

Nursing Information System

CHAPTER OUTLINE

- Introduction
- Definitions
- Purposes of Nursing Informatics
- Components of Nursing Informatics
- Advantages of Nursing Information System
- Disadvantages of Nursing Informatics
- Nursing Information System

KEY TERMS

Bioinformatics: It is a type of health informatics that focuses on the application of molecular biology to biomedical science and translational medicine.

Client: The client can be a person who can access the stored information.

Computer Network: In the field of computers, any assembly of computers connected together so that they can be used to communicate, permitting the sharing of data or programs.

CPOE: Computerized Physician Order Entry, e.g., ordering tests or medications.

CPR: Computer-based Patient Record.

Decision support system: It is a broad term for any computer application that improves a human's ability to make decisions.

DNS: DNS stands for Domain Name System. It is beneficial in converting the domain name.

Electronic nursing record (ENR): A general term describing computer-based patient record systems designed mainly for the use of nurses.

Hardware: The physical components of computer like CPU, storage device, etc.

Health information exchange: A computer network intended to allow various clinical information systems to interconnect and share patient's data.

LAN: Local Area Network. A form of computer network restricted to servicing computers in a small locality.

Modem: It is a combination of two words, i.e., 'MO' and 'DEM'. 'MO' stands for modulator and 'DEM' is demodulator. It serves as a medium for exchange of data between computer and internet through telephone lines.

Servers: Servers are required to transfer the data through internet, it becomes a storage point and also manages the network resources.

INTRODUCTION

“Nursing informatics specialists are the translators that have evolved into health tech innovators who establish businesses, manage medical economics, create technology and amplify the voice of end-user clinicians.”

—Danielle Siarri

Health sector is one of the huge sectors that is consumer oriented. Introduction of computers and information technology has greatly increased its scope. A lot of improvement in the healthcare delivery system has been reported since last few years at every level of healthcare because of the use of the advanced technology. This has greatly influenced the primary care, ambulatory care and tertiary level care. With emergence of such technology, there is a felt need that all hospitals eventually will have to implement some form of healthcare information system, computer and communication system used by healthcare providers to collect, process, store and analyze data. Nursing Informatics is a branch of health informatics that uses a combination of nursing science, computer science and communication technology to provide quality-based care.

DEFINITIONS

Nursing informatics is “a specialty that integrates nursing, science, computer science, and information science to manage and communicate data, information, and knowledge in nursing practice.” —ANA, 2001

Nursing informatics is “a combination of computer science, information science, and nursing science designed to assist in the management and processing of nursing data, information, and knowledge to support the practice of nursing and the delivery of nursing care.” —Graves and Corcoran

Nursing informatics is “the use of technology and/or a computer system to collect, store, process, display, retrieve, and communicate timely data and information in and across healthcare facilities that administer nursing services and resources, manage the delivery of patient and nursing care, link research resources and findings to nursing practice, and apply educational resources to nursing education.” —Saba and McCormick

Nursing informatics is “the use of information technologies in relation to those functions within the purview of nursing, and that are carried out by nurses when performing their duties. Therefore, any use of information technologies by nurses in relation to the care of their patients, the administration of healthcare facilities or the educational preparation of individuals to practice the discipline is considered nursing informatics.”

—Ball and Hannah

PURPOSES OF NURSING INFORMATICS

- To create pertinent patient data available in a usable form
- To process information to support managerial functions
- To make policy decisions
- To assist in taking the operating decisions
- To provide a framework to take patient care decisions
- To make available an integrated automated information processing system for all phases of the nursing process
- To formulate nursing care plan for families and patients

- To deliver quality-based care
- To enhance the level of wellness of the entire society
- To make wise use of technological advancement in the field of nursing
- To provide cost-effective care
- To improve level of patient satisfaction
- To deliver faster services related to nursing care

COMPONENTS OF NURSING INFORMATICS

As per the definition of nursing informatics by American Nurses Association, its main components are:

- Nursing science
- Information science
- Computer science

Nursing science comprises the skills and knowledge that the nursing officers have in the field of nursing. These include the skills related to the implementation of nursing care like communication skills, leadership qualities, managerial skill, administrative skills, clinical practice skills, etc. The nurse performs these as per the set standards by various professional bodies.

Information science is the science and practice that deals with the constructive collection, storage, retrieval, and use of information.

