



Leading healthcare  
terminology, worldwide

# SNOMED CT Clinical Implementation Guide for the Nutrition Care Process Terminology

0.1

DRAFT

Publication date: 2024-11-18

Web version link: <http://snomed.org/nutrition>

SNOMED CT document library: <http://snomed.org/doc>

This PDF document was generated from the web version on the publication date shown above. Any changes made to the web pages since that date will not appear in the PDF. See the web version of this document for recent updates.



Leading healthcare terminology, worldwide

DRAFT



Leading healthcare terminology, worldwide

DRAFT

# Table of Contents

Executive Summary .....	2
<b>1. Introduction.....</b>	<b>3</b>
Background .....	3
Objective.....	4
Scope .....	4
Audience.....	4
Attribution .....	5
Guide Overview .....	5
Review .....	6
<b>2. What is NCP and NCPT? .....</b>	<b>7</b>
Nutrition Care Process Model (NCPM) .....	7
Nutrition Care Process Terminology (NCPT) .....	10
SNOMED CT NCPT Reference Set .....	11
<b>3. Clinical Use Cases.....</b>	<b>16</b>
Use Case 1: Interoperable nutrition care utilizing the Nutrition Care Process Model and standardized terminology .....	16
Use Case 2: Transitions of care include continuity of nutrition care across settings. How does the information follow the patient.....	20
Use Case 3: Facilitating Clinical Decision Support and Research .....	20
<b>4. SNOMED CT Content .....</b>	<b>23</b>
History .....	23
Benefits of SNOMED CT .....	23
SNOMED CT Content for NCPT .....	23
Nutrition Assessment and Reassessment.....	24
Nutrition Diagnosis .....	26
Nutrition Interventions .....	29
Nutrition Monitoring and Evaluation .....	31
<b>5. Information Models and Terminology Binding.....</b>	<b>33</b>
Implementation and Flexibility in Clinical Guideline Application .....	33
Logical Model .....	35
General Terminology Bindings.....	37
HL7 FHIR and NCPT .....	42
<b>6. Technical Application .....</b>	<b>55</b>
Implementation Approaches and Considerations .....	55
Translating Reference Set Members .....	58

Accessing the NCPT Reference Set.....	59
Deploying the NCPT Reference Set .....	60
Using the NCPT Reference Set.....	63
<b>Appendices .....</b>	<b>66</b>
Appendix A: How to Learn More .....	66
Appendix B: Glossary of Terms .....	66
Appendix C - International Standards and Resources .....	67

The logo for SNOMED International, featuring the word "SNOMED" in a large, bold, white sans-serif font above the word "International" in a smaller, white sans-serif font, both set against a solid blue rectangular background.

Leading healthcare  
terminology, worldwide

The SNOMED CT Implementation Guide for the Nutrition Care Process Terminology offers comprehensive guidance for healthcare providers, information managers, and software developers to standardize documenting nutrition and dietetics care. It includes five chapters that introduce the guide, provide key use cases, elaborate on SNOMED CT terminological needs, introduce HL7 FHIR for data exchange, and present technical considerations for implementation. This guide is beneficial for healthcare providers, information managers, and software developers interested in integrating SNOMED CT into workflows within the domain of nutrition and dietetics care.

**Users may submit and contribute new content (e.g. use cases and/or implementation experiences), comments, and questions using the Feedback option located at the bottom of each web page.**

Web browsable version: <http://snomed.org/>

SNOMED CT Document Library: <http://snomed.org/doc>

© Copyright 2024 International Health Terminology Standards Development Organisation, all rights reserved.

This document is a publication of International Health Terminology Standards Development Organisation, trading as SNOMED International. SNOMED International owns and maintains SNOMED CT®.

Any modification of this document (including without limitation the removal or modification of this notice) is prohibited without the express written permission of SNOMED International. This document may be subject to updates. Always use the latest version of this document published by SNOMED International. This can be viewed online and downloaded by following the links on the front page or cover of this document.

SNOMED®, SNOMED CT® and IHTSDO® are registered trademarks of International Health Terminology Standards Development Organisation. SNOMED CT® licensing information is available at <http://snomed.org/licensing>. For more information about SNOMED International and SNOMED International Membership, please refer to <http://www.snomed.org> or contact us at [info@snomed.org](mailto:info@snomed.org).

## Executive Summary

The **SNOMED CT Implementation Guide for NCPT (Nutrition Care Process Terminology)** offers practical guidance and tools for professionals to effectively integrate SNOMED CT in nutrition and dietetics care. This guide is designed as a valuable resource for clinicians and technical implementers, providing clear, actionable steps to standardize SNOMED CT implementation within nutrition care processes. It emphasizes the **NCPT (Nutrition Care Process Terminology) reference set** as a key strategy for enhancing documentation quality in this field.

The guide is organized into chapters, beginning with an introduction that outlines essential background, scope, and target audience. **Chapter 2** provides an overview of the Nutrition Care Process (NCP) Model and its accompanying terminology (NCPT), which is supported by several countries. **Chapter 3** presents use cases that inspired this guide, illustrating clinical scenarios where SNOMED CT implementation benefits nutrition and dietetics care. **Chapter 4** describes the SNOMED CT concepts used to document each of the four steps in the NCP Model: nutrition assessment and reassessment, diagnosis, intervention, and monitoring and evaluation.

Chapters 1 through 4 are intended for clinicians, as well as technical and informatics professionals. The final chapters, **Chapter 5** (Information Models and Terminology) and **Chapter 6** (Technical Application), provide in-depth technical guidance on terminology, information models, and nutrition-related standards, crucial for professionals involved in SNOMED CT technical and software implementation projects.

Appendices provide additional resources, including guidance for clinicians and professionals seeking further understanding of SNOMED CT terminology and related topics.

SNOMED International aims to develop a web-based demonstration tool (“demonstrator”) to illustrate the guide’s principles and techniques in practice.

This guide is relevant to healthcare providers, information managers, and software developers interested in learning how SNOMED CT can support documentation, clinical decision support (CDS), and interoperability in nutrition and dietetics care. Information managers can see how SNOMED CT integrates within health information models, and software developers can understand how to embed SNOMED CT in applications and enable clinical data exchange using [HL7 FHIR](#) (Fast Healthcare Interoperability Resources).

The guide, initiated by the NCPT Project Group in 2017 and advanced by the SNOMED International Nutrition and Dietetics Clinical Reference Group (CRG) since 2023, provides comprehensive, practical guidance for integrating SNOMED CT into workflows within nutrition and dietetics. The CRG oversees the content to ensure accuracy and relevance, with contributions from SNOMED International’s implementation support team for the technical chapters.

# 1. Introduction

## Background

Most nutrition and dietetics professionals work in settings where they treat people (either clients or patients or groups) through medical nutrition therapy (MNT) to manage or prevent nutrition-related disease.

The Nutrition Care Process Model (NCPM) is a concise roadmap for professionals who provide nutrition and dietetics care. The NCPM embraces people-centered care and has been evolving since 2003 to become the international standard for nutrition and dietetics care delivery. The NCPM encourages the use of standardized terminology. Standardized terminology is necessary for data to follow the patient across settings (e.g. all data from an acute care unit is transmitted as documented to a community care setting).

The documentation and exchange of coded nutrition and dietetics care data vary across electronic health records (EHRs). This renders the exchange (or interoperability) of nutrition and dietetics care data across electronic systems challenging at best. The lack of interoperability limits the aggregation of nutrition and dietetics care data for informed clinical decision support. It also hinders the ability to research the effectiveness of nutrition care and resulting health outcomes. The documentation of nutrition and dietetics care data must be clearly defined in EHRs to support patient health, safety and a comprehensive health record.

Entry points to the NCP (i.e. initiation of nutrition and dietetics care by a nutrition and dietetics professional) are typically screening and/or referral systems. The NCP framework (or NCPM) for nutrition care was designed and approved by the Academy of Nutrition and Dietetics (AND) in 2003. Since then, the Academy of Nutrition and Dietetics has collaborated with many international dietetic associations to revise, evolve and adopt the NCPM in its current form. Also, alternate iterations of the NCPM have since been used and exist. From an international perspective, this demonstrates and solidifies the usability and adaptability of the NCPM going into the future.

In the NCPM, there are four steps:

- Nutrition Assessment and Reassessment
- Nutrition Diagnosis
- Nutrition Intervention
- Nutrition Monitoring and Evaluation

Nutrition and dietetics professionals frequently use the Nutrition Care Process Terminology (NCPT) to communicate the Nutrition Care Process. The NCPT is a standardized terminology that complements the NCP, communicates the functions of nutrition and dietetics professionals, and facilitates research on the outcomes of nutrition and dietetics care.

In its majority, the NCPT (edition 2020) has been integrated into SNOMED CT as a result of many international nutrition and dietetics organizations working collaboratively with the Academy of Nutrition and Dietetics and SNOMED International. The first iteration of SNOMED CT's NCPT reference set (released in April 2024) contained the concepts that document Nutrition Diagnosis in the NCP (166 concepts), ([related press release](#)). The current SNOMED CT NCPT Reference Set (released in April 2025) contains updated nutrition problems and the addition of nutrition intervention terms mapped to SNOMED CT. Nutrition assessment and monitoring and evaluation terms will also be added (April 2026, as time and resources permit). This last addition will complete the currently planned content to the reference set.

In a healthcare environment that evolves rapidly, the vision for the NCP and NCPT is to make possible communication within and across healthcare systems for quality care and outcomes research. Implementation strategies should include the development of resources like the present implementation guide, education and training, leadership support, and change-management approaches.

Standards Development Organizations (SDOs), like HL7, in collaboration with the Academy of Nutrition and Dietetics have developed standards and provided guidance to assist implementers, however specific guidance in using and implementing SNOMED CT in the context of nutrition care is limited. The present implementation guide fills this gap.



## Objective

The objective of the SNOMED CT implementation guide for Nutrition Care Process Terminology (NCPT) is to support standardized practices and terminology for documenting nutrition and dietetics care data within Electronic Health Records (EHRs), specifically describing the four steps of the Nutrition Care Process (NCP) Model:

- Nutrition Assessment and Reassessment
- Nutrition Diagnosis
- Nutrition Intervention
- Nutrition Monitoring and Evaluation

This guide aims to improve consistency, and quality of nutrition care data documentation and exchange across electronic systems (interoperability), facilitating informed clinical decision support, research on the efficacy of nutrition care, and enhancing patient health, safety, and comprehensive health record management.

The guide operationalizes the utilization of the SNOMED CT NCPT (Nutrition Care Process Terminology) reference set to enhance the quality of documentation and care in this vital domain.

SNOMED International aims to create a demonstration tool to showcase the principles and techniques elucidated in the guide.

## Scope

The scope of the work presented in this guide includes:

1. Review standards on nutrition and dietetics care
2. Analyze relevant information models
  - a. Review existing information models that are in scope, with emphasis on HL7® FHIR® resources that have gained wide adoption in recent years
3. Provide typical use cases
  - a. Describe common and important scenarios for capturing or exchanging nutrition care data
  - b. Illustrate how the information can be represented by using FHIR® and SNOMED CT concepts
4. Support use of the SNOMED CT NCPT refset and explain how it facilitates implementation of SNOMED CT
  - a. Identify **SNOMED CT NCPT refset** concepts used to define nutrition and dietetics care
  - b. Identify existing **value sets** for specific applications and standards e.g., malnutrition assessment
5. Provide practical guidance on the use of SNOMED CT in nutrition care as it pertains to the implementation of the following:
  - a. Problem list (this edition)
  - b. Intervention list (this edition)
  - c. Assessment, Monitoring and Evaluation list (future edition)
  - d. Clinical decision support (future edition)

## Audience

SNOMED CT is a comprehensive, multilingual clinical terminology that can be used to standardize and improve the quality of data related to nutrition and dietetics care. This guide is targeted at the various stakeholders involved with the implementation of SNOMED CT:

- [SNOMED International Members](#) who are seeking uniform, clear best practices for documenting nutrition and dietetics care, and understanding how SNOMED CT can be applied in this domain.

- **Clinicians and other healthcare professionals** (such as hospital administrators and managers) who are interested in understanding how SNOMED CT can support the clinical needs for data collection and acquisition within the field of nutrition and dietetics care; and how SNOMED CT can facilitate communication within a collaborative team where the client is included.
- **Information managers** who are looking to learn how SNOMED CT can be integrated into health information models within the domain of nutrition and dietetics care to support the implementation of SNOMED CT and enhance data interoperability.
- **Software developers** who want to learn how to integrate SNOMED CT into software applications used in the domain of nutrition and dietetics care.

## Attribution

This SNOMED CT Implementation guide and the underlying work have been developed by the [Nutrition and Dietetics Clinical Reference Group](#). The Clinical Reference Group (CRG) is composed of experts in the field of **nutrition and dietetics** providing input from the community of practice on the development, maintenance, and use of SNOMED CT in this specific domain. The CRG members have been instrumental in the development of this guide, providing their expertise, knowledge, and experience to ensure that it is accurate, up-to-date, and relevant to the needs of its intended audience. Their dedication and hard work have made this guide possible and SNOMED International is grateful for their contributions. This guide is a product of SNOMED International's ongoing commitment to improving healthcare through the use of high-quality, standardized clinical terminologies.

Authors: Constantina Papoutsakis, William Swan, Angela Vivanti, Ylva Orrevall, Lindsay Woodcock, Anne Randorff Højen, Elaine Wooler, Alejandro Lopez Osornio.

Add additional attributions: Acknowledgement to the Academy of Nutrition and Dietetics

## Guide Overview

This SNOMED CT Implementation Guide is designed to provide guidance for the use of SNOMED CT within the domain of nutrition and dietetics care. The guide is organized into the following main chapters:

- Chapter 1: **Introduction** - This chapter provides a background on the guide, including the objectives, scope, and target audience.
- Chapter 2: **What is NCP and NCPT?** - This chapter provides basic information on the Nutrition Care Process (NCP) Model (NCPM) and NCP Terminology (NCPT).
- Chapter 3: **Clinical Use Cases** - This chapter describes the key use cases that have motivated the creation of this guide and explains scenarios where implementation of SNOMED CT within this domain is needed.
- Chapter 4: **Content in SNOMED CT** - This chapter describes how SNOMED CT addresses the terminological needs within the domain of **nutrition and dietetics**. It also elaborates on the major types of related concepts and relative templates that exist in SNOMED CT.
- Chapter 5: **Information Model and Terminology Binding** - This chapter introduces a generic logical model for nutrition care records, and general terminology bindings, so that healthcare organizations can ensure data are recorded with precision and utilized effectively.
- Chapter 6: **Technical Application** - This chapter presents technical considerations related to the SNOMED implementation of NCPT including accessing, deploying, and using the SNOMED CT NCPT reference set.

In addition, a number of appendices present additional information and insights into the terms used in this document, and references to relevant resources.

## Review

This SNOMED CT Implementation guide represents the culmination of work started by the Implementation SIG in 2014 and continued by the [Nutrition and Dietetics Clinical Reference Group](#) starting in 2023.

We welcome feedback from readers on the guide and encourage them to share their insights and experiences with us. Your comments and suggestions will help us improve the content of the guide and ensure that it is relevant and useful to those who use it. We will review any feedback received and make updates to the guide as needed.

We appreciate your interest in this guide and thank you for your contributions to the improvement of healthcare through the use of high-quality, standardized clinical terminologies like SNOMED CT. Please raise any comments to this document via the feedback button (At the bottom of the page).

## REFERENCES

Lloyd L, Swan WI, Jent S, Vivanti A, Pertel DG. Worldwide Release of SNOMED CT Nutrition Care Process Terminology Problem List. *J Acad Nutr Diet.* 2024 Apr;124(4):531-534.

Swan WI, Vivanti A, Hakel-Smith NA, Hotson B, Orrevall Y, Trostler N, Beck Howarter K, Papoutsakis C. Nutrition Care Process and Model Update: Toward Realizing People-Centered Care and Outcomes Management. *J Acad Nutr Diet.* 2017 Dec;117:2003-14.

Swan WI, Pertel DG, Hotson B, Lloyd L, Orrevall Y, Trostler N, Vivanti A, Howarter KB, Papoutsakis C. Nutrition Care Process (NCP) Update Part 2: Developing and Using the NCP Terminology to Demonstrate Efficacy of Nutrition Care and Related Outcomes. *J Acad Nutr Diet.* 2019 May;119:840-55.

## 2. What is NCP and NCPT?

Effective nutrition and dietetics care delivery hinges on a structured approach that ensures consistency, quality, and personalized attention. This chapter introduces the **Nutrition Care Process (NCP) Model** and its associated **Nutrition Care Process Terminology (NCPT)**, a pivotal framework and standardized language designed to help professionals deliver tailored nutrition and dietetics care. The NCP and NCPT have been developed and continually refined over years through global collaboration, led by the **Academy of Nutrition and Dietetics (AND)**, with input from numerous dietetic associations around the world.

Additionally, the chapter will introduce the **SNOMED CT NCPT Reference Set**, which further enhances the ability of healthcare professionals to standardize and integrate nutrition and dietetics care into broader clinical systems, supporting interoperability and comprehensive patient care across settings.

At present, the SNOMED CT NCPT Reference Set (release of April 2024) contains the "problems" or nutrition diagnoses of the NCPT (edition 2020). Future iterations will include progressively more sections of the NCPT. The plan is to add next the nutrition intervention terms of NCPT, and last the nutrition assessment, monitoring and evaluation terms of NCPT.

### Nutrition Care Process Model (NCPM)

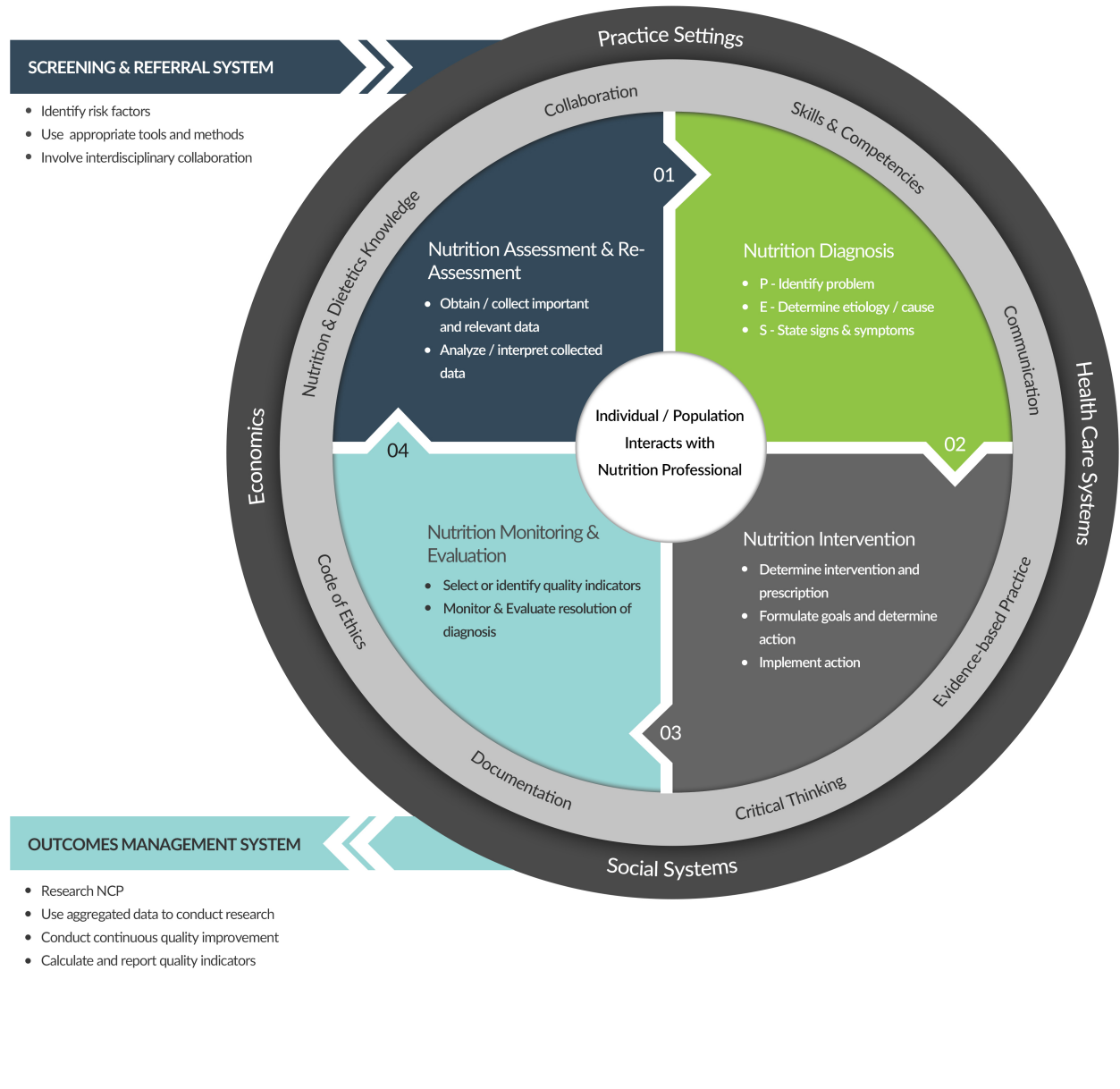
The Nutrition Care Process Model (NCPM) serves as a roadmap for healthcare professionals engaged in providing nutrition and dietetics care. The NCP Model offers a systematic, evidence-based approach to assessing, diagnosing, planning, implementing, and evaluating nutrition and dietetics care.

