

Medical Terminology Curriculum



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1068001-01

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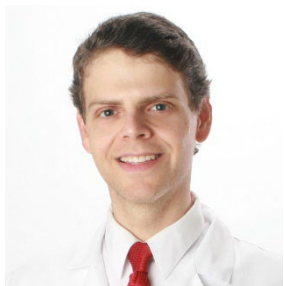
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About the Author

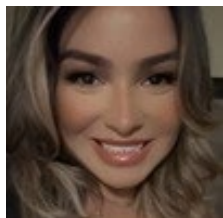


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Janice Rosario, R.N. is a New York state licensed registered professional nurse with a strong background in customer service, office administration, and data entry. She earned a Bachelor of Science in Nursing (BSN) from CUNY School for Professional Studies. She also completed an Associate of Arts and Sciences (AAS) in Nursing at Laguardia Community College. She is bilingual in English/Spanish with the ability to translate and edit in both languages.

Medical Terminology Curriculum

The purpose of this curriculum is to familiarize participants with the different concepts of medical terminology, including introduction to how medical words are formed as well as common medical prefixes, suffixes, and root words. They will also learn how to break medical terms down into smaller parts to determine their meaning.

Curriculum Structure

The *Medical Terminology Curriculum* is composed of the following lessons. Approximate lesson times are included.

Lesson	Title	Approximate Time
One	Introduction to Medical Terminology	35 minutes
Two	Common Medical Prefixes	35-50 minutes
Three	Common Medical Suffixes	35-50 minutes
Four	Common Medical Root Words	35-50 minutes
Five	Overview of the Body	50-70 minutes
Six	Lymphatic System Terminology	50-70 minutes
Seven	Circulatory System Terminology	50-70 minutes
Eight	Muscular System Terminology	50-70 minutes
Nine	Integumentary System Terminology	50-70 minutes
Ten	Respiratory System Terminology	50-70 minutes
Eleven	Digestive System Terminology	50-70 minutes
Twelve	Urinary System Terminology	50-70 minutes
Thirteen	Reproductive System Terminology	50-70 minutes
Fourteen	Skeletal System Terminology	50-70 minutes
Fifteen	Endocrine System Terminology	50-70 minutes
Sixteen	Nervous System Terminology	50-70 minutes
Seventeen	Sensory Systems Terminology	50-70 minutes
	Total	13 – 18 hours

Lesson Structure

Each lesson begins with a Lesson Overview, Lesson Objectives, and a Lesson at a Glance table, listing lesson activities, materials required, suggested preparation steps, and approximate class time.

Lesson Sections

The actual lesson follows the overview, which contains the sections described below.

FOCUS

Every lesson begins with a FOCUS activity intended to capture participants' attention. This may be in the form of a small or large class discussion, a game, a demonstration, or a review of previous lesson information. During this activity, participants are introduced to the topic of the lesson.

LEARN

The LEARN activity in each lesson varies in its presentation mode. It may be a slide presentation, group activity, or demonstration.

REVIEW

The lessons end with a REVIEW activity intended to briefly review the lesson's key messages or main points.

Lesson One – Introduction to Medical Terminology

Lesson Overview

In this lesson, participants will learn to identify the parts of medical words so that they can begin breaking the words down to help them determine the meaning of the word and better understand how medical terms are created.

Lesson Objectives

After completing this lesson, participants will be able to:

- Identify parts of words and what role each part has in understanding a medical term
- Understand combining vowels and how they fit into word structure
- Differentiate between single and plural forms of medical terms
- Break down a medical term to determine its meaning

Lesson at a Glance

Activity	Materials	Preparation	10
FOCUS	• <i>Introduction to Medical Terminology Worksheet</i> • <i>Introduction to Medical Terminology Worksheet – Answer Key</i>	1. Print/photocopy the <i>Introduction to Medical Terminology Worksheet</i> (one per participant).	10 minutes
LEARN	• <i>Introduction to Medical Terminology</i> slide presentation	1. Prepare the <i>Introduction to Medical Terminology</i> slide presentation for viewing.	15 minutes
REVIEW	• <i>Introduction to Medical Terminology Quiz</i> • <i>Introduction to Medical Terminology Quiz – Answer Key</i>	1. Print/photocopy the <i>Introduction to Medical Terminology Quiz</i> (one per participant).	10 minutes

Lesson One – Introduction to Medical Terminology

FOCUS: Introduction to Medical Terminology

10 minutes

Purpose:

To provide distinction and definition for the different parts of medical words so that participants can begin understanding the structure of medical words.

Materials:

- *Introduction to Medical Terminology Worksheet*
- *Introduction to Medical Terminology – Answer Key*

Facilitation Steps:

1. Distribute the *Introduction to Medical Terminology Worksheet* prior to or at the start of the class.
2. Have participants read through the information and complete the worksheet.
3. Have participants pair up upon completion, share answers, and discuss.

Name: _____ Class: _____

Introduction to Medical Terminology Worksheet

Instructions: Match the different parts of medical words (Column A) with their definitions (Column B). When you finish the worksheet, pair up with someone in your class and discuss.

Column A

A. Prefix

B. Suffix

C. Root word

D. Combining vowel

E. Pluralizing

F. Medical terminology

Column B

_____ The core or stem of a word to which other parts can be attached

_____ An ending added after the stem of a word

_____ A beginning added before the stem of a word

_____ A letter, usually an O, added between a stem and another stem or a stem and a suffix

_____ The study of the rules of medical word building

_____ The rules surrounding how to modify a medical word to indicate more than one of something

Introduction to Medical Terminology Worksheet – Answer Key

Instructions: Match the different parts of medical words (Column A) with their definitions (Column B). When you finish the worksheet, pair up with someone in your class and discuss.

Column A

A. Prefix

B. Suffix

C. Root word

D. Combining vowel

E. Pluralizing

F. Medical terminology

Column B

C

The core or stem of a word to which other parts can be attached

B

An ending added after the stem of a word

A

A beginning added before the stem of a word

D

A letter, usually an O, added between a stem and another stem or a stem and a suffix

F

The study of the rules of medical word building

E

The rules surrounding how to modify a medical word to indicate more than one of something

Lesson One – Introduction to Medical Terminology

LEARN: Introduction to Medical Terminology Slide Presentation

15 minutes

Purpose:

Participants will receive a thorough introduction to medical terminology, the process of identifying word parts, and breaking words down to determine their meaning.

Materials:

- *Introduction to Medical Terminology* slide presentation

Facilitation Steps:

1. If desired, choose an introduction to medical terminology video to share. There are many short videos on YouTube with good information. Here are a few to consider:

<https://www.youtube.com/watch?v=ndb3a4jLLWM>

<https://www.youtube.com/watch?v=I9E5Fmh9-yc>

2. Or you can share the following information with participants as you show the slide presentation introducing participants to medical terminology.

Slide 1: Introduction slide

Slide 2: Formatting

There is a standard way to format medical terminology when learning to break it down and learning various word parts.

Slashes are used to separate word parts.

Hyphens are used after a prefix and before a suffix when they stand alone. Examples are on the slide.

Slides 3-5: Identifying Word Parts

A root word or stem word is the core of the word, the most basic and broken-down part that gives the word the center of its meaning.

Root words cannot be broken down any further. They are usually Greek or Latin in origin.

You can add other root words, combining vowel, and prefixes or suffixes to root words to create new meaning and new words.

Prefixes are added to the beginning of words to change the meaning.

Examples include words like “pre-,” which means before, or “bi-,” which means two. We will learn more about common prefixes in future lessons.

Suffixes are added to the end of words to change the meaning.

Examples include words like “-ectomy,” which means removal, or “-itis,” which means inflammation. We will learn more about common suffixes in future lessons.

Slide 6: Combining Vowels

Combining vowels are used to join parts of medical terms. They can join two root words or a root word and a suffix. The most common combining vowel is “O,” but other vowels can also be used.

Slides 7-9: Plural Forms

Common English rules like adding –s or –es do not always apply to medical terminology.

Slide 10: Putting It All Together

Practice breaking down different medical terms into prefixes, root words, combining vowels, and suffixes.

Lesson One – Introduction to Medical Terminology

REVIEW: Introduction to Medical Terminology

10 minutes

Purpose:

Participants will test their knowledge on the various parts of medical words and how the words are broken down to determine meaning.

Materials:

- *Introduction to Medical Terminology Quiz*
- *Introduction to Medical Terminology Quiz- Answer Key*

Facilitation Steps:

1. Distribute the *Introduction to Medical Terminology Quiz*.
2. Have participants complete the quiz.
3. Grade the quiz results according to the *Medical Terminology Quiz – Answer Key*.
4. Have participants review their answers and ask questions as needed.

Name: _____ Class: _____

Introduction to Medical Terminology Quiz

1. Which part of the medical term vesic/**o**/ureter/al/cysto/gram is in bold?
 - a. Prefix
 - b. Suffix
 - c. Root word
 - d. Combining vowel
2. Which part of the medical term **append**/ectomy is in bold?
 - a. Prefix
 - b. Suffix
 - c. Root word
 - d. Combining vowel
3. Which part of the medical term thor/a/**centesis** is in bold?
 - a. Prefix
 - b. Suffix
 - c. Root word
 - d. Combining vowel
4. What is the defining characteristic of a root word or stem?
 - a. It can be added to the beginning of a word to modify it
 - b. It can be added to the end of a word to modify it
 - c. It cannot be broken down further
 - d. It is usually from the Japanese language
5. Based on the formatting of the word part -paresis, one can assume it is a _____.
 - a. Prefix
 - b. Suffix
 - c. Root word
 - d. Combining vowel
6. Based on the formatting of the word part hyper-, one can assume it is a _____.
 - a. Prefix
 - b. Suffix
 - c. Root word
 - d. Combining vowel
7. Based on the rules for pluralizing medical terms, the plural form of scapula is _____.
 - a. Scapulas
 - b. Scapulaes
 - c. Scapulae
 - d. Scapulie
8. Based on the rules for pluralizing medical terms, the plural form of metastasis is _____.
 - a. Metastasis
 - b. Metastasises
 - c. Metasti
 - d. Metastases

Introduction to Medical Terminology Quiz – Answer Key

1. Which part of the medical term vesic/**o**/ureter/al/cysto/gram is in bold?
 - a. Prefix
 - b. Suffix
 - c. Root word
 - d. Combining vowel**
2. Which part of the medical term **append**/ectomy is in bold?
 - a. Prefix
 - b. Suffix
 - c. Root word**
 - d. Combining vowel
3. Which part of the medical term thor/a/**centesis** is in bold?
 - a. Prefix
 - b. Suffix**
 - c. Root word
 - d. Combining vowel
4. What is the defining characteristic of a root word or stem?
 - a. It can be added to the beginning of a word to modify it
 - b. It can be added to the end of a word to modify it
 - c. It cannot be broken down further**
 - d. It is usually from the Japanese language
5. Based on the formatting of the word part -paresis, one can assume it is a _____.
 - a. Prefix
 - b. Suffix**
 - c. Root word
 - d. Combining vowel
6. Based on the formatting of the word part hyper-, one can assume it is a _____.
 - a. Prefix**
 - b. Suffix
 - c. Root word
 - d. Combining vowel
7. Based on the rules for pluralizing medical terms, the plural form of scapula is _____.
 - a. Scapulas
 - b. Scapulaes
 - c. Scapulae**
 - d. Scapulie
8. Based on the rules for pluralizing medical terms, the plural form of metastasis is _____.
 - a. Metastasis
 - b. Metastasises
 - c. Metasti
 - d. Metastases**

Lesson Two – Common Medical Prefixes

Lesson Overview

In this lesson, participants will learn how prefixes are used to modify medical terms as well as common medical prefixes and their meanings.

Lesson Objectives

After completing this lesson, participants will be able to:

- Explain what a prefix is and how it is used to modify a root word
- List common medical prefixes
- Understand the meaning of common medical prefixes

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• Medical Terminology Prefixes Printable Flashcards OR online flashcards for Lesson 2 • Scissors	1. Print the Medical Terminology Prefixes Printable Flashcards (printed front and back, one per participant). Alternatively, give participants access to the online flashcards for Lesson 2.	10 minutes
LEARN	• <i>Common Medical Prefixes</i> slide presentation • Medical Terminology Prefixes Printable Flashcards • Online flashcards for Lesson 2 • <i>Medical Terminology Student Glossary</i>	1. Prepare the <i>Common Medical Prefixes</i> slide presentation for viewing. 2. Access the Medical Terminology Prefixes Printable Flashcards (one per participant). 3. Access the Online Flashcards for Lesson 2 and the Prefixes section of the student glossary.	15-30 minutes
REVIEW	• <i>Common Medical Prefixes Quiz</i> • <i>Common Medical Prefixes Quiz – Answer Key</i>	1. Print/photocopy the <i>Common Medical Prefixes Quiz</i> (one per participant).	10 minutes

Note: See the Medical Terminology Block Instructions at the end of this curriculum. These blocks provide a hands-on experience constructing and deconstructing medical terms. There are many ways the blocks may be used at the end of each lesson to provide additional practice for learning medical terminology.

Lesson Two – Common Medical Prefixes

FOCUS: Common Medical Prefixes Flashcards

10 minutes

Purpose:

Participants will familiarize themselves with common medical prefixes and their meanings.

Materials:

- Medical Terminology Prefixes Printable Flashcards
- Online flashcards for Lesson 2
- Scissors

Facilitation Steps:

1. Distribute the Medical Terminology Prefixes Printable Flashcard sets to each participant (printed front and back). The flashcards can be found at www.realityworks.com/medicalterminologykit-downloads.
2. Have participants cut out the flashcards along the designated lines.
3. Have participants pair up and quiz each other on the prefixes and their meanings.

As an alternative independent practice method, give each participant access to the online flashcards for this lesson. Participants will read the online flashcard, click on the term/prefix and then the card will flip and reveal the definition.

This activity will help participants identify how much knowledge of medical prefixes they already have and what they need to learn.

Lesson Two – Common Medical Prefixes

LEARN: Common Medical Prefixes Slide Presentation

15-30 minutes

Purpose:

Participants will review information about what a prefix is and how it modifies medical words, as well as a list and definitions of the most common medical prefixes.

Materials:

- *Common Medical Prefixes* slide presentation
- Medical Terminology Prefixes Printable Flashcards
- Online flashcards for Lesson 2
- *Medical Terminology Student Glossary*

Facilitation Steps:

1. Give each participant their own *Medical Terminology Student Glossary*. Participants should record their definition for the various prefixes as the slide presentation is shared.
2. Share the following information with participants as you show the slide presentation.

Slide 1: Introduction slide

Slide 2: What Are Prefixes?

- Prefixes are modifiers placed at the beginning of medical terms
- They can change the meaning of the root word to indicate things like
 - Position
 - Time
 - Number
 - Measurement
 - Negation

Slide 3: Prefixes: Rules for Use

- Prefixes occur at the beginning of a word

- Alone, they are indicated with a hyphen at the end
 - Pre-
 - Hypo-
- They do not have a combining vowel after them

Slides 4-6: Common Prefixes

- In relation to position
 - Ante-, Pre-, Pro- mean before
 - Epi- means above
 - Hypo- and Sub- mean below or underneath
 - Inter- means between
 - Medi- means middle
 - Post- means behind or after
 - Retro- means behind or backwards
- In relation to time
 - Pre- means before
 - Post- means after
- In negation
 - and An- mean without
 - Im- and In- mean not
- In relation to number or measurement
 - Micro- means small
 - Macro- means large
 - Multi- and Poly- mean many
 - Hyper- means excessive
 - Primi- means first
 - Mono- and Uni- mean one
 - Bi- and Di- mean two
 - Tri- means three
 - Quad- means four

Flashcard Practice:

1. Distribute the Medical Terminology Prefixes Printable Flashcard sets to each participant (printed front and back). The flashcards can be found at www.realityworks.com/medicalterminology-kit-downloads
2. Have participants cut out the flashcards along the designated lines.
3. Have participants pair up and quiz each other on the prefixes and their meanings.
4. As an alternative independent practice method, give each participant access to the online flashcards for this lesson. Participants will read the online flashcard, click on the term/prefix and then the card will flip and reveal the definition.

Lesson Two – Common Medical Prefixes

REVIEW: Common Medical Prefixes

10 minutes

Purpose:

To test participants' knowledge of common prefixes and understanding of how they modify medical root words.

Materials:

- *Common Medical Prefixes Quiz*
- *Common Medical Prefixes Quiz – Answer Key*

Facilitation Steps:

1. Distribute the *Common Medical Prefixes Quiz*.
2. Have participants complete the quiz.
3. Grade the quiz results according to the *Common Medical Prefixes Quiz – Answer Key*.
4. Have participants review their answers and ask questions as needed.

Name: _____

Class: _____

Common Medical Prefixes Quiz

Instructions: Select the best answer for each question below.

1. Consider the word sub/dural in which the root word “dura” means a membrane of the brain and spinal cord. Given your knowledge of this word’s root and prefix, what is a subdural hemorrhage?
 - a. Bleeding above this membrane
 - b. Bleeding below this membrane
 - c. Bleeding around this membrane
 - d. Bleeding through this membrane
2. Consider the word inter/costal in which the root word “costal” means in relation to the ribs. Given your knowledge of this word’s root and prefix, where is the intercostal space?
 - a. The space above the ribs
 - b. The space below the ribs
 - c. The space between the ribs
 - d. The bony part of the ribs
3. Consider the word null/i/parous in which the root word “parous” or “parity” means a viable fetus has been expelled from the uterus. Given your knowledge of this word’s root and prefix, when a pregnant woman’s chart lists her as a nulliparous patient, you know she has given birth how many times before?
 - a. 0
 - b. 1
 - c. 2
 - d. 3
4. Consider the word macro/cephal/ic in which the root word “cephal” means head. Given your knowledge of this word’s root and prefix, you would expect that a macrocephalic patient would have a skull with what characteristic?
 - a. Fractured bones
 - b. Smaller than normal size
 - c. Larger than normal size
 - d. Elongated shape
5. Consider the word hyper/emesis in which the root word “emesis” means vomiting. Given your knowledge of this word’s root and prefix, what is the meaning of hyperemesis?
 - a. Forceful vomiting
 - b. Excessive vomiting
 - c. Inability to vomit
 - d. Vomiting while asleep

Medical Terminology Curriculum

6. What does the prefix Poly- mean?
 - a. Many
 - b. Few
 - c. Elastic
 - d. Stiff
7. What does the prefix Post- mean?
 - a. Before
 - b. After
 - c. Upright
 - d. Heavy
8. What does the prefix Quad- mean
 - a. Divided
 - b. Four
 - c. Three
 - d. Combined
9. What does the prefix An- mean?
 - a. Under
 - b. Over
 - c. With
 - d. Without
10. What does the prefix Epi- mean?
 - a. Within
 - b. Around
 - c. Under
 - d. Above

Common Medical Prefixes Quiz - Answer Key

1. Consider the word sub/dural in which the root word “dura” means a membrane of the brain and spinal cord. Given your knowledge of this word’s root and prefix, what is a subdural hemorrhage?
 - a. Bleeding above this membrane
 - b. Bleeding below this membrane**
 - c. Bleeding around this membrane
 - d. Bleeding through this membrane
2. Consider the word inter/costal in which the root word “costal” means in relation to the ribs. Given your knowledge of this word’s root and prefix, where is the intercostal space?
 - a. The space above the ribs
 - b. The space below the ribs
 - c. The space between the ribs**
 - d. The bony part of the ribs
3. Consider the word null/i/parous in which the root word “parous” or “parity” means a viable fetus has been expelled from the uterus. Given your knowledge of this word’s root and prefix, when a pregnant woman’s chart lists her as a nulliparous patient, you know she has given birth how many times before?
 - a. 0**
 - b. 1
 - c. 2
 - d. 3
4. Consider the word macro/cephal/ic in which the root word “cephal” means head. Given your knowledge of this word’s root and prefix, you would expect that a macrocephalic patient would have a skull with what characteristic?
 - a. Fractured bones
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 - c. Larger than normal size**
 - d. Elongated shape
5. Consider the word hyper/emesis in which the root word “emesis” means vomiting. Given your knowledge of this word’s root and prefix, what is the meaning of hyperemesis?
 - a. Forceful vomiting
 - b. Excessive vomiting**
 - c. Inability to vomit
 - d. Vomiting while asleep

Medical Terminology Curriculum

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- a. Under
- b. Over
- c. With
- d. Without**

10. What does the prefix Epi- mean?

- a. Within
- b. Around
- c. Above**
- d. Below

Sources

Cohen, B. J. (2011). Medical terminology: an illustrated guide. 6th Ed. Baltimore, MD. Wolters Kluwer Health/Lippincott Williams and Wilkins.