Computer science provides special tools to enhance the quality of patient care in the field of informatics. For instance, use of portable sensors to detect changes in heart rate.

All these components of nursing informatics can give rise to some of the sub-components of nursing Informatics, which are even considered the main components by some. These components (nursing science, information science and analytical science) form the sub-components of NI by identifying, defining, managing and communicating it in the nursing practice in the form of data, information, knowledge and wisdom (Fig. 1).

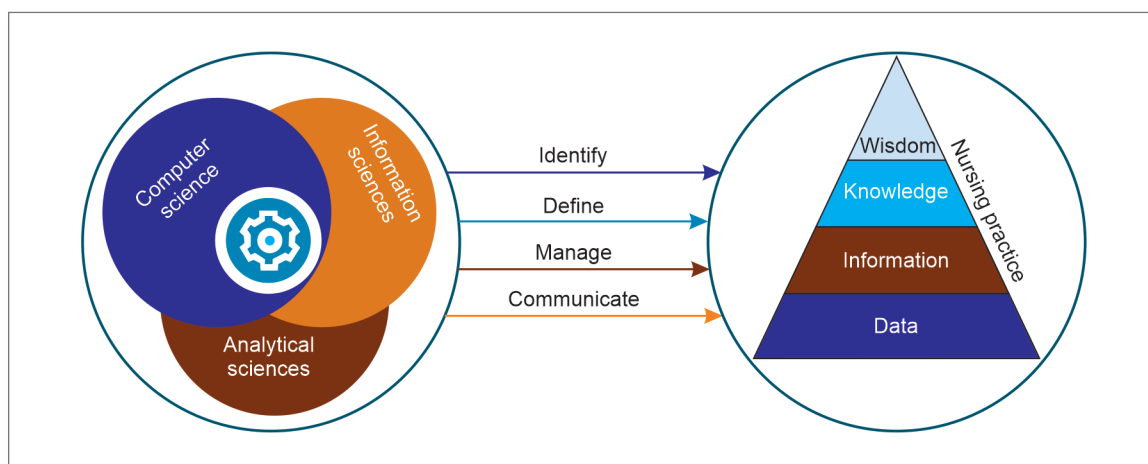


Fig. 1: Components and sub-components of nursing informatics as per American Nurses Association