Structured around four sequential steps, the NCP Model guides nutrition and dietetics professionals through the process of delivering comprehensive nutrition and dietetics care:

1. **Nutrition Assessment and Reassessment:** This initial step involves gathering pertinent information about the individual's nutritional status, dietary habits, health history, and lifestyle factors. Regular reassessment ensures that care plans remain current and responsive to evolving needs.
2. **Nutrition Diagnosis:** Building upon the assessment findings, professionals identify nutrition-related problems and establish clear, actionable diagnoses. These diagnoses serve as the foundation for developing targeted interventions aimed at meeting specific nutritional needs and goals.
3. **Nutrition Intervention:** With diagnoses in hand, professionals collaborate with individuals and/or groups of people to develop and implement evidence-based nutrition interventions. These interventions may include a) customized approaches for food/nutrient provision such as dietary modifications, oral nutrition supplementation, and other forms of enteral or parenteral nutrition, b) nutrition education, c) nutrition counseling (frequently aiming to achieve behavior change among other objectives), and d) support services (such as coordination of nutrition and dietetics care) tailored to promote optimal health outcomes.
4. **Nutrition Monitoring and Evaluation:** Continuous monitoring and evaluation are integral to assessing the effectiveness of nutrition interventions and adjusting care plans as needed. By tracking progress and outcomes over time, healthcare professionals can ensure that individuals and/or groups of people receive ongoing support and achieve their nutrition-related goals.

Through its structured approach, the NCP Model enhances consistency, quality, and description of nutrition/dietetics care and related health outcomes. While care delivery remains individualized to meet the unique needs of those being served, the NCP Model provides a standardized framework for guiding professionals through the delivery process.

# THE NUTRITION CARE PROCESS MODEL



Reprinted from J Acad Nutr Diet. 2017 Dec, Swan WI, Vivanti A, Hakel-Smith NA, Hotson B, Orrevall Y, Trostler N, Beck Howarter K, Papoutsakis C., Nutrition Care Process and Model Update: Toward Realizing People-Centered Care and Outcomes Management, Pages 2003-14, Copyright 2017, with permission from Elsevier. <https://www.jandonline.org/>

## Nutrition Care Process Terminology (NCPT)

Complementing the NCPM is the Nutrition Care Process Terminology (NCPT), a standardized language developed to facilitate the documentation, communication, and exchange of nutrition and dietetics care data. Aligned with the NCPM, NCPT offers a comprehensive set of terms and codes that enable healthcare professionals to accurately capture and communicate related care information.

The NCPT includes a set of terms for each step of the NCPM. Nutrition Assessment terms describe observed and measured data that provide evidence about nutrition-related problems or diagnoses. Nutrition Diagnosis terms describe the nutrition problem that nutrition and dietetics professionals are responsible for treating. Intervention terms describe planned actions aimed toward resolving nutrition problems. The Nutrition Assessment and Monitoring and Evaluation steps share, for the most part, the same terminology. *Specifically*, Nutrition Assessment terms that describe Client History are not included in the Monitoring and Evaluation terminology because nutrition interventions cannot change a client's history. When terms are used in the Monitoring and Evaluation step, they are used to describe outcomes or expected outcomes relevant to the Nutrition Diagnosis. NCP Terms for each step are organized by Domains. Domains are further organized into Classes and Subclasses. For example, the term Energy Intake falls under the Domain: Food/Nutrition-related History. (Detailed information on the current organization of NCPT and term definitions can be found at [www.ncpro.org](http://www.ncpro.org) (log in required)).

By employing standardized terminology and coding conventions outlined in NCPT, nutrition and dietetics professionals can ensure consistency, accuracy, and interoperability (automated data exchange) in documenting nutrition and dietetics care data across different electronic health record (EHR) systems. This standardized approach supports improved data quality, enhances communication between healthcare providers, and enables meaningful analysis and research on nutrition and dietetics care outcomes and health outcomes.

The development and adoption of the Nutrition Care Process Terminology (NCPT) have been the result of extensive international collaboration and usage, reflecting a global consensus on the need for standardized documentation and communication of nutrition and dietetics care data.

While vendors may initially question the investment required to integrate NCPT into electronic health record (EHR) systems, understanding its widespread acceptance and the benefits it offers can illuminate its value.

### NCPT and SNOMED CT

Clinicians stand to benefit significantly from utilizing NCPT, regardless of whether they are already using SNOMED CT or not, as it provides a standardized language for documenting nutrition care data. The submission and modelling of NCPT in SNOMED CT further enhances NCPT's utility, facilitating seamless interoperability and enabling clinicians to leverage the SNOMED CT NCPT refset within the EHR. Even if clinicians are already using SNOMED CT, the SNOMED CT NCPT refset offers additional value by providing a curated set of concepts specifically tailored to document nutrition diagnosis within the Nutrition Care Process, streamlining documentation and ensuring consistency across practices.

This integration not only enhances the quality and efficiency of nutrition and dietetics care delivery but also supports informed clinical decision-making and research efforts aimed at improving patient outcomes.

For systems who use NCPT as an interface terminology and pursuing to enable SNOMED CT, the Academy of Nutrition and Dietetics maintains mappings from NCPT to SNOMED CT ([www.ncpro.org](http://www.ncpro.org), log in required).

In summary, the NCP Model and NCPT represent foundational tools for guiding professionals in delivering evidence-based, personalized nutrition and dietetics care. By adopting tools like these, healthcare organizations can enhance the quality, consistency, and effectiveness of nutrition and dietetics care delivery, ultimately promoting better health outcomes for individuals and communities alike. Wide adoption also facilitates communication, data exchange and aggregation among health delivery systems, making the accumulation of big data and advanced analyses possible.

### REFERENCES

1. Swan WI, Vivanti A, Hakel-Smith NA, Hotson B, Orrevall Y, Trostler N, Beck Howarter K, Papoutsakis C. Nutrition Care Process and Model Update: Toward Realizing People-Centered Care and Outcomes Management. *J Acad Nutr Diet.* 2017 Dec;117:2003-14.
2. Swan WI, Pertel DG, Hotson B, Lloyd L, Orrevall Y, Trostler N, Vivanti A, Howarter KB, Papoutsakis C. Nutrition Care Process (NCP) Update Part 2: Developing and Using the NCP Terminology to Demonstrate Efficacy of Nutrition Care and Related Outcomes. *J Acad Nutr Diet.* 2019 May;119:840-55.
3. Lövestam E, Steiber A, Vivanti A, Boström AM, Devine A, Haughey O, Kiss CM, Lang NR, Lieffers J, et al. Use of the Nutrition Care Process and Nutrition Care Process Terminology in an International Cohort Reported by an Online Survey Tool. *J Acad Nutr Diet.* 2019 Feb;119:225-41.
4. Lövestam E, Vivanti A, Steiber A, Boström AM, Devine A, Haughey O, Kiss CM, Lang NR, Lieffers J, et al. The International Nutrition Care Process and Terminology Implementation Survey: Towards a Global Evaluation Tool to Assess Individual Practitioner Implementation in Multiple Countries and Languages. *J Acad Nutr Diet.* 2019 Feb;119:242-60.
5. Kight CE, Bouche JM, Curry A, Frankenfield D, Good K, Guenter P, Murphy B, Papoutsakis C, Brown Richards E, et al. Consensus Recommendations for Optimizing Electronic Health Records for Nutrition Care. *Nutr Clin Pract.* 2020 Feb;35:12-23.
6. Lloyd L, Swan WI, Jent S, Vivanti A, Pertel DG. Worldwide Release of SNOMED CT Nutrition Care Process Terminology Problem List. *J Acad Nutr Diet.* 2024 Apr;124:531-4.
7. Maduri C, Hsueh PYS, Li Z, Chen CH, Papoutsakis C. Applying contemporary machine learning approaches to nutrition care real-world evidence: findings from the National Quality Improvement Data Set. *J Acad Nutr Diet.* 2021;121(12): 2549-2559.e1. doi: 10.1016/j.jand.2021.02.003

## Nutrition Care Process Terminology (NCPT)

The NCPT includes a set of terms for each step of the NCP. Nutrition Assessment terms describe observed and measured data that provide evidence about nutrition-related problems or diagnoses. Nutrition Diagnosis terms describe the nutrition problem that nutrition and dietetics professionals are responsible for treating. Intervention terms describe planned actions aimed toward resolving nutrition problems. The Nutrition Assessment and Monitoring and Evaluation steps share, for the most part, the same terminology. Specifically, Nutrition Assessment terms that describe Client History are not included in the Monitoring and Evaluation terminology because nutrition interventions cannot change a client's history. When terms are used in the Monitoring and Evaluation step, they are used to describe outcomes or expected outcomes relevant to the Nutrition Diagnosis. NCP Terms for each step are organized by Domains. Domains are further organized into Classes and Subclasses. For example, the term Energy Intake falls under the Domain: Food/Nutrition-related History. (Detailed information on the current organization of NCPT and term definitions can be found at [www.ncpro.org](http://www.ncpro.org) (log in required)).

By employing standardized terminology and coding conventions outlined in NCPT, nutrition and dietetics professionals can ensure consistency, accuracy, and interoperability (automated data exchange) in documenting nutrition and dietetics care data across different electronic health record (EHR) systems. This standardized approach supports improved data quality, enhances communication between healthcare providers, and enables meaningful analysis and research on nutrition and dietetics care outcomes and health outcomes.

The development and adoption of the Nutrition Care Process Terminology (NCPT) have been the result of extensive international collaboration and usage, reflecting a global consensus on the need for standardized documentation and communication of nutrition and dietetics care data.

While vendors may initially question the investment required to integrate NCPT into electronic health record (EHR) systems, understanding its widespread acceptance and the benefits it offers can illuminate its value.



## NCPT and SNOMED CT

Clinicians stand to benefit significantly from utilizing NCPT, regardless of whether they are already using SNOMED CT or not, as it provides a standardized language for documenting nutrition care data. The integration of NCPT with SNOMED CT further enhances its utility, facilitating seamless interoperability and enabling clinicians to leverage the NCPT refset within the EHR. Even if clinicians are already using SNOMED CT, the NCPT refset offer additional value by providing a curated set of concepts specifically tailored to document nutrition diagnosis within the Nutrition Care Process, streamlining documentation and ensuring consistency across practices.

This integration not only enhances the quality and efficiency of nutrition and dietetics care delivery but also supports informed clinical decision-making and research efforts aimed at improving patient outcomes.

For systems who use NCPT as an interface terminology and pursuing to enable SNOMED CT, the Academy of Nutrition and Dietetics maintains mappings from NCPT to SNOMED CT ([www.ncpro.org](http://www.ncpro.org), log in required).

In summary, the NCP Model and NCPT represent foundational tools for guiding professionals in delivering evidence-based, personalized nutrition and dietetics care. By adopting tools like these, healthcare organizations can enhance the quality, consistency, and effectiveness of nutrition and dietetics care delivery, ultimately promoting better health outcomes for individuals and communities alike. Wide adoption also facilitates communication, data exchange and aggregation among health delivery systems, making the accumulation of big data and advanced analyses possible.

### REFERENCES

1. Swan WI, Vivanti A, Hakel-Smith NA, Hotson B, Orrevall Y, Trostler N, Beck Howarter K, Papoutsakis C. Nutrition Care Process and Model Update: Toward Realizing People-Centered Care and Outcomes Management. *J Acad Nutr Diet.* 2017 Dec;117:2003-14.
2. Swan WI, Pertel DG, Hotson B, Lloyd L, Orrevall Y, Trostler N, Vivanti A, Howarter KB, Papoutsakis C. Nutrition Care Process (NCP) Update Part 2: Developing and Using the NCP Terminology to Demonstrate Efficacy of Nutrition Care and Related Outcomes. *J Acad Nutr Diet.* 2019 May;119:840-55.
3. Lövestam E, Steiber A, Vivanti A, Boström AM, Devine A, Haughey O, Kiss CM, Lang NR, Lieffers J, et al. Use of the Nutrition Care Process and Nutrition Care Process Terminology in an International Cohort Reported by an Online Survey Tool. *J Acad Nutr Diet.* 2019 Feb;119:225-41.
4. Lövestam E, Vivanti A, Steiber A, Boström AM, Devine A, Haughey O, Kiss CM, Lang NR, Lieffers J, et al. The International Nutrition Care Process and Terminology Implementation Survey: Towards a Global Evaluation Tool to Assess Individual Practitioner Implementation in Multiple Countries and Languages. *J Acad Nutr Diet.* 2019 Feb;119:242-60.
5. Kight CE, Bouche JM, Curry A, Frankenfield D, Good K, Guenter P, Murphy B, Papoutsakis C, Brown Richards E, et al. Consensus Recommendations for Optimizing Electronic Health Records for Nutrition Care. *Nutr Clin Pract.* 2020 Feb;35:12-23.
6. Lloyd L, Swan WI, Jent S, Vivanti A, Pertel DG. Worldwide Release of SNOMED CT Nutrition Care Process Terminology Problem List. *J Acad Nutr Diet.* 2024 Apr;124:531-4.
7. Maduri C, Hsueh PYS, Li Z, Chen CH, Papoutsakis C. Applying contemporary machine learning approaches to nutrition care real-world evidence: findings from the National Quality Improvement Data Set. *J Acad Nutr Diet.* 2021;121(12): 2549-2559.e1. doi: 10.1016/j.jand.2021.02.003

## SNOMED CT NCPT Reference Set

The SNOMED CT Nutrition Care Process Terminology (NCPT) Reference Set is a product agreed as part of a collaboration agreement between the Academy of Nutrition and Dietetics and the International Health Terminology Standards Organisation (IHTSDO), trading as SNOMED International. NCPT content has been incorporated into



SNOMED CT and released as a reference set by SNOMED International. This production release is based on NCPT, 2020 edition. NCPT is available at [www.nutritioncareprocess.org](http://www.nutritioncareprocess.org) (log in required).

## Why is the SNOMED CT NCPT reference set needed?

The SNOMED CT NCPT reference set comprises concept references from the SNOMED CT hierarchy, each carefully aligned with the Nutrition Care Process Terminology. In the absence of a dedicated nutrition hierarchy within SNOMED CT, these concepts are sourced from multiple subhierarchies. The reference set effectively organizes these nutrition-specific concepts, streamlining their integration into electronic documentation.

## What is it?

When downloaded, the SNOMED CT NCPT Reference Set is a list of SNOMED CT concept identifiers. To utilize the codes referenced in the set, a user must also have access to the International Edition of SNOMED CT. A user will find in the International Edition of SNOMED CT all the associated concept names and relationships (definitions). Please see below the "Explore the SNOMED CT Reference Set" section and [6. Technical Application](#).

The initial release of this reference set contained 166 NCPT nutrition problems from the Clinical Finding and Situation with Explicit Context hierarchies. These represent Nutrition Diagnoses from the 2020 Nutrition Care Process Terminology publication including nutrition intake findings, clinical nutrition diagnoses and behavioral-environmental nutrition diagnoses. The current release of the SNOMED CT NCPT Reference Set (released in April 2025) contains updated nutrition problems and the addition of nutrition intervention terms mapped to SNOMED CT **(CP=a total of XYZ concepts, I think 584, to be verified)**. After that nutrition assessment and monitoring and evaluation terms will also be added (April 2026, as time and resources permit). This gradual updating of the SNOMED CT reference set that prioritized nutrition problems aligns with data from the International NCP Implementation Survey (INIS). Specifically, INIS data showed countries implementing the documentation of nutrition problems first. Future annual releases of the reference set will contain additional content of nutrition concepts in the NCPT. Further information on the background, motivation and design of the reference set is available in the release notes. [SNOMED CT Nutrition Care Process Terminology \(NCPT\) Refset package Release Notes](#)

Concepts follow the SNOMED naming conventions and the NCPT terms are often included in SNOMED CT as synonyms (when appropriate as preferred terms). The Academy of Nutrition and Dietetics maintains an electronic NCPT manual that provides guidance on how to use terms in nutrition and dietetics practice ([www.nutritioncareprocess.org](http://www.nutritioncareprocess.org), log-in required). In the electronic NCPT manual, terms are explained in reference sheets. Reference sheets for nutrition diagnoses provide a definition, common etiologies, and signs and symptoms (defining characteristics). A committee of subject matter experts from around the world has been developing and maintaining the Academy's NCPT since 2003. Terms and definitions have been submitted to SNOMED International as part of the agreement between the two organizations (SNOMED CT and the Academy of Nutrition and Dietetics).

## Explore the SNOMED CT NCPT Reference set

The following pages provide instructions for exploring the members of the NCPT Reference set.

### References

Lloyd L, Swan WI, Jent S, Vivanti A, Pertel DG. Worldwide Release of SNOMED CT Nutrition Care Process Terminology Problem List. *J Acad Nutr Diet*. 2024 Apr;124(4):531-534.

Swan WI, Vivanti A, Hakel-Smith NA, Hotson B, Orrevall Y, Trostler N, Beck Howarter K, Papoutsakis C. Nutrition Care Process and Model Update: Toward Realizing People-Centered Care and Outcomes Management. *J Acad Nutr Diet*. 2017 Dec;117:2003-14.

Swan WI, Pertel DG, Hotson B, Lloyd L, Orrevall Y, Trostler N, Vivanti A, Howarter KB, Papoutsakis C. Nutrition Care Process (NCP) Update Part 2: Developing and Using the NCP Terminology to Demonstrate Efficacy of Nutrition Care and Related Outcomes. J Acad Nutr Diet. 2019 May;119:840-55.

## Explore all Members of the SNOMED CT NCPT Reference Set

### Demonstration Video

The following video shows how to view the members of the NCPT reference set using the SNOMED International SNOMED CT Browser. You can access the browser at [browser.snomedtools.org](https://browser.snomedtools.org).

### Step-by-step Instructions

This step-by-step guide will show you how to view the members of the NCPT reference set using the SNOMED International SNOMED CT Browser.

1. Open the SNOMED CT Browser ([browser.snomedtools.org](https://browser.snomedtools.org))



2. Click "Go browsing...International Derivatives"



### 3. Click "Refset"

### 4. Scroll down the list to see the "Nutrition Care Process Terminology reference set" - then click this row

### 5. Click "Members"

### 6. Members are shown in the list

## Check if a concept is part of the SNOMED CT NCPT Reference Set

### Demonstration Video

The following video shows how to verify if a given concept is a member of the NCPT reference set using the SNOMED International SNOMED CT Browser. You can access the browser at [browser.snomedtools.org](https://browser.snomedtools.org).

## Step-by-Step Instructions

Explore how to verify if a concept is part of the NCPT reference set using the SNOMED International SNOMED CT Browser. You can access the browser at [browser.snomedtools.org](https://browser.snomedtools.org).

### 1. Open the SNOMED CT Browser ([browser.snomedtools.org](https://browser.snomedtools.org))

## 2. Click "Go browsing...International Derivatives"

## 3. Perform a search for a concept of interest.

Fill in a search term matching the concept you are looking for.

## 4. Select the concept of interest

Click on the concept, so that its details appear in the Summary section

## 5. Click "Refsets"

Select the "Refsets" tab

## 6. View simple type reference sets

If you see the concept |Nutrition Care Process Terminology reference set| in the list of Simple Refsets Memberships, this means that the selected concept is included in the reference set.

## 7. Here you see what simple type reference sets, the selected concept is included in

As you can see here, when selecting the concept 414916001 |Obesity (disorder)|, this is part of the reference set.

## 8. In this example, the concept 'Hypoglycaemic coma' is selected

Try to search for and select the concept 267384006 |Coma due to hypoglycemia (disorder)|

## 9. Click "Refsets"

Click on "Refsets"

## 10. This concept is NOT included in the NCPT reference set

As you can see, the |Nutrition Care Process Terminology reference set| does not appear in the list of Simple Refsets Memberships, indicating that the selected concept is NOT part of the reference set.

### 3. Clinical Use Cases

<https://www.snomed.org/members> Effective nutrition care relies on the ability to share, receive, reuse, and interpret structured nutrition data seamlessly across healthcare settings. Structured nutrition data play a crucial role in supporting comprehensive care transitions, ensuring continuity and consistency in nutrition interventions as patients move through different levels of care.

The use cases provided on this page serve as examples of how SNOMED CT terms can be applied to document various aspects of nutrition care. These examples are illustrative rather than exhaustive, offering guidance on practical applications of SNOMED CT for capturing nutrition-related information within clinical workflows.

#### Use Case 1: Interoperable nutrition care utilizing the Nutrition Care Process Model and standardized terminology

Standardizing the documentation of nutrition care using SNOMED CT allows for consistent recording of patient data across different EHR systems. Structured documentation facilitates interoperability between healthcare providers and enables seamless sharing of nutrition-related data during patient transitions between care settings (e.g. when a patient is discharged from a hospital to a long term care facility). Development of functional digital nutrition care templates in EHR systems, and subsequent seamless data acquisition and analysis are greatly facilitated by the SNOMED CT NCPT reference set and other available concept groupings such as value sets. Value sets are lists of codes and corresponding terms, such as SNOMED CT that define clinical concepts to support effective and interoperable health information exchange. In the United States, the [Value Set Authority](#) of the National Library of Medicine maintains value sets. The Academy stewards over 160 nutrition and dietetics related value sets that are available at the [Value Set Authority](#) (log in required).

##### Example 1.1 - Nutrition Assessment

A patient with **newly diagnosed diabetes mellitus type 2** is referred to a credentialed dietitian for nutrition care. The patient has not seen a dietitian before.

