

NURSING INFORMATICS

CHAPTER 2

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**INTRODUCTION TO INFORMATION,
INFORMATION SCIENCE, AND
INFORMATION SYSTEMS**

CHAPTER OBJECTIVES

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1. Reflect on the progression from data to information to knowledge.
2. Describe the term information.
3. Assess how information is acquired.
4. Explore the characteristics of quality information.
5. Describe an information system.
6. Explore data acquisition or input and processing or retrieval, analysis and synthesis of data.

7. Assess output or reports, documents, summaries alerts and outcomes.
8. Describe information dissemination and feedback.
9. Define information science.
10. Assess how information is processed.
11. Explore how knowledge is generated in information science.

CHAPTER INTRODUCTION

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- In this chapter you will be exploring information, information systems and information science.
- As healthcare professionals, nurses are knowledge workers and deal with information on a daily basis.

INFORMATION

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Types of data the nurse deal with:

- 1. Alphanumeric Data:** In the form of patient's name, ID, and Medical Record Number
- 2. Audio Data:** In the form of patient's recorded interview, phone call
- 3. Image Data:** In the form of graphics and pictures such as graphic monitor displays or recorded Electrocardiograms, X-rays, MRIs and CT scans
- 4. Video data:** Refers to animations, moving pictures or moving graphics

Factors compromising data integrity:

1. Human error
2. Viruses
3. Worms, or other bugs
4. Hardware failures or crashes
5. Transmission errors
6. Hackers entering the system

Information technologies solutions:

1. Backing up files on a routine basis
 2. Error detection for transmissions
 3. Developing user interfaces that help people enter the data correctly
- It is imperative that we have clean data if we want quality information.
 - Quality of information is necessary for it to be valuable.

Characteristics of valuable, quality information

1. Accessible
2. Secure
3. Timely
4. Accurate
5. Relevant
6. Complete
7. Flexible
8. Reliable

9. Objective

10. Has utility

11. Transparency

12. Verifiable

13. Reproducible

- We receive information from our computers (output), through our vision, hearing or touch (input), and we respond (output), to the computer (input), and this is how we interface with technology.

INFORMATION SCIENCE

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- This science originated as a sub-discipline of computer science
- Information science impacts information interfacing, influencing how we interact with information, and subsequently develop and use knowledge.
- Healthcare organizations have been profoundly affected by the evolution of information science, and rely on information science to:

1. Enhance the recording and processing of routine and intimate information
2. Facilitating human-to-human and human-to-systems communications
3. Delivery of healthcare products
4. Dissemination of information
5. Enhancing the organization's business transactions.

- Information science has had a tremendous impact on society and will expand its sphere of influence as it continues to evolve and innovate human activities at all levels, especially the nature of our work.

Information science:

Studies everything that deals with information and can be defined as the study of information systems

Information Science:

Information science is a multidisciplinary science that involves aspects from computer science, cognitive science, social science, communication science and library science to deal with obtaining, gathering, organizing, manipulating, managing, storing, retrieving, recapturing, disposing of, distributing or broadcasting information.

Information Science:

Can be thought of as the science of information studying the application and usage of information and knowledge in organizations and the interfacing or interaction between people organizations and information systems

- It is an extensive, interdisciplinary science that integrates features from cognitive science, communication science, computer science, library science and social sciences.

- Information science is primarily concerned with the input, processing, output, and feedback of data and information through technology integration and then applying information technology as needed
- It is systemically based, dealing with the big picture rather than individual pieces of technology.

- Our society is dominated by the need for information and knowledge and information science focuses on systems as well as individual users fostering user-centered approaches that enhance society's information capabilities by effectively and efficiently linking people, information and technology.
- Information science enables the processing of information.

- Humans are organic information systems constantly acquiring, processing and generating information or knowledge both in our professional and personal lives.

Information Processing:

- Information science and computational tools are extremely important in enabling the processing of data, information and knowledge in healthcare.
- The links between information processing and scientific discovery are vital.
- Knowledge must be viable (practical)

- Knowledge viability refers to applications that offer easily accessible, accurate and timely information obtained from a variety of resources and methods and presented in a manner as to provide us with the necessary elements to generate knowledge.
- Knowledge and wisdom are not synonymous since knowledge abounds with others' thoughts and information while wisdom is focused on our own minds and the synthesis of our experience, insight, understanding and knowledge.

INFORMATION SYSTEMS

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- Information technologies help to shape the healthcare organization, in conjunction with the personnel or people, money, materials and equipment.
- In healthcare, information systems must be able to handle the volume of data and information necessary to generate the needed information and knowledge for best practices, the basis of our actions, since our goal is to provide the highest quality of patient care.

Introduction to Information System (ISs)

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- Information systems can be either manually-based or computer-based

Computer Based Information System (CBIS):

Information systems used in the professional arena that are computer based.

- ISs are designed for specific purposes within organizations.

- The IS's capability to disseminate, provide feedback and adjust the data and information based on these dynamic processes are what differentiate them from other computer systems.
- Processing, the retrieval, analysis and/or synthesis of data, refers to the alteration and transformation of the data into helpful or useful information and outputs.

The range of Data Processing

1. Storing data for future use
 2. Comparing the data
 3. Making calculations or applying formulas
 4. Taking selective actions.
- **Output or dissemination** produces helpful or useful information that can be in the form of *reports, documents, summaries, and alerts* or *outcomes*

Reports:

Are *documents* that contain data or information based on a query or investigation designed to yield customized content in relation to a situation and a user group of users or an organization; designed to inform reports may include recommendations or suggestions based on programming and other embedded parameters.

Documents:

Represent information that can be printed saved emailed or shared or displayed; communication in the form of written or text audio video graphic; photographic pictorial or any blending of these means used to describe some characteristics or elements of an object system or practice.

Summaries:

Condensed versions of the original designed to highlight the major points.

Alerts:

Warnings or additional information provided to clinicians to help with decision making; the action of the clinician or system triggers the generation of an alert.

- Example of when an alert could be generated would be if the patient's serum potassium level is high and they are on potassium chloride, the system would alert the nurse on the screen (soft copy alert) with or without audio and/or by a printed (hard copy alert) warning; also know as triggers.

- Documents represent information that can be printed, saved, emailed or shared, or displayed.
- Outcomes are the expected results of input and processing.
- Output devices are combinations of hardware, software and telecommunications and include sound and speech synthesis outputs, printers and monitors.

- Feedback or responses are reactions to the inputting, processing and outputs.
- In ISs, feedback refers to information from the system that is used to make modifications in the input, processing actions or outputs.