Based on **INC Syllabus 2021-22**

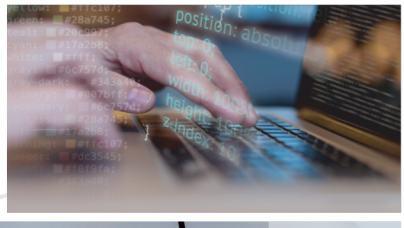
II Semester

Health/Nursing
Informatics & Technology

for BSc Nursing Students

As per the Revised INC Syllabus (2021-22) for BSc Nursing






Special Features

- **200+** Key Terms on computer-related vocabulary
- Enriched with Practical Activity exercises
- **300+** Figures, Screenshots (Windows 11 and 10) and Tables
- Practical tips covered extensively

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L Lakshmi

15

SNOMED CT to ICD-10-CM Map

—*Sathiyapriya V*

LEARNING OBJECTIVES

After the completion of the chapter, the readers will be able to:

- Explain SNOMED CT and Standard Nursing Terminologies.
- Know the difference between SNOMED CT versus ICD-10
- Map SNOMED CT versus ICD-10
- Apply the Standard Nursing Terminologies—NANDA, NOC, Omaha System.

CHAPTER OUTLINE

- Introduction
- SNOMED CT

KEY TERMS

International Classification Diseases (ICD-10): The 10th revision of the International Statistical Classification of Diseases and Related Health Problems—a medical classification list by the World Health Organization.
Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT): SNOMED CT is a terminology that can cross-map to other international terminologies, classifications and code systems.

INTRODUCTION

Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT), a complete health language, is used by physicians and other healthcare workers for the electronic communication of health information. In all contexts of healthcare, it is now the most comprehensive international terminology. Every 6 months, SNOMED CT is updated in the UK.

SNOMED CT

The SNOMED CT is the largest multilingual clinical vocabulary in the world, with over 300,000 concepts and phrases, synonyms, and meanings for both human and nonhuman concepts. It is the most comprehensive, accurate, health terminology in the world, and it is continuously being collaboratively developed to ensure that it serves the different needs and demands of the international medical profession. It facilitates the electronic exchange of clinical health information. It is made simpler by the ability to map to other coding systems, such as ICD-9 and ICD-10. It is recognized as a universal language for medical terms in >50 countries.

Origin of SNOMED CT

A logic-based nomenclature for the medical industry, SNOMED began as a Systematized Nomenclature of Pathology (SNOP) in 1965.

The SNOMED CT was created in 1999 by the fusion of two important healthcare terminologies—SNOMED Reference Terminology (SNOMED RT) and Clinical Terms Version 3.

- A controlled coded clinical terminology for use in electronic health records (EHRs)
  - Developed in the USA and the UK by:
    - College of American Pathologists in USA
    - National Health Service in the UK
- Design based on:
  - Identified user requirements
  - Practical experience
  - Scientific principles established in peer reviewed publications.
- First released in 2002
- All rights and administration transferred for the public good to IHTSDO in 2007.
- Earlier systematized nomenclature for medicine (SNOMED) Clinical Terms (CT), now simply SNOMED Clinical Terms.

The SNOMED CT is currently considered as the most comprehensive, multilingual, clinical health care terminology in the world, with >300,000 concepts and a million relationships.

Access to SNOMED CT

The SNOMED CT can be accessed by:

- Anyone with an affiliate license can utilize SNOMED CT (free for all member countries)
- 40 nations with poor incomes (defined by the World Bank)
- Research, humanitarian, and charitable projects that qualify
- Currently 27 countries are members of International Health Terminology Standards Development Organizations (IHTSDO)

- The clinical terminology is used in >50 countries
- India became a member in April 2014
- It is represented by e-Governance Division, Ministry of Health and Family Welfare, Government of India
- Interim National Release Center (NRC) was created at C-DAC, Pune in September 2014.