During the initial assessment, the dietitian records the patient's dietary habits, anthropometric measurements, biochemical data (e.g. blood glucose concentration), and relevant medical history using standardized SNOMED CT concepts within the EHR. This structured documentation allows for seamless sharing of the patient's nutrition assessment data with other healthcare providers involved in their care, such as endocrinologists, primary care physicians, and nurses.

##### Examples

- 788472008 Carbohydrate intake (observable entity): > 500 grams per day exceeding recommended range of 250-300 grams per day
- 785891000 Nutrition knowledge of individual client (observable entity): poor
- 819960006 Healthy Eating Index 2015 score (observable entity): 49 (out of 100, which is categorized in the lowest quality)\*: poor
- 405152002 Quality of life satisfaction (observable entity): poor as measured by
- 273725009 Quality of life scale (assessment scale): Health Related Quality of Life (HRQOL)\*\*

\*Healthy Eating Index (HEI) 2015 scale is: from 1 point (lowest) to 100 points (highest diet quality), five categories:

- scores of 90 to 100=excellent
- scores of 80 to 89=very good
- 70 to 79=good
- 60 to 69=fair, and
- 0 to 59=poor

\*\*Health Related Quality of Life (HRQOL) scale is: excellent, very good, good, fair, or poor

Best practice tip: There is discussion in many countries like Sweden about minimizing double documentation. In the EHR, any professional can read information other professionals have documented. Thus, it should not be necessary for dietitians to re-document values like blood glucose concentration. The dietitians could refer to the related section in the EHR.

### Benefits for Clinicians:

- **Streamlined Workflow:** Clinicians can efficiently capture and access comprehensive nutrition assessment data within the EHR, reducing documentation time and minimizing redundancies.
- **Enhanced Communication:** Standardized documentation facilitates seamless communication and information sharing among interdisciplinary healthcare teams, improving care coordination and patient outcomes, and helping to provide safe care; also SNOMED CT can facilitate communication within a collaborative team where the client is included.
- **Improved Continuity of Care:** Clinicians can easily retrieve and review recorded nutrition data from previous encounters, ensuring continuity of care and informed decision-making across care settings.

### Benefits for Patients:

- **Enhanced communication:** Standardized documentation facilitates seamless communication and information sharing among interdisciplinary healthcare teams, improving care coordination and patient outcomes, and helping to provide safe care. Standardized terminology promotes health literacy of client.
- **Improved Continuity of Care:** Clients can retrieve and review recorded nutrition data from provider encounters, ensuring continuity of care and participation in informed decision-making across care settings.

## Example 1.2 - Evidence-Based Nutrition **Diagnosis**

By leveraging SNOMED CT concepts for nutrition diagnosis within the **SNOMED CT NCPT reference set (first release April 2024)**, healthcare professionals can accurately identify and categorize patients' nutrition problems. This standardized approach enhances the ability to apply evidence-based interventions and track outcomes effectively.

### Example of a complete diagnostic statement in PES format (P: problem, E: etiology, S: signs and symptoms)

- **Problem:** 870404000 Excessive intake of carbohydrate (finding), related to
- **Etiology:** 424890008 Unbalanced diet (finding), as evidenced by
- **Signs and Symptoms:**
  - 788472008 Carbohydrate intake (observable entity): > 500 grams per day exceeding recommended range of 250-300 grams per day and
  - 785891000 Nutrition knowledge of individual client (observable entity): poor
  - 819960006 Healthy Eating Index 2015 score (observable entity): 49 (out of 100): poor
  - 405152002 Quality of life satisfaction (observable entity): poor as reported by patient's Health Related Quality of Life (HRQOL)

By applying standardized terminology, the healthcare team can accurately identify the patient's nutrition-related problems and prioritize interventions to address the patients' specific needs.

**i** The NCPT includes a group of terms to record nutrition diagnosis status when recording a diagnostic statement. At present, there is one available mapping for one of the nutrition diagnosis status terms (mapping is from NCPT to SNOMED CT). An EHR build may have alternate built in options to record 'status' of nutrition diagnosis. Also, [FHIR](#) includes condition clinical status codes that may be considered.

### Benefits for Clinicians:

- **Accurate Problem Identification:** Standardized terminology enables clinicians to accurately identify and document nutrition-related problems, enhancing diagnostic precision and supporting evidence-based decision-making.
- **Consistency in Documentation:** Clinicians can consistently document nutrition diagnoses using SNOMED CT concepts, ensuring clarity and coherence in health records and facilitating effective communication with other members of the healthcare team.
- **Facilitated Care Planning:** Clear and standardized nutrition diagnoses guide clinicians in developing tailored care plans and interventions that address patients' specific nutritional needs and goals.

### Benefits for Patients:

- **Facilitated Care Planning:** Clear and standardized nutrition diagnoses guide clinicians and patients in developing individualized, tailored care plans and interventions that address patients' specific nutritional needs and goals.

**i** In general, having the SNOMED CT NCPT reference set supports the ability to generate automated frequency reports and gather data for quality improvement. There can be huge benefits when data is aggregated on a group level. In the United States, a web based data aggregation platform has facilitated data collection of all types of cases (this registry is called the Dietary Outcomes Registry) where the prevalence of nutrition problems was determined, the percent of problem resolution was identified, and using machine learning analyses jointly with IBM Watson revealed types of nutrition care (phenotypes) where nutrition counseling was found to be the most effective intervention to achieve nutrition problem improvement.

## Example 1.3 - Tailored Nutrition **Intervention**

Utilizing SNOMED CT for documenting nutrition interventions enables healthcare providers to select and implement appropriate dietary recommendations and therapies based on standardized terminology. This supports personalized care planning and ensures consistency in treatment strategies across different care settings.

The dietitian provides an intervention that supports carbohydrate control and portion sizes. The use of SNOMED CT ensures consistency in documenting dietary recommendations and facilitates communication between the dietitian, nurse, endocrinologist, and other members of the healthcare team involved in the patient's care.

### Examples

- 445301000124102 Content-related nutrition education (procedure), on
- 787766009 Estimated quantity of intake of simple carbohydrate in 24 hours (observable entity)

### Benefits for Clinicians:

- **Personalized Care Planning:** Standardized documentation of nutrition interventions supports clinicians in developing personalized care plans that align with patients' nutrition diagnoses, preferences, and cultural backgrounds.

- **Consistency in Treatment:** Clinicians can consistently implement evidence-based nutrition interventions using SNOMED CT-coded concepts, promoting standardization and quality of care across diverse patient populations and care settings.
- **Enhanced Patient Engagement:** Clear and standardized documentation facilitates effective communication between clinicians and patients, empowering patients to actively participate in their nutrition management and adhere to recommended dietary changes.

#### Benefits for Patients:

- **Personalized Care Planning:** Standardized documentation of nutrition interventions supports clinicians in developing personalized care plans that align with patients' nutrition diagnoses, preferences, and cultural backgrounds.
- **Enhanced Patient Engagement:** Clear and standardized documentation facilitates effective communication between clinicians and patients, empowering patients to actively participate in their nutrition management and adhere to recommended dietary changes.

### Example 1.4 - Continuous Nutrition **Monitoring and Evaluation**

Standardized documentation of nutrition monitoring and evaluation data using SNOMED CT facilitates ongoing assessment of patients' nutritional status and progress over time. This enables healthcare professionals to identify trends, adjust interventions as needed, and evaluate the effectiveness of nutrition care plans in achieving desired outcomes.

#### Examples

- 788472008 Carbohydrate intake (observable entity): **> 500 grams per day** exceeding recommended range of 250-300 grams per day
- 785891000 Nutrition knowledge of individual client (observable entity): **poor**
- 819960006 Healthy Eating Index 2015 score (observable entity): **49 (out of 100): poor**
- 405152002 Quality of life satisfaction (observable entity): **poor** as reported by patient's Health Related Quality of Life (HRQOL)

#### Benefits for Clinicians:

- **Timely Assessment:** Standardized documentation enables clinicians to systematically monitor and evaluate patients' nutritional status and response to interventions over time, facilitating early detection of changes and timely adjustments to care plans.
- **Data-Driven Decision-making:** Clinicians can leverage aggregated nutrition monitoring data to identify trends, assess treatment efficacy, and make evidence-based decisions to optimize patient outcomes.
- **Quality Improvement:** Ongoing documentation and evaluation of nutrition care outcomes support quality improvement initiatives by identifying areas for practice refinement and implementing targeted interventions to enhance patient care and safety.

#### Benefits for Patients:

- **Quality Improvement:** Ongoing documentation and evaluation of nutrition care outcomes support quality improvement initiatives by identifying areas for practice refinement and implementing targeted interventions to enhance patient care and safety.
- **Improved health outcomes**



## Use Case 2: Transitions of care include continuity of nutrition care across settings. How does the information follow the patient

Transitional care models are practice systems that “follow patients across settings (e.g., from hospital to home), improve coordination among health care providers, and help individuals better understand their post-hospital care. When implementing SNOMED CT for nutrition care documentation, concurrent effective use of data standards (such as Health Level 7 FHIR) allows for data to follow the patient effectively. Standardized documentation of nutrition care using SNOMED CT is a critical pre-step to the use of data standards such as FHIR as the structured data is more readily exchanged.

**i** For these types of use cases and many others, utilizing approved SNOMED concepts is very important to ascertain high quality documentation and to be able to leverage data standards that allow seamless data exchange between electronic health record systems. This best practice is essential for effective transitions of care.

### Example 2.1 - Exchanging Nutrition Data

A standardized digital referral using SNOMED CT codes and a FHIR API is able to transfer nutrition related data of patients with malnutrition between dietitians (from hospital to a community-based meal provision organization) and this communication of care improves health outcomes post discharge.

#### Benefits for Clinicians:

- **Real Time Data Transfer:** Ensures timely continuity of care and reduces clinician and patient burden (no more repeating of information).
- **Reduced Opportunity for Human Error in Clinical Documentation:** Automated data transfer allows for accurate data transmission from hospital to other venues of care.
- **Enhanced Security and Privacy:** While FHIR is not a security protocol in itself, using data standards to exchange documentation requires advanced security measures that better protect patient privacy.

#### Benefits for Patients:

- **Improved Access to Care:** Interoperable EHR systems facilitate referral completion (closing the loop in transitions of care effectively). After their hospital discharge, patients can be referred to dietitians and/or other healthcare professionals serving in outpatient settings.
- **Enhanced Security and Privacy:** While FHIR is not a security protocol in itself, using data standards to exchange documentation requires advanced security measures that better protect patient privacy.

## Use Case 3: Facilitating Clinical Decision Support and Research

By implementing SNOMED CT for nutrition care documentation, EHR systems can support clinical decision support tools that utilize standardized data to provide tailored recommendations for nutrition management. Furthermore, the consistent use of SNOMED CT enables aggregation of data for research purposes, allowing for the analysis of nutrition care practices, outcomes, and their impact on patient health.

### Example 3.1 - EHR-Integrated Tool for Personalized Care and Research Insights

A healthcare system implements a clinical decision support tool embedded within its EHR system to assist providers in managing patients with chronic kidney disease. The tool utilizes SNOMED CT-coded nutrition data to generate tailored recommendations for dietary modifications, fluid restriction, and electrolyte management based on the patient's stage of disease and comorbid conditions. Additionally, aggregated SNOMED CT-coded nutrition data from EHRs across the healthcare system are utilized for research purposes to analyze trends in nutrition-related outcomes among patients with chronic kidney disease and evaluate the impact of various interventions on disease progression and quality of life.

## Benefits for Clinicians:

- **Enhanced Decision Support:** Clinicians benefit from clinical decision support tools embedded within the EHR that utilize standardized SNOMED CT-coded nutrition data to provide real-time, evidence-based recommendations for patient care, enhancing clinical decision-making and patient safety.
- **Informed Research:** Aggregated SNOMED CT-coded nutrition data facilitate research initiatives by providing valuable insights into nutrition care practices, outcomes, and trends across diverse patient populations, supporting evidence-based practice and continuous quality improvement efforts.
- **Knowledge Translation:** Research findings derived from SNOMED CT-coded nutrition data can be translated into clinical practice guidelines and protocols, equipping clinicians with up-to-date evidence to guide their decision-making and improve patient care.

## Benefits for Patients:

- **Generation of New Evidence:** Aggregated SNOMED CT-coded nutrition data facilitate the updating of evidence-based nutrition practice guidelines and can be used in quality improvement work, advocacy and policy design efforts for advancing nutrition care services and related staffing capacity.

**Users who would like to submit new use cases they have developed may do so at any time, and will be considered for inclusion. Please submit content, comments, and questions at: [cpapoutsakis@eatright.org](mailto:cpapoutsakis@eatright.org)**

## REFERENCES

- Chui TK, Proaño GV, Raynor HA, Papoutsakis C. A Nutrition Care Process Audit of the National Quality Improvement Dataset: Supporting the Improvement of Data Quality Using the ANDHII Platform. *J Acad Nutr Diet.* Jul 2020;120(7):1238-1248.e1. doi:10.1016/j.jand.2019.08.174
- Colin C, Arikawa A, Lewis S, et al. Documentation of the evidence-diagnosis link predicts nutrition diagnosis resolution in the Academy of Nutrition and Dietetics' diabetes mellitus registry study: A secondary analysis of Nutrition Care Process outcomes. *Front Nutr.* 2023;10:1011958. doi:10.3389/fnut.2023.1011958
- Kight CE, Bouche JM, Curry A, et al. Consensus Recommendations for Optimizing Electronic Health Records for Nutrition Care. *Nutr Clin Pract.* Feb 2020;35(1):12-23. doi:10.1002/ncp.10433
- Krebs-Smith SM, Pannucci TE, Subar AF, et al. Update of the Healthy Eating Index: HEI-2015. *J Acad Nutr Diet.* Sep 2018;118(9):1591-1602. doi:10.1016/j.jand.2018.05.021
- Lewis SL, Miranda LS, Kurtz J, Larison LM, Brewer WJ, Papoutsakis C. Nutrition Care Process Quality Evaluation and Standardization Tool: The Next Frontier in Quality Evaluation of Documentation. *J Acad Nutr Diet.* Mar 2022;122(3):650-660. doi:10.1016/j.jand.2021.07.004
- Lewis SL, Wright L, Arikawa AY, Papoutsakis C. Etiology Intervention Link Predicts Resolution of Nutrition Diagnosis: A Nutrition Care Process Outcomes Study from a Veterans' Health Care Facility. *J Acad Nutr Diet.* Sep 2021;121(9):1831-1840. doi:10.1016/j.jand.2020.04.015
- Lloyd L, Swan WI, Jent S, Vivanti A, Pertel DG. Worldwide Release of SNOMED CT Nutrition Care Process Terminology Problem List. *J Acad Nutr Diet.* 2024 Apr;124(4):531-534.
- Long JM, Yoder A, Woodcock L, Papoutsakis C. Impact of a Registered Dietitian Nutritionist-Led Food as Medicine Program in the Food Retail Setting: A Feasibility Study. (2212-2672 (Print))
- Maduri C, Sabrina Hsueh PY, Li Z, Chen CH, Papoutsakis C. Applying Contemporary Machine Learning Approaches to Nutrition Care Real-World Evidence: Findings From the National Quality Improvement Data Set. *J Acad Nutr Diet.* Dec 2021;121(12):2549-2559.e1. doi:10.1016/j.jand.2021.02.003

Moriarty DG, Zack MM, Kobau R. The Centers for Disease Control and Prevention's Healthy Days Measures - Population tracking of perceived physical and mental health over time. Health Qual Life Outcomes. 2003;1:37. <https://doi.org/10.1186/1477-7525-1-37>

Proaño GV, Papoutsakis C, Lamers-Johnson E, et al. Evaluating the Implementation of Evidence-based Kidney Nutrition Practice Guidelines: The AUGmeNt Study Protocol. J Ren Nutr. Sep 2022;32(5):613-625. doi:10.1053/j.jrn.2021.09.006

Vergili JM, Proaño GV, Jimenez EY, Moloney L, Papoutsakis C, Steiber A. Academy of Nutrition and Dietetics Commentary on the Phosphorus Recommendation in the KDOQI Clinical Practice Guidelines for Nutrition in CKD: 2020 Update. J Ren Nutr. May 2024;34(3):192-199. doi:10.1053/j.jrn.2023.11.001

## 4. SNOMED CT Content

### History

To facilitate the development of nutrition-related content in SNOMED CT, the **NCPT Clinical Project Group** was established, bringing together nutrition and dietetics professionals across several continents. This group played a pivotal role in reviewing, validating, and authoring content directly into the SNOMED CT International Release with support from SNOMED International authors. The work of the project group, which took place between 2017 and 2024, culminated in the integration of NCPT (Nutrition Care Process Terminology, Edition 2020) into SNOMED CT. With the integration complete, the NCPT Clinical Project Group concluded its efforts.

The responsibility for maintaining nutrition and dietetics content within SNOMED CT has since transitioned to the **Nutrition and Dietetics Clinical Project Resource Group (CPRG)**. This group is now tasked with overseeing the management of nutrition-related concepts, maintaining the reference set, and leading quality improvement projects in collaboration with SNOMED International. The Academy of Nutrition and Dietetics continues to provide stewardship through dedicated staff support.

### Benefits of SNOMED CT

When clinical concepts are modeled using a set of rules (these rules are explained in the [SNOMED CT Editorial Guide](#)), this allows for consistent representation of clinical information in electronic health records (EHRs). Thus, good modeling enhances the quality of the data. Also, modeling of concepts offers the necessary infrastructure to carry out data analytics, collapse, or parse different sets of data. This means that data can be analyzed with different levels of granularity, across different settings, and [very importantly data can be](#) reused by many for different objectives. (for more information on data analysis with SNOMED CT, please refer to: [Data Analytics with SNOMED CT](#) and [Data Analytics Tooling](#))

### Key Benefits of High-Quality Clinical Concept Modeling

High-quality modeling of clinical concepts is crucial for ensuring data quality and maximizing the utility of health information. Effective modeling supports the automation of processes and the generation of knowledge at various levels, from individual healthcare services to institutional, regional, national, and international systems.

- **Population Analytics:** With SNOMED CT, healthcare organizations can analyze population data to identify patterns and trends across patient groups. This enables the detection of shifts in the prevalence of clinical issues (such as nutrition-related problems), procedures, and interventions over time, helping to inform public health initiatives, resource allocation, and policy development.
- **Clinical Decision Support Systems:** SNOMED CT serves as a foundation for clinical decision support, enabling systems to provide timely, evidence-based recommendations. By standardizing data, it also facilitates accurate laboratory reporting [and](#) registry tracking and reporting, improving the precision and consistency of clinical decision-making and documentation.
- **Removing Language Barriers:** SNOMED CT supports multilingual use, allowing healthcare data to be shared and understood across language divides. This is especially valuable in diverse or multilingual regions, as it enables healthcare providers to communicate consistently and accurately regardless of language.

By modeling clinical concepts with precision, SNOMED CT not only enhances data quality but also empowers healthcare systems to harness data for deeper insights, improved decision-making, and more equitable, coordinated care globally.

### SNOMED CT Content for NCPT

This chapter provides a comprehensive overview of SNOMED CT content specific to the Nutrition Care Process Terminology (NCPT). The objective of the following sections is to explain how SNOMED CT concepts relevant to the Nutrition Care Process (NCP) are modeled within the SNOMED CT framework.

It is important to note that there is no single, unified hierarchy dedicated solely to “nutrition content” within SNOMED CT. Instead, relevant content is distributed across various sub-hierarchies according to broader domains, such as *Procedures*, *Clinical Findings*, and others. This division ensures that nutrition-related concepts are aligned with the overarching structure of SNOMED CT while remaining accessible within the appropriate contexts.

To aid understanding and interpretation, each page of this chapter will introduce relevant content, along with explanations of its modeling approach, attributes, and examples. This layout is designed to help readers navigate and utilize SNOMED CT content for NCP effectively, with practical examples that demonstrate the structure and utility of each concept within clinical documentation and workflows.

## Nutrition Assessment and Reassessment

### Content and Modeling

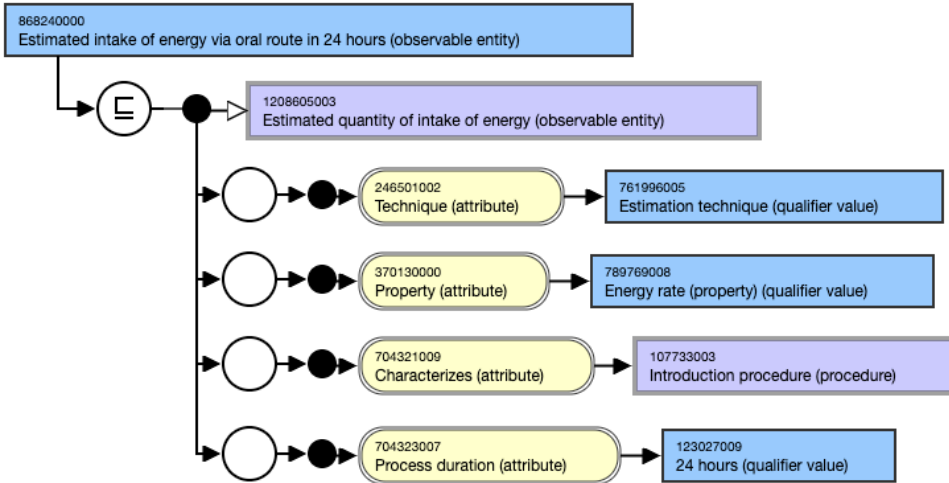
- **Main hierarchies**
  - Terminology for **nutrition assessment** is predominantly from the **Observable Entities** hierarchy and includes questions relating to client and food/nutrition-related history, anthropometric measurements, biomedical tests and assessment tools.
- **Key attributes and value ranges**
  - A range of attributes are available to represent the properties for concepts in this hierarchy ([Observable Entity Defining Attributes](#)); however, the key attributes that are used for content in the scope of nutrition assessment and reassessment include:
    - **Technique:** This attribute links to a concept from the Technique (qualifier value) hierarchy and specifies the observation method, e.g., estimation, measurement.
    - **Property:** This attribute links to a concept from the Property (qualifier value) hierarchy and specifies the type of feature to be observed, e.g., intake quantity, energy intake.
    - **Characterizes:** This attribute links to a concept from the Introduction procedure (procedure) hierarchy and specifies the process associated with intake quantity or energy intake, e.g. administration via gastrointestinal route.
    - *Please view the examples below illustrating the modeling of these concepts.*
- **Templates**
  - As part of the content development process, authoring templates were created to support future content additions and quality assurance of existing and new content in this area. [Nutritional intake \(observable entity\) - v3.0](#) [Nutritional intake \(observable entity\) - v2.0](#)

These templates ensure that nutrition diagnosis concepts are modeled in a clear, consistent, and clinically relevant manner, supporting effective documentation and interoperability in healthcare settings.