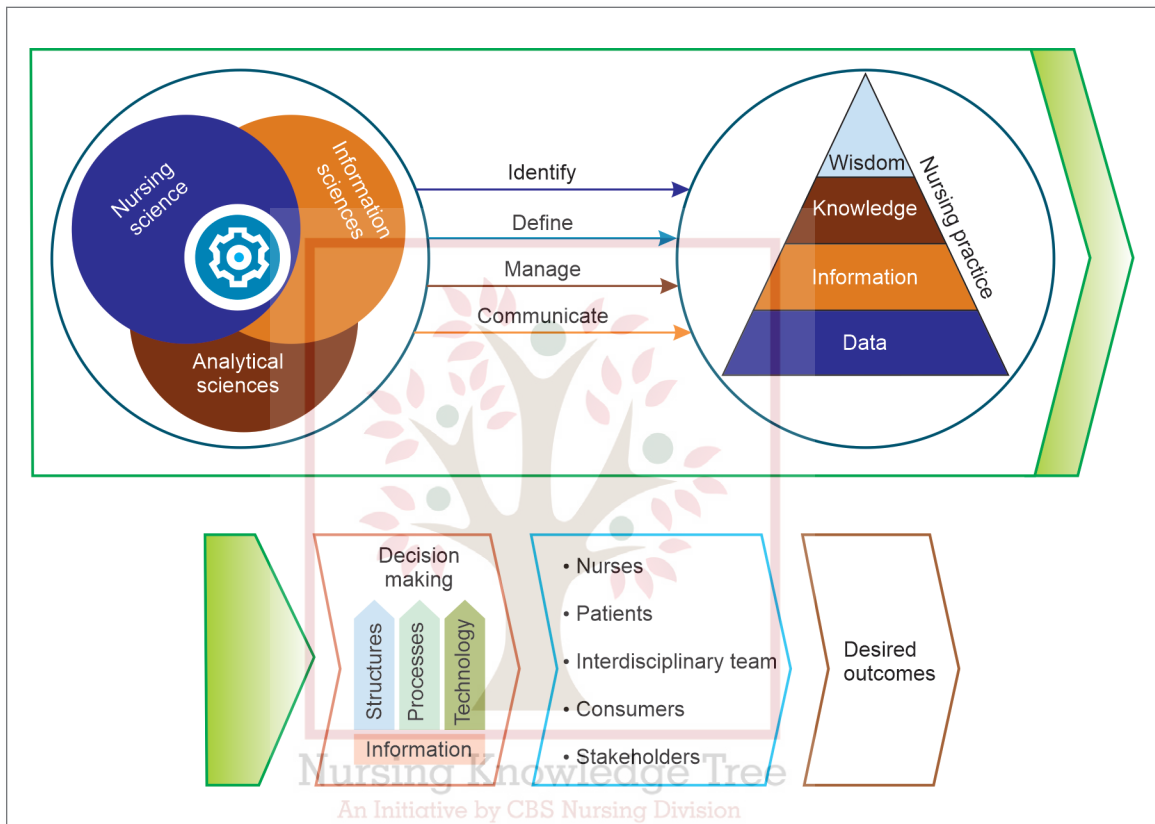


Fig. 2: Application of the components of nursing informatics

Therefore, the sub-components or components (for some informaticians) are:

- Data
- Information
- Knowledge
- Wisdom

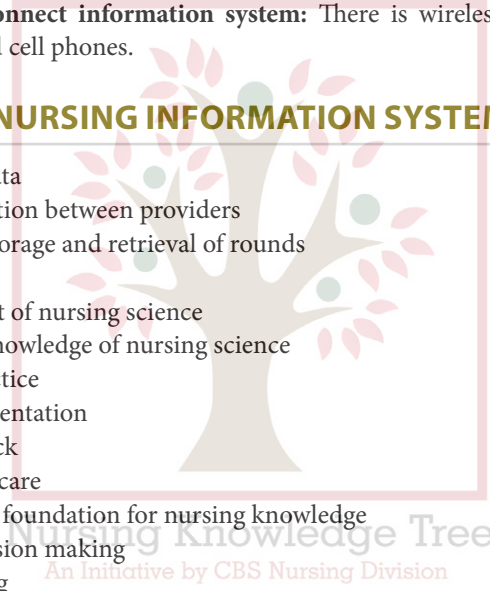
All of these combine to form the informatics pyramid about which we have discussed earlier in this book. These components are quite useful in the clinical practice as it helps in the decision making process to achieve the expected outcomes of the healthcare facility (Fig. 2).

If we consider the perspectives of people from the field of computer science, the components of NI can be:

- **Hardware:** The hardware component includes the physical devices that help in managing the data like input devices (keyboards, mouse, etc.), output devices (printers, VDUs, etc.), CPU, RAM, video card, hard drives, etc.
- **Software:** These are the series of programs that help to perform a specific computer related application. For instance, operating systems, application and programming (word processors, spreadsheets, databases, multimedia applications and communication programs).

- **Network:** Network helps to provide communication and data transfer between two or more computer systems. These can be further divided into:
- **Wide-area network (WAN):** It helps in linking computer users to other users and systems through the telephone company's communication infrastructure. This type of network can support voice, data and image transmission.
- **Local-area network (LAN):** This network usually works within a building or closely grouped set of buildings.
- **Wireless networks connect information system:** There is wireless transmission of data as seen in electrocardiogram and cell phones.

ADVANTAGES OF NURSING INFORMATION SYSTEM

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- Easy accessibility of data
 - Enhances communication between providers
 - Provides easy, quick storage and retrieval of rounds
 - Time saving
 - Assists in development of nursing science
 - Adds to the body of knowledge of nursing science
 - Improves nursing practice
 - Helps in better documentation
 - Provides a quality check
 - Ensures quality based care
 - Offers evidence-based foundation for nursing knowledge
 - Assists in clinical decision making
 - Helps in policy making
 - Defines new role in the nursing profession

DISADVANTAGES OF NURSING INFORMATICS

- Threat to data security
- Over dependency on technology
- Cost consuming
- Needs to be updated time to time
- Special skills required to operate
- Separate IT team required for handling issues
- Accidental loss of data
- Problems of adjustability

So, overall the nursing informatics is a boon for the nursing profession that has enabled the introduction of new technologies in the field of nursing. Understanding of its components is important in order to implement it in the nursing profession and to make the most of it.

