics Nurse Specialist (INS):**

An RN with formal, graduate education in the field of informatics or a related field and is considered a specialist in the field of nursing informatics.

- **Informatics Nurse (IN):**

An RN with an interest or experience working in an informatics field. A generalist in the field of informatics in nursing.