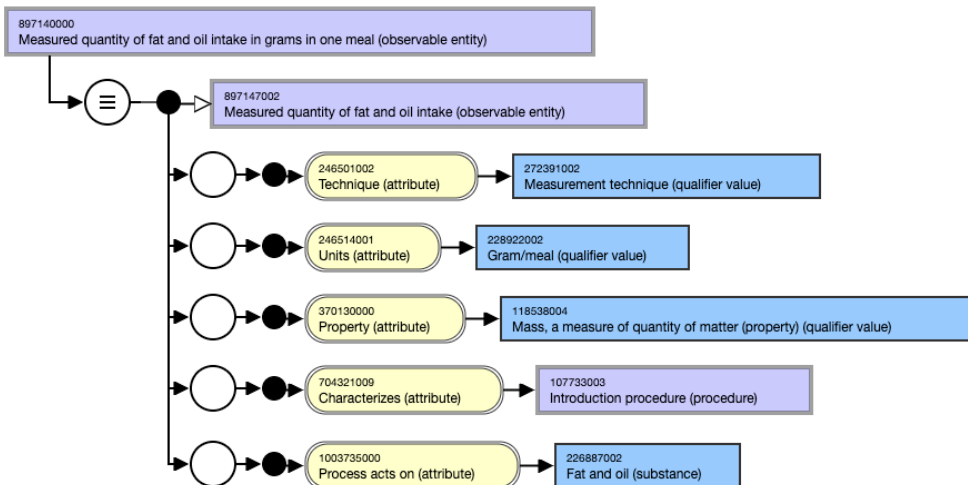
## Examples

### Nutritional intake assessment

868240000 |Estimated intake of energy via oral route in 24 hours (observable entity)|

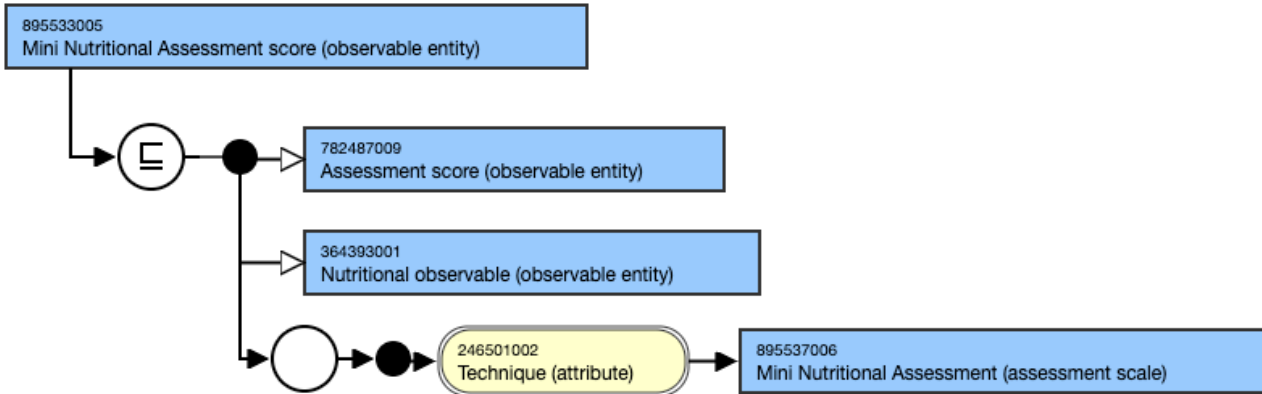


897140000 |Measured quantity of fat and oil intake in grams in one meal (observable entity)|



## Assessment, monitoring and evaluation tools

### 895533005 |Mini Nutritional Assessment score (observable entity)|



## Nutrition Diagnosis

### Content and Modeling

- **Main hierarchies**
  - Terminology for **nutrition diagnosis** is predominantly from the **Clinical Finding** hierarchy within SNOMED CT. This hierarchy includes concepts related to nutrition-related health issues, conditions, and diagnoses, such as malnutrition, nutrient deficiencies, and dietary imbalances.
- **Key Attributes and Value Ranges**
  - A range of attributes is available to represent the properties for concepts within this hierarchy ([Clinical Finding Defining Attributes](#)); however, the key attributes relevant for nutrition assessment and diagnosis include:
    - **Interprets:** This attribute links the diagnosis to an observable entity being assessed or measured. For example, a diagnosis of '**difficulty swallowing**' interprets the observation related to a patient's 'ability to swallow', see the example below. This attribute specifies what aspect of nutrition or health is being interpreted within the context of the diagnosis.
    - **Has Interpretation:** This attribute represents the outcome or evaluation of the observation, specifying how the observation is interpreted in relation to the diagnosis. For example, it may link to a **Qualifier Value** such as **Deficient**, **Excessive**, or **Normal** intake, providing a clear description of the interpretation relevant to the nutrition diagnosis.
    - These attributes, **Interprets** and **Has Interpretation**, ensure that each diagnosis is directly linked to the observed data and its interpretation, allowing for precise and standardized representation of nutrition-related diagnoses within SNOMED CT.
- **Templates**
  - As part of the content development process, authoring templates were created to support future content additions and quality assurance of existing and new content in this area. [Nutrition intake \(finding\) - v1.0](#)

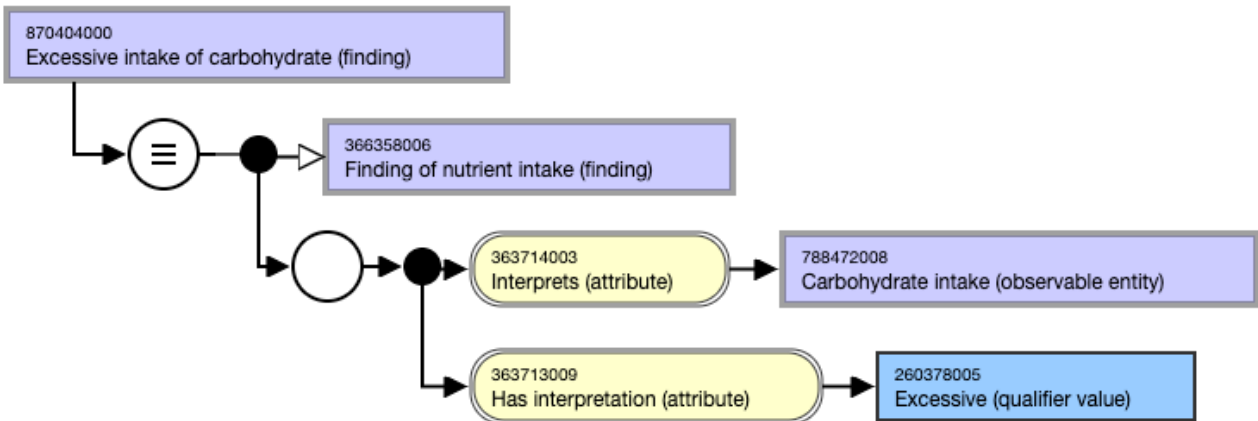
These templates ensure that nutrition diagnosis concepts are modeled in a clear, consistent, and clinically relevant manner, supporting effective documentation and interoperability in healthcare settings.

## Examples

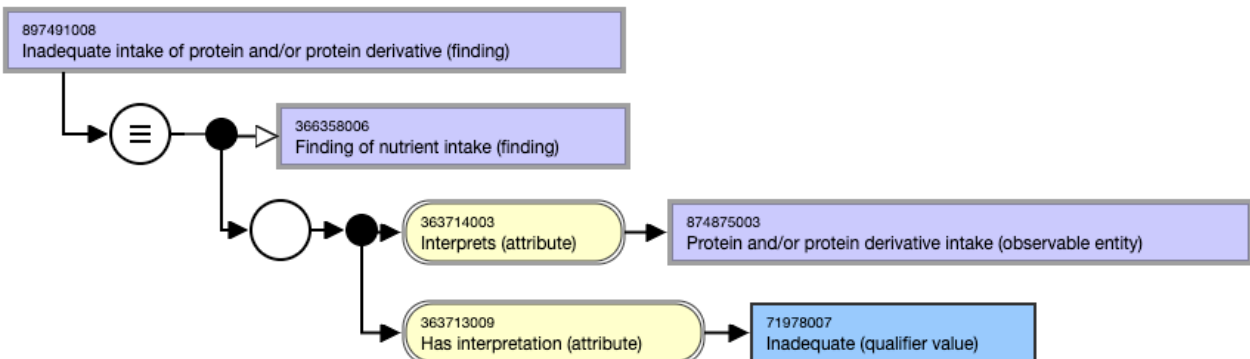
### Nutrition Intake findings

Problems related to intake of energy, nutrients, fluids, bioactive constituents through oral diet or nutrition support.

870404000 |Excessive intake of carbohydrate (finding)|



897491008 |Inadequate intake of protein and/or protein derivative (finding)|

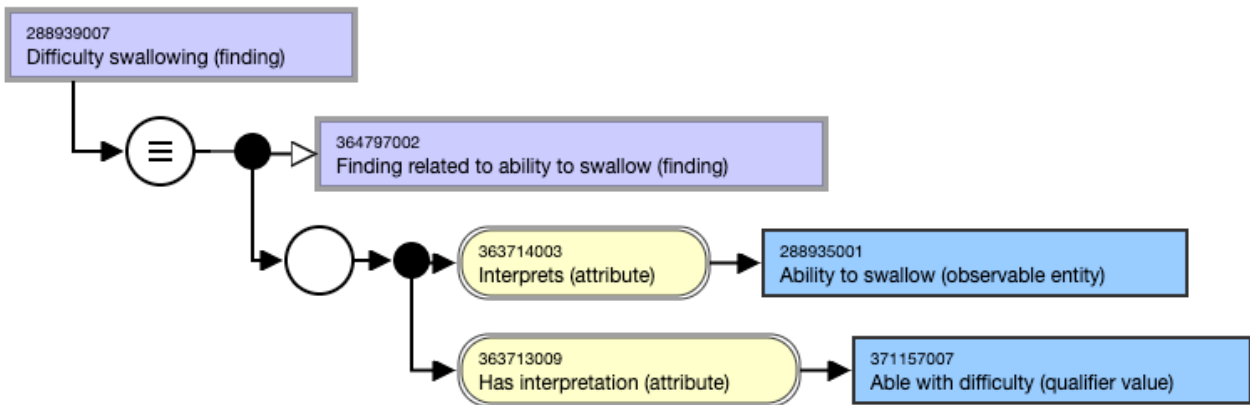


### Clinical Nutrition Diagnoses

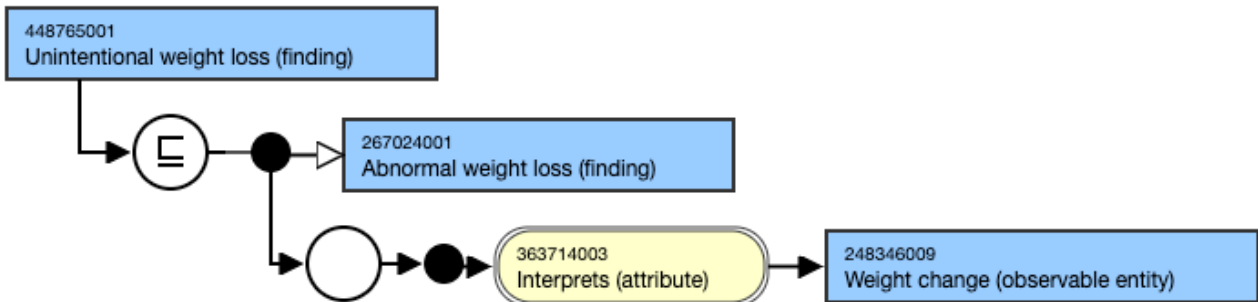
Nutritional findings/problems identified that relate to medical or physical conditions



288939007 |Difficulty swallowing (finding)|



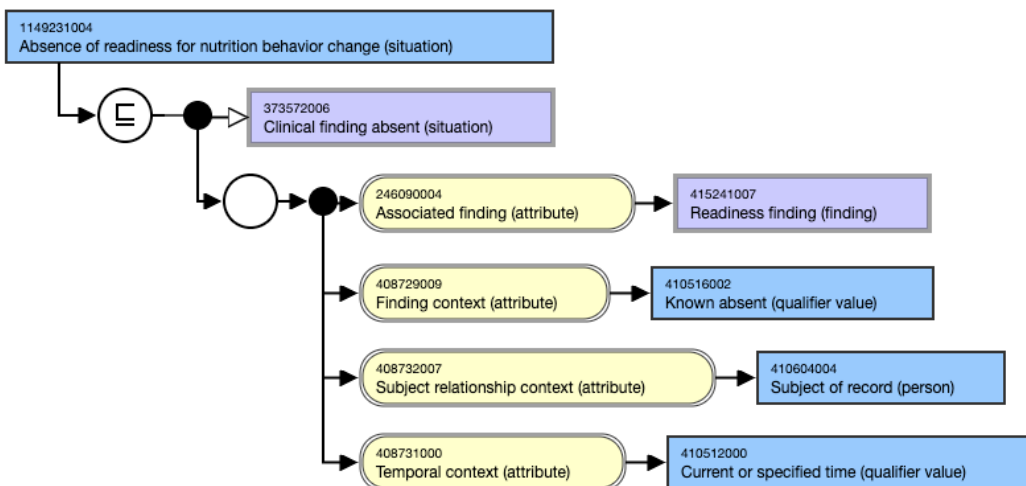
448765001 |Unintentional weight loss (finding)|



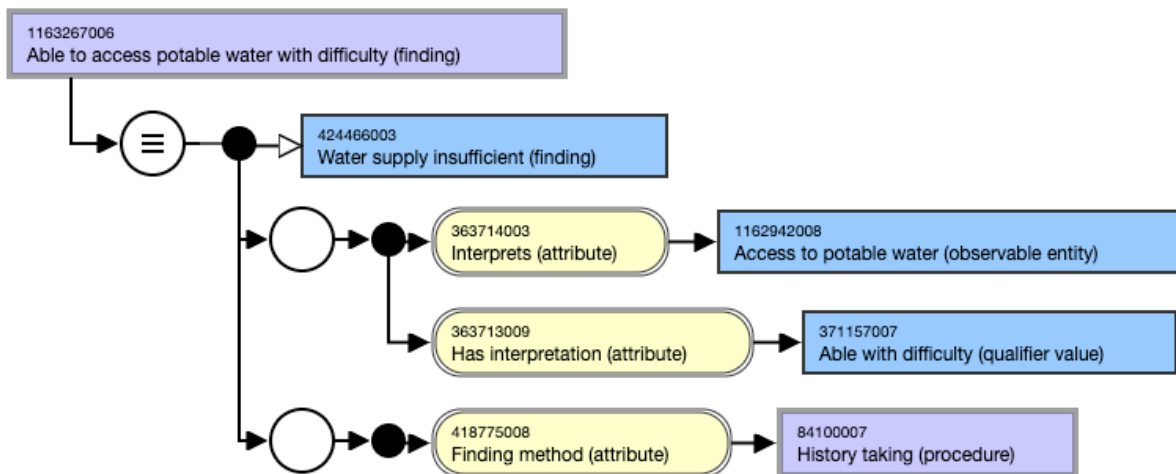
Behavioral-Environmental Nutrition Diagnoses

Nutritional findings/problems that relate to knowledge, attitudes, beliefs, physical environment, access to food or food safety

1149231004 |Absence of readiness for nutrition behavior change (situation)|



## 1163267006 |Able to access potable water with difficulty (finding)|



## Nutrition Interventions

### Content and Modeling

- **Main hierarchies**

**386373004 | Nutrition therapy (regime/therapy) | or 384760004 |Feeding and dietary regime (regime/therapy)| and 61310001 |Nutrition education (procedure)|.**

- Terminology for nutrition interventions are represented in the SNOMED CT **384760004 | Feeding and dietary regime (regime/therapy)|** hierarchy to facilitate recording nutrition interventions such as counselling, food and/or nutrient delivery, or coordination of nutrition care by a nutrition professional. The **384760004 | Feeding and dietary regime (regime/therapy)|** hierarchy is under active revision and part of a quality improvement project of the Nutrition and Dietetics CRG (June 2024).

- **Key attributes and value ranges**

- A range of attributes are available to represent the properties for concepts in this hierarchy (**Procedure, General**); however, the key attributes that are used for content in the scope of nutrition assessment and reassessment include:
  - **Method:** This attribute links to a concept from the Action (qualifier value) hierarchy and specifies the action used to perform the procedure, e.g. education, counselling, administration.
  - **Direct substance:** This attribute links to a concept from the substance hierarchy and represents the substance that is directly involved or acted upon in a clinical procedure e.g. administration of carbohydrate in **436681000124105 |Increased carbohydrate diet (regime/therapy)|**.
  - **Has focus:** This attribute links to a concept from the clinical finding or procedure hierarchies, specifying the particular clinical finding or procedure that is the primary focus of the current procedure, e.g. For **437331000124101 |Increased iron diet (regime/therapy)|** the focus is an inadequate intake of iron (finding)

- **Templates**

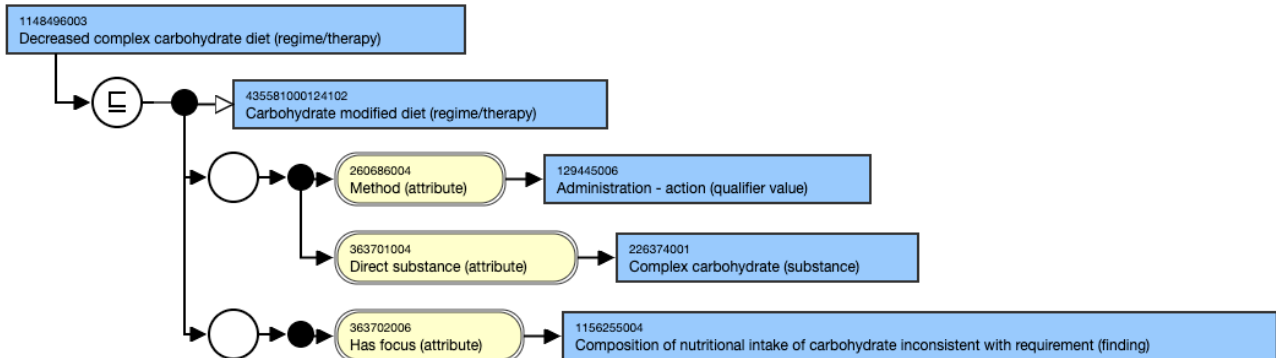
- As part of the content development process authoring, templates were created to support future content additions and quality assurance of existing and new content in this area. Currently, there is one template outlining the model for a modified substance diet **Modified substance diet (regime/therapy) - v2.0**. However, additional templates may be developed in the future to support various interventions.

- These templates ensure that nutrition diagnosis concepts are modeled in a clear, consistent, and clinically relevant manner, supporting effective documentation and interoperability in healthcare settings.