Lesson Three – Common Medical Suffixes

Lesson Overview

In this lesson, participants will learn how suffixes are used to modify medical terms as well as common medical suffixes and their meanings.

Lesson Objectives

After completing this lesson, participants will be able to:

- Explain what a suffix is and how it is used to modify a root word
- List common medical suffixes
- Understand the meaning of common medical suffixes

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• <i>Common Medical Suffixes Worksheet</i> • <i>Common Medical Suffixes Worksheet – Answer Key</i>	1. Print/photocopy the <i>Common Medical Suffixes Worksheet</i> (one per participant).	10 minutes
LEARN	• <i>Common Medical Suffixes</i> slide presentation • Medical Terminology Suffixes Printable Flashcards • Online flashcards for Lesson 3 • <i>Medical Terminology Student Glossary</i>	1. Prepare the <i>Common Medical Suffixes</i> slide presentation for viewing. 2. Print the Medical Terminology Suffixes Printable Flashcards (one per participant). 3. Access the online flashcards for Lesson 3 and the Suffixes section to the student glossary.	15-30 minutes
REVIEW	• <i>Common Medical Suffixes Quiz</i> • <i>Common Medical Suffixes Quiz – Answer Key</i>	1. Print/photocopy <i>Common Medical Suffixes Quiz</i> (one per participant).	10 minutes

Note: See the Medical Terminology Block Instructions at the end of this curriculum. These blocks provide hands-on experience constructing and deconstructing medical terms. There are many ways that the blocks may be used at the end of each lesson to provide additional practice for learning medical terminology.

Lesson Three – Common Medical Suffixes

FOCUS: Common Medical Suffixes Worksheet

10 minutes

Purpose:

To provide distinction and definition for the different parts of medical words so that participants can begin understanding the structure of medical words. Participants will complete the activity to challenge themselves and discover what they know about medical suffixes.

Materials:

- *Common Medical Suffixes Worksheet*
- *Common Medical Suffixes Worksheet – Answer Key*

Facilitation Steps:

1. Distribute the *Common Medical Suffixes Worksheet* prior to or at the start of the class.
2. Have the *Common Medical Suffixes Worksheet – Answer Key* page available.
3. Have participants read through the information and complete the activity.
4. Have participants pair up upon completion, share answers, and discuss.

Name: _____ Class: _____

Common Medical Suffixes

Worksheet

Instructions: For each of the suffixes at the bottom of the page, write them in the appropriate column.

Indicates a Procedure	Indicates a Condition	Means Pertaining To	Related to a Disease/Disorder

-ic	-ostomy	-otomy	-osis	-plasty	-ia	-ism	-pathy
-itis	-phobia	-algia	-paresis	-al	-rrhea	-penia	-blast
-malacia	-ar	-ectomy	-ial	-os	-scope	-ology	-rrhagia

Common Medical Suffixes Worksheet

– Answer Key

Instructions: For each of the suffixes at the bottom of the page, write them in the appropriate column.

Indicates a Procedure	Abnormal Condition	Means Pertaining To	Related to a Disease/Disorder
-ectomy -ostomy -otomy -ology -plasty -scope	-ia -ism -pathy -osis	-itis -phobia -algia -paresis -malacia -rrhea -penia -blast -rrhagia	-al -ar -ic -ial -os

Lesson Three – Common Medical Suffixes

LEARN: Common Medical Suffixes Slide Presentation

15 -30 minutes

Purpose:

Participants will review information about what a suffix is and how they modify medical words, as well as a list and definitions of the most common medical suffixes.

Materials:

- *Common Medical Suffixes* slide presentation
- Medical Terminology Suffixes Flashcards
- Online flashcards for Lesson 3
- *Medical Terminology Student Glossary*

Facilitation Steps:

1. Give each participant their own *Medical Terminology Student Glossary*. Participants should record their definition for the various suffixes as the slide presentation is shared.
2. Share the following information with participants as you show the slide presentation.

Slide 1: Introduction slide

Slide 2: What Are Suffixes?

- Suffixes are modifiers placed at the end of medical terms.
- They can change the meaning of the root word, usually to indicate:
 - Procedures
 - Conditions
 - “Pertaining to”
 - Diseases/Disorders

Slide 3: Rules for Use

- Suffixes occur at the end of a word
- Alone, they are indicated with a hyphen at the beginning
 - -ectomy
 - -phobia

- Often have a combining vowel before them (when a suffix begins with a consonant)
 - Hepat/o/megaly
 - Cyst/o/gram

Slides 4-6: Common Suffixes

- In relation to procedures:
 - -ectomy means removal or excision of
 - -otomy means incision into
 - -ostomy means creating an opening in
 - -scope means use of an instrument to view
 - -plasty means molding, formation, or repair
 - -ology means study of
- Meaning “abnormal condition”
 - -osis
 - -ia
 - -ism
 - -ago
 - -pathy
- Meaning “pertaining to”
 - -al
 - -ar
 - -ic
 - -ary
 - -ial
 - -os
- In relation to diseases or disorders
 - -itis means inflammation
 - -phobia means fear
 - -paresis means partial paralysis
 - -plegia means paralysis
 - -rrhea means flow
 - -rrhagia means heavy flow

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- -blast means cell
- -malacia means abnormal softening of tissue
- -penia means lack or deficiency
- -algia means pain

Flashcard Practice:

1. Distribute the Medical Terminology Suffixes Printable Flashcards to each participant. The flashcards can be found at this link:
www.realityworks.com/medicalterminologykit-downloads
2. Have participants cut out the flashcards along the designated lines.
3. Have participants pair up and quiz each other on the suffixes and their meanings.

As an alternative independent practice method, give each participant access to the online flashcards for this lesson. Participants will read the online flashcard, click on the term/suffix, and then the card will flip and reveal the definition.

Lesson Three – Common Medical Suffixes

REVIEW: Common Medical Suffixes

10 minutes

Purpose:

To test the participants' knowledge of common suffixes and understanding of how they modify medical root words.

Materials:

- *Common Medical Suffixes Quiz*
- *Common Medical Suffixes Quiz – Answer Key*

Facilitation Steps:

1. Distribute the *Common Medical Suffixes Quiz*.
2. Have participants complete the quiz.
3. Grade the quiz results according to the *Common Medical Suffixes Quiz – Answer Key*.
4. Have participants review their answers and ask questions as needed.

Name: _____ Class: _____

Common Medical Suffixes Quiz

Instructions: Select the best answer for each question below.

1. Consider the word arthr/itis in which the root word “arthr” means pertaining to the joints. Given your knowledge of this word’s root and suffix, what is the meaning of arthritis?
 - a. Joint repair surgery
 - b. Joint inflammation
 - c. Low flexibility of a joint
 - d. Hyper-flexibility of a joint
2. Consider the word rhin/o/plasty in which the root word “rhin” means nose. Given your knowledge of this word’s root and suffix, what is the meaning of rhinoplasty?
 - a. Runny nose
 - b. Frequent sneezing
 - c. Surgical repair of the nose
 - d. Fractured nose
3. Consider the word ile/ostomy in which the root word “ile” means pertaining to the small intestine. Given your knowledge of this word’s root and suffix, what is an ileostomy?
 - a. A surgically made opening from the outside of the body to the small intestine
 - b. Removal of a portion of the small intestine
 - c. Paralysis of a portion of the small intestine
 - d. Rejoining two separated portions of the small intestine
4. Consider the word men/o/rrhagia in which the root word “men” means related to menstruation. Given your knowledge of this word’s root and suffix, what is the meaning of menorrhagia?
 - a. First menstruation
 - b. Lack of menstruation
 - c. Light menstrual flow
 - d. Heavy menstrual flow
5. Consider the word append/ectomy in which the root word “append” means related to the appendix. Given your knowledge of this word’s root and suffix, what is the meaning of appendectomy?
 - a. Rupture of the appendix
 - b. Surgical removal of the appendix
 - c. Inflammation of the appendix
 - d. Infection of the appendix

6. What does the suffix -phobia mean?
 - a. Fear of
 - b. Lack of
 - c. Removal of
 - d. Pertaining to
7. What does the suffix -plegia mean?
 - a. Softening
 - b. Hardening
 - c. Partial paralysis
 - d. Malignancy
8. What does the suffix -blast mean?
 - a. Removal of
 - b. Related to cells
 - c. Inflammation
 - d. Study of
9. What does the suffix -malacia mean?
 - a. Shifting from one side to another
 - b. Fluid filled
 - c. Hardening
 - d. Softening
10. What does the suffix -osis mean?
 - a. Abnormal condition
 - b. Pertaining to
 - c. Study of
 - d. Removal of

Common Medical Suffixes Quiz – Answer Key

1. Consider the word arthr/itis in which the root word “arthr” means pertaining to the joints. Given your knowledge of this word’s root and suffix, what is the meaning of arthritis?
 - a. Joint repair surgery
 - b. Joint inflammation**
 - c. Low flexibility of a joint
 - d. Hyper-flexibility of a joint
2. Consider the word rhin/o/plasty in which the root word “rhin” means nose. Given your knowledge of this word’s root and suffix, what is the meaning of rhinoplasty?
 - a. Runny nose
 - b. Frequent sneezing
 - c. Surgical repair of the nose**
 - d. Fractured nose
3. Consider the word ile/ostomy in which the root word “ile” means pertaining to the small intestine. Given your knowledge of this word’s root and suffix, what is an ileostomy?
 - a. A surgically made opening from the outside of the body to the small intestine**
 - b. Removal of a portion of the small intestine
 - c. Paralysis of a portion of the small intestine
 - d. Rejoining two separated portions of the small intestine
4. Consider the word men/o/rrhagia in which the root word “men” means related to menstruation. Given your knowledge of this word’s root and suffix, what is the meaning of menorrhagia?
 - a. First menstruation
 - b. Lack of menstruation
 - c. Light menstrual flow
 - d. Heavy menstrual flow**
5. Consider the word append/ectomy in which the root word “append” means related to the appendix. Given your knowledge of this word’s root and suffix, what is the meaning of appendectomy?
 - a. Rupture of the appendix
 - b. Surgical removal of the appendix**
 - c. Inflammation of the appendix
 - d. Infection of the appendix

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6. What does the suffix -phobia mean?
 - a. Fear of**
 - b. Lack of
 - c. Removal of
 - d. Pertaining to

7. What does the suffix -plegia mean?
 - a. Softening
 - b. Hardening
 - c. Partial paralysis**
 - d. Malignancy

8. What does the suffix -blast mean?
 - a. Removal of
 - b. Related to cells**
 - c. Inflammation
 - d. Study of

9. What does the suffix -malacia mean?
 - a. Shifting from one side to another
 - b. Fluid filled
 - c. Hardening
 - d. Softening**

10. What does the suffix -osis mean?
 - a. Abnormal condition**
 - b. Pertaining to
 - c. Study of
 - d. Removal of

Lesson Four – Common Medical Root Words

Lesson Overview

In this lesson, participants will learn the role of root words in medical terms as well as common medical root words and their meanings.

Lesson Objectives

After completing this lesson, participants will be able to:

- Explain what a root word is and how it is used in a medical term
- Explain how a root word might be modified by a prefix or suffix
- Understand the meaning of common medical root words

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• <i>Common Medical Root Words Matching</i> worksheet • <i>Common Medical Root Words Matching – Answer Key</i>	1. Print/photocopy the <i>Common Medical Root Words Matching</i> (one per participant).	10 minutes
LEARN	• <i>Common Medical Root Words</i> slide presentation • Medical Terminology Root Words Printable Flashcards • Online flashcards for Lesson 4 • <i>Medical Terminology Student Glossary</i>	1. Prepare to share the <i>Common Medical Root Words</i> slide presentation for viewing. 2. Print the Medical Terminology Root Words Printable Flashcards (one per participant). 3. Access the online flashcards for Lesson 2 and the Root Words section of the student glossary.	15-30 minutes
REVIEW	• <i>Common Medical Root Words Quiz</i> • <i>Common Medical Root Words Quiz – Answer Key</i>	1. Print/photocopy the <i>Common Medical Root Words Quiz</i> for each participant.	10 minutes

Note: See the Medical Terminology Block Instructions at the end of this curriculum. These blocks provide hands-on experience constructing and deconstructing medical terms. There are many ways that the blocks may be used at the end of each lesson to provide additional practice for learning medical terminology.

Lesson Four – Common Medical Root Words

FOCUS: Common Medical Root Words Matching

10 minutes

Purpose:

Participants will familiarize themselves with common medical root words and their meanings. This activity will be a good self-assessment for participants to see what they already know about common medical root words.

Materials:

- *Common Medical Root Words Matching* worksheet
- *Common Medical Root Words Matching – Answer Key*

Facilitation Steps:

1. Distribute the *Common Medical Root Words Matching*, one per participant.
2. Have participants read through the information and complete the activity.
3. Once they have completed the worksheet, have participants pair up to share answers and discuss.

Common Medical Root Words

Matching

Instructions: Match the different root words (Column A) with their definitions (Column B).

Column A

- A. Arter
- B. Luek
- C. Melan
- D. Somn
- E. Eryth
- F. Cerebr
- G. Hemat
- H. Prand
- I. Uter
- J. Duod
- K. Trach
- L. Purpur
- M. Pharnyng
- N. Neph
- O. Nuch

Column B

- ___ Neck
- ___ Throat
- ___ Trachea
- ___ Uterus
- ___ Blood
- ___ Red
- ___ Black
- ___ Artery
- ___ White
- ___ Sleep
- ___ Brain
- ___ Meals
- ___ Small intestine
- ___ Purple
- ___ Kidney

Common Medical Root Words Matching – Answer Key

Column A

- A. Arter
- B. Luek
- C. Melan
- D. Somn
- E. Eryth
- F. Cerebr
- G. Hemat
- H. Prand
- I. Uter
- J. Duod
- K. Trach
- L. Purpur
- M. Pharnyng
- N. Neph
- O. Nuch

Column B

- O** Neck
- M** Throat
- K** Trachea
- I** Uterus
- G** Blood
- E** Red
- C** Black
- A** Artery
- B** White
- D** Sleep
- F** Brain
- H** Meals
- J** Small intestine
- L** Purple
- N** Kidney

Lesson Four – Common Medical Root Words

LEARN: Common Medical Root Words Slide Presentation

15 minutes

Purpose:

Participants will review information about what a root word is and how they can be modified, as well as a list and definitions of the most common medical root words.

Materials:

- *Common Medical Root Words* slide Presentation
- Medical Terminology Root Words Printable Flashcards
- Online flashcards for Lesson 4
- *Medical Terminology Student Glossary*

Facilitation Steps:

1. Give each participant their own *Medical Terminology Student Glossary*. Participants should record their definition for the various root words as the slide presentation is shared.
2. Share the following information with participants as you show the slide presentation.

Slide 1: Introduction slide

Slide 2: What Are Root Words

- Root words are the main part or foundation of a word
- They can indicate:
 - Body parts or systems
 - Body processes
 - Colors
 - Timing
- Often Latin or Greek
- They can be modified or have the meaning changed or made more specific by:
 - Prefixes (added at the beginning of a root word)

- Suffixes (added at the end of a root word)
- Combining vowels (used to combine root words or suffixes beginning in consonants)

Slide 3: Rules for Use

- Root Words can have
 - Prefixes added before
 - Suffixes added after
 - Other root words combined with them
- Cannot be broken down further

Slides 4-6: Common Root Words

- In relation to body parts, systems, or processes:
 - Arter/o- means relating to arteries
 - Bronch- means relating to the bronchi
 - Cerebr- means relating to the brain
 - Duoden- means relating to the small intestine
 - Hemat- means relating to blood cells
 - Integument- means relating to skin
 - Muscul- means relating to muscles
 - Nuch- means related to the neck
 - Pharyng- means relating to throat
 - Neph- means relating to kidneys
 - Ophthalm- means relating to the eyes

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- Scoli- means relating to the spine
- Trach- means relating to the trachea
- Uter- means relating to the uterus
- Ventricul- means relating to ventricles
- Galact- means relating to milk production
- Gravid- means relating to pregnancy
- In relation to colors:
 - Cyan means blue
 - Melan means black
 - Chlor means green
 - Erythr means red
 - Leuk means white
 - Purpur means purple
- In relation to timing:
 - Prand means around meals
 - Somn means related to sleep

Flashcard Practice:

1. Distribute the Medical Terminology Root Word Printable Flashcards to each participant. The flashcards can be found at this link:
www.realityworks.com/medicalterminologykit-downloads
2. Have participants cut out the flashcards along the designated lines.
3. Have participants pair up and quiz each other on the root words and their meanings.

As an alternative independent practice method, give each participant access to the online flashcards for this lesson. Participants will read the online flashcard, click on the term/root word and then the card will flip and reveal the definition.

Lesson Four – Common Medical Root Words

REVIEW: Common Medical Root Words Quiz

10 minutes

Purpose:

To test the participants' knowledge of common root words and their meanings.

Materials:

- *Common Medical Root Words Quiz*
- *Common Medical Root Words Quiz – Answer Key*

Facilitation Steps:

1. Distribute the *Common Medical Root Words Quiz* and have participants complete it.
2. Grade the quiz results according to the *Common Medical Root Words Quiz – Answer Key*.
3. Have participants review their answers and ask questions as needed.

Name: _____ Class: _____

Common Medical Root Words Quiz

Instructions: Select the best answer for each question below.

1. Consider the word hemat/ology in which the suffix “-ology” means study of. Given your knowledge of this word’s root, what type of doctor is a hematologist?
 - a. Brain
 - b. Blood
 - c. Foot
 - d. Lungs
2. Consider the word pharyng/itis in which the suffix “-itis” means inflammation. Given your knowledge of this word’s root, what is pharyngitis?
 - a. Runny nose
 - b. Cough
 - c. Sore throat
 - d. Earache
3. Consider the word nuch/al in which the suffix “-al” means pertaining to. Given your knowledge of this word’s root, what does it mean when a baby is born with a nuchal cord?
 - a. Short umbilical cord
 - b. Long umbilical cord
 - c. Knot in the umbilical cord
 - d. Umbilical cord around the neck
4. Consider the word galact/a/gogue in which the second root word “gogue” means to lead. Given your knowledge of both root words, what would you expect a galactagogue medication to do?
 - a. Improve vision
 - b. Promote the production of breastmilk
 - c. Trigger a first menstrual period
 - d. Stop vomiting
5. Consider the word leuk/o/cytosis in which the prefix “a-” means without and the suffix “-cytosis” means increase in cell production. Given your knowledge of this word’s root, what is the meaning of leukocytosis?
 - a. Decrease in production of white blood cells
 - b. Increase in production of white blood cells
 - c. Decrease in production of red blood cells
 - d. Increase in production of red blood cells

6. Consider the word ipsi/lateral in which the prefix “ipsi-” means same. Given your knowledge of this word’s root, what does it mean if something is ipsilateral?
 - a. Affecting both sides
 - b. Affecting neither side
 - c. Affecting the opposite side
 - d. Affecting the same side
7. Consider the word macro/cephal/ic in which the prefix “macro-” means large and the suffix “-ic” means related to. Given your knowledge of this word’s root, you would expect a macrocephalic child to have what feature larger than normal?
 - a. Head
 - b. Abdomen
 - c. Legs
 - d. Eyes
8. Consider the word sub/cutaneous in which the prefix “sub-” means below. Given your knowledge of this word’s root, where would you administer a subcutaneous medication?
 - a. Under the tongue
 - b. Injected under the skin
 - c. Injected into the muscle
 - d. Onto the eye
9. Consider the word post/prandial in which the prefix “post-” means after. Given your knowledge of this word’s root, when would you check postprandial blood sugar?
 - a. After a meal
 - b. Before a meal
 - c. After sleeping
 - d. After exercise
10. Consider the word tachy/cardic in which the prefix “tachy-” means fast. Given your knowledge of this word’s root, what would you expect to observe on a tachycardic patient?
 - a. Fast breathing
 - b. Fast metabolism
 - c. Fast speech
 - d. Fast heart rate

Common Medical Root Words Quiz

– Answer Key

Instructions: Select the best answer for each question below.