SNOMED CT can be integrated and used as follows:

A code system	To store clinical information
An interface terminology	To capture and display clinical information
An indexing system	To retrieve clinical information
A common terminology	• To communicate in a meaningful way • To integrate heterogeneous data
A dictionary	To query, analyze and report

Scope of SNOMED CT

It is the richest vocabulary available to describe clinical findings, diseases, procedures, etc. It contains >365,000 concepts, almost 1 million descriptions and nearly one and a half million relationships. SNOMED CT aims at transmitting all concepts that have been expressed throughout history in the healthcare domain, unambiguously. SNOMED CT concepts are divided into 19 hierarchies (Fig. 15.1).

SNOMED CT concept

1. Body structure (body structure)
2. Clinical finding (finding)
3. Environment or geographical location (environment/location)
4. Event (event)
5. Observable entity (observable entity)
6. Organism (organism)
7. Pharmaceutical/biologic product (product)
8. Physical force (physical force)
9. Physical object (physical object)
10. Procedure (procedure)
11. Qualifier value (qualifier value)
12. Record artifact (record artifact)
13. Situation with explicit context (situation)
14. SNOMED CT Model Component (metadata)
15. Social context (social concept)
16. Special concept (special concept)
17. Specimen (specimen)
18. Staging and scales (staging scale)
19. Substance (substance)

Figure 15.1: Hierarchies in SNOMED CT

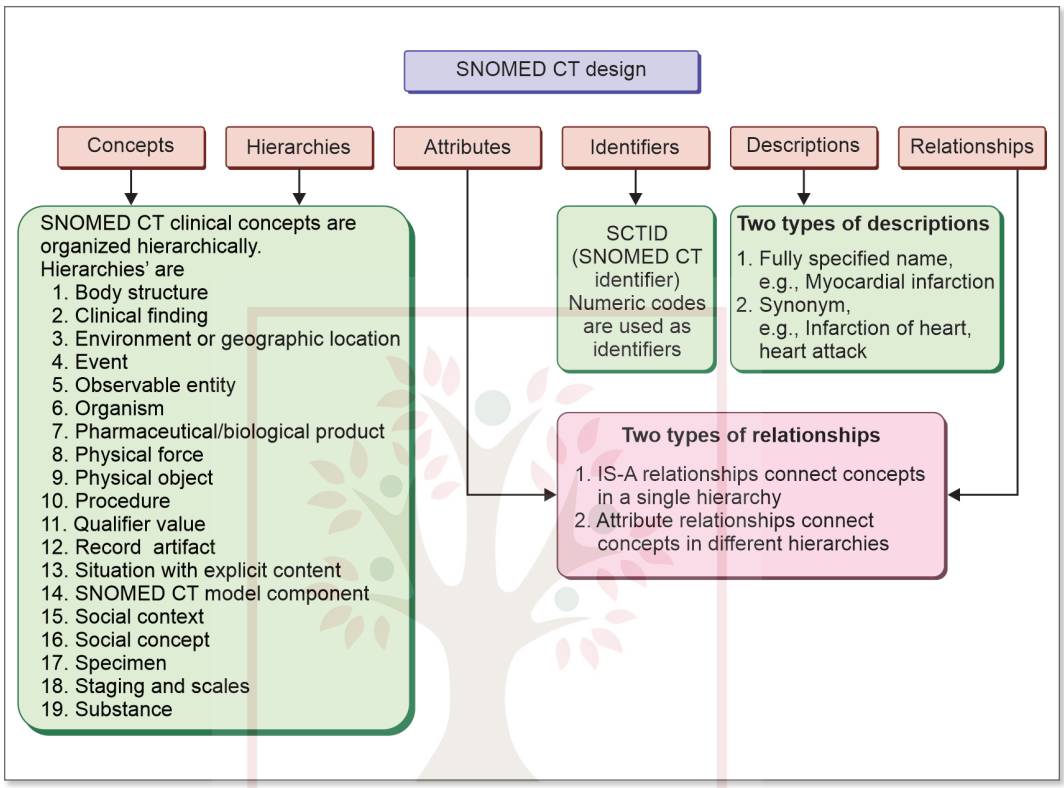


Figure 15.2: Design of SNOMED CT

Design of SNOMED CT

The design of SNOMED CT is as shown in Figure 15.2. Every coded concept is linked to related concepts:

- Multiaxial subtype hierarchy ('is a' relationships)
- Logical definitions (attribute relationships)
- The example is shown as follows (Fig. 15.3):

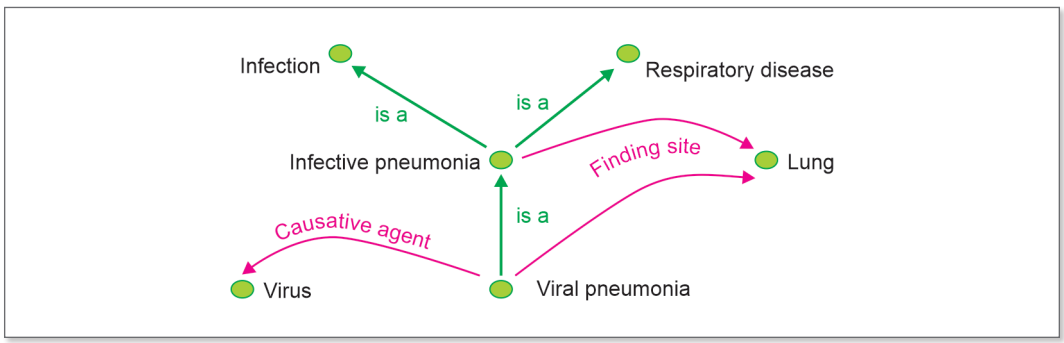


Figure 15.3: Example of SNOMED hierarchy

Concepts: The concepts are represented by a unique human-readable Fully Specified Name (FSN).
Descriptions: The descriptions are human readable terms or names assigned to a SNOMED CT concept. The descriptions are of two types:

1. Fully Specified Name (FSN)
2. Synonym

Descriptions can be preferred or acceptable according to the language dialect used.

Relationships: Relationships link concepts in SNOMED CT.

Expressions:

- **Precoordinated expression:** Representation of a clinical meaning using a single concept identifier is referred as a precoordinated expression.
- **Postcoordinated expression:** Representation of a clinical meaning using a combination of two or more concept identifiers is postcoordination.

SNOMED CT Additional Components

- **Subsets and reference sets:** A set of concepts, descriptions, or relationships form the international edition that is appropriate to support particular requirements or implementations.
- **Extensions:** The international edition contains the core content of SNOMED CT. Extensions can be added to the international edition to meet specific national or local needs.
- **Cross maps:** Mapping of concepts to other international standards and classifications such as ICD or LOINC.

Technical Aspects of SNOMED CT

- A SNOMED CT affiliate license is required to obtain the released files
- SNOMED CT international release files are released biannually (in January and July).
- Three release file types exist:
    1. **Snapshot:** Containing the current version of every component
    2. **Full:** Containing the complete history of every component
    3. **Delta:** Containing only the additions and changes since the previous release.

The snapshot type is recommended to use in applications. All release files are UTF-8 encoded tab-delimited text files. Data in these files need to be imported in relevant tables in database.

SNOMED CT Contains Four Types of Files

1. **Concept file:** Codes for object identification
2. **Description file:** Clarifying phrase.
3. **Relationship file:** The lateral association of related ideas
4. **Hierarchy file:** Vertical (hierarchical) structure

Clinical Aspects of SNOMED CT

Clinical ideas are complex and interrelated. SNOMED CT is based on the practical experiences and scientific principles. It:

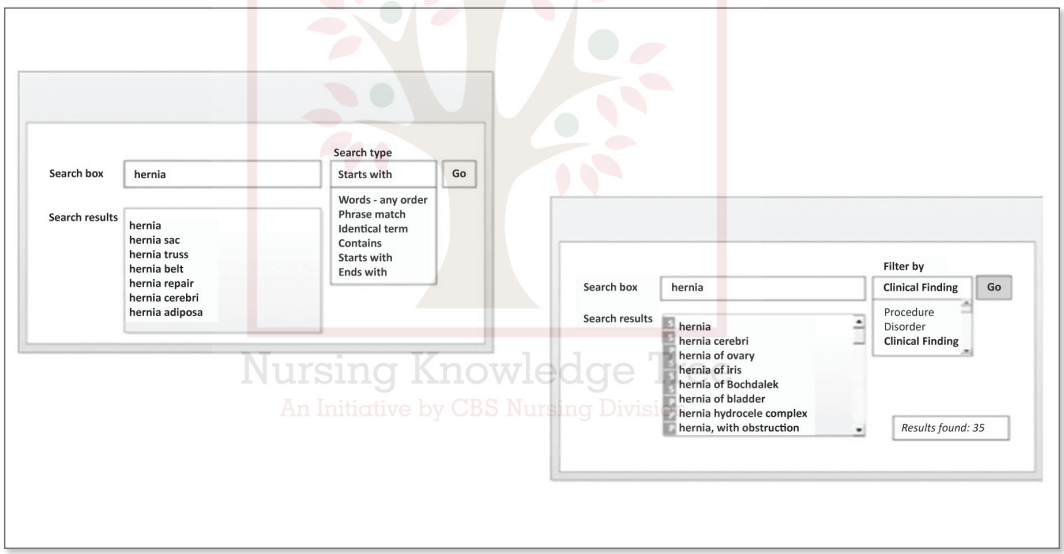
- Provides comprehensive coverage of broad clinical scope.
- Is designed for practical experience and is based on scientific principles.

- Adds value with a concept model that locates clinical ideas which are relative to one another and these support computable semantics making meaningful retrieval.
- Has observable entity that represents assessment which can produce objective result, e.g., blood pressure, color of conjunctiva.
- Situation with explicit context, which includes whether a condition is present or absent, whether a clinical result is recent, historical or related to someone other than the subject of the record. For examples, colonoscopy, prior history of hypertension, and cataract in the family.
- Shares information taking advantage of the global terminology.
- Provides user interface that simplifies capture of clinical ideas.

Drawback: Clinicians have to remember the codes to get relevant descriptions.

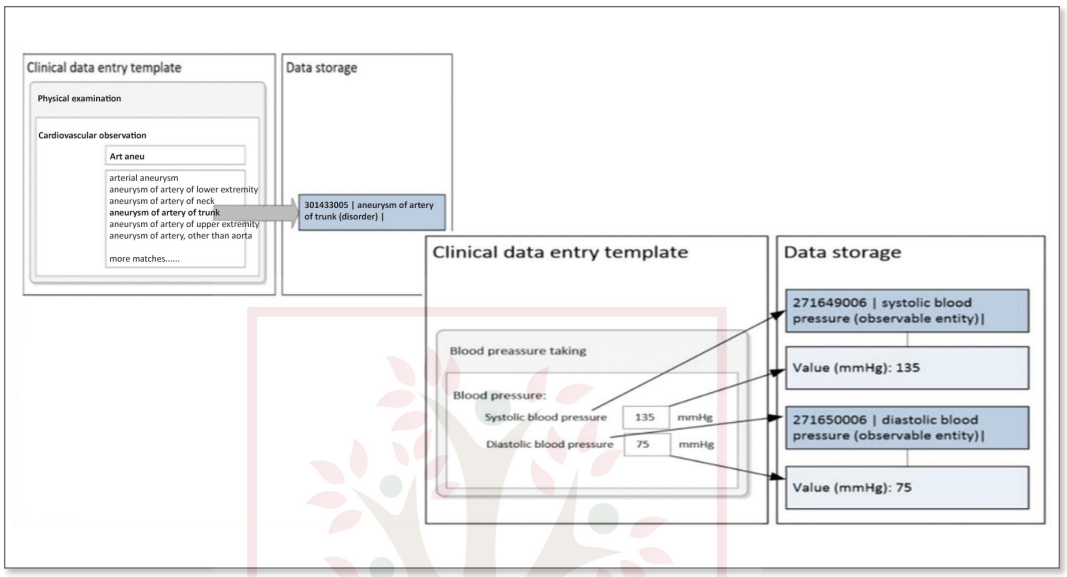
Using SNOMED CT

Following screenshots are added here to show you how the interface of SNOMED CT looks.