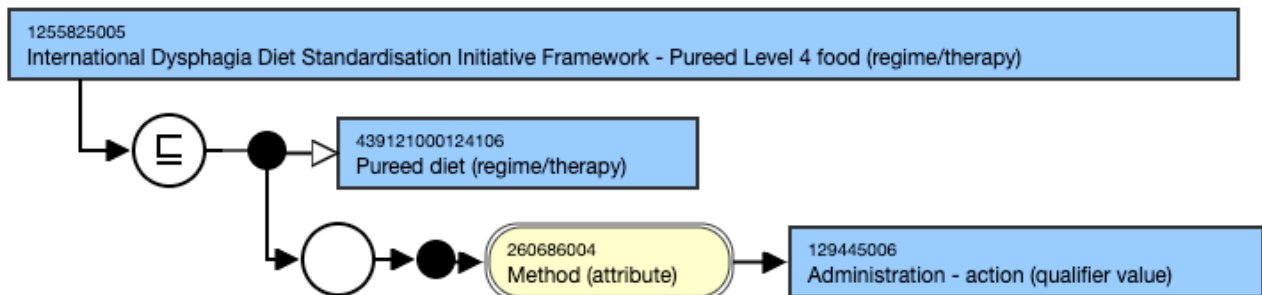
## Examples

### Food and/or Nutrient Delivery

#### 1148496003 |Decreased complex carbohydrate diet (regime/therapy)|

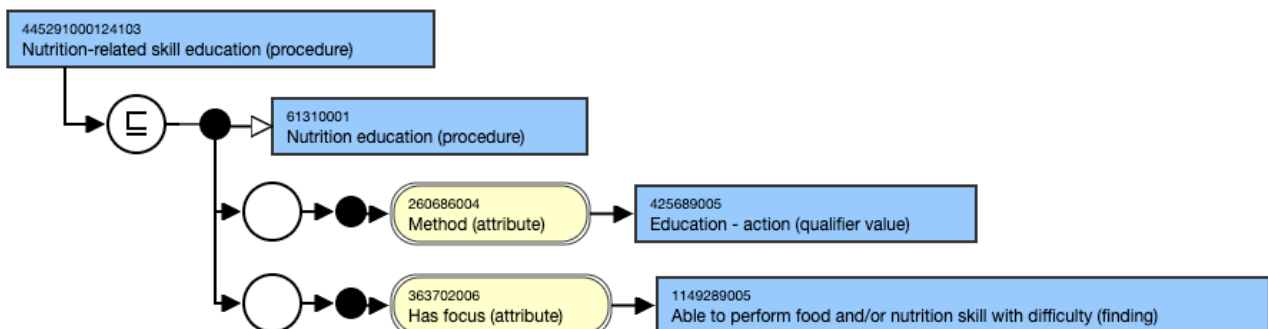


#### 1255825005 |International Dysphagia Diet Standardisation Initiative Framework - Pureed Level 4 food (regime/therapy)|

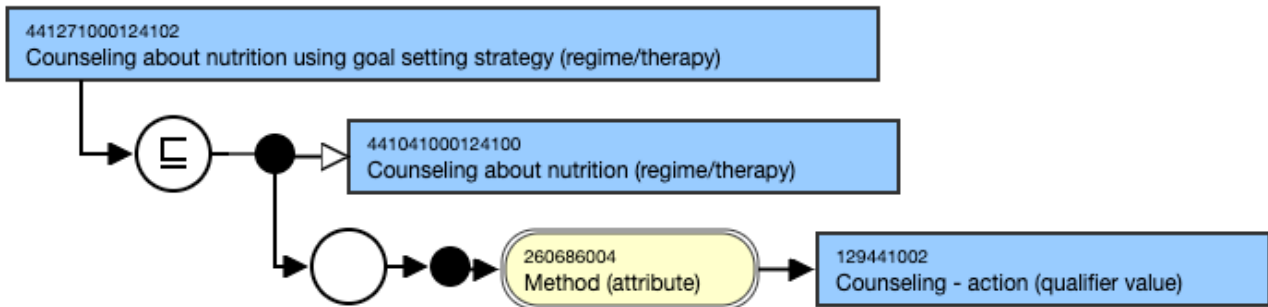


### Education and counselling

#### 445291000124103 |Nutrition-related skill education (procedure)|



441271000124102 |Counseling about nutrition using goal setting strategy (regime/therapy)|



## Nutrition Monitoring and Evaluation

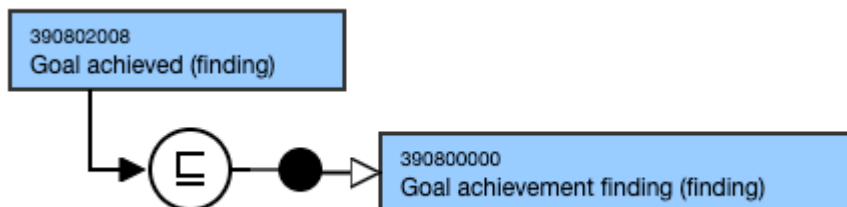
### Content and Modeling

- **Main hierarchies**
  - Nutrition Monitoring and Evaluation concepts are not yet included in the reference set. However, SNOMED CT contains content from the Observable Entity and Clinical Finding hierarchies, which encompass questions, outcomes, and indicators relevant to evaluating nutrition interventions and goals.
  - The content is modeled in alignment with these previously described hierarchies
- **Templates**
  - As part of the content development process authoring templates were created to support future content additions and quality assurance of existing and new content in this area. The templates described in the assessment and reassessment section are also applicable to monitoring and evaluation. [Nutritional intake \(observable entity\) - v3.0](#) [Nutritional intake \(observable entity\) - v2.0](#)

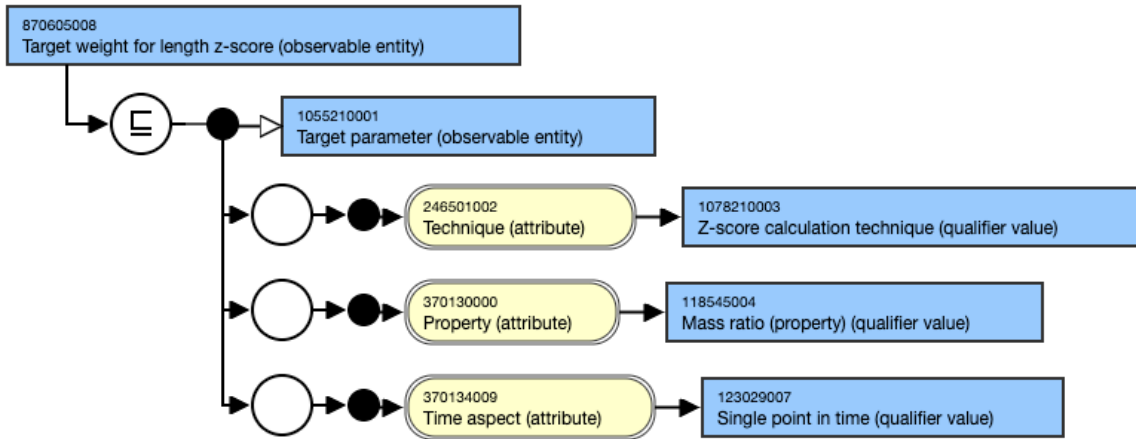
### Examples

This will also include concepts from Nutrition Assessment and Reassessment section with some additional examples given here. With the exception of historical assessment content, Nutrition Assessment and Reassessment concepts are modified to achieve nutrition care goals and track nutrition care progress in the Nutrition Monitoring and Evaluation step of the NCP.

390802008 |Goal achieved (finding)|



870605008 |Target weight for length z-score (observable entity)|



## 5. Information Models and Terminology Binding

A well-defined information model and appropriate terminology bindings are essential to accurately document the NCP within healthcare systems using SNOMED CT. The information model provides a structured framework for organizing data related to nutrition assessment, diagnosis, intervention, and monitoring. Terminology bindings link this data to standardized SNOMED CT concepts, promoting consistent communication and interoperability across healthcare settings. This approach ensures clear **and** precise documentation, facilitates data sharing, and supports high-quality, patient-centered nutrition care.

To clarify how the NCP can be implemented in clinical information systems and supported by SNOMED CT, we present a Logical Model for the NCP. This model serves as a technology-agnostic common reference information model, adaptable to specific implementation needs, and highlights points where terminology bindings to SNOMED CT can be effectively applied.

By establishing these models and bindings, healthcare organizations can achieve precise data recording and effective data use.

In recent years, the integration of HL7<sup>®</sup> FHIR<sup>®</sup> with SNOMED CT has gained popularity. Given its wide acceptance and capabilities, HL7 FHIR is the preferred information model in this implementation guide. The following sections provide recommended strategies for integrating SNOMED CT with HL7 FHIR to document the NCP within electronic health records (EHRs).

Other information modeling solutions, such as openEHR, may provide useful archetypes. However, they are not included in this version of the guide due to the lack of widely recognized international models in this area. As progress continues, future updates to the guide may include these frameworks.

### Implementation and Flexibility in Clinical Guideline Application

#### Adapting Clinical Guidelines to Local Contexts

Implementing the NCPT reference set and following the recommendations in this guide do not require adherence to any specific clinical guidelines. Instead, this guide is designed to support flexible application, allowing nutrition assessments, interventions, and care plans to be tailored to the diverse practices, standards, and needs found across healthcare settings. Clinical guidelines and care protocols are inherently context-dependent, and practices may vary across different organizations, regions, and countries. As such, this guide does not prescribe or recommend any particular clinical guidelines, recognizing that suitable approaches may differ based on local and organizational requirements.

#### Role of Clinical Guidelines in Supporting Optimal Care

**Clinical guidelines**, also known as “clinical practice guidelines,” are “statements that provide recommendations intended to optimize patient care, informed by a systematic review of evidence and an evaluation of the benefits and risks of alternative care options.” Developed and implemented according to internationally recognized standards, clinical guidelines play an important role in:

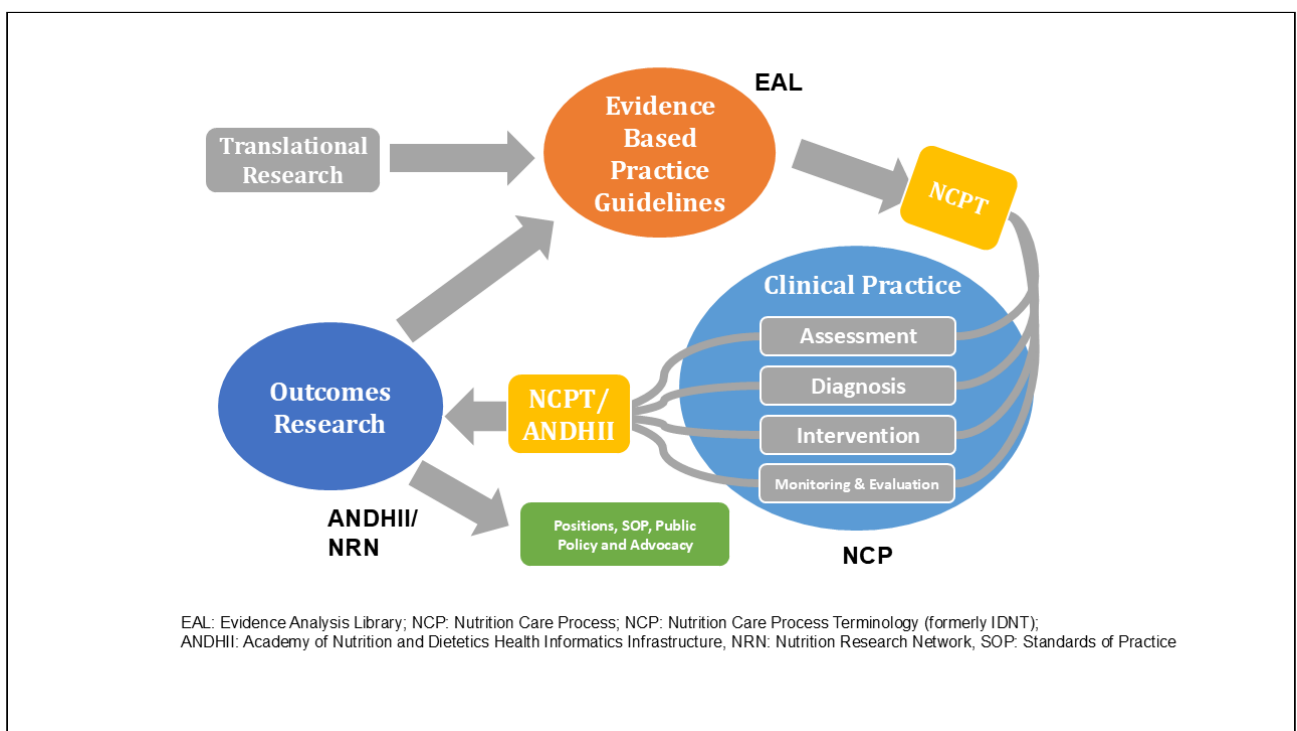
- **Reducing unwarranted practice variation** by providing evidence-based recommendations
- **Facilitating the integration of research into practice** by guiding clinicians in evidence-based decision-making
- **Enhancing healthcare quality and safety** by supporting consistent standards of care

Clinical guidelines serve multiple purposes, including helping healthcare professionals deliver optimal care, establishing standards for evaluating clinical practices, and supporting patient education and informed decision-making. They can influence care outcomes positively when effectively disseminated and integrated into clinical processes.

In the delivery of nutrition and dietetics care specifically, standardized terminology facilitates the ongoing application of evidence-based practice guidelines in practice. **Aggregated structured electronic health care record data** is the backbone for tracking outcomes on various levels: at the service, the organization, the regional,

national, and international levels. **Outcomes research** helps justify nutrition and dietetics position statements, related professional standards of practice, and decisions (eg funding, staffing, reimbursement or political and/or financial level decision-making depending on the country and healthcare environment). **Translational research** helps validate and or further fine tune evidence-based practice guidelines. Expected care plans (ECPs) are bundles of NCPT terms that have been identified as representing the application of a specific recommendation in a guideline. Several professional and scientific organizations internationally are invested in generating timely nutrition and dietetics evidence-based practice guidelines that progress scientific clinical knowledge and care delivery.

### Completing the Evidence-Based Practice Cycle: Linking Research with Practice



Reprinted from *J Acad Nutr Diet*. 2017 May, Papoutsakis C, Moloney L, Sinley RC, Acosta A, Handu D, Steiber AL. *Academy of Nutrition and Dietetics Methodology for Developing Evidence-Based Nutrition Practice Guidelines*, Pages 794-804, Copyright 2017, with permission from Elsevier. <https://www.jandonline.org/>

### Scope and Intent of Implementation Advice

This guide supports the adoption and implementation of the NCPT reference set by providing general recommendations that can be adapted to a variety of settings. However, it does not establish specific clinical guidelines, nor does it dictate how the NCPT should be integrated within particular clinical protocols. Organizations are encouraged to interpret and apply the NCPT reference set in ways that are responsive to their unique operational contexts, existing guidelines, and local practices.

By emphasizing flexibility, this guide aims to empower healthcare organizations to utilize the NCPT reference set effectively, in alignment with their own best practices and patient care standards.

## References

Hickson M, Papoutsakis C, Madden AM, Smith MA, Whelan K. Nature of the evidence base and approaches to guide nutrition interventions for individuals: a position paper from the Academy of Nutrition Sciences. *Br J Nutr*. May 28 2024;131(10):1754-1773. doi:10.1017/s0007114524000291

Lamers-Johnson E, Kelley K, Knippen KL, et al. A quasi-experimental study provides evidence that registered dietitian nutritionist care is aligned with the Academy of Nutrition and Dietetics evidence-based nutrition practice guidelines for type 1 and 2 diabetes. *Front Nutr*. 2022;9:969360. doi:10.3389/fnut.2022.969360

Lamers-Johnson E, Kelley K, Sánchez DM, et al. Academy of Nutrition and Dietetics Nutrition Research Network: Validation of a Novel Nutrition Informatics Tool to Assess Agreement Between Documented Nutrition Care and Evidence-Based Recommendations. *J Acad Nutr Diet*. Apr 2022;122(4):862-872. doi:10.1016/j.jand.2021.03.013

Papoutsakis C, Moloney L, Sinley RC, Acosta A, Handu D, Steiber AL. Academy of Nutrition and Dietetics Methodology for Developing Evidence-Based Nutrition Practice Guidelines. *J Acad Nutr Diet*. May 2017;117(5):794-804. doi:10.1016/j.jand.2016.07.011

Proaño GV, Papoutsakis C, Lamers-Johnson E, et al. Evaluating the Implementation of Evidence-based Kidney Nutrition Practice Guidelines: The AUGmeNt Study Protocol. *J Ren Nutr*. Sep 2022;32(5):613-625. doi:10.1053/j.jrn.2021.09.006

## Logical Model

### HL7 Domain Analysis Model for Nutrition Care

The *HL7 Domain Analysis Model: Nutrition Care, Release 3 Standard for Trial Use (December 2022-2024)* outlines a comprehensive framework for implementing and standardizing nutrition care processes in healthcare environments. Developed by Health Level Seven International (HL7) in collaboration with the Academy of Nutrition and Dietetics, this document focuses on enhancing the integration and interoperability of nutrition-related data within Electronic Health Records (EHRs) and other health information systems.

The model builds on the Nutrition Care Process (NCP), which standardizes the steps of Nutrition Assessment, Diagnosis, Intervention, and Monitoring/Evaluation to ensure consistent and high-quality nutrition care. This framework emphasizes patient-centered care, quality improvement, and the effective communication of nutrition orders and assessments across multidisciplinary healthcare teams.

The *HL7 Domain Analysis Model* elaborates on the specific workflows and data elements necessary for effective documentation, providing practical use cases such as diet ordering, food allergy management, and tailored nutrition interventions.

### Logical Model for Nutrition Care Records

This page adapts the *HL7 Domain Analysis Model for Nutrition Care*, and provides a Logical Model for the Nutrition Care Process (NCP), which serves as a **technology-agnostic common reference**, designed to be **adaptable to specific implementation requirements** while highlighting where terminology bindings to SNOMED CT can be applied. By outlining essential entities, such as **Patient, Dietitian, Assessment, Diagnosis, Intervention, and Monitoring/Evaluation**, and their relationships, this model aims to support consistent and organized documentation across the entire care process, provided it is implemented correctly.



## Key Entities

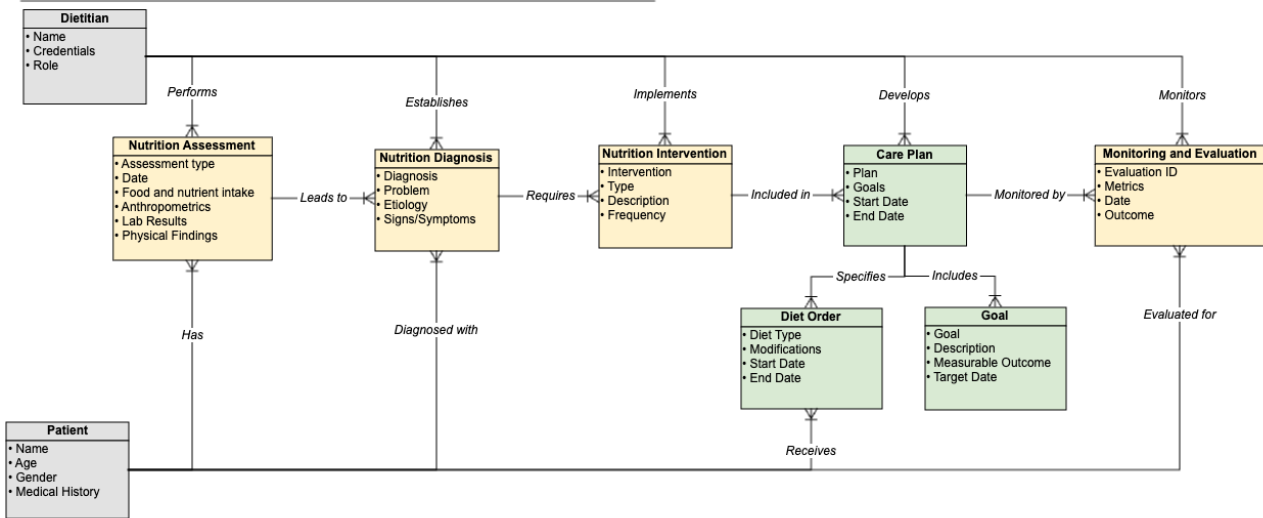
The **Nutrition Care Records Model** outlines a comprehensive framework for managing nutrition care, highlighting key entities' roles and interactions to support patient-centered outcomes.

- **Patient** is the central entity, representing the individual who receives nutrition care. The patient is linked to various elements of the care process, including nutrition assessments, diet orders, and monitoring and evaluation activities.
- **Dietitian** plays a pivotal role throughout the care process. Dietitians perform nutrition assessments, establish nutrition diagnoses, implement appropriate interventions, develop care plans, and monitor the patient's progress. They ensure that the nutrition care provided aligns with evidence-based practices and patient-specific needs.
- **Nutrition Assessment** involves collecting and analyzing data, such as anthropometric measurements, food and nutrient intake, lab results, and physical findings. This assessment informs the **Nutrition Diagnosis**, where dietitians identify nutrition-related problems. Each assessment may lead to one or more diagnoses, guiding the interventions needed.
- **Nutrition Diagnosis** identifies specific nutrition issues, using information gathered from the assessment. Each diagnosis may require multiple **Nutrition Interventions**, which are specific actions taken to address the identified problems, such as dietary adjustments, nutritional counseling, or supplementation.
- **Nutrition Intervention** represents the implementation of strategies designed to improve the patient's nutritional status. These interventions are included in a broader **Care Plan**, which outlines the goals, strategies, and timeline for the patient's nutrition care.
- **Care Plan** is a comprehensive blueprint for managing the patient's nutrition. It specifies measurable **Goals** that outline desired outcomes, such as weight management or improved nutrient intake. The care plan also details **Diet Orders**, which provide instructions on the types and modifications of diets to be provided to the patient.
- **Diet Order** outlines specific dietary requirements for the patient, such as a low-sodium or high-protein diet, based on the nutrition interventions outlined in the care plan. These diet orders ensure that nutrition therapy is tailored to the patient's needs.
- **Monitoring & Evaluation** tracks the effectiveness of the care plan by assessing whether the set goals are being met. The dietitian monitors the patient's progress, using metrics and outcomes to adjust the care plan as needed. This ongoing evaluation ensures that nutrition care remains effective and responsive to the patient's health status.