1. Consider the word hemat/ology in which the suffix “-ology” means study of. Given your knowledge of this word’s root, what type of doctor is a hematologist?
 - a. Brain
 - b. Blood**
 - c. Foot
 - d. Lungs
2. Consider the word pharyng/itis in which the suffix “-itis” means inflammation. Given your knowledge of this word’s root, what is pharyngitis?
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 - c. Sore throat**
 - d. Earache
3. Consider the word nuch/al in which the suffix “-al” means pertaining to. Given your knowledge of this word’s root, what does it mean when a baby is born with a nuchal cord?
 - a. Short umbilical cord
 - b. Long umbilical cord
 - c. Knot in the umbilical cord
 - d. Umbilical cord around the neck**
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 - d. Stop vomiting
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 - a. Decrease in production of white blood cells
 - b. Increase in production of white blood cells**
 - c. Decrease in production of red blood cells

- d. Increase in production of red blood cells
6. Consider the word ipsi/lateral in which the prefix “ipsi-” means same. Given your knowledge of this word’s root, what does it mean if something is ipsilateral?
- a. Affecting both sides
 - b. Affecting neither side
 - c. Affecting the opposite side
 - d. Affecting the same side**
7. Consider the word macro/cephal/ic in which the prefix “macro-” means large and the suffix “-ic” means related to. Given your knowledge of this word’s root, you would expect a macrocephalic child to have what feature larger than normal?
- a. Head**
 - b. Abdomen
 - c. Legs
 - d. Eyes
8. Consider the word sub/cutaneous in which the prefix “sub-” means below. Given your knowledge of this word’s root, where would you administer a subcutaneous medication?
- a. Under the tongue
 - b. Injected under the skin**
 - c. Injected into the muscle
 - d. Onto the eye
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- a. After a meal**
 - b. Before a meal
 - c. After sleeping
 - d. After exercise
10. Consider the word tachy/cardic in which the prefix “tachy-” means fast. Given your knowledge of this word’s root, what would you expect to observe on a tachycardic patient?
- a. Fast breathing
 - b. Fast metabolism
 - c. Fast speech
 - d. Fast heart rate**

Sources

Cohen, B. J. (2011). Medical terminology: an illustrated guide. 6th Ed. Baltimore, MD. Wolters Kluwer Health/Lippincott Williams and Wilkins.

Lesson Five – Overview of the Body

Lesson Overview

In order to discuss anatomical structures, it is important to be able to use terms that localize body parts relative to one another. This enables greater precision and clarity of communication in a medical setting.

Lesson Objectives

After completing this lesson, participants will be able to:

- Explain what common directional terms mean and how they are used in medical settings
- Identify the meaning behind common body structure terms
- Accurately read vocabulary terms in context

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• Internet access • Smart devices (2 per group) • Suggested website: https://training.seer.cancer.gov/anatomy/body/terminology.html	1. Access the website for research.	10- 15 minutes
LEARN	• <i>Overview of the Body</i> slide presentation • Medical Terminology Overview of the Body Printable Flashcards • Online flashcards for Lesson 5 • Online context cards for Lesson 5 • Context card deck (Overview of the Body cards for Lesson 5) • <i>Medical Terminology Student Glossary</i>	1. Prepare to share the <i>Overview of the Body</i> slide presentation. 2. Print the Medical Terminology Overview of the Body Printable Flashcards (one per participant). 3. Prepare online access to the flashcards and context cards 4. Access the Overview of the Body section of the student glossary.	30-45 minutes
REVIEW	• <i>Overview of the Body Quiz</i> • <i>Overview of the Body Quiz – Answer Key</i>	1. Print/photocopy <i>Overview of the Body Quiz</i> (one per participant).	10 minutes

Note: See the Medical Terminology Block Instructions at the end of this curriculum. These blocks provide hands-on experience constructing and deconstructing medical terms. There are many ways that the blocks may be used at the end of each lesson to provide additional practice for learning medical terminology.

Lesson Five – Overview of the Body

FOCUS: Directional Terms for Body Parts

10-15 minutes

Purpose:

During this exercise, participants will practice using directional terms in an interactive fashion with each other.

Materials:

- Internet Access
- Smart devices (2 per group)
- Suggested website:
<https://training.seer.cancer.gov/anatomy/body/terminology.html>

Facilitation Steps:

1. Have participants gather in groups of four and give each group at least two smart devices with internet access.
2. Each participant will look up and describe to each other the location of at least 10 different body parts using anatomical directional terminology.

Note: Common layperson's terms for body parts can be used.

Examples:

Anterior (or ventral): The tip of the nose is anterior (or ventral) to the eyes.

Posterior (or dorsal): The ears are posterior (or dorsal) to the forehead.

Superior (or cranial): The vertex of the head is superior (cranial) to the ears.

Inferior (or caudal): The pelvis is inferior (or caudal) to the abdomen.

Lateral: The cheeks are lateral to the tongue.

Medial: The belly button is medial to the hips.

Proximal: The elbow is proximal to the hand.

Distal: The fingers are distal to the wrist.

Superficial: The skin is superficial to the muscle layer.

Deep: Bones are deep to the muscle layer.

Lesson Five – Overview of the Body

LEARN: Common Medical Terms for Body Parts

30-45 minutes

Purpose:

During this section, participants will learn to recognize prefixes, suffixes, directional terms, body planes and positions, terms relating to cellular growth, tissue types, and body cavities relating to body parts.

Materials:

- *Overview of the Body* slide presentation
- Medical Terminology Overview of the Body Printable Flashcards
- Online flashcards for Lesson 5
- Online context cards for Lesson 5
- Context card deck (Overview of the Body cards for Lesson 5)
- *Medical Terminology Student Glossary*

Facilitation Steps:

1. Give each participant their own *Medical Terminology Student Glossary*. Students should record their definitions for the various body parts as the slide presentation is shared.
2. Share the following information with participants as you show the slide presentation.

Slide 1: Introduction slide

Slide 2: Prefixes Relating to the Body

- ana- = reversion or regression
- a- = without
- dys- = disordered or abnormal
- hyper- = excessive or above normal
- hypo- = under or below (normal)
- neo- = new
- ipsi- = same
- contra- = opposite
- epi- = upon or above

Slide 3: Root Words Relating to the Body

These root words all use the combining vowel 'o' and relate to the body.

- dors/o- = the back side, derives from French
- ventr/o- = the underside or belly, derives from French
- medi/o- = the middle or center
- later/o- = the side
- crani/o- = skull
- caud/o- = tail
- proxim/o- = near or close to
- viscer/o- = internal organs
- coron/o- = crown
- spin/o- = the spinal cord and vertebral column
- abdomin/o- = abdomen
- thorac/o- = chest or thorax

Slide 4: Suffixes Relating to the Body

- -plasia = growth or formation
- -al = relating to
- -ic = pertaining to

Slides 5-6: Directional Terms

Directional terms are words used to describe the location of an anatomical structure by comparing its position to other structures within the body or to the orientation of the body itself.

- Anterior (or ventral): Positioned toward the frontside of the body, where the belly is located
- Posterior (or dorsal): Positioned toward the backside of the body, where the back is located
- Superior (or cranial): Positioned toward the head; higher or above another body part

- Inferior (or caudal): Positioned toward the tail/ tailbone; lower, or below another body part
- Lateral: Positioned toward the side of the body or to the side of another body part
- Ipsilateral: Positioned on the same side as another body part
- Contralateral: Positioned on the opposite side of another body part
- Bilateral: Involving both sides of the body
- Medial: Positioned toward the middle or center of the body
- Proximal: Positioned at the base or point of origin of a body part or point nearest the trunk
- Distal: Positioned farther away from the point of origin of a body part or further from the trunk
- Superficial: Positioned on the outer layer, closer to the surface of the body
- Deep: Positioned toward the interior of the body

Slide 7: Body Planes

Body planes are hypothetical geometric planes used to divide the body into sections. They are commonly used in both human and zoological anatomy to describe the location or direction of bodily structures.

- Sagittal (or longitudinal or lateral): A vertical plane that divides the body into left and right sides
- Mid-sagittal: A sagittal section through the center or midline of the body
- Para-sagittal: A sagittal section lateral to the midline of the body
- Coronal (or frontal): A vertical plane that divides the body into anterior and posterior sections (e.g., the plane that runs from ear to ear is coronal)
- Transverse (or axial or horizontal): A horizontal plane that divides the body into superior (upper) and inferior (lower) sections

Slide 8: Body Positions

Anatomical positions are important because they give us a frame of reference for describing the body. Like a compass, they give us a universal way to describe the position of an organism.

The concept of anatomical position is particularly important in medicine, as mistakes can occur if medical professionals do not have a shared point of reference for discussing patients' bodies.

- Supine: Position of lying on the back; face up
- Prone: Position of lying on the belly or chest; face down

Slide 9: Terms Related to Cellular Growth

- Anaplasia: A state of a cell or group of cells reverting to a more primordial (immature) stage. They can no longer carry out their function. It is associated with cancer.
- Aplasia: Lack of growth or complete absence of a tissue or organ
- Dysplasia: Abnormal or disordered growth of cells, often associated with cancer
- Hyperplasia: Abnormal increase in the cell number (proliferation) that can result in an enlarged organ
- Hypoplasia: Underdevelopment or lack of growth of an organ or tissue, which results from a decrease in cell number
- Neoplasia: New, unrestrained growth of cells and tissue, can be cancerous or precancerous (an initial stage that increases the risk of later developing cancer)

Slide 10: Tissue Types

- Connective Tissue: Provides structural support and joins other tissues together, also serves to cushion or “fill in” surrounding tissue
- Epithelial Tissue: Dense tissue that lines internal organs and external organs

- Organs: Group of tissues that work together as a functional unit critical for an organism's survival
- Visceral: Concerning the viscera, which are internal organs that are situated within the body cavities, or pockets of space inside the body
- Viscera specifically refers to the internal organs within the abdominal and thoracic cavities
- Membrane: Thin, outer layer that serves as the external boundary of a cell, body cavity, or organ
- Muscle tissue contracts to initiate movement in the body
- Nervous tissue transmits and integrates information through the central and peripheral nervous systems

Slides 11-12: Body Cavities

- Cranial Cavity: Encloses the brain, blood vessels that supply the brain, and protective membranes surrounding the brain (meninges)
- Abdominal Cavity: Located between the pelvic and thoracic cavities, it is the largest cavity in the body. It houses most of the digestive tract, liver, pancreas, gallbladder, spleen, kidneys, colon, and rectum.
- Pelvic Cavity: It lies below the abdominal cavity. It contains the reproductive organs and urinary bladder.
- Thoracic Cavity: Located above the abdominal cavity, it contains the heart, major blood vessels, lungs, esophagus, thymus (an immune organ in the neck area), and elements of the nervous system (known as the autonomic nervous system)
- Spinal cavity: Where the vertebral column, spinal cord, and nerve roots that come off the spinal cord reside

Flashcard Practice:

1. Distribute the Medical Terminology Overview of the Body Printable Flashcards to each participant. The flashcards can be found at this link:
www.realityworks.com/medicalterminologykit-downloads
2. Have participants cut out the flashcards along the designated lines.
3. Have participants pair up and quiz each other on the vocabulary words and their meanings.

As an alternative independent practice method, give each participant access to the online flashcards for this lesson. Participants will read the online flashcard, click on the term/suffix and then the card will flip and reveal the definition.

Context Card Practice:

1. After participants become familiar with the vocabulary terms in this lesson, have them access the context cards. There are five for this lesson that can be used in a few different ways.
 - a. Share a card with participants using a document projector. Read the card aloud to the group while participants observe. Pair participants up and, while the card is projected, have each participant read the contents to each other aloud.

Alternatively, you could have participants pair up and read the card out loud to each other. Then follow up with reading the card contents to the class while participants self-check their pronunciation.
 - b. Divide the class into five small groups. Give each small group a different Overview of the Body context card. Everyone in the small groups should read the context card aloud to another member of their

group. All participants should have the opportunity to read the card. Then have each group rotate to another card. The goal is for each participant to read each of the five cards aloud to each other. At the end, read all five context cards for the lesson to model appropriate pronunciation for the class.

- c. Share online access to the context cards for this lesson. This can be done as independent practice. It could even be assigned as work outside of class time. At the access site provided, participants read the context card aloud. Then they may click on the audio icon and the card will be read back to them. They may self-check their pronunciation of the key vocabulary terms found in the context card.

Lesson Five – Overview of the Body

REVIEW: Overview of the Body Quiz

10 minutes

Purpose:

To test the participants' knowledge of the human body and body structure.

Materials:

- *Overview of the Body Quiz*
- *Overview of the Body Quiz – Answer Key*

Facilitation Steps:

1. Distribute the *Overview of the Body Quiz* and have participants complete it.
2. Grade the quiz results according to the *Overview of the Body Quiz – Answer Key*.
3. Have participants review their answers and ask questions as needed.

Name: _____ Class: _____

Overview of the Body Quiz

Instructions: Write in or circle the best answer for each question below.

1. If one part of the body lies in front of another body part, it is _____ to the other body part.
2. If one part of the body lies below another body part, it is _____ to the other body part.
3. True or False: The sagittal, coronal, and transverse planes lie parallel to one another. (circle one)
4. A body part that lies on the same side as another body part runs _____ to the other body part.
5. True or False: Visceral refers to internal organs within the cranial or lumbar cavities. (circle one)
6. Bone runs _____ to muscle.
7. _____ refers to loss of differentiation of cells.
8. True or False: Dysplasia is not associated with cancer. (circle one)
9. Lying on one's back is called the _____ position.
10. Which body cavity contains the reproductive organs? _____

Overview of the Body

Quiz – Answer Key

1. If one part of the body lies in front of another body part, it is **anterior or ventral** to the other body part. *Note: both answers are correct*
2. If one part of the body lies below another body part, it is **inferior or caudal** to the other body part. *Note: both answers are correct*
3. True or **False:** The sagittal, coronal, and transverse planes lie parallel to one another.
4. A body part that lies on the same side as another body part runs **ipsilateral** to the other body part.
5. True or **False:** Visceral refers to internal organs within the cranial or lumbar cavities.
6. Bone runs **deep** to muscle.
7. **Anaplasia** refers to loss of differentiation of cells.
8. True or **False:** Dysplasia is not associated with cancer.
9. Lying on one's back is called the **supine** position.
10. Which body cavity contains the reproductive organs? **the pelvic cavity**

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Lesson Six – Lymphatic System

Lesson Overview

Lymph nodes are connected by lymph vessels and transport lymph fluid along a network that is distributed throughout the body. Beyond this network, there are lymphatic organs in diverse locations important for immune function and waste removal.

Lesson Objectives

After completing this lesson, participants will be able to:

- Explain what medical terms relate to the lymphatic system and how they are used in medical settings
- Identify the meaning behind common lymphatic system terms
- Accurately read lymphatic system vocabulary terms in context

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• Internet access • Smart devices (2 per group) • Suggested website: https://my.clevelandclinic.org/health/articles/21199-lymphatic-system	1. Access the website for research.	10- 15 minutes
LEARN	• <i>Lymphatic System</i> slide presentation • Medical Terminology Lymphatic System Printable Flashcards • Online flashcards for Lesson 6 • Online context cards for Lesson 6 • Context card deck (Lymphatic System cards for Lesson 6) • <i>Medical Terminology Student Glossary</i>	1. Prepare the <i>Lymphatic System</i> slide presentation for viewing. 2. Print the Medical Terminology Lymphatic System Printable Flashcards. 3. Prepare online access to the flashcards and context cards. 4. Access the Lymphatic System section of the student glossary.	30-45 minutes
REVIEW	• <i>Lymphatic System Quiz</i> • <i>Lymphatic System Quiz – Answer Key</i>	1. Print/photocopy the <i>Lymphatic System Quiz</i> for each participant.	10 minutes

Note: See the Medical Terminology Block Instructions at the end of this curriculum. These blocks provide hands-on experience constructing and deconstructing medical terms. There are many ways that the blocks may be used at the end of each lesson to provide additional practice for learning medical terminology.

Lesson Six – Lymphatic System

FOCUS: Basic Components and Organs of the Lymphatic System

10-15 minutes

Purpose:

During this exercise, participants will practice identifying the names and locations of lymphatic organs in an interactive fashion with each other.

Materials:

- Internet access
- Smart devices (2 per group)
- Suggested website:
<https://my.clevelandclinic.org/health/articles/21199-lymphatic-system>

Facilitation Steps:

1. Have participants gather in groups of five.
2. Give group should have at least two smart devices with internet access.
3. Each participant will look up, name, and describe one of the basic components of the lymphatic system as well as the location of one lymphatic organ.
4. Allow five minutes for this activity and call the class back together.
5. Ask each group to share their basic component and location of one lymphatic organ.
6. Write each group's answers on a whiteboard and share a few potential answers, such as those below.

Basic Components: Lymph, lymph vessels, lymph nodes, or lymphatic ducts

Organ: Spleen, thymus, tonsils and adenoids, bone marrow, Peyer's patches, or appendix

Lesson Six – Lymphatic System

LEARN: Common Medical Terms of the Lymphatic System

30-45 minutes

Purpose:

During this section, participants will learn to recognize prefixes, suffixes, and root words relating to the lymphatic system.

Materials:

- *Lymphatic System* slide presentation
- Medical Terminology Lymphatic System Printable Flashcards
- Online flashcards for Lesson 6
- Online context cards for Lesson 6
- Context card deck (Lymphatic System cards for Lesson 6)
- *Medical Terminology Student Glossary*

Facilitation Steps:

1. Give each participant their own *Medical Terminology Student Glossary*. Participants should record their definitions for the various lymphatic system terms as the slide presentation is shared.
2. Share the following information with participants as you show the slide presentation.

Slide 1: Introduction slide

Slide 2: Prefixes

- a-, an- = without, the absence of
- anti- = against
- inter- = between

Slides 3-4: Root Words

- dendr/o = shaped like a tree-like branch
- erythemat/o = redness
- gen/o = genus or kind
- immun/o = immune system, immunity
- kine/o = motion, to create movement
- leuk/o = white, often white blood cell
- lymph/o = lymph tissue

- lymphaden/o = lymph node or lymph gland
- lymphangi/o = lymph vessel
- lupus = wolf
- myel/o = bone marrow or spinal cord
- sarc/o = flesh or connective tissue
- splen/o = spleen
- system/o = widespread, involving the whole system
- thym/o = thymus

Slide 5: Suffixes

- -cyte = cell
- -ectomy = surgically remove or cut out
- -itis = inflammation
- -ic = pertaining or relating to
- -logist = specialist in the study of
- -logy = science or study of
- -megaly = abnormal enlargement
- -oid = relating to or resembling
- -oma = bulging, swelling, or tumor
- -osis = condition or state, often abnormal
- -pathy = disease or illness
- -phage = something that consumes

Slide 6: Basic Components

- Lymph/Lymph Fluid: Excess fluid produced by cells and tissues that did not get absorbed back into the blood; just like blood, lymph circulates throughout the body
- Lymph Vessels: Network of vessels ranging in size from microscopic to easily visible that carry away lymph
- Lymph Nodes: These are bean-shaped glands that produce and harbor immune cells, called lymphocytes, and other immune cells, such as macrophages, that

digest cellular debris, damaged cells, and foreign invaders. Lymph nodes protect the body from cancer cells and pathogens.