NURSING INFORMATION SYSTEM

A **Nursing Information System (NIS)** is a computer-based system that supports nurses in **collecting, recording, managing, retrieving, and communicating patient-related information**. It combines nursing science, information science, and computer technology to improve patient care, clinical decision-making, documentation, communication, and patient safety.

Latest trends in nursing information system are as follows:

- **Electronic nursing documentation:** Nurses can electronically record:
 - Nursing assessments
 - Vital signs
 - Nursing diagnoses
 - Care plans
 - Nursing interventions
 - Patient outcomes
 - Progress notes

This reduces paperwork and improves accessibility of patient information.

- **Electronic medication administration:** NIS can support safe medication administration through:
 - Electronic Medication Administration Records (eMAR)
 - Barcode medication administration
 - Medication alerts
 - Allergy and interaction checks

Example: Before giving a medicine, the nurse scans the patient's identification band and medication barcode to verify the correct patient and medication.

- **Clinical decision support:** Nursing information systems can provide alerts and reminders related to:
 - Abnormal vital signs
 - Medication safety
 - Fall risk
 - Pressure injury risk
 - Infection prevention
 - Clinical protocols

These tools support, but do not replace, professional nursing judgment.

- **Mobile nursing technology:** Nurses increasingly use **smartphones, tablets, and mobile applications** to:
 - Access patient records
 - Document care at the bedside
 - Check medications
 - Communicate with healthcare teams
 - Receive clinical alerts
- **Integration with EHR and hospital systems:** Modern NIS can connect with:
 - Electronic Health Records (EHR)
 - Laboratory systems
 - Pharmacy systems
 - Radiology systems
 - Hospital Management Information Systems

This allows nurses to access relevant information from different departments through a connected system.

- **AI and predictive analytics:** AI-supported nursing systems can help identify:
 - Risk of patient deterioration
 - Fall risk
 - Pressure injury risk
 - Readmission risk
 - Changes in patient condition
- **Nursing dashboards and data analytics:** Digital dashboards can help nurses and nurse managers monitor:
 - Patient workload
 - Staffing requirements
 - Nursing quality indicators
 - Falls
 - Medication errors
 - Infection rates

- **Telehealth and remote nursing:** Nursing informatics supports **telehealth and remote patient monitoring**, particularly for chronic disease management, follow-up care, and patients in remote areas.
- **Cybersecurity and privacy:** Nursing information systems must protect confidential patient information through:
 - Secure login
 - Role-based access
 - Passwords and authentication
 - Encryption
 - Audit trails
 - Secure data storage

Nurses should never share passwords or access records without authorization.

Nursing Applications

A Nursing Information System helps nurses to:

- Assess and document patients.
- Develop and update nursing care plans.
- Record medication administration.
- Monitor patient progress.
- Access laboratory and diagnostic reports.
- Communicate during shift handover.
- Support evidence-based practice.
- Participate in quality improvement.
- Improve patient safety.

Example: A nurse records a patient's vital signs electronically. If the blood pressure or oxygen saturation reaches a critical level, the system can generate an alert, allowing the nurse to assess the patient and take appropriate action.

A **Nursing Information System** combines **nursing, information, and computer science** to support nursing practice.

The latest trends include **Electronic Nursing Documentation, eMAR, Barcode Medication Administration, Clinical Decision Support, Mobile Technology, EHR Integration, AI, Data Analytics, Telehealth, and Cybersecurity.**

Exam Tip

Remember: **NIS = Collect + Record + Manage + Retrieve + Communicate Nursing Information** to support **safe, efficient, and evidence-based patient care.**

Nursing Knowledge Tree
An Initiative by CBS Nursing Division

ASSESS YOURSELF**Short Answer Questions**

1. Define health informatics.
2. What do you mean by the term nursing informatics?
3. Enumerate the advantages of nursing informatics.

Long Answer Questions

1. Write in detail about the components of nursing informatics by ANA.
2. Throw light on the components of nursing informatics other than that given by ANA.
3. Explain in detail about how nursing informatics can be disadvantageous for us. Support your question with appropriate examples

ACTIVITY**Activity for Students**

Activity 1: Make an assignment on challenges in the field of nursing informatics.

Activity 2: Conduct a debate competition of “Nursing Informatics: A Curse or a Boon.”

Activity for Teachers

Activity 1: Help students to understand the working related to nursing informatics

Activity 2: Make students learn through computer assisted programs about the sub-categories of nursing informatics like telenursing.

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