## Diagram

The provided ER (Entity-Relationship) diagram for Nutrition Care Records outlines the relationships between key entities involved in nutrition care and how they interact with one another.

Entity Relationship Diagram for Nutrition Care Records



## General Terminology Bindings

The following provides a summary of the key entities specified in the [Logical Model](#), along with their attributes, including where SNOMED CT can be used to represent values.

Note that other attributes may be included to accommodate local requirements and specific organizational needs.

### Patient

Attribute	Meaning Binding	Description	Value Set Binding
<b>Name</b>	<< 703503000  Name (observable entity)	The patient's full name.	N/A
<b>Age</b>	184099003  Date of birth (observable entity)   OR  << 424144002  Current chronological age (observable entity)	The patient's age.	N/A
<b>Gender</b>	263495000  Gender (observable entity)   OR  33821000087103  Gender identity (observable entity)	The patient's gender.	< 285116001  Gender identity finding (finding)
<b>Medical History</b>	<< 363788007  Clinical history/ examination observable (observable entity)	Records of past and ongoing health conditions.	< 404684003  Clinical finding (finding)  OR < 417662000  History of clinical finding in subject (situation)

## Dietitian

Attribute	Meaning Binding	Description	Value Set Binding
<b>Name</b>	N/A	The dietitian's full name.	N/A
<b>Credentials</b>	N/A	Professional qualifications and certifications.	N/A
<b>Role</b>	N/A	The specific function or position of the dietitian in care delivery.	Can represent healthcare roles and job titles.  < 159033005  Dietitian (occupation)  < 223366009  Healthcare professional (occupation)

## Nutrition Assessment

Attribute	Meaning Binding	Description	SNOMED Binding
<b>Date</b>	439272007  Date of procedure (observable entity)	The date the assessment was conducted.	N/A
<b>Food and nutrition intake</b>	<< 364393001  Nutritional observable (observable entity)   OR  << 225388007  Dietary intake assessment (procedure)	Dietary intake information	< 300893006  Nutritional finding (finding)   OR < 363246002  Nutritional deficiency associated condition (disorder)
<b>Anthropometrics</b>	<< 248326004  Body measure (observable entity)	Measurements like weight, height, and BMI.	Can represent standardized anthropometric measurements. 365605003  Body measurement finding (finding)
<b>Lab Results</b>	<< 364712009  Laboratory test observable (observable entity)	Results from laboratory tests relevant to nutrition.	Can be used to code specific lab tests and results. 441742003  Evaluation finding (finding)
<b>Physical Findings</b>	<< 363788007  Clinical history/examination observable (observable entity)	Observable signs related to nutrition status.	Can represent clinical observations and physical exam findings. < 404684003  Clinical finding

## Diagnosis

Attribute	Meaning Binding	Description	SNOMED Binding
-----------	-----------------	-------------	----------------

<b>Problem</b>	<< 439401001  Diagnosis (observable entity)	The nutrition issue identified (e.g., malnutrition).	Can represent specific nutrition-related problems.  ^ 1303957004  Nutrition Care Process Terminology reference set  AND (< 404684003  Clinical finding  OR < 413350009  Finding with explicit context (situation)  )
----------------	---	--	--

<b>Etiology</b>	405534009  Adverse incident contributing factor (observable entity)	The cause or contributing factor of the problem.	Can code causes or contributing factors related to health conditions.		
			<b>Etiology</b>	NCP Description	SNOMED CT Domain
			<b>Beliefs-Attitudes</b>	Issues stemming from beliefs, attitudes, or emotional responses, e.g., food preferences, denial of need for change, disbelief in nutrition science.	118196009   Value belief finding (finding)
			<b>Cultural</b>	Related to the patient's values, norms, or customs.	N/A
			<b>Knowledge</b>	Impact of understanding or lack of knowledge on nutrition and health.	870752006   Finding related to health literacy (finding)
			<b>Physical Function</b>	Limitations in physical ability, which may also include cognitive function.	105719004   Body disability AND/OR failure state (finding)
			<b>Physiologic-Metabolic</b>	Factors related to medical conditions affecting nutrition.	404684003   Clinical finding (finding)
			<b>Psychological</b>	Mental health or psychological issues influencing nutrition.	284465006   Finding relating to psychosocial functioning (finding)
			<b>Social-Personal</b>	Influences from personal or social history.	271437004   Problem situation relating to social and personal history
<b>Treatment</b>	Issues arising from medical or surgical treatments affecting nutrition.	N/A			

			<table border="1"> <tr> <th>Etiology</th> <th>NCP Description</th> <th>SNOMED CT Domain</th> </tr> <tr> <td><b>Access</b></td> <td>Challenges related to availability and safe access to food, water, or supplies.</td> <td>445281000124101   Nutrition impaired due to limited access to healthful foods (finding)</td> </tr> <tr> <td><b>Behavior</b></td> <td>Actions that impact nutrition goals, sometimes without a known root cause.</td> <td>N/A</td> </tr> </table>	Etiology	NCP Description	SNOMED CT Domain	<b>Access</b>	Challenges related to availability and safe access to food, water, or supplies.	445281000124101   Nutrition impaired due to limited access to healthful foods (finding)	<b>Behavior</b>	Actions that impact nutrition goals, sometimes without a known root cause.	N/A
Etiology	NCP Description	SNOMED CT Domain										
<b>Access</b>	Challenges related to availability and safe access to food, water, or supplies.	445281000124101   Nutrition impaired due to limited access to healthful foods (finding)										
<b>Behavior</b>	Actions that impact nutrition goals, sometimes without a known root cause.	N/A										
<b>Signs/Symptoms</b>	N/A	Observable or reported evidence of the problem.	Can be used to represent clinical signs and symptoms. < 404684003  Clinical finding									

## Diet Order

Attribute	Meaning Binding	Description	SNOMED Binding
<b>Diet Type</b>	<< 278846007  Dietetic procedures (procedure) << 386373004  Nutrition therapy (regime/therapy)	The specific type of diet prescribed.	Can represent different diet types, like low-sodium or diabetic diets. <<   Feeding and dietary regime (regime/therapy)
<b>Modifications</b>	445341000124100  Modification of nutritional regime (regime/therapy)	Adjustments made to the diet, such as texture changes.	Can code for dietary modifications and restrictions. << 445341000124100   Modification of nutritional regime (regime/therapy)

## Goal

Attribute	Meaning Binding	Description	SNOMED Binding
<b>Description</b>	<< 1055210001  Target parameter (observable entity)	A summary of the intended outcome.	Can represent specific health and nutrition goals < 404684003  Clinical finding (finding)
<b>Measurable Outcome</b>	<< 1055210001  Target parameter (observable entity)	Specific metrics for evaluating success.	Can code measurable clinical outcomes. << 365605003  Body measurement finding (finding) Not limited to
<b>Target Date</b>	N/A	The deadline for achieving the goal.	N/A

## Care Plan

Attribute	Meaning Binding	Description	SNOMED Binding
<b>Goals</b>	<< 1055210001  Target parameter (observable entity)	Desired outcomes related to nutrition care.	As above
<b>Start Date</b>	N/A	The date the care plan begins.	N/A N/A
<b>End Date</b>	442137000  Completion time of procedure (observable entity)	The date the care plan concludes.	N/A N/A

## Intervention

Attribute	Meaning Binding	Description	SNOMED Binding
<b>Type</b>	N/A	The category of intervention (e.g., dietary adjustment, counseling).	Can represent types of nutrition interventions. ^ 1303957004  Nutrition Care Process Terminology reference set  AND (< 71388002  Procedure (procedure) )
<b>Description</b>	N/A	Detailed explanation of the intervention.	Can be used for descriptions of intervention types. N/A
<b>Frequency</b>	N/A	How often the intervention is administered.	Can represent frequency and scheduling terms. N/A

## Monitoring and Evaluation

Attribute	Meaning Binding	Description	SNOMED Binding
<b>Date</b>	439272007  Date of procedure (observable entity)	Date of evaluation	N/A
<b>Metrics</b>	N/A	Relevant metrics for monitoring the status of the intervention	404684003  Clinical finding (finding)
<b>Outcome</b>	1759002  Assessment of nutritional status (procedure)	Status of intervention compared to set goals	390800000  Goal achievement finding (finding)

## HL7 FHIR and NCPT

### Resources and Terminology Bindings

The Nutrition Care Process Terminology (NCPT) can be effectively represented using [HL7 FHIR](#) (Health Level 7 Fast Healthcare Interoperability Resources), a standardized framework for healthcare data exchange that ensures consistent and interoperable documentation across various healthcare systems. Notably, standardized documentation of nutrition care using SNOMED CT is a crucial preliminary step, as structured data is more readily exchanged with the HL7 FHIR standard.

The key components of the NCPT; Assessment, Diagnosis, Intervention, and Monitoring and Evaluation map to specific FHIR resources as follows:

- **Nutrition Assessment:** The *Observation*, *NutritionOrder*, *NutritionProduct*, *NutritionIntake*, and *Condition* resources capture dietary habits, anthropometric measurements, and test results, offering a comprehensive view of the patient’s nutritional status.
- **Nutrition Diagnosis:** The *Condition* resource represents nutrition diagnoses, including specific problems, etiologies, and related signs and symptoms.
- **Nutrition Intervention:** The *NutritionOrder*, *NutritionProduct*, *Procedure*, and *CarePlan* resources document detailed nutrition care plans, specific interventions, and strategies for managing nutrition-related issues.
- **Nutrition Monitoring and Evaluation:** The *Observation*, *Goal*, *Condition*, and *CarePlan* resources are used to track ongoing measurements, monitor progress toward goals, update condition statuses, and review and adjust care plans as needed.


In the context of HL7 FHIR and SNOMED CT, terminology binding defines how clinical data elements are represented within FHIR resources. Each data element in a FHIR resource is linked to a specific value set, which dictates the permissible SNOMED CT codes or concepts for that element.

For example, when recording a patient’s condition in a FHIR resource, the “code” field is bound to a specific SNOMED CT code that accurately represents the condition. This standardized approach ensures that healthcare providers and systems use consistent terminology to describe clinical information across different platforms and contexts.

By adhering to these value sets, FHIR enables precise data exchange and a shared understanding of clinical data elements, enhancing interoperability, supporting efficient healthcare delivery, and contributing to improved patient outcomes.

## Recommendations and Detailed Applications

The following pages will provide detailed recommendations for terminology bindings between relevant FHIR resources and SNOMED CT value sets, specifically as they apply to representing the Nutrition Care Process Terminology (NCPT). Each section will outline the application of specific FHIR resources and bindings to support different NCPT components.

 Please note that content will be added as new NCPT reference set domains for other areas of the framework are incorporated and published.

## What is FHIR?

HL7 FHIR is a modern standard designed to facilitate the exchange of healthcare information electronically. The standard defines resources, i.e. data formats, that can be used to represent data elements in a systematic way across the healthcare continuum.

- **Consistency:** With standardized resources and robust semantics, FHIR ensures uniformity in healthcare data representation. This consistency supports accurate data exchange and enables healthcare providers to make informed decisions based on reliable information, ultimately enhancing patient care quality.
- **Modularity:** FHIR’s flexible architecture allows its resources to be used independently or in combination to meet specific healthcare needs. This modular approach supports adaptability across diverse healthcare contexts, enabling tailored solutions without overhauling entire systems.
- **Interoperability:** FHIR facilitates seamless data exchange between different healthcare systems and applications, enhancing communication and collaboration among healthcare providers. By standardizing data formats and protocols such as RESTful APIs and JSON/XML, FHIR promotes interoperability, improving patient care coordination and information sharing.
- **Standardization:** FHIR leverages contemporary web standards to ensure compatibility with existing IT infrastructures. By defining well-structured resources like Patient, Observation, and Medication with clear semantics, FHIR fosters consistency in how healthcare data is represented and interpreted across various systems.



- **Scalability:** Designed to accommodate evolving healthcare requirements and technological advancements, FHIR is scalable for both current and future healthcare needs. Its flexible architecture and support for extensibility allow healthcare systems to grow and adapt without compromising interoperability or data integrity.

HL7 FHIR plays a crucial role in linking healthcare data with standard terminologies, including SNOMED CT. By integrating FHIR with terminologies like SNOMED CT, a more precise and standardized documentation and communication of clinical information can be achieved. This linkage enhances interoperability by enabling seamless exchange of structured clinical data, supporting accurate clinical decision-making, and promoting continuity of care for patients across various healthcare settings.

Together, FHIR and SNOMED CT facilitate a unified approach to healthcare information management, benefiting both vendors, healthcare providers and patients.

## FHIR Resources for Nutrition Assessment and Reassessment

Nutrition Assessment involves collecting and analyzing data to identify nutrition-related issues.

### Nutrition Assessment Data and Associated FHIR Resources

Several FHIR resources can represent different aspects of the assessment:

Types of data collected	Purpose	Example	FHIR Resource
Food- and nutrition-related history	Capture dietary habits and intake information	Food diary entries	<b>Observation</b> <b>NutritionOrder</b> <b>NutritionProduct</b> <b>NutritionIntake</b>
Anthropometric measurements	Record physical measurements such as weight, height, BMI	Weight: 70 kg, Height: 170 cm	<b>Observation</b>
Tests	Document laboratory or diagnostic tests	Blood glucose levels	<b>Observation</b>
Test results	Record results of tests	Hemoglobin A1c: 5.5%	<b>Observation</b>
Nutrition-focused physical examination findings	Detailed findings from a nutrition-focused physical exam	Skin condition, hair texture	<b>Observation</b> <b>Condition</b>
Patient history	Capture medical history	Chronic conditions, surgeries	<b>Observation</b>

### Example

<b>Nutrition Assessment</b>
<pre>{   "resourceType": "Observation",   "id": "observation-weight",   "status": "final",   "category": [     {       "coding": [         {           "system": "http://terminology.hl7.org/CodeSystem/observation-category",</pre>

```

"code": "vital-signs",
"display": "Vital Signs"
}
]
},
"code": {
"coding": [
{
"system": "http://snomed.info/sct",
"code": "27113001",
"display": "Body weight (observable entity)"
}
],
"text": "Body Weight"
},
"subject": {
"reference": "Patient/example"
},
"valueQuantity": {
"value": 70,
"unit": "kg",
"system": "http://unitsofmeasure.org",
"code": "kg"
}
}
}

```

## FHIR Resources for Nutrition Diagnosis

Nutrition Diagnosis identifies specific nutrition problems that can be addressed through interventions.

### Nutrition Diagnosis Data and Associated FHIR Resources

The FHIR **Condition** resource is primarily used to represent nutrition diagnoses. It captures the nutrition diagnosis using structured data.

- **Problem:** Represented by the condition code, often using SNOMED CT codes.
- **Etiology:** Captured in the details or extensions of the Condition resource.
- **Signs/Symptoms:** Documented as evidence within the Condition resource, referencing relevant Observation resources.

Types of data collected	Purpose	Example	FHIR Resource
Diagnosis			
<ul style="list-style-type: none"> <li>▪ Problem</li> </ul>	Represents the primary nutrition-related problem using a condition code	Malnutrition	<b>Condition</b>
<ul style="list-style-type: none"> <li>▪ Etiology</li> </ul>	Details the cause or contributing factors for the diagnosis	Physical Function, Social-personal	<b>Condition</b>
<ul style="list-style-type: none"> <li>▪ Signs/symptoms</li> </ul>	Documents observable signs or symptoms that support the diagnosis  <i>Documented as evidence within the Condition resource, referencing relevant Observation resources.</i>	Unintended weight loss, muscle wasting	<b>Observation</b> <b>Condition</b>

## Example: Nutrition Diagnosis with Etiology

### Clinical scenario

This scenario involves a 55-year-old patient with a history of Type 2 diabetes mellitus, managed with medications and lifestyle adjustments. Recent symptoms include unintended weight loss, weakness, and swelling in the lower limbs. Clinical evaluation reveals signs of weight loss and muscle wasting, indicating possible malnutrition exacerbated by chronic diabetes management.

Using FHIR resources, healthcare providers document these findings to support a structured approach to diagnosis and treatment planning.

- The **Condition Resource** represents the nutrition diagnosis (Malnutrition) using a SNOMED CT code.
  - The **evidence** section of the Condition resource includes:
    - **Etiology: *Physiologic-Metabolic***; Underlying chronic illness (Type 2 diabetes mellitus) as another **Condition** resource.
    - **Signs/Symptoms: Unintended weight loss** and **Muscle wasting**, which are represented as **Observation** resources linked to the condition. These observations document the presence of each symptom (Boolean value true).

### Diagnosis (Problem): Malnutrition

This resource represents the diagnosis of the nutritional disorder (malnutrition).

#### Condition Resource Representing a Nutrition Diagnosis

```
{
  "resourceType": "Condition",
  "id": "nutritional-disorder",
  "clinicalStatus": {
    "coding": [
      {
        "system": "http://terminology.hl7.org/CodeSystem/condition-clinical",
        "code": "active",
        "display": "Active"
      }
    ]
  },
  "verificationStatus": {
    "coding": [
      {
        "system": "http://terminology.hl7.org/CodeSystem/condition-ver-status",
        "code": "confirmed",
        "display": "Confirmed"
      }
    ]
  },
  "code": {
    "coding": [
      {
```

```

"system": "http://snomed.info/sct",
"code": "2492009",
"display": "Nutritional disorder (disorder)"
}
],
},
"subject": {
"reference": "Patient/example"
},
"evidence": [
{
"detail": [
{
"reference": "Condition/diabetes"
},
{
"reference": "Observation/weight-loss"
},
{
"reference": "Observation/muscle-atrophy"
}
]
}
]
}

```

### Etiology (Cause):

This resource represents the underlying chronic condition contributing to the nutritional disorder.

### Underlying Chronic Illness, Diabetes Mellitus:

#### Condition Resource for Underlying Chronic Illness

```

{
"resourceType": "Condition",
"id": "diabetes",
"clinicalStatus": {
"coding": [
{
"system": "http://terminology.hl7.org/CodeSystem/condition-clinical",
"code": "active",
"display": "Active"
}
]
},
"verificationStatus": {
"coding": [
{
"system": "http://terminology.hl7.org/CodeSystem/condition-ver-status",
"code": "confirmed",
"display": "Confirmed"
}
]
}
}

```

```

}
]
},
"code": {
"coding": [
{
"system": "http://snomed.info/sct",
"code": "44054006",
"display": "Diabetes mellitus type 2 (disorder)"
}
]
},
"subject": {
"reference": "Patient/example"
}
}

```

### Signs/Symptoms:

This is referenced in the evidence section of the Condition resource, and referencing a condition or observation resource.

### Unintentional Weight Loss

This resource documents the presence of unintentional weight loss.

#### Observation Resource for associated Symptom: Edema

```

{
"resourceType": "Observation",
"id": "weight-loss",
"status": "final",
"category": [
{
"coding": [
{
"system": "http://terminology.hl7.org/CodeSystem/observation-category",
"code": "clinical",
"display": "Clinical"
}
]
}
],
"code": {
"coding": [
{
"system": "http://snomed.info/sct",
"code": "448765001",
"display": "Unintentional weight loss (finding)"
}
]
},
"subject": {

```

```
"reference": "Patient/example"
},
"valueBoolean": true
}
```

## Muscle wasting:

### Observation Resource for associated Symptom: Muscle wasting

```
{
  "resourceType": "Observation",
  "id": "muscle-atrophy",
  "status": "final",
  "category": [
    {
      "coding": [
        {
          "system": "http://terminology.hl7.org/CodeSystem/observation-category",
          "code": "clinical",
          "display": "Clinical"
        }
      ]
    }
  ],
  "code": {
    "coding": [
      {
        "system": "http://snomed.info/sct",
        "code": "88092000",
        "display": "Muscle atrophy (disorder)"
      }
    ]
  },
  "subject": {
    "reference": "Patient/example"
  },
  "valueBoolean": true
}
```

### Linking the Resources

- The **Condition Resource for Nutritional Disorder** references:
- The **Condition Resource for Type 2 Diabetes Mellitus** in its evidence.detail array to represent the etiology.
- The **Observation Resources** for unintentional weight loss and muscle atrophy to represent signs/symptoms.
- All resources reference the same patient (Patient/example) for proper linkage and context.

## Terminology Bindings for Nutrition Diagnosis

### Nutrition Diagnosis Value Sets

These following bindings ensure that the FHIR resources effectively capture nutrition diagnosis information using standardized SNOMED CT terminology, promoting interoperability and accurate data exchange across healthcare systems.

FHIR element	General SNOMED CT value set	Nutrition-specific SNOMED CT value set	Corresponding ECL	Number of concepts
<b>Condition.code</b>	<a href="http://hl7.org/fhir/ValueSet/condition-code">http://hl7.org/fhir/ValueSet/condition-code</a>	Members of the Nutrition Care Process Terminology reference set	<sup>^</sup> 1303957004   Nutrition Care Process Terminology reference set   <b>AND</b> (< 404684003   Clinical finding   <b>OR</b> < 413350009   Finding with explicit context (situation)   )	166
<b>Condition.evidence.code</b>	<a href="http://hl7.org/fhir/ValueSet/clinical-findings">http://hl7.org/fhir/ValueSet/clinical-findings</a>	N/A	< 404684003   Clinical finding	122718 (June 2024)

The following value sets can be used as alternative bindings to represent nutrition diagnosis data. The “Nutrition Diagnosis Grouping” value set, stewarded by the Academy of Nutrition and Dietetics and available via the Value Set Authority Center (VSAC) at the National Library of Medicine (NLM), contains 167 concepts and can be accessed [here](#). Another value set, the “Nutrition Focused Physical Findings Grouping,” also stewarded by the Academy of Nutrition and Dietetics, includes 372 concepts and is accessible [here](#). These value sets enable precise and standardized documentation of nutrition-related diagnoses and physical findings.