- Pathogens are invading organisms, such as bacteria and viruses
- Lymphatic Ducts: Large collecting vessels into which lymph vessels eventually transport lymph; the right lymphatic duct and left lymphatic duct (aka the thoracic duct) connect to a large vein, called the subclavian vein

Slide 7: Immune System Categories

- Innate Immune System: Nonspecific “ready as is” immune response to a host of invading microorganisms, such as bacteria, viruses, parasites, and fungi
- Cytokines and Interleukins: Innate immune cells release chemical messengers called cytokines that draw immune cells to the site of infection
 - Interleukins are an important subset of cytokine
- Adaptive Immune System: Targeted immune response in which specific foreign proteins, called antigens, are remembered by certain lymphocytes, called memory cells, leading to a much more robust and efficient immune response after a second exposure to an invading microorganism

Slides 8-9: Immune System Cells

- Leukocytes: General term for white blood cells, or immune cells
- Phagocytes: Leukocytes that envelop and digest invading infectious organisms and remove cellular debris
- Neutrophils: Most common type of blood cell and a central part of the innate immune system, drawn to areas of the body needed to fight off infection or clear damaged tissue following injury via chemical messengers, such as Interleukin-8
- Macrophages: Second type of phagocyte important to both the innate and adaptive immune systems, help the body

remove cancer cells and infectious agents

- Dendritic Cells: By presenting antigens to T cells, dendritic cells form a line of communication between the innate and adaptive immune systems that leads to antibody production
- Antibodies are Y-shaped proteins produced by B-cells that target foreign invaders for destruction
- Lymphocytes: A type of leukocyte that circulates in both blood and lymph grouped into three major cell lines, T cells, B cells, and natural killer cells. Lymphocytes initially form in the bone marrow. Some further develop in the thymus to become T cells while others develop in the bone marrow to become B cells

Slides 10-11: Lymphatic System Organs

- Spleen: Located inferior to the ribs and superior to the stomach on the left side, the spleen filters blood and regulates the amount of blood and blood cells that circulate through the body. The spleen produces white blood cells to help fight infections.
- Asplenia: Condition describing loss of the spleen, such as due to trauma
- Splenomegaly: Enlargement of the spleen, as can occur in many disease processes
- Thymus/Thymus Gland: Located anterior to the base of the heart deep to the upper part of the breastbone, the thymus is involved in developing a specific line of lymphocytes, called T-lymphocytes
- Tonsils and Adenoids: Tonsils are located at the back of the throat bilaterally; adenoids are not visible but lie behind the nose and roof of the mouth. Both organs contain clusters of lymph nodes.
- Bone Marrow: This is found only in certain bones, such as the hip bone, breastbone, and vertebrae. It produces the main cell lines found in the blood.

- Peyer's Patches: These patches are clusters of lymph nodes that line the tissue inside the small intestine. Peyer's patches are a type of mucosal associated lymphoid tissue (MALT).
- Appendix: Attached to the large intestine, located in the right lower abdomen, the appendix houses lymphoid tissue that protects against infection
 - An appendectomy is the surgical removal of the appendix, which typically occurs in the setting of an inflamed appendix, known as appendicitis

Slides 12-13: Common Lymphatic Conditions

- Lymphedema: Swelling or fluid buildup due to a blockage in the lymphatic system that can occur when a lymph node or vessel gets damaged causing scar tissue
- Lymphadenopathy: Lymph node swelling or enlargement due to infection, inflammation, or cancer
- Lymphoma: This is a cancer that occurs when T or B lymphocytes replicate uncontrollably, forming masses of cells. The lymphocytes are not able to carry out their normal immune functions appropriately. There are two main categories of lymphoma: Hodgkin's and Non-Hodgkin's. They can be differentiated by visualizing the cancer cells under the microscope.
- Lymphangiosarcoma: Rare cancer that occurs in the setting of long-term lymphedema
- Leukemia: Cancer caused by excessive replication of white blood cells from either the myeloid line (myelocytic leukemia) or lymphocytic line (lymphocytic leukemia)
- Tonsillitis: This is an infection causing inflammation of the tonsils. A surgeon might perform a tonsillectomy or removal of the tonsils in cases of recurrent tonsillitis.

- Lymphocytosis: Abnormally high lymphocyte production, often due to an infection, particularly viral infections

Slides 14-15: Other Lymphatic Disorders

- Lymphangitis: Inflammation of lymph vessels
- Immunosuppression: Inhibition or weakening of immune function, such as can occur with HIV, the virus that causes AIDS, or with certain medications, such as steroids
- Myelosuppression: Suppression of the bone marrow
- Graft-Versus-Host Disease: Phenomenon that occurs after a bone marrow transplant where lymphocytes from the transplant (graft) begin to attack host tissue because they do not recognize the transplant recipient as "self"
- Severe Combined Immunodeficiency Disease (scid): Genetic condition that impairs the development and function of B and T cells
- The study of diseases of the immune system, or immunology, is the focus of specialist physicians known as immunologists
- Systemic Lupus Erythematosus: Autoimmune disorder in which the body's immune system attacks its own cells, mistaking them for foreign invaders, which can lead to widespread tissue and organ damage when severe and left untreated

Flashcard Practice:

1. Distribute the Medical Terminology Lymphatic System Printable Flashcards to each participant. The flashcards can be found at this link: www.realityworks.com/medicalterminologykit-downloads
2. Have participants cut out the flashcards along the designated lines.

3. Have participants pair up and quiz each other on the vocabulary words and their meanings.

may self-check their pronunciation of the key vocabulary terms found in the context card.

As an alternative independent practice method, give each participant access to the online flashcards for this lesson. Participants will read the online flashcard, click on the term/suffix and then the card will flip and reveal the definition.

Context Card Practice:

1. After participants become familiar with the vocabulary terms in this lesson, have them access the context cards. There are five for this lesson and a few different ways you can use them.
 - a. Share the card with participants using a document projector. Read the card aloud to the group while students observe. Pair participants up and while the card is projected, have each student read the contents to each other aloud.

Alternatively, you could choose to have participants pair up and read the card aloud to each other. Then follow-up with reading the card contents to the class while participants self-check their pronunciation.
 - b. Divide the class into five groups. Give each group a different context card for this lesson. Everyone in the small groups should read the context card aloud to another member of their group. All participants should have the opportunity to read the card. Then have each group rotate to another card. The goal is for each participant to read each of the five cards aloud to each other. At the end, read all five context cards for the lesson to model appropriate pronunciation for the class.
 - c. Share online access to the context cards for this lesson. This can be done as independent practice. It could even be assigned as work outside of class time. At the access site provided, participants read the context card aloud. Then they may click on the audio icon and the card will be read back to them. They

Lesson Six – Lymphatic System

REVIEW: Lymphatic System Quiz

10 minutes

Purpose:

To test the participants' knowledge of the lymphatic system.

Materials:

- *Lymphatic System Quiz*
- *Lymphatic System Quiz – Answer Key*

Facilitation Steps:

1. Distribute the *Lymphatic System Quiz* and have participants complete it.
2. Grade the quiz results according to the *Lymphatic System Quiz – Answer Key*.
3. Have participants review their answers and ask questions as needed.

Name: _____ Class: _____

Lymphatic System Quiz

Instructions: Write in or circle the best answer for each question below.

1. The _____ immune system is nonspecific.
2. The _____ cell bridges the innate and adaptive immune systems.
3. True or False: The right lymphatic duct is the largest lymphatic vessel in the human body. (circle one)
4. An inflammation of the tonsils is known as _____.
5. True or False: Lymphomas are solid cancers. (circle one)
6. Bone marrow transplants carry the risk of _____ disease.
7. _____ develop in the thymus gland after forming in the bone marrow.
8. True or False: Leukemias are solid cancers. (circle one)
9. If a person develops tonsillitis, they might get swollen lymph nodes, also known as _____.
10. Severe combined immunodeficiency disease impairs the function of which cells?

Lymphatic System Quiz – Answer Key

1. The **innate** immune system is nonspecific.
2. The **dendritic** cell bridges the innate and adaptive immune systems.
3. True or **False:** The right lymphatic duct is the largest lymphatic vessel in the human body.
4. An inflammation of the tonsils is known as **tonsillitis**.
5. **True** or False: Lymphomas are solid cancers.
6. Bone marrow transplants carry the risk of **graft-versus-host** disease.
7. **T cells or T lymphocytes** develop in the thymus gland after forming in the bone marrow.
8. True or **False:** Leukemias are solid cancers.
9. If a person develops tonsillitis, they might get swollen lymph nodes, also known as **lymphadenopathy**.
10. Severe combined immunodeficiency disease impairs the function of which cells? **both B and T cells**

Sources

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Lesson Seven – Circulatory System

Lesson Overview

The circulatory system (cardiovascular system) pumps blood from the heart to the lungs to get oxygen. The heart sends oxygenated blood through arteries to the rest of the body. The veins carry oxygen-poor blood back to the heart to start the circulation process over. Your circulatory system is critical to healthy organs, muscles, and tissues. As a healthcare worker, it is important to understand the terminology relating to this system.

Lesson Objectives

After completing this lesson, participants will be able to:

- Explain what medical terms relate to the circulatory system and how they are used in medical settings
- Identify the meaning behind common circulatory system terms
- Accurately read circulatory system vocabulary terms in context

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• Internet access • Smart devices (1 per group) • Suggested website: https://my.clevelandclinic.org/health/body/21775-circulatory-system	1. Access the website for research.	10- 15 minutes
LEARN	• <i>Circulatory System</i> slide presentation • Medical Terminology Circulatory System Printable Flashcards • Online flashcards for Lesson 7 • Online context cards for Lesson 7 • Context card deck (Circulatory System cards for Lesson 7) • <i>Medical Terminology Student Glossary</i>	1. Prepare the <i>Circulatory System</i> slide presentation for viewing. 2. Print the Medical Terminology Circulatory System Printable Flashcards. 3. Prepare online access to flashcards and context cards. 4. Access the Circulatory System terms section of the student glossary.	30-45 minutes
REVIEW	• <i>Circulatory System Quiz</i> • <i>Circulatory System Quiz – Answer Key</i>	1. Print/photocopy the <i>Circulatory System Quiz</i> for each participant.	10 minutes

Note: See the Medical Terminology Block Instructions at the end of this curriculum. These blocks provide hands-on experience constructing and deconstructing medical terms. There are many ways that the blocks may be used at the end of each lesson to provide additional practice for learning medical terminology.

Lesson Seven – Circulatory System

FOCUS: Circuits in the Circulatory System

10-15 minutes

Purpose:

Discuss the three blood vessels and circuits of the circulatory system.

Materials:

- Internet access
- Smart devices (1 per group)
- Suggested website:

<https://my.clevelandclinic.org/health/body/21775-circulatory-system>

Facilitation Steps:

1. Have participants gather in groups of three.
2. Each group should have at least one device with internet access.
3. Each participant will look up, name, and describe one of the blood vessels of the circulatory system and one circulatory system circuit. Some examples are listed below.
 - Blood vessels: Veins, Arteries, and Capillaries
 - Circuits: Pulmonary, Systemic, and Coronary

Lesson Seven – Circulatory System

LEARN: Common Medical Terms of the Circulatory System

30-45 minutes

Purpose:

During this section, participants will learn to recognize prefixes, suffixes, and root words relating to the circulatory system.

Materials:

- *Circulatory System* slide presentation
- Medical Terminology Circulatory System Printable Flashcards
- Online flashcards for Lesson 7
- Online context cards Lesson 7
- Context card deck (Circulatory System cards for Lesson 7)
- *Medical Terminology Student Glossary*

Facilitation Steps:

1. Give each participant their own *Medical Terminology Student Glossary*. Participants should record their definition for the various circulatory system terms as the slide presentation is shared.
2. Share the following information with students as you show the slide presentation.

Slide 1: Introduction slide

Slide 2: Prefixes

- a-, an- = without, the absence of
- anti- = against
- aut- = self
- brady- = slow
- dia- = through, across
- inter- = between
- intra-, endo- = within
- peri- = around, surrounding
- poly- = many
- supra- = above
- sys- = with, together

- tachy- = fast
- trans- = across
- ultra- = extreme, beyond

Slide 3: Roots Words

- angi/o, vas/o, vascul/o = vessel
- arteri/o, ather/o = artery
- atri/o = atrium, upper chamber of the heart
- cardi/o = heart
- coron/o = crown, circle
- ech/o = sound
- electr/o = electricity
- embol/o = blockage
- isch/o = suppression, lack of
- jugul/o = jaw
- my/o = muscle
- pector/o = breast, chest
- physi/o = relating to physiology or natural processes
- valv/o, valvul/o = valve, structure that directs passage of fluid
- ven/o = vein
- ventricul/o = ventricle, lower chamber of the heart

Slides 4-5: Suffixes

- -ar, -ous = relating or pertaining to
- -ectomy = surgically remove or cut out
- -centesis = surgical puncture
- -gram = picture or written recording
- -ia = condition or disease state
- -itis = inflammation
- -logist = specialist in the study of
- -logy = science or study of
- -megaly = abnormal enlargement
- -oma = bulging, swelling, tumor
- -osis = condition or state, often abnormal

- -pathy = disease, illness
- -plasty = surgical repair
- -sclerosis = hardening
- -stenosis = constriction, narrowing
- -stole = contraction

Slides 6-8: Blood Vessels

- Arteries: Muscular vessels that carry oxygenated blood away from the heart throughout the entire body
 - The aorta is the largest artery in the body that branches off the heart. It consists of the ascending aorta, aortic arch, and descending aorta.
 - The coronary arteries are the arteries that supply the heart itself with oxygenated blood. They branch off the aorta.
 - Distinct from all other arteries in the body, the pulmonary arteries carry deoxygenated blood away from the heart to the lungs.
 - The arterioles are the smallest arteries in the body.
- Veins: These thin blood vessels return deoxygenated blood back to the heart. Larger veins in the legs contain valves to prevent blood from flowing in the reverse direction.
 - The venous system starts in the venules, the smallest veins in the body
 - The superior and inferior vena cavae are the largest veins in the body and connect to the right side of the heart
 - The superior vena cava carries deoxygenated blood from the upper part of the body (head and arms)
 - The inferior vena cava returns deoxygenated blood from the lower body (legs, gut, and pelvis)
 - The coronary or cardiac veins return deoxygenated blood to the right side of the heart

- Distinct from all other veins in the body, the pulmonary veins return newly oxygenated blood from the lungs to the heart
- Capillaries: Networks of microscopic blood vessels that connect arterioles to venules, enabling dispersion of oxygen and nutrients into cells and removal of carbon dioxide and other waste products out of cells

Slide 9: Circuits

- Coronary Circuit: Includes the coronary arteries that supply oxygenated blood to the myocardium, or heart muscle, and the cardiac veins that return deoxygenated blood to the right upper chamber of the heart, called the right atrium
- Systemic Circuit: This circuit involves the distribution of oxygenated blood throughout the body after being pumped out of the heavily muscled left lower chamber of the heart, called the left ventricle. The deoxygenated blood in tissues throughout the body then returns to the right atrium via the superior and inferior vena cavae.
- Pulmonary Circuit: This circuit involves the transport of deoxygenated blood from the right lower chamber of the heart, called the right ventricle, into the lungs, via the pulmonary arteries. Oxygenated blood then returns to the heart via the pulmonary veins.

Slides 10-11: Diagnostic Studies

- Echocardiogram: This is a common procedure that uses ultrasound to image the heart. It is used to assess blood flow through the different heart chambers and to diagnose certain heart abnormalities.
- Transthoracic Echocardiogram (TTE): This is a noninvasive (does not “invade” the interior of the body) type echocardiogram. A sensor is placed on the patient’s chest after a gel is applied.
- Transesophageal Echocardiogram (TEE): This type of echocardiogram is invasive. The patient swallows a camera

down their esophagus (tube that connects the mouth and stomach) and pictures are taken of the heart from inside the body. The images are higher resolution than with a TTE.

- Cardiac Catheterization: This procedure involves inserting a catheter (long, flexible, artificial tube) into a blood vessel, which is threaded into the heart. Certain procedures are possible using the catheter.
- Coronary Angiogram: Procedure that involves releasing dye into the coronary circulation to visualize the coronary vessels and assess for blockage
- Electrocardiogram (ECG or EKG): Picture of the heart's electrical conduction
- Electrophysiology Study: Analyzes the heart's electrical system and can be used to diagnose abnormal heart rhythms
- Doppler ultrasound: This is an imaging device that uses the doppler effect, the shifting of the frequency of waves relative to the velocity of the object emitting or reflecting the wave. Doppler can inform the reader how fast blood is moving through a vessel and in what direction.
- Magnetic Resonance Imaging (MRI): Device that uses a magnetic field to image the inside of the body in high resolution by analyzing how the magnetic field affects movement of subatomic particles

Slide 12: Treatment Procedures

- Percutaneous Transluminal Coronary Angioplasty: Procedure made possible during a cardiac catheterization whereby a blockage within a vessel is opened by expanding a balloon on the catheter or releasing a device called a stent, a detachable mesh tube that expands outward
- Pericardiocentesis: Procedure whereby the sac surrounding the heart is punctured to relieve fluid buildup squeezing on the heart

- Coronary Artery Bypass Graft (CABG): Procedure that involves harvesting a vein from an easily accessible part of the body and using it as a device to bypass a coronary artery blockage
- Thoracotomy: Cutting into the chest, such as during heart surgery
- Endarterectomy: Procedure during which fatty plaque is surgically removed from a large artery
- Defibrillation: Process of delivering an electric shock to reset the heart's electrical system

Slides 13-15: Common Cardiovascular Conditions

- Arrhythmia: Abnormal heartbeat pattern, or rhythm
- Fibrillation is a term referring uncoordinated, asynchronous movements of myocardium (heart muscle) that are ineffective at pumping blood
- Atrial fibrillation, or fibrillatory movements affecting the atria of the heart, causes blood to pool, leading to clot formation. When these clots lodge into the circulation of the lungs, they are called pulmonary emboli, resulting in lung damage or death. They can also enter the circulation of the brain, causing strokes, aka cerebrovascular accidents (CVAs).
- Ventricular fibrillation, or fibrillatory movements affecting the ventricles of the heart, is immediately life threatening and treated with defibrillation
- Bacterial Endocarditis: This is a bacterial infection causing vegetations, or growths, inside the heart, often on heart valves. The vegetations cause irregular blood flow inside the heart leading to clot formation. Clots can be thrown into the systemic circulation causing strokes and other disease states that occur when a clot obstructs the flow of blood in an artery or vein.
- Angina Pectoris: Characterized by exertion-induced chest pain due to

coronary arteries narrowing, causing myocardial ischemia, or inadequate blood flow to the heart muscle

- Hypertension: Characterized by elevated blood pressure
- Hypotension: Characterized by low blood pressure
- Tachycardia: Descriptive term for an elevated heart rate
- Bradycardia: Descriptive term for a slow heart rate
- Cardiomyopathy: Descriptive term for disease of the heart muscle that can affect the heart's ability to pump blood effectively
- A massively enlarged heart, called dilated cardiomyopathy, can result from alcoholism
- Congestive Heart Failure (CHF): Progressive heart condition characterized by inadequate movement of blood through the heart (either by weak pumping or poor relaxation), leading to buildup of fluid either systemically (starting in the feet and legs) or within the lungs
- Myocardial Infarction: Commonly referred to as a heart attack, this condition is characterized by death of heart muscle tissue due to blockage of blood flow through the coronary arteries
- Pericardial Effusion: This is a condition involving buildup of fluid with the lining, or sac, surrounding the heart. When severe, this can cause cardiac tamponade in which the fluid applies so much pressure on the heart that it can no longer pump blood effectively.
- Pericarditis: Inflammation of the lining that covers the heart

Slide 16: Atherosclerosis

This condition involves buildup of fatty plaques within the interior lining of arteries, causing the vessel walls to lose their flexibility and become thickened, scarred, and hardened by calcium.

Atherosclerosis of the coronary arteries leads to coronary artery disease (CAD).

Slide 17: Other Cardiovascular Terms

- Diastole: Relaxation time between heart contractions
- Systole: The period when the heart contracts and blood pressure peaks
- Polycythemia Vera: This is a type of cancer characterized by overproduction of red blood cells by the bone marrow. It thickens the blood, predisposing it to blood clot formation that can cause heart attacks and strokes.
- Jugular Venous Distension: Engorgement of the jugular vein in the neck due to congestive heart failure
- Heart Murmur: Abnormal sounds associated with heart valve (valvular) pathologies

Flashcard Practice:

1. Distribute the Medical Terminology Circulatory System Printable Flashcards to each student. The flashcards can be found at this link:
www.realityworks.com/medicalterminologykit-downloads
2. Have participants cut out the flashcards along the designated lines.
3. Have participants pair up and quiz each other on the vocabulary words and their meanings.

As an alternative independent practice method, give each participant access to the online flashcards for this lesson. Participants will read the online flashcard, click on the term/suffix and then the card will flip and reveal the definition.