Uses of SNOMED CT

- Gathering clinical data.
- Used to decrease errors when entering clinical information about patients into electronic patient records.
- Combining different data into a single record.
- Prevents using ineffective diagnostic procedures and treatments.
- Enables effective and high-quality healthcare delivery.
- Allows data to be stored in a way that is both computer and human readable.
- Jointly created to meet the various demands and standards of the global medical community.
- Aids in the communication of clinical health information electronically.
- Contains clinical material with scientific validation.



SNOMED CT versus ICD

Healthcare professionals utilize SNOMED CT directly while giving care, but coding specialists use ICD-10 once patient care has been provided. The comparison between SNOMED CT and ICD-10 is given as follows:

ICD	SNOMED CT
Simple—meaning-based code system for disease, has ambiguity	Complex—concept-based code system covering every clinical aspect and unambiguous
Useful for statistical studies	Useful for all types of studies and automation
Long intervals between releases	Short interval between releases
Easy to implement	Difficult to implement
Difficult to upgrade	Easy to upgrade
End-user training required	No end-user training required

For example:

ICD-10 Code: K57.5 Description: Diverticular disease of both small and large intestines without perforation or abscess
SNOMED CT Code: 197091007 | diverticular disease of both small and large intestines without perforation or abscess | *[equivalent precoordinated expression]*
SNOMED CT Code is the equivalent precoordinated expression of ICD-10 Code.

SNOMED CT TO ICD-10-CM MAP

Mapping means making a map or associating two particular concepts, terms or terminologies. SNOMED CT can be mapped to other standardized terminologies. The goal of the SNOMED CT to ICD-10-CM map is to provide semi-automatic coding of data from hospital record that is encoded in SNOMED CT for ICD-10 statistical categorization.

It is not always possible to find a one-to-one correspondence between a SNOMED CT concept and an ICD10-CM code. One SNOMED CT concept may require multiple ICD-10-CM codes to fully represent its meaning. Sometimes, the same SNOMED CT concept can be mapped to several alternative ICD-10-CM codes, depending on patient context and comorbidities. In SNOMED CT, these three conditions are assigned with three codes.

1. 59455009 Metabolic acidosis
2. 12326000 Respiratory acidosis
3. 91273001 Lactic acidosis

While in ICD-10-CM, all three conditions are coded with a same single code E87.2 Acidosis.

Take Away

We have deliberate about SNOMED CT design, it is a commonly used terminology that has formal logic-based definitions arranged in hierarchies and extensive active concepts. Incorporation of such a comprehensive terminology in Electronic Health Record requires understanding of the underlying concept model, various levels at which clinical information can be effectively represented, and cross-mapping to other international vocabulary standards. SNOMED CT is used to ensure high quality healthcare delivery.

SUMMARY

- SNOMED CT is used to record clinical data in an electronic format to reduce errors.
- SNOMED CT, a complete health language, is used by healthcare workers for the electronic communication of health information.
- In all contexts of healthcare, it is now the most comprehensive international terminology.

STUDENT ASSIGNMENT

LONG ANSWER QUESTION

1. Write in detail about the SNOMED CT and it is design.

SHORT ANSWER QUESTION

1. Write short note on:
   a. Uses of SNOMED CT.

MULTIPLE CHOICE QUESTIONS

1. Which of the following are NOT SNOMED CT components?

a. Concepts
b. Subsets
c. Descriptions
d. Relations

2. Meaning-based retrieval of clinical data is made possible by SNOMED CT.

a. True
b. False
c. Don't know
d. All of these

3. How many files are there in SNOMED CT?

a. 7
b. 4
c. 6
d. 2

ACTIVITIES

Activity for Teacher

1. Divide the whole class students into small groups. Give each group one condition and tell them to do mapping with the help of the codes in ICD-10 and SNOMED CT.