Source	Name of value set	Reference	Steward	Number of concepts
Value Set Authority Center (VSAC), NLM	Nutrition Diagnosis Grouping	<a href="https://vsac.nlm.nih.gov/valueset/2.16.840.1.113762.1.4.1095.85/expansion">https://vsac.nlm.nih.gov/valueset/2.16.840.1.113762.1.4.1095.85/expansion</a>	Academy of Nutrition and Dietetics	167
Value Set Authority Center (VSAC), NLM	Nutrition Focused Physical Findings Grouping	<a href="https://vsac.nlm.nih.gov/valueset/2.16.840.1.113762.1.4.1095.49/expansion">https://vsac.nlm.nih.gov/valueset/2.16.840.1.113762.1.4.1095.49/expansion</a>	Academy of Nutrition and Dietetics	372

## FHIR Resources for Nutrition Intervention

Nutrition Intervention involves planning and implementing actions to address the nutrition diagnosis.

### Nutrition Intervention Data and Associated FHIR Resources

Several FHIR resources can be used to document these interventions:

- **NutritionOrder Resource** : Documents detailed nutrition care plans and orders.
- **NutritionProduct Resource**: Documents foods, fluids and oral nutrition supplements consumed by the patient.
- **Procedure Resource**: Records specific nutrition-related procedures and interventions.
- **CarePlan Resource**: Provides a comprehensive plan of care that includes nutrition interventions.

Types of Data Collected	Purpose	Example	FHIR Resource
<b>Food and Nutrient Delivery</b>	Document specific details of diets, oral supplements, or enteral/parenteral nutrition plans, including prescribed nutrition interventions.	High-protein diet, Tube feeding with formula	NutritionOrder, NutritionProduct
<b>Timing and Frequency</b>	Specify schedules for meals, oral supplements (e.g., protein shakes), or other forms of nutrition support.	TPN daily at night, Supplements twice daily	NutritionOrder
<b>Nutrition Counseling</b>	Capture details of counseling sessions and educational interventions to improve nutrition knowledge or behavior.	Nutrition education session on diabetic diet	Procedure
<b>Feeding Tube Placement</b>	Record details of procedures related to the placement of feeding tubes for enteral nutrition support.	Placement of nasogastric feeding tube	Procedure
<b>Goals and Objectives</b>	Outline specific, measurable nutrition-related goals that guide the overall care plan.	Increase weight by 2 kg in 1 month	CarePlan
<b>Activities and Interventions</b>	Coordinate actions such as administering supplements, monitoring tube feeding, or adjusting dietary plans as needed.	Administer supplements, Monitor tube feeding	CarePlan

## Examples

### Nutrition Order

This example demonstrates how the **NutritionOrder** resource can be used to document and manage dietary requirements, restrictions, and preferences for a patient. It illustrates a comprehensive cardiac diet order for an inpatient, including specific instructions, nutrient modifications, and food exclusions.

#### Key features highlighted in this example:

- **Diet Type:** Includes a low sodium diet and fluid-restricted diet to address cardiac health needs.
- **Nutrient Specifications:** Details on limiting sodium intake to 2 grams per day and fluids to 1500 milliliters per day.
- **Allergies and Exclusions:** Accounts for patient-specific allergies (e.g., cashew nuts) and excludes related food items.
- **Personalization:** Modifiers for food preferences, such as dairy-free options, to cater to the patient's dietary needs and preferences.
- **Instructions:** Provides specific guidance on meal preparation and fluid allowances.

This example is based on the official [FHIR documentation](#) and showcases how NutritionOrder supports structured, interoperable dietary management in healthcare.

For more examples and detailed use cases, refer to the [FHIR NutritionOrder documentation](#) and [FHIR NutritionOrder examples](#).

Nutrition Order
<pre>{   "resourceType" : "NutritionOrder",   "id" : "cardiacdiet",   "identifier" : [{     "system" : "http://goodhealthhospital.org/nutrition-requests",     "value" : "123"   }], }</pre>



```

"status" : "active",
"intent" : "order",
"subject" : {
"reference" : "Patient/example",
"display" : "Peter Chalmers"
},
"encounter" : {
"reference" : "Encounter/example",
"display" : "Inpatient"
},
"dateTime" : "2014-09-17",
"orderer" : {
"reference" : "Practitioner/example",
"display" : "Dr Adam Careful"
},
"allergyIntolerance" : [{
"reference" : "AllergyIntolerance/example",
"display" : "Cashew Nuts"
}],
"foodPreferenceModifier" : [{
"coding" : [{
"system" : "http://terminology.hl7.org/CodeSystem/diet",
"code" : "dairy-free"
}]
}],
"excludeFoodModifier" : [{
"coding" : [{
"system" : "http://snomed.info/sct",
"code" : "227493005",
"display" : "Cashew Nut"
}]
}],
"oralDiet" : {
"type" : [{
"coding" : [{
"system" : "http://snomed.info/sct",
"code" : "386619000",
"display" : "Low sodium diet"
}]
},
{
"system" : "http://goodhealthhospital.org/diet-type-codes",
"code" : "1040",
"display" : "Low Sodium Diet"
}],
"text" : "Low sodium diet"
},
{
"coding" : [{
"system" : "http://snomed.info/sct",
"code" : "226208002",
"display" : "Fluid restricted diet"
}]
},
{
"system" : "http://goodhealthhospital.org/diet-type-codes",

```

```

"code" : "1040",
"display" : "Fluid restricted diet"
}],
"text" : "Fluid restricted diet"
}],
"nutrient" : [{
  "modifier" : {
    "coding" : [{
      "system" : "http://snomed.info/sct",
      "code" : "39972003",
      "display" : "Sodium"
    }]
  },
  "amount" : {
    "value" : 2,
    "unit" : "grams",
    "system" : "http://unitsofmeasure.org",
    "code" : "g"
  }
}],
{
  "modifier" : {
    "coding" : [{
      "system" : "http://snomed.info/sct",
      "code" : "33463005",
      "display" : "Fluid"
    }]
  },
  "amount" : {
    "value" : 1500,
    "unit" : "milliliter",
    "system" : "http://unitsofmeasure.org",
    "code" : "mL"
  }
}],
"instruction" : "Starting on 2/10 breakfast, maximum 400 ml fluids per meal"
}
}

```

## FHIR Resources for Nutrition Monitoring and Evaluation

Nutrition Monitoring and Evaluation involve tracking the patient's progress and the outcomes of nutrition interventions.

### Nutrition Monitoring and Evaluation

Nutrition Monitoring and Evaluation involve tracking the patient's progress and the outcomes of nutrition interventions.

### Nutrition Monitoring and Evaluation Data and Associated FHIR Resources

FHIR resources used for this purpose include:

- **Observation Resource:** Continues to be crucial for ongoing measurements and assessments.
- **NutritionIntake Resource:** Details about the consumption of foods (i.e., solid and/or liquid), supplements, enteral nutrition, and infant formula.

- **NutritionProduct Resource:** Identification of a food (i.e., solid and/or liquid) product consumed by patients.
- **Goal Resource:** Tracks specific nutrition-related goals and their outcomes.
- **Condition Resource:** Updated to reflect changes in the patient’s condition as a result of interventions.
- **CarePlan Resource:** Monitors and evaluates the overall care plan, adjusting interventions as needed.

Types of data collected	Purpose	Example	FHIR Resource
<b>Monitoring Parameters</b>	Tracks ongoing measurements like weight, BMI, lab values, dietary intake	Weight: 70 kg, BMI: 25, Daily calorie intake	<b>Observation</b> <b>NutritionIntake</b> <b>NutritionProduct</b>
<b>Progress Notes</b>	Provides regular updates on the patient’s status	Weekly progress report on dietary changes	<b>Observation</b>
<b>Outcome Tracking</b>	Monitors progress towards achieving specific nutrition-related goals	Goal: Reduce BMI to 22 within 3 months	<b>Goal</b>
<b>Status Updates</b>	Documents changes in the status of the nutrition diagnosis	Condition improved from malnutrition to stable	<b>Condition</b>
<b>Plan Review and Adjustment</b>	Reviews the care plan, documenting changes and updates	Adjusted diet plan due to weight gain	<b>CarePlan</b>

## 6. Technical Application

The **Technical Application** chapter of the SNOMED CT Implementation Guide for the Nutrition Care Process Terminology (NCPT) Reference Set offers practical guidance for implementing and using the reference set in healthcare systems. It covers topics such as implementation approaches, translation of reference set members, accessing and deploying the NCPT Reference Set, and applying it in clinical workflows.

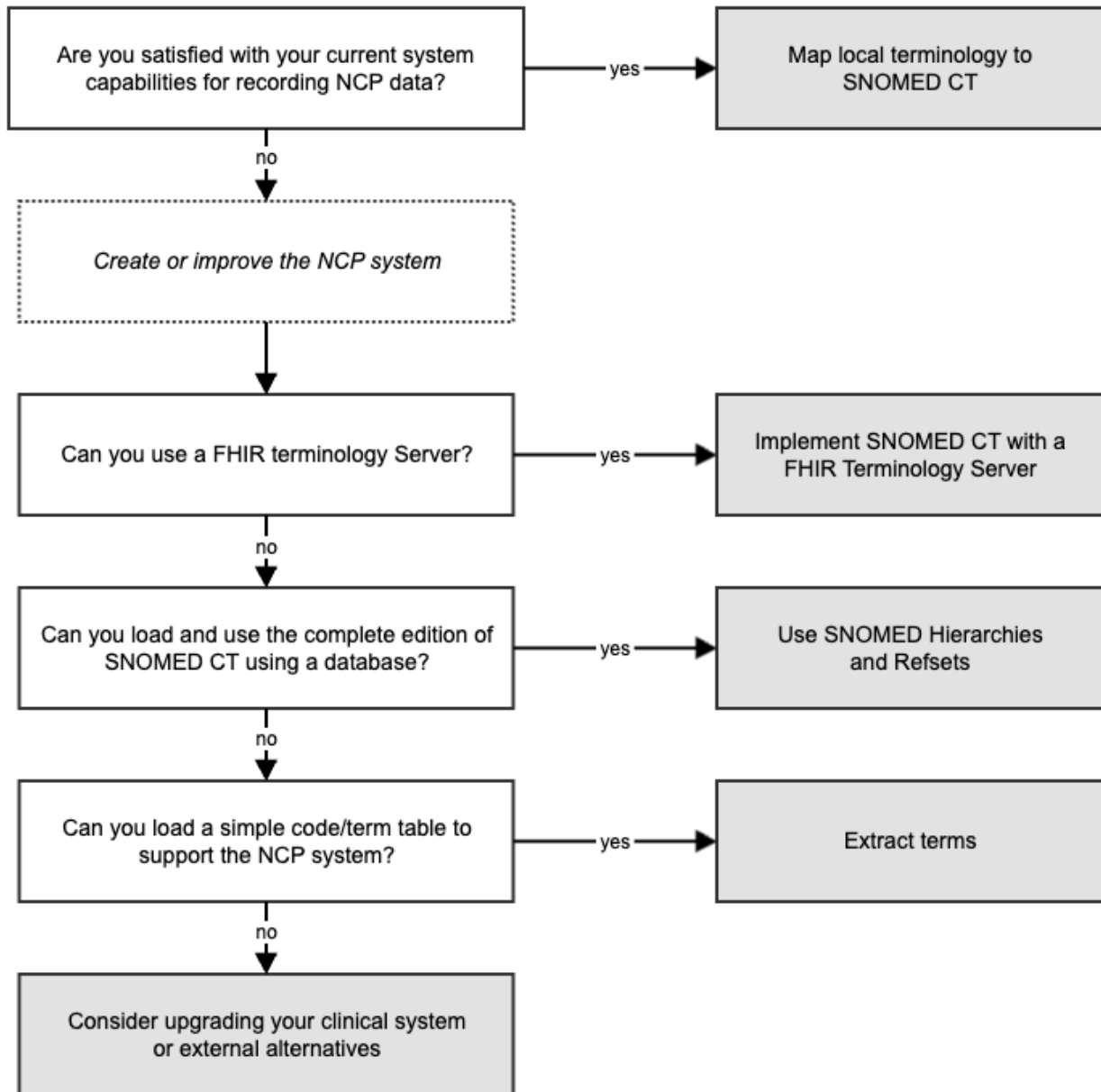
This chapter provides an overview of the steps needed to integrate the NCPT Reference Set effectively, including working with National Release Centers to align with SNOMED CT standards. By following the guidance, organizations can support standardized nutrition care documentation and improve consistency in nutrition-related data use.

### Implementation Approaches and Considerations

Implementing the SNOMED CT Nutrition Care Process Terminology (NCPT) Reference Set (Refset) within a clinical system can significantly improve the quality, consistency, and interoperability of nutrition documentation. This page outlines general approaches and considerations for successfully integrating the NCPT Refset into clinical workflows. These approaches will support healthcare professionals, technical implementers, and informatics teams in aligning documentation with the Nutrition Care Process (NCP) model.

### Key Approaches for Implementing the NCPT Reference Set

The flowchart below illustrates key considerations and decisions involved in selecting the optimal approach for implementing the NCPT. Detailed descriptions of each approach are provided below.



## Mapping

Mapping the NCPT Refset to existing local terminology is a common and practical starting point for implementation. By aligning SNOMED CT concepts within the NCPT Refset to equivalent or related terms used in the clinical system, mapping allows for accurate representation of nutrition-specific concepts without requiring extensive changes to existing systems.

## Recommendation

Collaborate with clinical experts to ensure mappings accurately reflect the intended meanings within the nutrition and dietetics domain. SNOMED International offers a free online mapping service, [Snap2SNOMED](#), which can be used to efficiently map local codes to SNOMED CT.

## Extracting a Plain List of Refset Members for Specific Contexts

In certain contexts, such as documenting diagnoses, interventions, or outcomes, it may be beneficial to extract a plain list of relevant NCPT Refset members. This approach enables easy access to the specific concepts needed for different stages of the Nutrition Care Process without overloading the system with unrelated terms.

### Recommendation

For each concept, extract its unique identifier, terms, and domain (e.g., diagnosis, intervention, monitoring) to create a streamlined list that aligns with your specific implementation needs. The [SNOMED Term Extractor](#) is a useful tool for this task, allowing efficient extraction of relevant SNOMED CT concepts directly from the terminology hierarchy. Use the bindings specified in General Terminology Bindings to determine the relevant SNOMED CT areas and subhierarchies for each data element, ensuring precise alignment with the appropriate SNOMED CT concepts. For this approach, it is important that you utilize the latest version of SNOMED CT and the NCPT reference set, as described in [Accessing the NCPT Reference Set](#).

### Utilizing Hierarchies

SNOMED CT is organized hierarchically, allowing for flexible navigation from broad categories (e.g., body systems or clinical findings) down to specific details (e.g., particular conditions or interventions). Implementers can utilize these hierarchies to contextualize NCPT concepts, enhance search functionality, and streamline data entry by directing clinicians to the most appropriate concept level.

### Recommendation

Refer to the bindings specified in [General Terminology Bindings](#) to identify the relevant SNOMED CT areas and subhierarchies for each data element. These bindings will help ensure accurate alignment with the appropriate SNOMED CT concepts. For this approach, it is important that you utilize the latest version of SNOMED CT and the NCPT reference set, as described in [Accessing the NCPT Reference Set](#).

## Implementing a Terminology Server

Using a terminology server can be a powerful way to manage, update, and integrate SNOMED CT concepts, including the NCPT Refset, within a clinical system. Terminology servers provide real-time access to SNOMED CT and can support dynamic updates as new versions of the terminology become available, enhancing both usability and long-term system maintenance.

Terminology servers offer centralized management of terms and facilitate seamless interoperability, especially when sharing data across systems or institutions.

### Recommendation

Engage with a technical team experienced in terminology servers and FHIR terminology services (FHIR TS) to ensure proper configuration, integration, and maintenance. Their expertise will help optimize server performance, enable seamless updates, and support interoperability across clinical applications. For this approach, it is important that you utilize the latest version of SNOMED CT and the NCPT reference set, as described in [Accessing the NCPT Reference Set](#).

## Getting Started: Steps and Considerations

We recommend following these fundamental steps to ensure a successful implementation of the NCPT Refset within SNOMED CT. Begin by engaging key stakeholders and assessing system capabilities, then set clear goals and consider starting with a pilot project. Providing user training on the Refset's purpose and benefits will further support effective integration into clinical practice.

## Engage Relevant Stakeholders

Begin by reaching out to your SNOMED CT National Release Center (NRC) or SNOMED International representative. They can offer valuable resources and guidance on accessing and implementing the NCPT Refset, ensuring alignment with regional and global standards.

## Review Existing System Capabilities

Evaluate your current clinical information system's capabilities, focusing on SNOMED CT compatibility, terminology mapping tools, and integration with a terminology server. Understanding system readiness helps identify any technical adjustments needed for successful implementation.

## Set Clear Goals for Implementation

Define specific use cases and desired outcomes for the NCPT Refset, such as improved documentation consistency, enhanced clinical decision support, or interoperability with external systems. Clear goals will help guide the project scope and implementation strategy.

## Develop a Pilot Project

Initiate a pilot project in a focused area, such as nutritional diagnosis or intervention. Starting small allows for the testing and refinement of workflows and user interactions, providing valuable insights before scaling to a full implementation.

## Training and Education

Conduct training for clinical users, particularly nutrition and dietetics professionals, to ensure they understand the NCPT Refset's purpose and benefits within SNOMED CT. Providing hands-on experience builds confidence and ensures that staff are well-prepared to use the Refset effectively in their practice.

## Support and Resources

For additional guidance, technical resources, or support with the NCPT Refset implementation, consider reaching out to:

- **National Release Center (NRC):** [snomed.org/members](https://snomed.org/members)
- **Nutrition and Dietetics Clinical Reference Group (CRG):** Participate in discussions or obtain updates related to NCPT within SNOMED CT by joining the Nutrition and Dietetics CRG. [Nutrition and Dietetics Clinical Reference Group](#)
- **SNOMED International Implementation Support Team:** [implementation@snomed.org](mailto:implementation@snomed.org)

## Translating Reference Set Members

The translation of reference set members involves creating meaningful and linguistically appropriate descriptions for the **concepts referenced by the subset**. These descriptions are added within the **national extension** of SNOMED CT, ensuring that healthcare professionals can understand and use the terminology effectively in their local language and clinical context.

## Creating Descriptions for Referenced Concepts

The reference set itself does not contain descriptions but instead includes references to specific SNOMED CT concepts.

Translating reference set members involve:

1. **Adding Descriptions for Referenced Concepts:**
  - For each concept in the reference set, create one or more descriptions for the concept in the target language.

- These descriptions ensure that the clinical intent of each concept is clear and usable by healthcare professionals in the target region.
- 2. **Maintaining Semantic Integrity:**
  - Ensure that the translated descriptions accurately reflect the original meaning of the concepts while using natural language familiar to the target audience.
- 3. **Integration into the National Extension:**
  - The translated descriptions are added to the national extension of SNOMED CT, which incorporates the localized content while maintaining alignment with the International Edition.

## Collaboration with the National Release Center

The translation process should be conducted in collaboration with the **National Release Center (NRC)** to:

- **Ensure Consistency Across Extensions:** Work with the NRC to maintain consistent translations across the national extension, avoiding discrepancies between reference sets and other SNOMED CT components.
- **Leverage Expertise:** Utilize the NRC’s access to clinical, linguistic, and terminological experts to validate the quality and usability of the translations.
- **Support Updates:** Coordinate with the NRC to integrate translated descriptions into the national extension and manage updates as SNOMED CT evolves.

## Benefits of Translating Referenced Concepts

- **Enhanced Usability:** Descriptions in the local language make the reference set more accessible to healthcare professionals.
- **Improved Data Quality:** Localized descriptions reduce the risk of misinterpretation and improve the accuracy of clinical documentation.
- **Alignment with National Standards:** Ensures the reference set reflects local healthcare practices and terminologies.

### More information

Overview of Members and contact details: <https://www.snomed.org/members>

Translation Guidance and principles: <https://www.implementation.snomed.org/translation>

## Accessing the NCPT Reference Set

The NCPT reference set is distributed as an independent derivative package. Using it requires a valid Affiliate License, which can be obtained through national or international channels depending on the user’s location. Understanding the licensing requirements and processes is essential for proper utilization and compliance. For more detailed information on obtaining a license and accessing the NCPT reference set, users should contact their National Release Center or SNOMED International directly.

## License to Use SNOMED CT

To access and use the NCPT reference set, users must have a valid Affiliate License for SNOMED CT. SNOMED CT is a globally recognized clinical terminology standard, and its usage is governed by strict licensing agreements to ensure compliance and proper utilization. Licensing ensures that users are authorized to access and implement SNOMED CT in their systems.

Individuals or organizations interested in using SNOMED CT must obtain an Affiliate License through their respective National Release Center (NRC) or via SNOMED International.

More information can be found here: <https://www.snomed.org/get-snomed>



Countries that are members of SNOMED International have specific licensing arrangements in place for accessing SNOMED CT, including the NCPT reference set.