Context Card Practice:

1. After participants become familiar with the vocabulary terms in this lesson, have them access the context cards. There are five for this lesson and a few different ways you can use them.
 - a. Share the card with participants using a document projector. Read the card aloud to the group while participants observe. Pair

participants up and, while the card is projected, have each participant read the contents aloud to each other.

Alternatively, you could choose to have participants pair up and read the card aloud to each other. Then read the card contents to the class while students self-check their pronunciation.

- b. Divide the class into five groups. Give each small group a different context card for that specific lesson content. Everyone should read the context card aloud to another member of their group. All participants should have the opportunity to read the card. Then have each group rotate to another card. The goal is for each student to read each of the five cards aloud to each other. At the end, read all five context cards aloud for the lesson to model appropriate pronunciation for the class.
- c. Share online access to the context cards for this lesson. This can be done as independent practice. It could even be assigned as work outside of class time. At the access site provided, participants read the context card aloud. Then they may click on the audio icon and the card will be read back to them. They may self-check their pronunciation of the key vocabulary terms found in the context card.

Lesson Seven – Circulatory System

REVIEW: Circulatory System Quiz

10 minutes

Purpose:

To test the participants' knowledge of the circulatory system.

Materials:

- *Circulatory System Quiz*
- *Circulatory System Quiz – Answer Key*

Facilitation Steps:

1. Distribute the *Circulatory System Quiz* and have participants complete it.
2. Grade the quiz results according to the *Circulatory System Quiz – Answer Key*.
3. Have participants review their answers and ask questions as needed.

Name: _____ Class: _____

Circulatory System Quiz

Instructions: Write in the best answer for each question below.

1. This condition causes vegetative growths inside the heart, often on heart valves, and frequently causes blood clots to be thrown into the circulation. _____.
2. The _____ circuit involves oxygenating blood in the lungs after leaving the right side of the heart and returning blood to the left side of the heart.
3. What technique involves inserting a catheter (long, flexible, artificial tube) into a blood vessel, which is threaded into the heart? _____
4. An inflammation of the lining that covers the heart is known as _____.
5. True or False? Bradycardia means a fast heart rate. _____
6. The _____ circuit involves circulating oxygenated blood to the heart muscle, or myocardium, itself and returning deoxygenated blood to the right atrium.
7. _____ is a descriptive term for disease of the heart muscle that can affect the heart's ability to pump blood effectively.
8. True or False? Systole refers to the relaxation time between heart contractions. _____
9. If a person develops congestive heart failure, they might get enlarged neck veins, known as _____.
10. _____ is a condition characterized by exertion-induced chest pain.

Circulatory System Quiz – Answer Key

1. This condition causes vegetative growths inside the heart, often on heart valves, and frequently causes blood clots to be thrown into the circulation. **bacterial endocarditis**
2. The **pulmonary** circuit involves oxygenating blood in the lungs after leaving the right side of the heart and returning blood to the left side of the heart.
3. What technique involves inserting a catheter (long, flexible, artificial tube) into a blood vessel, which is threaded into the heart? **cardiac catheterization**
4. An inflammation of the lining that covers the heart is known as **pericarditis**.
5. True or **False**? Bradycardia means a fast heart rate.
6. The **coronary** circuit involves circulating oxygenated to the heart muscle, or myocardium, itself and returning deoxygenated blood to the right atrium.
7. **Cardiomyopathy** is a descriptive term for disease of the heart muscle that can affect the heart's ability to pump blood effectively.
8. True or **False**? Systole refers to the relaxation time between heart contractions.
9. If a person develops congestive heart failure, they might get enlarged neck veins, known as **jugular venous distension**.
10. **Angina pectoris** is a condition characterized by exertion-induced chest pain.

Sources

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Lesson Eight – Muscular System

Lesson Overview

The muscular system is a complex network of muscles that are vital to the human body. Muscles play a part in everything you do. It is very important for healthcare professionals to understand the terminology related to the muscular system.

Lesson Objectives

After completing this lesson, participants will be able to:

- Explain what medical terms relate to the muscular system and how they are used in medical settings
- Identify the meaning behind common muscular system terms
- Accurately read muscular system vocabulary terms in context

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• Internet access • Smart devices (1 per group) • Suggested website: https://pressbooks.uwf.edu/medicalterminology/	1. Access the website for research.	10- 15 minutes
LEARN	• <i>Muscular System</i> slide presentation • Medical Terminology Muscular System Printable Flashcards • Online flashcards for Lesson 8 • Online context cards for Lesson 8 • Context card deck (Muscular System cards for Lesson 8) • <i>Medical Terminology Student Glossary</i>	1. Prepare to share the <i>Muscular System</i> slide presentation. 2. Print the Medical Terminology Muscular System Printable Flashcards. 3. Prepare online access to flashcards and context cards. 4. Access the Muscular System terms section of the student glossary.	30-45 minutes
REVIEW	• <i>Muscular System Quiz</i> • <i>Muscular System Quiz – Answer Key</i>	1. Print/photocopy the <i>Muscular System Quiz</i> for each participant.	10 minutes

Note: See the Medical Terminology Block Instructions at the end of this curriculum. These blocks provide hands-on experience constructing and deconstructing medical terms. There are many ways that the blocks may be used at the end of each lesson to provide additional practice for learning medical terminology.

Lesson Eight – Muscular System

FOCUS: Muscle Cell Types and Muscle Nomenclatures

10-15 minutes

Purpose:

Discuss the three muscle cell types and seven naming methods, or nomenclatures, for muscles.

Materials:

- Internet access
- Smart devices (1 per group)
- Suggested website:
<https://pressbooks.uwf.edu/medicalterminology/>

Facilitation Steps:

1. Have participants gather in groups of three.
2. Each group should have at least 1 device with internet access.
3. Each participant will look up, name, and describe one of the muscle cell types in the body and two naming methods (nomenclatures) for muscles with examples:

Muscle cell types: Skeletal, cardiac, and smooth

Nomenclatures: Origin and insertion points, parts or divisions (the number of divisions within the muscle), size, shape, location, direction, and action

Example of origin and insertion: Sternocleidomastoid (referring to the sternum (sterno-), clavicle (cleido-), and mastoid process (the projection of the temporal bone behind the ear))

Examples of division: Biceps (two parts), triceps (three parts), and quadriceps (four parts)

Examples of size: Maximus (largest size), minimus (smallest size)

Examples of shape: Trapezius (shape of trapezoid), deltoid (shape of triangle)

Example of location: Gluteus maximus (gluteal refers to the buttocks region)

Example of direction: Rectus abdominis (rectus means straight)

Example of action: Flexors (flex muscle), adductors (bring parts together), abductors (pull body parts apart)

Lesson Eight – Muscular System

LEARN: Common Medical Terms of the Muscular System

30-45 minutes

Purpose:

During this section, participants will learn to recognize prefixes, suffixes, and root words relating to the muscular system.

Materials:

- *Muscular System* slide presentation
- Medical Terminology Muscular System Printable Flashcards
- Online flashcards for Lesson 8
- Online context cards for Lesson 8
- Context card deck (Muscular System cards for Lesson 8)
- *Medical Terminology Student Glossary*

Facilitation Steps:

1. Give each participant their own *Medical Terminology Student Glossary*. Students should record their definition for the various muscular system terms as the slide presentation is shared.
2. Share the following information with students as you show the slide presentation.

Slide 1: Introduction slide

Slide 2: Prefixes

- a- = without, the absence of
- ab- = away from
- ad- = towards
- dys- = abnormal, ill
- hyper- = excessive, too much
- inter- = between
- intra- = within
- poly- = many, multiple
- supra- = above
- syn- = together, joined

Slide 3: Roots

- cerebr/o = brain
- cleid/o = clavicle
- gluteus = buttocks
- kinesi/o = movement, motion
- mastoid = temporal bone process located behind ear
- my/o, myos/o, muscul/o = muscle
- pector/o = breast or chest
- rectus = straight
- sarc/o = flesh, connective tissue
- skelet/o = skeleton or bone
- ten/o, tendin/o, tend/o = tendon (sturdy, elastic tissue connecting bone to muscle)

Slides 4-5: Suffixes

- -algia = pain
- -ar = relating or pertaining to
- -asthenia = weakness
- -ectomy = surgically remove or cut out
- -gram = picture, written recording
- -itis = inflammation
- -logy = science or study of
- -lysis = dissolution, destruction
- -oid = resembling, having features of
- -oma = bulging, swelling, tumor
- -osis = condition or state, often abnormal
- -pathy = disease, illness
- -plasty = surgical repair
- -plegia = paralysis, complete loss of motor function
- -tomy = cut, incision
- -trophy = nourishment, growth

Slide 6: Muscle Cell Types

- Smooth Muscle: This type of muscle is composed of so-called smooth muscle cells that are free of striations, a striped

pattern of proteins. Muscle cells are often called muscle fibers and can grow very long. Smooth muscle fibers are short when compared to other muscle types, and they only house one circular organelle containing genetic material, called the nucleus. Smooth muscle is associated with blood vessels and internal organs in the abdominal cavity. Its movement is involuntary, meaning that it is not consciously controlled.

- **Skeletal Muscle:** This type of muscle is directly connected to bone and central to voluntary movement. Skeletal muscle fibers are striated. They can be very long and contain multiple nuclei from the fusion of immature cells, called myoblasts.
- **Cardiac Muscle:** This is the type of muscle that composes heart muscle. It has a unique combination of qualities in being both striated and involuntary.

Slides 7-8: Muscle Names

- **Diaphragm:** This muscle is central to breathing. It is dome-shaped and contracts downward with inspiration, pulling air into the lungs.
- **Intercostals:** Intercostal muscles lie between the ribs. They contract and lift the rib cage up during inspiration, expanding the chest, and relax during expiration, which contracts the chest.
- **Biceps Brachii:** Composed of two divisions, the biceps muscle flexes the elbow
- **Triceps Brachii:** Composed of three divisions, the triceps muscle extends the elbow
- **Quadriceps Femoris:** Consisting of a “quartet” of four muscles located anteriorly and laterally on the thigh, the quadriceps straighten and stabilize the leg at the knee joint
- **Trapezius:** Covering a large area (includes the back, shoulders, and neck), these trapezoid- or diamond-shaped muscles orchestrate shoulder blade movements and neck extension

- **Deltoid:** Triangular muscles that lift the arms laterally away from the body (abduction)
- **Gluteus Maximus:** Largest muscle in the buttocks region and helps to move the thigh
- **Pectoralis Major:** Largest muscle in the chest region underlying the breast area
- **Rectus Abdominis:** This long, straight muscle overlies the abdominal cavity. It is visible in muscularly toned individuals as a “six-pack.”
- **Sternocleidomastoid:** Large, prominent muscle in the anterior neck that is important for turning the head from side to side and flexing the neck

Slides 9-10: Muscle Movement Categories

- **Flexors:** Muscles that contract, narrowing the angle of a joint
- **Extensors:** Muscles that oppose flexors and straighten joints, expanding their angle
- **Abductors:** Muscles that carry bones away from the center, or midline, of the body or separate adjacent bones from each other
- **Adductors:** Muscles that bring bones towards the center of the body or squeeze adjacent bones closer together
- **Levators:** Muscles that lift parts of the body upward
- **Depressors:** Muscles that lower parts of the body downward
- **Supinators:** Muscles that turn the palm so that it faces outward or upward
- **Pronators:** Muscles that turn the palm downwards, exposing the dorsal aspect of the hand
- **Sphincters:** Muscles that narrow an opening or tube, such as the opening to the bladder
- **Tensors:** Muscles stiffen or “tense up” a part of the body
- **Rotators:** Muscles that rotate a body part around a joint, such as the rotator cuff around the shoulder joint

Slides 11-12: Muscular and Neuromuscular Conditions

- **Muscular Dystrophy:** Collection of disorders that result in progressive weakness and muscle atrophy (loss of muscle mass)
- **Duchenne's Muscular Dystrophy:** Severe form of muscular dystrophy caused by loss of function of a muscle protein, called dystrophin
- **Becker's Muscular Dystrophy:** Less severe form of muscular dystrophy caused by only a partial loss of function of dystrophin
- **Polymyositis:** Rare inflammatory condition that affects muscles closest to the trunk on both sides of the body, leading to weakness in the neck and proximal limb muscles, such as those used to stand or lift things
- **Amyotrophic Lateral Sclerosis (ALS):** Devastating disease of adulthood characterized by progressive loss of motor neurons in the brain and spinal cord that leads to widespread muscle wasting and atrophy
- **Myotonic Dystrophy:** A disorder that comes from a genetic mutation that affects muscle function, causing progressive weakness and muscle atrophy. A characteristic feature is persistent muscle contraction with delayed relaxation, such as following a handshake.
- **Myasthenia Gravis:** This is a disease of the neuromuscular junction, the point of contact between muscle and motor neuron (nerve cell). It is an autoimmune condition in which one's immune cells attack receptors on the muscle cell that receive messages from the motor neuron. Although some affected people only have eye muscle weakness, others have generalized muscle weakness.
- **Spinal Muscular Atrophy:** Genetic disorder of infancy and childhood that causes progressive loss of motor neurons, leading to muscle weakness and atrophy

- **Fibromyalgia Syndrome:** This is a disorder characterized by musculoskeletal (relating to muscle and bone) pain, called tender points. Other symptoms include fatigue, brain fog, sleep disturbance, and alterations in mood.
- **Palsy:** Nonspecific term for impaired motor function
 - **Cerebral Palsy:** Group of disorders present at birth that cause problems with movement, muscle tone, balance, and posture
- **Paresis:** Incomplete paralysis that still involves significant muscular weakness
- **Paraplegia:** Paralysis affecting the legs and inferior trunk
- **Quadriplegia:** Paralysis of all four extremities
- **Hemiplegia:** Paralysis involving half of the body, such as a matching arm and leg

Slide 13: Muscle Cancers

- **Rhabdomyosarcoma:** This is a type of soft tissue cancer that usually targets skeletal muscle. However, hollow organs (such as the intestines, blood vessels, stomach, and bladder) can sometimes be involved. There are three broad sub-types:
 - **Embryonal Rhabdomyosarcoma:** This type of rhabdomyosarcoma primarily affects infants and young children. Typically, the tumor starts in the head, neck, or genitourinary system. The bladder and reproductive organs (such as the testicles, prostate, and vagina) are particularly affected.
 - **Alveolar Rhabdomyosarcoma:** Predominantly affects adolescents and young adults, targeting muscles in the extremities
 - **Pleomorphic Rhabdomyosarcoma:** Also

targets extremity muscles but mostly affects adults

- Leiomyosarcoma: Smooth muscle cancer that affects organs of the body with a hollow interior, such as the intestines, blood vessels, stomach, and bladder

Slide 14: Neuromuscular Diagnostic Procedures

- Electromyography (EMG): Diagnostic procedure that involves inserting a needle into muscle that provides electrical information about the muscle, the nerve that connects to the muscle, and the communication point between them
- Electroneuromyography: Another term for nerve conduction studies, this procedure measures the electrical discharge of nerves to assess if they are working appropriately
- Reflex Testing: This is a test performed by a physician, such as a neurologist, to assess deep tendon reflexes, such as the knee or patellar reflex, using a reflex hammer. Such reflexes evaluate sensory nerves, spinal cord interconnections, and motor nerves.

Slide 15: Treating Specialists

- Neurologist: Physician who specializes in treating nervous system diseases
- Rheumatologist: Physician who specializes in soft tissue and joint diseases
- Physiatrist: Physician who specializes in injection therapies and rehabilitation for nervous and muscular system diseases
- Chiropractor: Doctor trained to treat patients with musculoskeletal conditions using spine and neck manipulations

Flashcard Practice:

1. Distribute the Medical Terminology Muscular System Printable Flashcards to each participant. The flashcards can be found at this link: www.realityworks.com/medicalterminologykit-downloads

2. Have participants cut out the flashcards along the designated lines before pairing up to quiz each other on the vocabulary words and their meanings.

As an alternative independent practice method, give each participant access to the online flashcards for this lesson. Participants will read the online flashcard, click on the term/suffix and then the card will flip and reveal the definition.

Context Card Practice:

1. After participants become familiar with the vocabulary terms in this lesson, have them access the context cards. There are five for this lesson with a few different ways you can use them.
 - a. Share the card with participants using a document projector. Read the card aloud to the group while participants observe. Pair participants up and, while the card is projected, have each student read the contents to each other aloud.

Alternatively, you could choose to have participants pair up and read the card aloud to each other. Then read the card contents to the class while participants self-check their pronunciation.

- b. Divide the class into five groups. Give each group a different context card for. Everyone in the small groups should read the context card aloud to another member of their group. All participants should have the opportunity to read the card. Then have each group rotate to another card. The goal is for each student to read the five cards aloud to each other. At the end, read all five context cards for the lesson to model appropriate pronunciation for the class.
- c. Share online access to the context cards for this lesson. This can be done as independent practice. It could even be assigned as work outside of class time. At the access site provided, participants read the context card aloud. Then they

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may click on the audio icon and the card will be read back to them. They may self-check their pronunciation of the key vocabulary terms found in the context card.

Lesson Eight – Muscular System

REVIEW: Muscular System Quiz

10 minutes

Purpose:

To test the participants' knowledge of the muscular system.

Materials:

- *Muscular System Quiz*
- *Muscular System Quiz – Answer Key*

Facilitation Steps:

1. Distribute the *Muscular System Quiz* and have participants complete it.
2. Grade the quiz results according to the *Muscular System Quiz – Answer Key*.
3. Have participants review their answers and ask questions as needed.

Name: _____ Class: _____

Muscular System Quiz

Instructions: Write in or circle the best answer for each question below.

1. This type of cancer primarily targets skeletal muscle. However, hollow organs (such as the intestines, blood vessels, stomach, and bladder) can sometimes be involved.
_____.
2. This muscle is central to breathing. _____
3. What are muscles that narrow an opening or tube, such as the opening to the bladder, called? _____
4. What is the diagnostic study that involves inserting a needle into muscle tissue to evaluate their electrical activity? _____
5. True or False? A rheumatologist treats nervous system diseases. (circle one)
6. _____ is a rare condition characterized by inflammation affecting neck and proximal limb muscles close to the trunk.
7. _____ is a term that describes paralysis (complete loss of motor function) of all four extremities.
8. True or False? Pleomorphic rhabdomyosarcoma primarily affects children. (circle one)
9. This is the term for a doctor trained to perform injections on patients to alleviate musculoskeletal pain and improve function, if possible. _____
10. _____ is an autoimmune condition in which one's immune cells attack receptors on the muscle cell that receive messages from the motor neuron (the neuromuscular junction).

Muscular System Quiz – Answer Key

1. This type of cancer primarily targets skeletal muscle. However, hollow organs (such as the intestines, blood vessels, stomach, and bladder) can sometimes be involved. **rhabdomyosarcoma**
2. This muscle is central to breathing. **the diaphragm**
3. What are muscles that narrow an opening or tube, such as the opening to the bladder? **sphincters**
4. What is the diagnostic study that involves inserting a needle into muscle tissue to evaluate their electrical activity? **electromyogram (EMG)**
5. True or **False**? A rheumatologist treats nervous system diseases.
6. **Polymyositis** is a rare condition characterized by inflammation affecting neck and proximal limb muscles close to the trunk.
7. **Quadriplegia** is a term that describes paralysis (complete loss of motor function) of all four extremities.
8. True or **False**? Pleomorphic rhabdomyosarcoma primarily affects children.
9. This is the term for a doctor trained to perform injections on patients to alleviate musculoskeletal pain and improve function, if possible. **physiatrist**
10. **Myasthenia gravis** is an autoimmune condition in which one's immune cells attack receptors on the muscle cell that receive messages from the motor neuron (the neuromuscular junction).

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Lesson Nine – Integumentary System

Lesson Overview

The integumentary system is the largest organ of the body that forms a physical barrier between the external environment and the internal environment that it serves to protect and maintain. It is very important for healthcare professionals to understand the terminology related to the integumentary system.