Activity for Student

1. Students should do mapping of ICD-10 with SNOMED CT with the given condition.

ANSWER KEY

1. b **2.** a **3.** b

Health/Nursing

Informatics & Technology for BSc Nursing Students

Salient Features

- Special focus on the evolving role of computers in the healthcare industry, with detailed insights aligned to current trends in nursing practice.
- Concepts are explained with practical relevance to the nursing field, making it easier for students and professionals to relate theory to real-world applications.
- The book covers everything from the basics of computers to their advanced applications in healthcare, presented in a clear and accessible style.
- Includes a comparative analysis of Windows 10 and Windows 11, helping readers understand the key differences and enhancements in the newer version.
- Special emphasis is placed on the use of statistical software tools commonly used in nursing research and data analysis.
- Contains practical exercises and activities designed for both teachers and students to enhance experiential learning and deepen conceptual understanding.

Important **Learning Objectives** in the beginning of every chapter are given to help readers understand the purpose of the chapter.

LEARNING OBJECTIVES

After the completion of the chapter, the readers will be able to:

- Define Windows, Microsoft Office, Internet, Literature search, Statistical package.
- Explain the usage of Windows, MS Office, MS Word, MS PowerPoint and MS Excel for nurses.

Chapter Outline is given in the beginning of every chapter to provide the readers a glimpse of entire chapter.

CHAPTER OUTLINE

- Introduction
- Role of Computers in Teaching and Learning
- Use of Computers in Learning
- Use of Computers in Nursing Research
- Relevance of Computers in Nursing

Important **Key Terms** used in the chapter are presented to familiarize the readers with the important terminologies.

KEY TERMS

Academic and research activities: Academic research entails a detailed inquiry into the body of knowledge regarding a certain issue.
Accounting: Activity or process of maintaining financial records.

Relevance in Nursing boxes cover applied aspects of clinical situations.

Relevance in Nursing

A patient is being prepared for the procedure, as per the protocol, the patient has to take a shower before the procedure.
The patient may be allergic to using a particular soap.

Numerous **Tables** and **Figures** are used to clarify the concept and make the reading enjoyable and informative.

TABLE 2.1: Versions of Windows and release years

Sl. no.	Versions	Years
1.	Windows 11 (Fig. 2.1)	2021
2.	Windows 10 (Fig. 2.2)	2015
3.	Windows 8	2012
4.	Windows 7	2009
5.	Windows Vista	2007

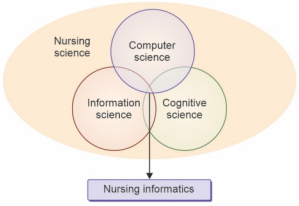


Figure 7.1: Turley's model for nursing informatics

Giving extra edge to the study, **Take Away** boxes have been included at the end of every chapter.

Take Away

Computers have taken on a highly sophisticated position in the field of nursing for their versatile action in various fields like nursing education, practice research, and administration that tremendously help nursing practice, globally.

Summary at the end of each chapter has been given for a quick glance over the concepts in one go.

SUMMARY

- The use of computers in the field of teaching and learning has created a greater impact.
- Computer serves as a biggest innovation in education sector.

At the end of chapters, **Student Assignment** section is given which contains frequently asked questions in exams and multiple choice questions to help students attain mastery over the subject.

STUDENT ASSIGNMENT

LONG ANSWER QUESTION

1. Explain in detail the applications of computer in nursing.

SHORT ANSWER QUESTION

1. Write short notes on:
   a. Patient management system

About the Author

L Lakshmi, BSN, RN, RM, MSN, PhD (N), has been holding the position of Professor cum Dean at Sathyabama College of Nursing, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, since May 2019. With a distinguished career in nursing education and leadership, she previously held the positions of Principal at Chettinad College of Nursing, Chengalpattu, and Vel R S College of Nursing, Chennai. Additionally, she has held various roles at SRM College of Nursing, Chengalpattu. She earned her BSc (1989) from Annamalai University, MSc (1997) from Manipal Academy, and PhD (2016) from Chettinad Academy.

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