The following points outline the key aspects of member licensing:

- **Member Countries:** Member countries have a national licensing arrangement with SNOMED International. Healthcare professionals and organizations within these countries can usually access SNOMED CT through their NRC without additional licensing fees.
- **Access via NRCs:** National Release Centers are responsible for distributing SNOMED CT within their respective countries. They provide access, support, and updates to licensed users. Users should contact their NRC for specific details on how to access the NCPT reference set.
- **Non-Member Countries:** In countries that are not members of SNOMED International, individuals and organizations must directly approach SNOMED International to obtain the necessary licenses. This may involve additional costs and compliance with international licensing requirements.

## Accessing the NCPT Reference Set via MLDS

The SNOMED International Member Licensing and Distribution Service (MLDS) facilitates access to the NCPT reference set by providing a centralized platform for distributing SNOMED CT and its related reference sets.

The MLDS simplifies the distribution and licensing process for SNOMED CT, including the NCPT reference set. It is available to users through their National Release Centers (NRCs) in member countries and directly through SNOMED International for users in non-member countries.

### Access to MLDS

- **MLDS:** [snomed.org/mlds](https://snomed.org/mlds)
- **User Guidance:** [MLDS User Guide](#)

### Identifying the Release Package



Once logged into MLDS, you can access the NCPT release package under ‘SNOMED Releases’, as shown in the example image below.

#### SNOMED CT NCPT Refset package

This package contains the SNOMED CT International Nutrition Care Process Terminology (NCPT) Reference Set.

---

**Latest:** **January 2024 v1.0**  
 Published on: 2024-04-12

-  [SnomedCT\\_NCPTRelease\\_PRODUCTION\\_20240412T120000Z.zip](#)
-  [doc\\_SnomedCT-NCPT-ReleaseNotes\\_Current\\_en-US\\_INT\\_20240101.pdf](#)

## Deploying the NCPT Reference Set

### Introduction

Effective use of the content of the Reference Set requires access to the content in ways that leverage the features of the terminology. A [terminology service](#) is a software function that interfaces with and provides access to information from one or more representations of a terminology.

Different technical options are available for implementing terminology services, such as using a relational database, other database options (such as Graph databases ), or predefined services accessible via an API (for example, SNOMED International's Snowstorm).

When deploying the NCPT reference set, it is important to decide on an appropriate approach. The choice will depend on factors such as the organization’s existing infrastructure, the complexity of integration, and the level of

flexibility required. Whether opting for a local database solution or a cloud-based service, the decision should ensure efficient retrieval, updates, and management of the terminology content.

Regardless of the technological platform chosen to deploy the Reference Set content, the process always involves importing a SNOMED CT Edition and the reference set in the server or database.

## Required Release Packages

To load the NCPT reference set, the RF2 packages required are:

- The latest version of the national release you have access to
  - For national extension packages, the corresponding international edition is also required (the version that the national extension is dependent on)
- The latest version of the NCPT Release Package where the International Edition dependency is not newer than the version you are using.
  - The release notes accompanying the NCPT release package include a chapter titled ‘Versions,’ which details the International Edition dependency of the current release package.

## Understanding Releases and Dependencies

The NCPT (Nutrition Care Process Terminology) Reference Set is aligned with specific releases of the SNOMED CT International Edition. Each version of the NCPT Reference Set is released annually in April and is dependent on the January release of the International Edition.

For users in a specific country or region, access to the descriptions of the reference set members, including translations, requires the use of the National Edition. The national extension may incorporate localized descriptions for the concepts referenced in the reference set, ensuring translations are available for use in the target language. Without the national extension, users will only have access to the descriptions provided in the International Edition.

National Editions follow independent release cycles, which vary by country or member organization. Some National Editions are released monthly, others quarterly, and some biannually. SNOMED CT is designed to accommodate these variations in release schedules, with comprehensive history tracking to manage any discrepancies that arise due to differing update cycles.

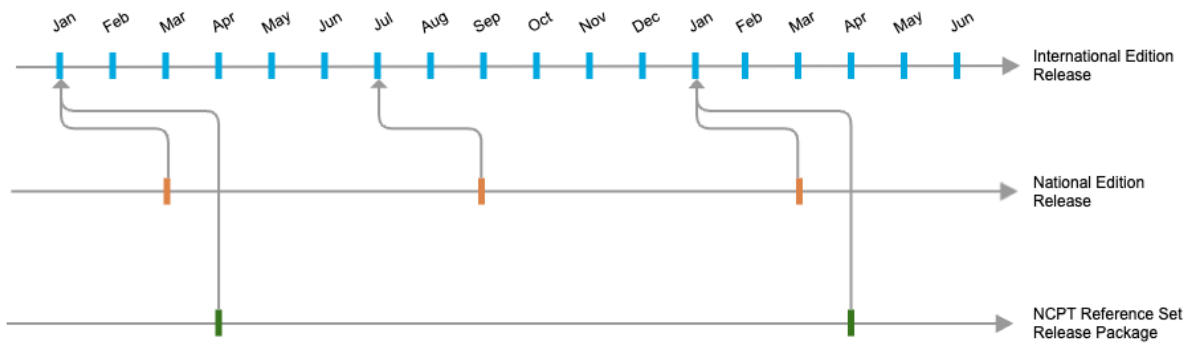
### Example Scenario

A National Edition is released in September and is based on the July release of the International Edition.

At the same time, the NCPT Reference Set, dependent on the January International Edition, is required by implementations in this Member country.

In this case, certain concepts within the International Edition that are referenced in the NCPT Reference Set may have been inactivated between the January and July releases.

When the September National Edition is implemented alongside the April version of the NCPT Reference Set, this could result in references to inactive concepts.



To address this, SNOMED CT’s design enables easy identification and resolution of any references to inactive concepts when updating to the new National Edition.

This process ensures that the NCPT Reference Set remains consistent and operational across varying release cycles.

## Implementation Considerations

You have two options:

1) Use the Reference set as it is, accepting the risk that some of the components may refer to inactive concepts

- **Benefit:** No need to spend time and resources on processing or updating the reference set before implementation. This approach allows for quicker deployment, reducing the upfront effort required. Additionally, SNOMED CT provides tools and workarounds, such as historical associations, to mitigate the impact of using inactive content.
- **Challenge:** Risk of coding with concepts that are inactive in the current version of SNOMED CT

**i** This approach is commonly adopted by most implementations because it offers easy deployment, and SNOMED CT provides workarounds for using inactive content, such as historical associations. The key recommendation is to consistently apply the latest version of the published reference set. This ensures that the reference set’s content remains aligned with a more recent version of the International Edition, preventing it from becoming outdated.

2) Conduct a pre-implementation processing step to resolve any references to inactive concepts

- **Benefit:** The reference set will be fully aligned with the version of SNOMED CT applied in the implementation
- **Challenge:** Various requirements needs to be in place, including
  - Expertise knowledge on SNOMED CT
  - Services supporting the identification of proposed replacements (see section below)
  - Services to publish the updated reference set

## Managing References to Inactive Concepts

Inactive concepts within the NCPT Reference Set do not present an obstacle for normal use. SNOMED CT provides tools to identify and manage these inactive concepts through Expression Constraint Language (ECL) queries.

To locate references to inactive concepts within the NCPT Reference Set, you can use the following ECL:

```
^ 1303957004 |NCPT (Nutrition Care Process Terminology) reference set| {{C active=0}}
```

This ECL query identifies all concepts within the NCPT Reference Set that are currently inactive ( ` active = false ` ). This is useful when you need to review or manage concepts that are no longer active.

If you prefer to work only with active concepts and exclude any that have been inactivated, you can use the inverse ECL:

```
^ 1303957004 |NCPT (Nutrition Care Process Terminology) reference set| {{C active=1}}
```

This query returns only those concepts within the NCPT Reference Set that are currently active (`active = true`). It ensures that you are working with concepts that are up-to-date and valid according to the latest standards.

Additionally, if you need to combine this selection with a hierarchy selection, such as selecting only those concepts within a specific clinical hierarchy, you can do so while ensuring all results are active.

For example, if you are only interested in active concepts within the "Clinical finding" hierarchy, the ECL would be:

```
^ 1303957004 |NCPT (Nutrition Care Process Terminology) AND << 404684003 |Clinical finding (finding)|
```

This combined ECL query retrieves all active concepts in the NCPT Reference Set that fall within the "Clinical finding" hierarchy, ensuring that your results are both relevant and current.

## Using the NCPT Reference Set

### Introduction

When working with the Nutrition Care Process Terminology (NCPT) reference set, it's essential to have efficient access to the content through various systems, regardless of the technology used.

Clinical applications will access the Reference Set content from the selected terminology repository. The main functional requirements include listing all concepts in the Reference Set, filtering by text search strings, and validating whether a concept is a member of the Reference Set.

This page provides examples of how to interact with the reference set, whether you're using a FHIR terminology server or a relational database like MySQL.

### Accessing the Reference Set from a FHIR Terminology Server

When working with the Nutrition Care Process Terminology (NCPT) reference set, leveraging a FHIR terminology server can simplify access and management. The server allows you to handle the reference set as a Value Set, providing key operations such as \$expand and \$validate to interact with the content.

A FHIR terminology server provides mechanisms to work with the Reference Set as a Value Set; the main operations available are **\$expand** and **\$validate-code**:

#### FHIR Operations

Service Name and Status	Input	Output
<b>\$expand</b> Get all members of the reference set <span style="background-color: orange; padding: 2px;">REQUIRED</span>	<ul style="list-style-type: none"> <li>A reference set specified by its refsetId, in this case the identifier for the 1303957004  Nutrition Care Process Terminology reference set (foundation metadata concept) </li> </ul>	<ul style="list-style-type: none"> <li>A list of concept or description IDs</li> <li>Option to include additional information about each concept or description</li> </ul>

Service Name and Status	Input	Output
<b>\$validate-code</b> Test if a concept or description is a member of a specified reference set <b>REQUIRED</b>	<ul style="list-style-type: none"> <li>A reference set specified by its refsetId</li> <li>A candidate <a href="#">concept.id</a></li> </ul>	<ul style="list-style-type: none"> <li>If the candidate concept is a member of the reference set: TRUE</li> <li>Otherwise: FALSE</li> </ul>

### Example FHIR Requests

These examples use the concept [1303957004](#) |Nutrition Care Process Terminology reference set (foundation metadata concept)| as the refsetId.

Service Name	API Call
<b>Get all members of the reference set</b>	<pre>GET [fhir]/ValueSet/\$expand ?url=http://snomed.info/sct?fhir_vs=refset/[refsetId] &amp;count=10</pre> <p>for example</p> <pre>GET [fhir]/ValueSet/\$expand ?url=http%3A%2F%2Fsnomed.info%2Fsct%3Ffhir_vs%3Drefset%2F1303957004&amp; &amp;count=10</pre> <p>An alternative solution is to use the expression constraint language, as shown here:</p> <pre>GET [fhir]/ValueSet/\$expand ?url=http%3A%2F%2Fsnomed.info%2Fsct%3Ffhir_vs%3Decl%2F%5E%5B1303957004%5D&amp; &amp;count=10</pre> <pre>GET [fhir]/ValueSet/\$expand ?url=http%3A%2F%2Fsnomed.info%2Fsct%3Ffhir_vs%3Decl%2F%5E1303957004%5D&amp; &amp;count=10</pre>
<b>Test if a concept is a member of the reference set</b>	<pre>GET [fhir]/ValueSet/\$validate-code ?system=http://snomed.info/sct&amp;code=181216001 &amp;url=http://snomed.info/sct/[moduleId]/version/[effectiveTime]?fhir_vs=refset/[refsetId]</pre> <p>for example</p> <pre>GET [fhir]/ValueSet/\$validate-code ?system=http://snomed.info/sct&amp;code=181216001 &amp;url=http://snomed.info/sct/900000000000207008/version/20200131?fhir_vs=refset/[refsetId]</pre>

## Accessing the Reference Set in a Relational Database

If the Reference Set has been loaded in a relational database using a model that complies with the RF2 specification for tables and column names, the reference set content can be accessed using SQL queries in line with the examples below:

Service Name	SQL Query <sup>6</sup>
<b>Get all members of the reference set</b>	<pre data-bbox="782 548 1548 616">SELECT referencedComponentId FROM snap_refset_simple WHERE active=1 AND refsetId=[refsetId];</pre> <p data-bbox="758 638 861 672">for example</p> <pre data-bbox="782 705 1548 772">SELECT referencedComponentId FROM snap_refset_simple WHERE active=1 AND refsetId=1303957004;</pre>
<b>Test if a concept is a member of the reference set</b>	<pre data-bbox="782 840 1564 974">SELECT count(referencedComponentId) FROM snap_refset_simple WHERE active=1 AND refsetId=[refsetId] AND referencedComponentId=[candidateComponentId];</pre> <p data-bbox="758 996 861 1030">for example</p> <pre data-bbox="782 1064 1404 1198">SELECT count(referencedComponentId) FROM snap_refset_simple WHERE active=1 AND refsetId=1303957004 AND referencedComponentId=53120007;</pre>

## Example Implementations

Two examples are offered as to how the refset could streamline digital nutrition care. Because the Nutrition Refset is relatively new, few implementation examples exist. However, these two scenarios offer insight into possible use cases. First, in Brisbane, Australia, a nutrition diagnosis dashboard using NCPT was developed for internal reports to demonstrate nutrition care outcomes. (This was presented in a May 2024 webinar, which is available with a Commission on Dietetic Registration account <https://www.pathlms.com/cdr/courses/69648>) And second, later this year, Sweden will be transitioning to a new EHR. Dietitians in Sweden see opportunities to incorporate the refset into the transition advancing report generation and demonstrating quality care [personal correspondence]. With the Swedish EHR transition, dietitians are working with nursing to standardize malnutrition diagnostic criteria and nutrition interventions among other issues. The completed nutrition care refset would support this work in Sweden.

Participation in standards development, recognize others with interest in nutrition such as wound care, treatment of dysphagia (<https://iddsi.org/events/webinar-promoting-meaningful-electronic-health-information-exchange-between-patient-care-sites-inclusion-of-iddsi-in-snomed-ct>) and general nursing practice. Implementation of the refset in these care areas would be expected to grow as interventions are included.

The article accompanying the refset release (Lloyd et al , 2024) suggests additional use cases. The availability of a defined terminology can promote: 1) Cross border demonstration of nutrition care outcomes: US and Australian dietitians comparing Hemoglobin A1C changes after nutrition intervention, 2) Cross border and cross-cultural research to assess culturally diverse diets in the treatment of Inflammatory Bowel Disease.

## Appendices

### Appendix A: How to Learn More

What	Why	Where
SNOMED CT Introductory Videos	Why structured clinical data matters	<a href="#">Video</a>
	Introduction to using the SNOMED CT Browser (including details about design features and the SNOMED CT concept diagrams)	<a href="#">Video</a>
eLearning Courses	To learn about SNOMED CT, its design and applications	<a href="https://snomed.org/courses">snomed.org/courses</a>
Diagramming Guideline	To learn how to read the SNOMED CT concept diagrams	<a href="https://snomed.org/diagram">snomed.org/diagram</a>
Clinical Engagement	To learn about SNOMED International's clinical engagement and related resources	<a href="https://snomed.org/clinical">snomed.org/clinical</a>
Nutrition and Dietetics Clinical Reference Group	To learn about SNOMED International's clinical reference group for Nutrition and Dietetics	<a href="#">Nutrition and Dietetics Clinical Reference Group</a>

### Appendix B: Glossary of Terms

Term	Explication	Description
AND	Academy of Nutrition and Dietetics	World's largest association of food and nutrition professionals headquartered in Chicago, Illinois
BMI	Body Mass Index	Weight in kg/height in meter squared typically used as measure of weight status
CDA	Clinical Documentation Architecture	HL7 markup standard which specifies structure and semantics of electronic clinical documents
C-CDA	Consolidated Clinical Documentation Architecture	An HL7 library of CDA formatted documents
CDS	Clinical Decision Support	Electronic health information to help inform decisions about a patient's care
CMS	Centers for Medicare and Medicaid Services	An organizational unit of the US federal government's Department of Health and Human Services which assures healthcare to elderly and underserved populations
CRG	Clinical Reference Group	Clinical engagement structure in SNOMED CT, <a href="#">Introduction - Clinical Reference Groups</a>
EHR	Electronic Health Record	The electronic, digitized version of a patient's paper medical record
ENCPRS	Electronic Nutrition Care Process Record System	<a href="https://www.standict.eu/standards-repository/hl7-ehr-system-electronic-nutrition-care-process-record-system-encprs">https://www.standict.eu/standards-repository/hl7-ehr-system-electronic-nutrition-care-process-record-system-encprs</a>
EU	European Union	Supranational economic and political union of twenty-seven European countries and their territories
FHIR	Fast Healthcare Interoperability Resources	HL7 standard for exchanging health information electronically <a href="#">link</a>
HIE	Health Information Exchange	Allows health care professionals and patients to appropriately access and securely share medical information electronically

HL7	Health Level Seven International	"a not-for-profit, ANSI-accredited standards developing organization dedicated to providing a comprehensive framework and related standards for the exchange, integration, sharing and retrieval of electronic health information that supports clinical practice and the management, delivery and evaluation of health services." <a href="https://www.hl7.org/">https://www.hl7.org/</a>
HbA1C	Hemoglobin A1C, glycolated hemoglobin	Blood test used to assess blood glucose control over preceding 2-3 months
IBD	Irritable Bowel Disease	Lifelong diseases that affect the intestines
IPS	International Patient Summary	The International Patient Summary is a minimal and non-exhaustive set of basic clinical data of a patient, specialty-agnostic, condition-independent, but readily usable by all clinicians for the unscheduled (cross-border) patient care. <a href="https://international-patient-summary.net/">https://international-patient-summary.net/</a>
K-CDA IG	Korean Clinical Documentation Architecture Implementation Guide	An example of adaptation of HL7 CDA to meet social and cultural HIE needs of a country
NCP	Nutrition Care Process	Systematic method that dietetics and nutrition professionals use to provide nutrition care. Fully described in Section 2.
NCPM	Nutrition Care Process Model	Illustrated in Chapter 2
NCPT	Nutrition Care Process Terminology	Terms which support the NCP as described in Chapter 2
PS-CA	Pan-Canadian Patient Summary	Canadian adaptation of the IPS concept
SDO	Standards Development Organization	ISO (International Organization for Standardization, <a href="https://www.iso.org/home.html">https://www.iso.org/home.html</a> ) and ANSI (American National Standards Institute, <a href="https://www.ansi.org/">https://www.ansi.org/</a> ) are examples of SDOs. HL7 is ANSI accredited.
USCDI	United States Core Data for Interoperability	A standardized set of health data classes and constituent data elements for nationwide, interoperable health information exchange, <a href="https://www.healthit.gov/isp/united-states-core-data-interoperability-uscdi">https://www.healthit.gov/isp/united-states-core-data-interoperability-uscdi</a>
VSAC	Value Set Authority Center	A repository and authoring tool for public value sets created by external programs. Value sets are lists of codes and corresponding terms, from <a href="#">NLM-hosted standard clinical vocabularies</a> (such as SNOMED CT®, RxNorm, LOINC® and others), that define clinical concepts to support effective and interoperable health information exchange. <a href="https://vsac.nlm.nih.gov/">https://vsac.nlm.nih.gov/</a>

## Appendix C - International Standards and Resources

### International Standards and Resources

- International Patient Summary (IPS)
  - Essential medical information for unplanned, cross border medical care. Allergies and intolerances, medications, medical devices (feeding pumps, central lines). To be implemented in 2025. Refugees with food insecurity or malnutrition (undernutrition).
- European Patient Summary
  - Essential medical information for unplanned medical care within the EU. Internally displaced persons with food insecurity or malnutrition (undernutrition).
- pan-Canadian Patient Summary Specification (PS-CA)
  - Essential medical information for unplanned medical care within Canada.
- Korean CDA Implementation Guide (K-CDA IG)
  - Adapted HL7 CDA standards to meet needs of the local healthcare system.
  - Jung S, Bae S, Seong D, Yi B. Standard Document Development for Health Information Exchange in Korea. *Appl Clin Info* 13:3, 592-601, 2022.
- HL7



- FHIR, relationship described in Section 5
- HL7 Domain Analysis Model for Nutrition Care Release 3, Universal Realm
- HL7 EHR-System Electronic Nutrition Care Process Record System (ENCPRS) Functional Profile Release 2, Universal Realm
- HL7 Version 3 Care Provision - Nutrition and Drug Preferences, Universal Realm

## US Standards and Resources

- Consolidated Clinical Documentation Architecture (C-CDA)
  - HL7 CDA® R2 Implementation Guide: C-CDA R2.1 Supplemental Templates for Nutrition, US Realm
- Value Set Authority Center (VSAC), National Institutes of Health, National Library of Medicine
  - Approximately 34 sets of SNOMED-CT terms that support documentation of a nutrition professional's encounter using NCP. Also supports FHIR Resources
- Assistant Secretary for Technology Policy/Office of National Coordinator for Health Information Technology (ASTP/ONC), Department of Health and Human Services
  - United States Core Data for Interoperability (USCDI)
  - Allergies and intolerances, Ht and Wt with BMI, problem list, progress notes, medications, discharge summary. Additional nutrition content (enteral nutrition, MNT) has been proposed.
- Centers for Medicare and Medicaid (CMS)
- Electronic Quality Measures (eCQM)
  - Global Malnutrition Composite Score
  - Screening for malnutrition completed, assessment by dietitian completed in a timely manner, provider diagnosis based on dietitian's and their examination, care plan
  - Supported by a number of VSAC value sets