Lesson Objectives

After completing this lesson, participants will be able to:

- Explain what medical terms relate to the integumentary system and how they are used in medical settings
- Identify the meaning behind common integumentary system terms
- Accurately read integumentary system vocabulary terms in context

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• Internet access • Smart devices (1 per group) • Suggested websites: https://my.clevelandclinic.org/health/body/22827-integumentary-system https://training.seer.cancer.gov/melanoma/anatomy/layers.html	1. Access the website for research.	10- 15 minutes
LEARN	• <i>Integumentary System</i> slide presentation • Medical Terminology Integumentary System Flashcards • Online flashcards for Lesson 9 • Online context cards for Lesson 9 • Context card deck (Integumentary System cards for Lesson 9) • <i>Medical Terminology Student Glossary</i>	1. Prepare to share the <i>Integumentary System</i> slide presentation. 2. Print the Medical Terminology Integumentary System Flashcards. 3. Prepare online access to flashcards and context cards. 4. Access the Integumentary System terms section of the student glossary.	30-45 minutes
REVIEW	• <i>Integumentary System Quiz</i> • <i>Integumentary System Quiz – Answer Key</i>	1. Print/photocopy the <i>Integumentary System Quiz</i> for each participant.	10 minutes

Note: See the Medical Terminology Block Instructions at the end of this curriculum. These blocks provide hands-on experience constructing and deconstructing medical terms. There are many ways that the blocks may be used at the end of each lesson to provide additional practice for learning medical terminology.

Lesson Nine – Integumentary System

FOCUS: Skin Tissue Layers, Glands, and Cells

10-15 minutes

Purpose:

Discuss the three skin tissue layers and four glands found in the skin. Then discuss types of cells found in the top layer of skin.

Materials:

- Internet access
- Smart devices (1 per group).
- Suggested websites:

<https://my.clevelandclinic.org/health/body/2827-integumentary-system>

<https://training.seer.cancer.gov/melanoma/anatomy/layers.html>

Facilitation Steps:

1. Have students gather in groups of three.
2. Each group should have at least 1 device with internet access.
3. Each student will look up, name, and describe one of the skin tissue layers in the body and one type of gland found in the skin and its function:

Skin Tissue Layers: Epidermis, dermis, and hypodermis

Integumentary Glands: Sebaceous, sudoriferous, ceruminous, and mammary

4. Discuss cell types found in the epidermis
 - Cell Types: Basal cells, keratinocytes (also called squamous cells), melanocytes, and Langerhans cells

Lesson Nine – Integumentary System

LEARN: Common Medical Terms of the Integumentary System

30-45 minutes

Purpose:

During this section, participants will learn to recognize prefixes, suffixes, and root words relating to the integumentary system.

Materials:

- *Integumentary System* slide presentation
- Medical Terminology Integumentary System Printable Flashcards
- Online flashcards for Lesson 9
- Online context cards for Lesson 9
- Context card deck (Integumentary System cards for Lesson 9)
- *Medical Terminology Student Glossary*

Facilitation Steps:

1. Give each participant their own *Medical Terminology Student Glossary*. Students should record their definition for the various integumentary system terms as the slide presentation is shared.
2. Share the following information with participants as you show the slide presentation.

Slide 1: Introduction slide

Slide 2: Prefixes

- a-, an- = without, the absence of
- dia-, trans- = through, across
- dys- = abnormal, ill
- epi- = upon, above
- hyper- = excessive, too much
- hypo-, sub- = under, below
- intra- = within

Slide 3: Roots

- adip/o, lip/o = fat, lipid
- cry/o = cold
- cutane/o, derm/o, dermat/o = skin

- erythr/o = red
- hidr/o, sudor = sweat
- ichthy/o = fish or scale-like
- kerat/o = hard, horn-like tissue, keratin protein
- melan/o = black, dark
- myc/o = fungus
- necr/o = death
- onych/o, ungu/o = nail
- pachy/o = thick
- path/o = disease
- rhytid/o = wrinkle
- seb/o = sebum, oil
- xer/o = dry

Slide 4: Suffixes

- -derma = skin
- -ectomy = surgical removal
- -itis = inflammation
- -logy = science or study of
- -lysis = dissolution or destruction
- -malacia = softening
- -oid = resembling, having features of
- -oma = bulging, swelling, or tumor
- -osis = condition or state, often abnormal
- -pathy = disease or illness
- -plasty = surgical repair
- -tomy = cut or incision
- -trophy = nourishment, growth

Slide 5: Skin Tissue Layers

- Epidermis: This is the upper, most superficial layer of skin. While the epidermis is the part of the skin we can see and touch, it is also the thinnest. It contains multiple cells that work to retain hydration, provide protection (against UV light, infectious organisms,

and chemicals), impart color, and generate new skin cells. The epidermis is avascular, meaning it does not have blood vessels.

- **Dermis:** This is the thickest layer of the skin and lies deep to epidermis and superficial to the hypodermis. It contains the proteins collagen and elastin as well as the integumentary glands and hair follicles.
- **Hypodermis:** This is the deepest layer of the skin and referred to as the subcutaneous layer. It is mainly composed of adipose and connective tissue.

Slide 6: Epidermal Skin Cells

- **Basal Cells:** These are small cells within the deepest tissue layer of the epidermis, called the basal cell layer. They are responsible for producing new skin cells.
- **Keratinocytes:** Also called squamous cells, keratinocytes are characterized by their production of keratin, a protein. The epidermis is primarily composed of keratinocytes.
- **Melanocytes:** Cells responsible for the color of skin through production of the pigment melanin
- **Langerhans Cells:** These cells are immune cells, called macrophages, that travel from the bone marrow to the epidermis. They react to the external environment to defend the body against invading microorganisms.

Slide 7: Glands of the Integumentary System

- **Sebaceous Glands:** These glands produce an oily material, called sebum. Sebum helps keep skin lubricated and forms a water-resistant coating around skin and hair.
- **Sudoriferous Glands:** Release sweat through openings, or pores, in the skin to cool the body
- **Eccrine Glands:** Release thinner sweat located throughout the body's exterior but found in greatest numbers in the palms, soles, and forehead

- **Apocrine Glands:** These glands release a thicker sweat and are located deeper in the dermis, sometimes in the hypodermis. They congregate in areas of dense hair growth, such as the armpit and genitals. Apocrine sweat is associated with body odor due to bacterial breakdown of organic compounds.
- **Ceruminous Glands:** Responsible for generating ear wax
- **Mammary Glands:** Located on the chest, mammary glands are responsible for milk production in women after childbirth

Slides 8-10: Skin, Hair, and Nail Conditions

- **Dermatitis:** General term for skin inflammation or irritation
 - **Seborrheic Dermatitis:** Also known as dandruff, this condition is an irritation of the skin that results from overproduction of sebum from sebaceous glands, causing white or yellow flakes
 - **Erythroderma:** Literally meaning "red skin," this potentially life-threatening condition causes a generalized inflammation of the skin that begins in discrete patches and then expands. The skin then starts to slough off or exfoliate.
- **Onychomycosis:** Fungal infection involving the nails of the hands or feet
- **Anhidrosis:** This condition, which could also be referred to as hypohidrosis, is characterized by insufficient secretion of sweat due to trauma, radiation, burns, medication, or rare genetic conditions
- **Hyperhidrosis:** Characterized by overproduction of sweat
- **Lipoma:** Benign (noncancerous) tumor composed of adipose, or fat, cells
- **Xeroderma:** Dry skin that may result from a variety of disease processes, including a group of genetic disorders known as ichthyosis that is characterized by scaly skin

- **Acne:** This is a condition frequently associated with the teenage years in which pores become obstructed by excess sebum production, leading to infection and inflammation. This results in pimple formation.
- **Alopecia Areata:** Autoimmune condition characterized by patchy hair loss
- **Cellulitis:** Bacterial infection of the skin and underlying connective tissue that starts suddenly and rapidly spreads
- **Psoriasis:** Chronic autoimmune skin disorder that results in patches of thickened skin associated with dry, silvery scales overlying itchy, red areas of inflammation
- **Eczema:** Results from an allergic reaction and resembles a rash marked by patchy areas of itchy, dry, flaking skin
- **Vitiligo:** Autoimmune disorder that results in patchy loss of skin pigmentation

Slide 11: Skin Cancers/Precancerous Conditions

- **Basal Cell Carcinoma (BCC):** This is the leading form of skin cancer, which starts in the basal cell layer of the epidermis in areas of the body exposed most heavily to sunlight. Metastasis, or spread of the cancer to other body parts, is uncommon
- **Squamous Cell Carcinoma (SCC):** This type of cancer forms in the upper layers of the epidermis, most frequently in sun-exposed areas of the skin, and can develop from actinic keratoses. Often, it can be entirely excised, or removed surgically. The likelihood of metastasis is higher than with BCC.
- **Melanoma:** Formed from mutated melanocytes, melanoma occurs far less frequently than BCC and SCC but has a much higher risk of metastasis
- **Actinic Keratoses (AK):** These are spots of hyperpigmented skin (tan, brown, or black) with a somewhat coarse, flakey texture. They are considered precancerous, meaning they can turn into cancer, specifically SCC.

- **Keratoacanthoma:** This is a type of skin tumor related to SCC that is characterized by its dome shape. It has an unpredictable progression. Sometimes it spontaneously goes away while other times it expands. In rare instances, it can spread to other areas of the body.

Slides 12-14: Integumentary-Related Procedures

- **Cryotherapy/Cryosurgery:** Applying below-freezing temperatures (such as with liquid nitrogen) to destroy diseased tissue, such as to remove localized skin cancer
- **Hypodermic:** Placement below the skin, such as a hypodermic needle
- **Rhytidectomy:** More commonly known as a “face lift,” this term describes the surgical removal of wrinkles by excising loose tissue, tightening the skin
- **Onychectomy:** Surgical removal of a nail, which is frequently performed by veterinarians (declawing)
- **Debridement:** Surgical term to describe removal of dead or otherwise damaged tissue on an open wound
- **Curettage:** Debridement using a scooping device, called a curette
- **Liposuction:** Surgical removal of adipose tissue using a suctioning device
- **Punch Biopsy:** Punching out a section of superficial tissue, such as the skin, to analyze it for disease
- **Skin Graft:** Surgical procedure that involves implanting new skin to cover areas of skin that were lost due to a large burn or wound
- **Electrodessication:** Surgical burning away of tissue using an electrical device, known as a Bovie

Slide 15: Integumentary Treating Specialists

- **Dermatologist:** Specialist physician who focuses on diseases of the skin and related structures
- **Pathologist:** Specialist physician who does not treat patients directly but examines cells and tissues from biopsy specimens to try to diagnose medical

conditions that are difficult to determine otherwise

Flashcard Practice:

1. Distribute the Medical Terminology Integumentary System Printable Flashcards to each participant. The flashcards can be found at this link:
www.realityworks.com/medicalterminologykit-downloads
2. Have participants cut out the flashcards along the designated lines.
3. Have participants pair up and quiz each other on the vocabulary words and their meanings.

As an alternative independent practice method, give each participant access to the online flashcards for this lesson. Participants will read the online flashcard, click on the term/suffix and then the card will flip and reveal the definition.

Context Card Practice:

1. After participants become familiar with the vocabulary terms in this lesson, have them access the context cards. There are five for this lesson with a few different ways you can use them.
 - a. Share the card with participants using a document projector. Read the card aloud to the group while participants observe. Pair participants up and, while the card is projected, have each student read the contents aloud to each other.

Alternatively, you could have participants pair up and read the card aloud to each other. Then read the card contents to the class while students self-check their pronunciation.

- b. Divide the class into five groups. Give each group a different context card for that specific lesson content. Everyone in the small groups should read the context card aloud to another member of their group. All participants should have the opportunity to read the card. Then have each group rotate to another card. The goal is for each participant to read each of the five cards aloud to each other. At the end, the instructor will read all five context cards for the lesson to model appropriate pronunciation for the class.
- c. Share online access to the context cards for this lesson. This can be done as independent practice. It could even be assigned as work outside of class time. At the access site provided, participants read the context card aloud. Then they may click on the audio icon and the card will be read back to them. They may self-check their pronunciation of the key vocabulary terms found in the context card.

Lesson Nine – Integumentary System

REVIEW: Integumentary System Quiz

10 minutes

Purpose:

To test the participants' knowledge of the integumentary system.

Materials:

- *Integumentary System Quiz*
- *Integumentary System Quiz – Answer Key*

Facilitation Steps:

1. Distribute the *Integumentary System Quiz* and have participants complete it.
2. Grade the quiz results according to the *Integumentary System Quiz – Answer Key*.
3. Have participants review their answers and ask questions as needed.

Name: _____ Class: _____

Integumentary System Quiz

Instructions: Write in or circle the best answer for each question below.

1. True or False? (circle one) Basal cell carcinoma carries greater risk of metastases than melanoma.
2. A _____ is a benign tumor composed of adipose, or fat, cells.
3. _____ are considered precancerous and can be a precursor to squamous cell carcinoma (SCC).
4. This potentially life-threatening condition causes a generalized inflammation of the skin that begins in discrete patches and then expands. _____
5. True or False? (circle one) A pathologist is a specialist physician who treats diseases of the skin/integumentary system.
6. _____ is a type of skin tumor related to squamous cell carcinoma (SCC) that is characterized by its dome shape.
7. _____ is a term that describes the surgical burning away of tissue using an electrical device, known as a Bovie.
8. True or False? (circle one) Acne is a condition frequently associated with the teenage years in which pores become obstructed by excess sebum production, leading to infection and inflammation.
9. More commonly known as a “face lift,” this term describes the surgical removal of wrinkles by excising loose tissue, tightening the skin. _____
10. _____ is an autoimmune condition that results in patchy loss of skin pigmentation.

Integumentary System Quiz – Answer Key

1. True or **False**? Basal cell carcinoma carries greater risk of metastases than melanoma.
2. A **lipoma** is a benign tumor composed of adipose, or fat, cells.
3. **Actinic keratoses (AKs)** are considered precancerous and can be a precursor to squamous cell carcinoma (SCC).
4. This potentially life-threatening condition causes a generalized inflammation of the skin that begins in discrete patches and then expands. **Erythroderma**
5. True or **False**? A pathologist is a specialist physician who treats diseases of the skin/integumentary system.
6. **Keratoacanthoma** is a type of skin tumor related to squamous cell carcinoma (SCC) that is characterized by its dome shape.
7. **Electrodesiccation** is a term that describes the surgical burning away of tissue using an electrical device, known as a Bovie.
8. **True** or False? Acne is a condition frequently associated with the teenage years in which pores become obstructed by excess sebum production, leading to infection and inflammation.
9. More commonly known as a “face lift,” this term describes the surgical removal of wrinkles by excising loose tissue, tightening the skin. **rhytidectomy**
10. **Vitiligo** is an autoimmune condition that results in patchy loss of skin pigmentation.

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Lesson Ten – Respiratory System

Lesson Overview

The respiratory system is the network of organs and tissues that help you breathe. It includes your airways, lungs, and blood vessels. It is very important for healthcare professionals to understand the terminology related to the respiratory system.

Lesson Objectives

After completing this lesson, participants will be able to:

- Explain what medical terms relate to the respiratory system and how they are used in medical settings
- Identify the meaning behind common respiratory system terms
- Accurately read respiratory system vocabulary terms in context

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• Internet access • Smart devices (1 per group) • Suggested websites: http://www.cancerindex.org/medterm/medtm11.htm https://www.visiblebody.com/blog/anatomy-and-physiology-gas-exchange	1. Access the website for research.	10- 15 minutes
LEARN	• <i>Respiratory System</i> slide presentation • Medical Terminology Respiratory System Printable Flashcards • Online flashcards for Lesson 10 • Online context cards for Lesson 10 • Context card deck (Respiratory System cards for Lesson 10) • <i>Medical Terminology Student Glossary</i>	1. Prepare to share the <i>Respiratory System</i> slide presentation. 2. Print the Medical Terminology Respiratory System Flashcards. 3. Prepare online access to the flashcards and context cards. 4. Access the Respiratory System terms section of the student glossary.	30-45 minutes
REVIEW	• <i>Respiratory System Quiz</i> • <i>Respiratory System Quiz – Answer Key</i>	1. Print/photocopy the <i>Respiratory System Quiz</i> for each participant.	10 minutes

Note: See the Medical Terminology Block Instructions at the end of this curriculum. These blocks provide hands-on experience constructing and deconstructing medical terms. There are many ways that the blocks may be used at the end of each lesson to provide additional practice for learning medical terminology.

Lesson Ten – Respiratory System

FOCUS: Air Flow From Nasal Passages to Gas Exchange in the Lungs

10-15 minutes

Purpose:

Discuss the passageways carrying air from the nose to the lungs for gas exchange.

Materials:

- Internet access
- Smart devices (1 per group)
- Suggested website:
<http://www.cancerindex.org/medterm/medtm11.htm>

<https://www.visiblebody.com/blog/anatomy-and-physiology-gas-exchange>

Facilitation Steps:

1. Have participants gather in groups of three.
2. Each group should have at least one device with internet access.
3. Each participant will look up, name, and describe two air passageways.

Air Passageways: Nares (aka nostrils)/nasal cavity, pharynx, larynx, trachea, bronchi, bronchioles, alveoli

4. Discuss what gas exchange occurs between the alveoli and capillaries and in which direction it occurs.
 - Oxygen travels from the alveoli into the capillaries during inhalation and carbon dioxide travels from the capillaries into the alveoli to be exhaled

Lesson Ten – Respiratory System

LEARN: Common Medical Terms of the Respiratory System

30-45 minutes

Purpose:

During this section, participants will learn to recognize prefixes, suffixes, and root words relating to the respiratory system.

Materials:

- *Respiratory System* slide presentation
- Medical Terminology Respiratory System Printable Flashcards
- Online flashcards for Lesson 10
- Online context cards for Lesson 10
- Context card deck (Respiratory System cards for Lesson 10)
- *Medical Terminology Student Glossary*

Facilitation Steps:

1. Give each participant their own *Medical Terminology Student Glossary*. Students should record their definition for the various respiratory system terms as the slide presentation is shared.
2. Share the following information with participants as you show the slide presentation.

Slide 1: Introduction slide

Slide 2: Prefixes

- a- = without, the absence of
- dia- = through, across
- dys- = abnormal, ill
- epi- = upon, above
- eu- = normal
- hyper- = excessive, too much
- hypo- = under, below
- pleo- = multiple
- tachy- = fast

Slides 3-5: Roots

- alveol/o = cavity, pertaining to the alveolus
- bronch/o = bronchus
- bronchi/o = bronchioles
- cost/o = rib
- cyst/o = cyst, sac, vesicle
- capn/o = carbon dioxide
- diaphragmat/o = diaphragm
- epiglott/o = epiglottis
- hem/o = blood
- laryng/o = larynx
- lip/o = fat, lipid
- lob/o = lobe, section
- morph/o = shape
- nas/o = nose
- ox/i = oxygen
- pariet/o = body wall
- pharyng/o = pharynx
- phren/o = diaphragm
- pleur/o = pleura, lining
- pneum/o, pneumon/o, pneumat/o = lung, air
- pulmon/o = lung
- respir/o, spir/o = breath, breathing
- rhin/o = nose
- sarc/o = fleshy
- sept/o = partition
- sin/o = cavity, chamber
- thorac/o = thorax, chest cavity
- trache/o = trachea
- tubercul/o = tubercle, nodular projection

Slides 6-7: Suffixes

- -centesis = surgical puncture
- -ectasia = abnormal dilation
- -ia = condition, state
- -ic = pertaining to

- -itis = inflammation
- -logy = science or study of
- -lysis = dissolution, destruction
- -metry = measurement
- -oxia = state of oxygenation
- -oid = resembling, having features of
- -oma = bulging, swelling, tumor
- -osis = condition or state, often abnormal
- -pathy = disease, illness
- -plasty = surgical repair
- -pnea = breathing, breath
- -spasm = sudden involuntary muscle contraction
- -thorax = chest, chest cavity
- -tomy = cut, incision

Slides 8-10: Respiratory System Components

- Alveoli (alveolus, singular): These are tiny, sac-like projections into which inhaled air eventually enters. They serve as the site of gas exchange with capillaries during respiration.
- Bronchus (bronchi, plural): These are the large branches of the airway that come off the distal trachea. They are right and left bronchi.
- Bronchioles: Smaller airway passages distal to the bronchi
- Diaphragm: Dome-shaped muscle that serves as the primary driver for respiration by decreasing the pressure inside the thoracic cavity
- Epiglottis: Structure made of flexible cartilage that blocks food from going down the trachea when swallowing
- Larynx: Also called the “voice box” or “Adam’s apple,” this is an organ composed of cartilage that is responsible for voice production
- Lobes of the Lung: These are the sections or divisions of the lungs. There are three lobes that compose the right lung and two lobes that compose the left lung.
- Nasal Cavities: These are the internal passageways behind the nares, or nostrils, which divide into right and left sides by the nasal septum. Inhaled air is

cleaned and warmed. Air is further warmed and humidified in the mucus producing paranasal sinuses.

- Pleura: Membrane that surrounds the lungs
- Pharynx: This is the passageway anterior to the larynx and posterior to the oral and nasal cavities. It carries air from the nose to the trachea.
 - Nasopharynx: Section of the pharynx posterior to the nasal cavities
 - Oropharynx: Section of the pharynx posterior to the oral cavity, behind the mouth
- Trachea: Commonly referred to as the “windpipe,” this is the large tube made of cartilage through which air navigates into and out of the lungs. It lies inferior to the larynx.

Slides 11-12: Respiratory Cells and Alveolar Anatomy

- Type I Pneumocytes: These are flat, elongated, squamous cells that constitute 95% of the internal surface of each alveolus. Gas exchanges occur across a shared basement membrane with pulmonary capillary endothelium that serves as an air-blood barrier. These cells are incapable of replication.
- Type II Pneumocytes: These cells are small and cuboidal. Their major function is producing and secreting surfactant. They can transform into type I pneumocytes if the type I cells get damaged.
- Alveolar Macrophages: These are cells that are the blood-derived immune cells of the respiratory system. They defend against toxic agents and microorganisms present in inhaled air.
- Pulmonary Surfactant: Vital lipoprotein product that reduces surface tension, allowing alveoli to stay open, which is critical for gas exchange
- Pulmonary Capillary Endothelium: Tiny blood vessels that cover alveoli and form the blood component of air-blood gas exchange where oxygen from the air

is traded for carbon dioxide from the blood

Slides 13-14: Pulmonary Ventilation

- Inspiration: Drawing air into the lungs when the diaphragm contracts
- Expiration: Ejecting air from the lungs when the diaphragm relaxes
- Dyspnea: Abnormal breathing
- Eupnea: Normal, relaxed breathing that occurs unconsciously when a person is at rest
- Hyperpnea: Also known as forced breathing, this type of breathing is triggered by heavy exertion or when fast air movement is intentionally produced, such as when singing or shouting
- Tachypnea: Fast breathing
- Diaphragmatic Breathing: Also known as deep breathing, diaphragmatic breathing involves vigorous contraction of the diaphragm muscle during inhalation, which then relaxes during exhalation
- Costal Breathing: Results in shallow breaths from intercostal muscles contracting during inhalation and relaxing during exhalation

Slides 15-18: Respiratory System Conditions

- Pneumonia: This is a general term for an infection involving the lungs and alveoli. Pus and fluid build up in the air passageways.
 - Aspiration Pneumonia: Results from food product (often vomitus) that was inhaled into the trachea instead of going down the esophagus
 - Lobar Pneumonia: Involves one or more lobes of the lungs
 - Bronchopneumonia: Also known as bronchial pneumonia, this type of pneumonia presents as patchy involvement all over both lungs
- Asthma: Inflammatory disorder of the respiratory system that leads to acute bronchial narrowing that presents in

affected individuals as wheezing and coughing

- Chronic Obstructive Pulmonary Disease (COPD): This term includes both chronic bronchitis and emphysema. It results in a diminished capacity of the lungs to ventilate air.
- Hemoptysis: Coughing up blood, could be caused by many conditions (such as lung cancer)
- Hemothorax: Buildup of blood in the space between the lungs and the chest wall (the pleural space)
- Hypoxia: Having insufficient oxygen to meet the body's energy demands
- Pleuritis: Inflammation of the parietal pleura, the membrane coating the lungs
- Pleural Effusion: Buildup of fluid within the pleural space
- Pneumothorax: This term refers to the buildup of air within the pleural space. A tension pneumothorax is a life-threatening emergency in which the air pressure of the pneumothorax is so severe that it impedes cardiopulmonary function.
- Pulmonary Embolism: Throwing a clot into the blood circulation supplying blood to the lungs, which can result in the death (necrosis) of lung tissue, known as pulmonary infarction
- Cystic Fibrosis: This is a progressively worsening genetic condition (affecting the cystic fibrosis transmembrane conductance regulator (CFTR)) that results in thickened, sticky mucous production. The mucous gets trapped in the lungs' airways, leading to bronchiectasis (abnormal enlargement of the bronchial passageways) and chronic pulmonary infection. The pancreas is another major organ that is affected in this condition.
- Sarcoidosis: Inflammatory condition of unknown cause that is characterized by fleshy pulmonary lesions, called non-caseating granulomas, walled off by alveolar macrophages.
- Tuberculosis: This is an infection caused by the bacteria *Mycobacterium*

tuberculosis that is notoriously difficult to treat because the bacteria resist degradation by the alveolar macrophages. The immune response to tuberculosis can also cause lesions within the lungs known as tuberculous granulomas.

Slide 19: Non-Small Cell Lung Cancer (NSCLC)

- Adenocarcinoma: This type of lung cancer affects cells that would usually secrete biochemicals, such as mucous. While it primarily affects current and prior smokers, it is also the most common form of pulmonary cancer in nonsmokers. It tends to affect the outer, superficial areas of the lung.
 - Adenocarcinoma in situ (previously called bronchioloalveolar carcinoma) is a subtype of adenocarcinoma that has not spread (metastasized) and carries a relatively better prognosis for this type of cancer
- Squamous Cell Carcinoma (SCC): This type of cancer starts in the thin, squamous cells that line the air passageways of the lungs. It is associated with a smoking history and usually starts centrally near the large bronchial tubes.
- Large cell (undifferentiated) Carcinoma: This type of cancer is composed of undifferentiated pleomorphic cells that do not fit into any other category. It can start in any area of the lung and is predisposed to proliferate and spread rapidly, making it more difficult to treat.
 - Large Cell Neuroendocrine Carcinoma: Rare, virulent subtype of large cell carcinoma that carries a poor prognosis and behaves like small cell lung cancer

Slide 20: Small Cell Lung Cancer (SCLC)

Overall, this type of cancer proliferates and spreads more rapidly than NSCLC and usually has metastasized by the time of diagnosis. However, it is often sensitive to treatment with chemotherapy and radiation.

- Pulmonary Hamartoma: Benign tumor composed of multiple tissue types found

in the lung (including cartilage, epithelium, fat, and muscle) but with loss of the normal tissue architecture

Slides 21-23: Respiratory-Related Procedures

- Bronchoscopy: Inserting a long, flexible tube with a camera at its tip into the trachea and beyond to visualize the bronchial tree
- Computed Tomography (CT) of the Chest: Most common imaging modality to visualize cancerous tumors in the lungs
- Lung Biopsy: Obtaining lung tissue that can be analyzed under the microscope to aid in diagnosis
- Pulmonary Angiography: This procedure involves injecting dye into the circulation supplying the lungs. It can be used to detect a pulmonary embolism, but it is rarely performed because less invasive methods like CT angiography and V/Q mismatch imaging are available.
- Oximetry: Measuring oxygenation in arterial blood often using a sensor placed over the fingernail
- Pulmonary Function Test (PFT): Assesses the capacity of the lungs to ventilate and carry out gas exchange
- Spirometry: Test that measures the amount of air one can inhale and exhale
- Ventilation-Perfusion (V/Q) Scan: This imaging test determines the ratio of alveolar ventilation to blood flow (perfusion) of the pulmonary capillary endothelium. It can be used to diagnose a pulmonary embolism.
- Endotracheal Intubation: Emergency procedure performed when an individual cannot breathe on their own or has been placed under anesthesia prior to surgery
- Thoracentesis: Also known as a pleurocentesis, this is a term for surgical puncture of the thoracic cavity, which might be performed to remove excess fluid buildup in the pleural space from a pleural effusion
- Thoracotomy: Surgical procedure that involves cutting open the chest, such as

to remove a section of the lung (pulmonary resection)

- Tracheostomy: This is an emergency surgical opening that circumvents the nose and mouth to deliver air directly to the trachea. A tracheotomy is the surgical incision into the trachea that creates a tracheostomy, through which a tracheostomy tube is placed.

Slide 24: Respiratory Treating Specialists

- Pulmonologist: Physician who specializes in treating lung diseases
- Respiratory Therapist: Certified medical professional who specializes in providing healthcare for your lungs

Flashcard Practice:

1. Distribute the Medical Terminology Respiratory System Printable Flashcards to each participant. The flashcards can be found at this link:
www.realityworks.com/medicalterminologykit-downloads
2. Have students cut out the flashcards along the designated lines and pair up to quiz each other on the vocabulary words.

As an alternative independent practice method, give each student access to the online flashcards for this lesson. Students will read the online flashcard, click on the term/suffix and then the card will flip and reveal the definition.

Context Card Practice:

1. After students become familiar with the vocabulary terms in this lesson, have them access the context cards. There are five for this lesson with a few different ways you can use them.

- a. Share the card with participants using a document projector. Read the card aloud to the group while students observe. Pair students up and, while the card is projected, have each student read the contents aloud to each other.

Alternatively, you could have students pair up and read the card aloud to each other. Then read the card contents to the class while students self-check their pronunciation.

- b. Divide the class into five groups. Give each group a different context card for the lesson. Everyone in the groups should read the context card aloud to another member of their group. All students should have the opportunity to read the card. Then have each group rotate to another card. The goal is for each student to read each of the five cards aloud to each other. At the end, read all five context cards for the lesson to model appropriate pronunciation for the class.
- c. Share online access to the context cards for this lesson. This can be done as independent practice. It could even be assigned as work outside of class time. At the access site provided, students read the context card aloud. Then they may click on the audio icon and the card will be read back to them. They may self-check their pronunciation of the key vocabulary terms found in the context card.

Lesson Ten – Respiratory System

REVIEW: Respiratory System Quiz

10 minutes

Purpose:

To test participants' knowledge of the respiratory system.

Materials:

- *Respiratory System Quiz*
- *Respiratory System Quiz – Answer Key*

Facilitation Steps:

1. Distribute the *Respiratory System Quiz* and have participants complete it.
2. Grade the quiz results according to the *Respiratory System Quiz – Answer Key*.
3. Have participants review their answers and ask questions as needed.

Name: _____ Class: _____

Respiratory System Quiz

Instructions: Select or write in the best answer for each question below.

1. True or False? (circle one) Adenocarcinoma in situ carries greater risk of metastases than small cell lung cancer (SCLC).
2. A _____ is a benign tumor composed of multiple tissue types found in the lung (including cartilage, epithelium, fat, and muscle) but with loss of the normal tissue architecture.
3. _____ are small, cuboidal cells. Their major function is producing and secreting surfactant.
4. This is a potentially life-threatening condition in which the air pressure from the buildup of air within the pleural space is so severe that it impedes cardiopulmonary function.

5. True or False? (circle one) A respiratory therapist is a physician who specializes in treating lung diseases.
6. _____ is a type of cancer that is associated with a smoking history and usually starts centrally, near the large bronchial tubes.
7. _____ measures the amount of air one can inhale and exhale.
8. True or False? (circle one) There are two lobes that compose the right lung and three lobes that compose the left lung.
9. These are flat, elongated, squamous cells that constitute 95% of the internal surface of each alveolus. _____
10. A _____ is a surgical procedure that involves cutting open the chest, such as to remove a section of the lung (a pulmonary resection).

Respiratory System Quiz – Answer Key

1. True or **False**? Adenocarcinoma in situ carries greater risk of metastases than small cell lung cancer (SCLC).
2. A **pulmonary hamartoma** is a benign tumor composed of multiple tissue types found in the lung (including cartilage, epithelium, fat, and muscle) but with loss of the normal tissue architecture.
3. **Type II pneumocytes** are small, cuboidal cells. Their major function is the production and secretion of surfactant.
4. This is a potentially life-threatening condition in which the air pressure from the buildup of air within the pleural space is so severe that it impedes cardiopulmonary function. **tension pneumothorax**
5. True or **False**? A respiratory therapist is a physician who specializes in treating lung diseases.
6. **Squamous cell carcinoma (SCC)** is a type of cancer that is associated with a smoking history and usually starts centrally, near the large bronchial tubes.
7. **Spirometry** measures the amount of air one can inhale and exhale.
8. True or **False**? There are two lobes that compose the right lung and three lobes that compose the left lung.
9. These are flat, elongated, squamous cells that constitute 95% of the internal surface of each alveolus. **Type I pneumocytes**
10. A **thoracotomy** is a surgical procedure that involves cutting open the chest, such as to remove a section of the lung (a pulmonary resection).

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Lesson Eleven – Digestive System

Lesson Overview

Your digestive system is uniquely constructed to do its job of turning your food into the nutrients and energy you need to survive. It is very important for healthcare professionals to understand the terminology related to the digestive system.

Lesson Objectives

After completing this lesson, participants will be able to:

- Explain what medical terms relate to the digestive system and how they are used in medical settings
- Identify the meaning behind common digestive system terms
- Accurately read digestive system vocabulary terms in context

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• Internet access • Smart devices (1 per group) • Suggested websites: https://ecampusontario.pressbooks.pub/medicalterminology/chapter/digestive-systems/ https://my.clevelandclinic.org/health/body/7041-digestive-system	1. Access the website for research.	10- 15 minutes
LEARN	• <i>Digestive System</i> slide presentation • Medical Terminology Digestive System Printable Flashcards • Online flashcards for Lesson 11 • Online context cards for Lesson 11 • Context card deck (Digestive System cards for Lesson 11) • <i>Medical Terminology Student Glossary</i>	1. Prepare to share the <i>Digestive System</i> slide presentation. 2. Print the Medical Terminology Digestive System Printable Flashcards. 3. Prepare online access to the flashcards and context cards. 4. Access the Digestive System terms section of the student glossary.	30-45 minutes
REVIEW	• <i>Digestive System Quiz</i> • <i>Digestive System Quiz – Answer Key</i>	1. Print/photocopy the <i>Digestive System Quiz</i> for each participant.	10 minutes

Note: See the Medical Terminology Block Instructions at the end of this curriculum. These blocks provide hands-on experience constructing and deconstructing medical terms. There are many ways that the blocks may be used at the end of each lesson to provide additional practice for learning medical terminology.

Lesson Eleven – Digestive System

FOCUS: Path of the Alimentary Canal/Digestive Tract and Accessory Organs

10-15 minutes

Purpose:

Discuss the organs composing the urinary system and the internal anatomy of the kidney.

Materials:

- Internet access
- Smart devices (1 per group)
- Suggested websites:
<https://ecampusontario.pressbooks.pub/medicalterminology/chapter/digestive-systems/>
- <https://my.clevelandclinic.org/health/body/7041-digestive-system>

Facilitation Steps:

1. Have participants gather in groups of three and give each group at least one device with internet access.
2. Each participant will look up, name, and describe two organs of the alimentary canal and one accessory organ.
 - Alimentary Canal/ Digestive Tract: Mouth, pharynx, esophagus, stomach, small intestine (duodenum, jejunum, ileum), and large intestine (cecum, colon, rectum, anal canal)
 - Accessory Organs: Salivary glands, liver, pancreas, gallbladder

Lesson Eleven – Digestive System

LEARN: Common Medical Terms of the Digestive System

30-45 minutes

Purpose:

During this section, participants will learn to recognize prefixes, suffixes, and root words relating to the digestive system.

Materials:

- *Digestive System* slide presentation
- Medical Terminology Digestive System Printable Flashcards
- Online flashcards for Lesson 11
- Online context cards for Lesson 11
- Context card deck (Digestive System cards for Lesson 11)
- *Medical Terminology Student Glossary*

Facilitation Steps:

1. Give each participant their own *Medical Terminology Student Glossary*. Students should record their definition for the various digestive system terms as the slide presentation is shared.
2. Share the following information with students as you show the slide presentation.

Slide 1: Introduction slide

Slide 2: Prefixes

- an- = without, the absence of
- anti- = against
- dys- = abnormal, ill
- end-, endo- = internal, within
- epi- = upon, overlying
- hyper- = excessive, too much
- hypo- = insufficient
- re- = backward, again
- retro- = behind, posterior to
- peri- = around
- trans- = across, through
- ultra- = beyond, further than

Slide 3: Root Words

- aliment/o = food
- chol/e = bile
- cyst/o = sac, bladder
- cholecyst/o = gallbladder
- choledoch/o = bile duct
- colon/o = colon
- diverticul/o = outpouchings
- duoden/o = duodenum
- enter/o = intestine
- emes/o = vomit
- gastr/o = stomach
- hemat/o = blood
- hepat/o = liver
- ile/o = ileum
- jejun/o = jejunum
- lapar/o = abdominal wall
- lith/o = stone
- proct/o = rectum and anus
- rect/o = rectum
- sigmoid/o = relating to a section of the colon called the sigmoid colon

Slides 4-5: Suffixes

- -ectomy = surgical removal
- -ia, -iasis = condition, state
- -ic = pertaining to
- -itis = inflammation
- -logy = science or study of
- -oid = resembling, having features of
- -oma = bulging, swelling, tumor
- -osis, -iasis = condition or state, often abnormal
- -pathy = disease, illness
- -plasty = surgical repair
- -rrhea = flow, passage
- -scope = lighted instrument for visualization

- -scopy = visual examination
- -stenosis = narrowing, stricture
- -tripsy = surgical crushing
- -chezia = feces, stool

Slides 6-10: Organs and Anatomy

- Anus: Opening for the release of feces at the terminal end of the of the large intestine
 - Anal canal: This is the terminal portion of the large intestine that opens to the anus. It lies inferior to the rectum.
- Appendix: This is a worm-shaped structure attached to the end of the cecum like a tail. It contains lymphoid tissue.
- Bile: This is a greenish-brown alkaline fluid that de-clumps fats to promote their digestion by enzymes. It is produced by the liver and stored in the gallbladder.
 - Common Bile Duct: Enables the transport of bile from the liver and gall bladder into the duodenum (the first section of the small intestine) to facilitate digestion
- Cecum: First section of the large intestine that connects to the ileum of the small intestine
- Colon: Longest section of the large intestine and lies between the cecum and rectum
- Duodenum: First section of the small intestine that connects with the stomach
- Esophagus: Organ that serves to transport a bolus of swallowed food into the stomach
- Gallbladder: Muscular, bladder-shaped structure located below the liver that stores and ejects bile
- Ileum: Final section of the small intestine that connects to the cecum
- Jejunum: Middle section of the small intestine that lies between the duodenum and the ileum
- Liver: This large, heavily vascularized organ filters blood and detoxifies ingested chemicals. It is the largest

gland in the body and facilitates digestion by producing bile.

- Pancreas: Large gland that secretes pancreatic fluid that eventually flows into the duodenum and facilitates digestion
- Rectum: Third section of the large intestine that houses stool and connects with the anal canal
- Salivary Glands: Release salivary fluid into the mouth to moisten food and facilitate digestion
- Sigmoid Colon: This is the last section of the colon and connects with the rectum. It produces and stores feces and is S-shaped.
- Stomach: This muscular, sac-shaped organ serves as a receptacle for ingested food and begins to break it down by producing hydrochloric acid. The stomach avoids autodigestion (digesting itself) from the acid by forming a protective layer of mucous that lines its internal surface.
- Hepatic Portal Vein: Transfers blood from the gastrointestinal tract to the liver, where it is filtered

Slides 11-14: Digestive Processes

- Ingestion: Intake of food products through the mouth at the start of the pathway through the digestive tract
- Propulsion: Forward movement of food products through the alimentary canal
- Peristalsis: Mechanism used to propel food along the digestive tract, accomplished by the activity of smooth muscles that contract and relax in sequential, alternating waves
- Digestion: Breaking down food so that it can be used by the body for energy, nutrients, and structural building blocks for growth and repair
- Mechanical Digestion: Physical breakdown of food that occurs during mastication, or chewing, which is also accompanied by coordinated tongue movements
- Chemical Digestion: This type of digestion uses secretions containing

various enzymes, acids, and salts mixed with water to chemically break food down into its fundamental components. This process begins in the mouth with the release of salivary enzymes and is continued in the stomach, ending in the small intestine.

- Absorption: This is the process of absorbing nutrients into the bloodstream that primarily occurs in the small intestine. The large intestine absorbs water and electrolytes.
- Defecation: Removing leftover, undigested waste in the form of feces

Slides 15-18: Digestive System Conditions

- Appendicitis: Inflammation of the appendix from infection or obstruction, which can be associated with right lower quadrant pain
- Cholecystitis: This is a term to describe inflammation of the gallbladder. Its main cause is from gallstones obstructing the outflow of bile.
- Cholelithiasis: Characterized by the development of gallstones in the gallbladder
- Cirrhosis: This is a condition characterized by chronic scarring and degeneration of the liver. Persistent alcoholism is one potential cause.
- Crohn's Disease/Ulcerative Colitis: These conditions are collectively referred to as inflammatory bowel disease (IBD). They are characterized by inflamed sections of the digestive tract. In Crohn's disease, the small intestine is most frequently affected, although the entire digestive tract from the mouth to the anus may be affected. Ulcerative colitis is limited to the colon.
- Diarrhea: More frequent, watery bowel movements
- Diverticulosis: This is a condition characterized by small outpouchings (called diverticula) that develop along the wall of the colon. It is usually asymptomatic but can sometimes be associated with abdominal pain or painless rectal bleeding.
- Diverticulitis: This is a condition that describes inflammation or infection of diverticula. Mild forms may be treated with a liquid diet and oral antibiotics.
- Dysphagia: This is a condition characterized by abnormal swallowing. Dysphagia could lead to aspiration of food into the lungs that could cause aspiration pneumonia.
- Emesis: Vomiting
- Hematemesis: Vomiting up blood
- Esophageal Varices: Distended veins engorged with blood along the lining of the esophagus when blood gets backed up in the liver, as can happen from cirrhosis
- Gastroenteritis: Inflammation or infection of the stomach and intestines
- Gastroesophageal Reflux Disease (GERD): Characterized by retrograde (backward) flow of stomach acid and other stomach contents into the esophagus resulting in "heartburn" pain
- Hemorrhoids: These are distended veins that develop inside or outside the anus or in the rectum. They are often painful and can be associated with rectal bleeding.
- Hematochezia: Exit of bright red blood from the rectum often during defecation
- Hepatitis: Characterized by inflammation of the liver. One potential cause is from viral infection.
- Jaundice: This term derives from the French word meaning "yellow" and describes the yellowing of the skin and whites of the eyes from the buildup of bilirubin (a breakdown product of hemoglobin) in the blood, which can occur from diseases of the liver and bile duct obstruction
- Melena: Dark tarry stool, such as from digested blood from bleeding in the stomach
- Peritonitis: Characterized by inflammation or infection of the lining that covers the abdominal cavity wall and the surface of the abdominal organs

Slides 19-23: Digestive System Cancers

- Colorectal Carcinoma: One of the most widespread cancers affecting both men and women, colorectal carcinoma includes primary cancers of the colon and rectum
- Polyps: These are benign mucous membrane growths that develop into cancer in some instances. They can often be removed during colonoscopies, when the colon is being viewed from the inside with a camera.
- Anal Carcinoma: Uncommon type of cancer that develops in the anal canal
- Gastric Carcinoma: This is the medical term for stomach cancer. Early symptoms include early satiety, bloating, and nausea. Infection with the bacteria *H. pylori* and smoking increase the risk of developing gastric carcinoma.
- Esophageal Carcinoma: This type of cancer develops in the tissues of the esophagus and may present as dysphagia. Histologically, about half of cases of esophageal carcinoma are adenocarcinoma (glandular) and half are squamous cells (flat scaly cells that form the surface of tissues).
- Hepatocellular Carcinoma: Leading histological subtype of primary liver cancer
- Cholangiocarcinoma: Rare type of cancer that affects the bile ducts that connect the liver, gallbladder, and small intestine

Slides 24-27: Digestive Tract Diagnostic Procedures

- Abdominal Ultrasound: Imaging modality that uses the reflection of high frequency sound waves to visualize abdominal organs
- Barium Swallow/Upper GI Series: Taking a series of X-rays after swallowing liquid barium, a radio-opaque material that blocks X-rays, and thus will make the outline of the upper alimentary canal (including the esophagus, stomach, and small intestine) visible

- Barium Enema/Lower GI Series: Taking a series of X-rays after administering a barium enema, a radio-opaque material that blocks X-rays
- Endoscopy: General term for using a flexible, fiber optic tube attached to a camera to visualize the alimentary canal internally to look for tumors, ulcers, and other pathologies
- Endoscopic Retrograde Cholangiopancreatography (ERCP): Uses an endoscope to inject a contrast dye into the digestive tract to specifically visualize the bile and pancreatic ducts
- Esophagogastroduodenoscopy (EGD): This procedure uses an endoscope to visualize the esophagus, stomach, and upper part of the small intestine.
- Colonoscopy: This technique uses an endoscope inserted through the anus to visualize the colon. Polyps can often be excised after being identified during a colonoscopy.
- Hemoccult/Guaiac Test: Makes use of a chemical to detect blood in the stool, which might be associated with colorectal cancer or other pathologies
- Liver Function Tests (LFTs): These are lab tests to evaluate liver function. Elevated levels suggest damage to the liver.
- Liver Biopsy: This procedure involves taking a piece of liver tissue to evaluate for pathology under a microscope. Special chemical stains may be applied to look for specific molecules.

Slide 28: Digestive Tract Treating Specialists

- Gastroenterologist: Physician who specializes in treating gastrointestinal tract diseases
- Colorectal Surgeon/Proctologist: Surgeon who specializes in treating colon, rectum, and anus diseases

Slides 29-31: Digestive Tract Treatment Procedures

- Abdominocentesis: Surgical puncture of the abdomen to remove fluid buildup that can occur from liver disease and obstruction of the hepatic portal vein that transfers blood from the gastrointestinal tract to the liver
- Appendectomy: Surgical removal of the appendix, which is usually necessary in the setting of appendicitis
- Cholecystectomy: Surgical removal of the gallbladder, which may be necessary in the setting of cholecystitis and cholelithiasis
- Cholelithotomy: Surgical removal of gallstones
- Choledocholithotomy: Surgical removal of gallstones from the common bile duct
- Cholelithotripsy Using Extracorporeal Shock Wave Lithotripsy (ESWL): Destroying smaller gallstones using high-energy sound waves
- Colectomy: Surgical resection (removal) of the colon, which can be complete or partial
- Colostomy: This is a surgical procedure connecting an opening in the colon with an opening created in the abdomen wall. The abdominal opening serves as an artificial anus, where feces is collected in a bag that is attached. This procedure is performed when there is damage to the colon or rectum preventing normal defecation.
- Gastrectomy: Surgical resection (removal) of the stomach, which can be complete or partial
- Gastrostomy: This is a surgical procedure during which a tube is placed in the stomach and connected to an opening created in the abdomen wall. This procedure is performed on someone unable to swallow food properly on their own or consume enough calories.
- Laparotomy: This is a surgical procedure during which the abdominal wall is incised to inspect the abdominal organs for lesions or damage. This

might be performed after a puncture wound to look for the source of internal bleeding.

Flashcard Practice:

1. Distribute the Medical Terminology Digestive System Printable Flashcards to each participant. The flashcards can be found at this link: www.realityworks.com/medicalterminologykit-downloads
2. Have participants cut out the flashcards along the designated lines.
3. Have participants pair up and quiz each other on the vocabulary words and their meanings.

As an alternative independent practice method, give each participant access to the online flashcards for this lesson. Participants will read the online flashcard, click on the term/suffix and then the card will flip and reveal the definition.

Context Card Practice:

1. After participants become familiar with the vocabulary terms in this lesson, have them access the context cards. There are five for this lesson with a few different ways you can use them.
 - a. Share the card with participants using a document projector. Read the card aloud to the group while participants observe. Pair participants up and, while the card is projected, have each student read the contents aloud to each other.

Alternatively, you could have participants pair up and read the card aloud to each other. Then read the card contents to the class while students self-check their pronunciation.

- b. Divide the class into five groups. Give each group a different context card for that specific lesson content. Everyone in the small groups should read the context card aloud to another member of their group. All participants should have the

opportunity to read the card. Then have each group rotate to another card. The goal is for each participant to read each of the five cards aloud to each other. At the end, the instructor will read all five context cards for the lesson to model appropriate pronunciation for the class.

- c. Share online access to the context cards for this lesson. This can be done as independent practice. It could even be assigned as work outside of class time. At the access site provided, participants read the context card aloud. Then they may click on the audio icon and the card will be read back to them. They may self-check their pronunciation of the key vocabulary terms found in the context card.
4. Have students cut out the flashcards along the designated lines.
5. Have students pair up and quiz each other on the vocabulary words and their meanings.

As an alternative independent practice method, give each student access to the online flashcards for this lesson. Students will read the online flashcard, click on the term/suffix and then the card will flip and reveal the definition.

Context Card Practice:

1. After students become familiar with the vocabulary terms in this lesson, have them access the context cards. There are five for this lesson with a few different ways you can use them.
 - a. Share the card with participants using a document projector. Read the card aloud to the group while students observe. Pair students up and, while the card is projected, have each student read the contents aloud to each other.

Alternatively, have students pair up and read the card aloud to each other. Then read the card contents to the class while students self-check their pronunciation.

- b. Divide the class into five groups. Give each small group a different context card for this lesson's content. Everyone in the groups should read the context card aloud to another member of their group. All students should have the opportunity to read the card. Then have each group rotate to another card. The goal is for each student to read each of the five cards aloud to each other. At the end, read all five context cards for the lesson to model appropriate pronunciation for the class.
- c. Share online access to the context cards for this lesson. This can be done as independent practice. It could even be assigned as work outside of class time. At the access site provided, students read the context card aloud. Then they may click on the audio icon and the card will be read back to them. They may self-check their pronunciation of the key vocabulary terms found in the context card.

Lesson Eleven – Digestive System

REVIEW: Digestive System Quiz

10 minutes

Purpose:

To test participants' knowledge of the digestive system.

Materials:

- *Digestive System Quiz*
- *Digestive System Quiz - Answer Key*

Facilitation Steps:

1. Distribute the *Digestive System Quiz* and have participants complete the quiz.
2. Grade the quiz results according to the *Digestive System Quiz – Answer Key*.
3. Have participants review their answers and ask questions as needed.

Name: _____ Class: _____

Digestive System Quiz

Instructions: Select or write in the best answer for each question below.

1. True or False? (circle one) Hepatocellular carcinoma is the leading histological subtype of primary liver cancer.
2. _____ is a greenish-brown alkaline fluid that de-clumps fats to promote their digestion by enzymes.
3. The _____ is the middle section of the small intestine that lies between the duodenum and the ileum.
4. _____ is the mechanism used to propel food along the digestive tract, accomplished by the activity of smooth muscles that contract and relax in sequential, alternating waves.
5. True or False? (circle one) A gastroenterologist is a surgeon who specializes in treating colon, rectum, and anus diseases.
6. _____ is a rare type of cancer that affects the bile ducts that connect the liver, gallbladder, and small intestine.
7. _____ is a procedure that uses an endoscope to inject a contrast dye into the digestive tract to specifically visualize the bile and pancreatic ducts.
8. True or False? (circle one) Hepatitis describes the yellowing of the skin and whites of the eyes from the buildup of bilirubin in the blood, which can occur from diseases of the liver and bile duct obstruction.
9. This is a condition characterized by inflammation or infection of the lining of the abdominal cavity wall. _____
10. The _____ is a worm-shaped structure attached to the end of the cecum like a tail. It contains lymphoid tissue.

Digestive System Quiz – Answer Key

1. **True** or False? Hepatocellular carcinoma is the leading histological subtype of primary liver cancer.
2. **Bile** is a greenish-brown alkaline fluid that de-clumps fats to promote their digestion by enzymes.
3. The **jejunum** is the middle section of the small intestine that lies between the duodenum and the ileum.
4. **Peristalsis** is the mechanism used to propel food along the digestive tract, accomplished by the activity of smooth muscles that contract and relax in sequential, alternating waves.
5. True or **False**? A gastroenterologist is a surgeon who specializes in treating colon, rectum, and anus diseases.
6. **Cholangiocarcinoma** is a rare type of cancer that affects the bile ducts connecting the liver, gallbladder, and small intestine.
7. **Endoscopic retrograde cholangiopancreatography (ERCP)** is a procedure that uses an endoscope to inject a contrast dye into the digestive tract to specifically visualize the bile and pancreatic ducts.
8. True or **False**? Hepatitis describes the yellowing of the skin and whites of the eyes from the buildup of bilirubin (a breakdown product of hemoglobin) in the blood, which can occur from diseases of the liver and bile duct obstruction.
9. This is a condition characterized by inflammation or infection of the lining of the abdominal cavity wall. **peritonitis**
10. The **appendix** is a worm-shaped structure attached to the end of the cecum like a tail. It contains lymphoid tissue.

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Lesson Twelve – Urinary System

Lesson Overview

The urinary system works as a filter, removing toxins and wastes from your body through urine. Your urinary system helps the rest of your body work properly and that is why it is very important for healthcare professionals to understand the terminology related to the urinary system.

Lesson Objectives

After completing this lesson, participants will be able to:

- Explain what medical terms relate to the urinary system and how they are used in medical settings
- Identify the meaning behind common urinary system terms
- Accurately read urinary system vocabulary terms in context

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• Internet access • Smart devices (1 per group) • Suggested websites: https://nursecepts.com/medical-terminology-for-the-urinary-system/ https://ecampusontario.pressbooks.pub/medicalterminology/chapter/urinary-system/	1. Access the website for research.	10- 15 minutes
LEARN	• <i>Urinary System</i> slide presentation • Medical Terminology Urinary System Printable Flashcards • Online flashcards for Lesson 12 • Online context cards for Lesson 12 • Context card deck (Urinary System cards for Lesson 12) • <i>Medical Terminology Student Glossary</i>	1. Prepare to share the <i>Urinary System</i> slide presentation. 2. Print the Medical Terminology Urinary System Printable Flashcards. 3. Prepare online access to the flashcards and context cards. 4. Access the Urinary System terms section of the student glossary.	30-45 minutes
REVIEW	• <i>Urinary System Quiz</i> • <i>Urinary System Quiz – Answer Key</i>	1. Print/photocopy the <i>Urinary System Quiz</i> for each participant.	10 minutes

Note: See the Medical Terminology Block Instructions at the end of this curriculum. These blocks provide hands-on experience constructing and deconstructing medical terms. There are many ways that the blocks may be used at the end of each lesson to provide additional practice for learning medical terminology.

Lesson Twelve – Urinary System

FOCUS: Route of Urine Excretion From the Kidneys to the Bladder

10-15 minutes

Purpose:

Discuss the organs composing the urinary system and the internal anatomy of the kidney.

Materials:

- Internet access
- Smart devices (1 per group)
- Suggested websites:
<https://nursecepts.com/medical-terminology-for-the-urinary-system/>
<https://ecampusontario.pressbooks.pub/medical-terminology/chapter/urinary-system/>

Facilitation Steps:

1. Have participants gather in groups of three.
2. Each group should have at least one device with internet access.
3. Each participant will look up, name, and describe one organ of the urinary tract and two internal subcomponents of the kidney:
 - Urinary Tract: Kidneys (two), ureters (two), bladder, urethra
 - Anatomy of the Kidney: Cortex, medulla, and renal columns; subcomponents of the medulla; renal pyramids, renal papillae; calyces; renal pelvis

Lesson Twelve – Urinary System

LEARN: Common Medical Terms of the Urinary System

30-45 minutes

Purpose:

During this section, participants will learn to recognize prefixes, suffixes, and root words relating to the urinary system.

Materials:

- *Urinary System* slide presentation
- Medical Terminology Urinary System Printable Flashcards
- Online flashcards for Lesson 12
- Online context cards for Lesson 12
- Context card deck (Urinary System cards for Lesson 12)
- *Medical Terminology Student Glossary*

Facilitation Steps:

1. Give each student their own *Medical Terminology Student Glossary*. Students should record their definition for the various urinary system terms as the slide presentation is shared.
2. Share the following information with students as you show the slide presentation.

Slide 1: Introduction slide

Slide 2: Prefixes

- an- = without, the absence of
- di- = twice, double
- dia- = through, across
- dialy- = dialysis
- dys- = abnormal, ill
- neo- = new
- noct- = night
- oligo- = few, insufficient
- poly- = many
- pan- = all
- peri- = around
- trans- = across, through

- ultra- = beyond, further than

Slide 3: Roots

- cost/o = rib
- cyst/o, vesic/o = bladder
- glomerul/o = glomerulus
- hem/o = blood
- hydr/o = water
- lith/o = stone
- nephro/o, ren/o = kidney
- pyel/o = renal pelvis (the dilated proximal end of the ureter located within to the kidney)
- ur/o, urin/o = urine
- ureter/o = ureter
- urethr/o = urethra

Slides 4-5: Suffixes

- -algia, -dynia = pain
- -ectomy = surgical removal
- -ia, -iasis = condition, state
- -ic = pertaining to
- -itis = inflammation
- -logy = science or study of
- -lysis = dissolution, destruction
- -oid = resembling, having features of
- -oma = bulging, swelling, tumor
- -osis = condition or state, often abnormal
- -pathy = disease, illness
- -plasty = surgical repair
- -pexy = surgical attachment
- -scope = lighted instrument for visualization
- -scopy = visual examination
- -stenosis = narrowing, stricture
- -tripsy = surgical crushing
- -uria = relating to the urine

Slide 6: Urinary System Organs/Anatomy

- Kidneys: Bean-shaped organs (two in total) that filter blood to remove toxins and produce urine
- Ureters: Tube-shaped structures, one for each kidney, that carry urine, produced in the kidneys, to the urinary bladder
- Bladder/Urinary Bladder: Sac-like structure that holds urine prior to emptying
- Urethra: Tubular extension from the bladder that enables urine stored in the bladder to be excreted out into the environment
- Costovertebral Angle: This is the point where the last rib meets the vertebral column. Tenderness here traces to the kidneys and urinary tract.

Slides 7-8: Kidney Anatomy/Anatomical Substructure

- Renal Cortex: Outer layer of the kidney, where the glomerulus and convoluted tubules of the nephron reside
- Renal Medulla: Inner layer of the kidney that contains the renal pyramids
- Renal Columns: These are long, straight connective tissue structures that traverse the cortex and medulla, dividing the kidney into 6-8 lobes. They form a scaffold upon which blood vessels can travel into and leave the cortex.
- Renal Pyramids: Triangular structures within the renal medulla, where the collecting ducts reside
- Renal Papillae: Groupings of collecting ducts that transfer urine to the calyces on its path to being excreted from the kidney
- Renal Calyces: Cup-shaped tubes that receive urine from the pyramids
- Renal Pelvis: This is a funnel-shaped collection area where the renal calyces converge. Urine drains from the renal pelvis into the ureter.

Slides 9-12: Functional Unit of the Kidney: The Nephron

- Functions of the Nephron:
 - Filtration: Removal of toxins and waste products
 - Reabsorption: Absorption of fluid back into the bloodstream
 - Secretion: Creation and ejection of certain chemical products
- Glomerulus (glomeruli, plural): This is a network of interwoven capillaries within the nephron. Glomerular blood filtration leads to urine production.
- Bowman's Capsule/Glomerular Capsule: Cup-shaped section of the renal tubule that surrounds the glomerulus
- Afferent Arteriole: Tiny arteries, called arterioles, that carry blood to the glomerulus
- Efferent Arteriole: Tiny arteries, called arterioles, that carry blood away from the glomerulus
- Loop of Henle: U-shaped section of the renal tubule that connects the proximal and distal convoluted tubules
- Convoluted Tubule: Twisted or "convoluted" sections of the renal tubule
 - The proximal convoluted tubule is close to the glomerulus
 - The distal convoluted tubule is further away from the glomerulus, separated by the loop of Henle
- Collecting Tubule: Section of the renal tubule that transports urine to the renal pelvis
- Vasa Recta and Peritubular Capillaries: Capillary networks that surround the more distal sections of the renal tubule, specifically the loop of Henle (vasa recta) and the convoluted tubules (peritubular capillaries)

Slides 13-15: Urinary System Conditions

- Anuria: Absence of urine production, which might occur during kidney failure
- Hematuria: Blood in the urine
- Oliguria: Insufficient urine production

- Polyuria: Excessive urine production, which might occur from diabetes (mellitus or insipidus)
- Proteinuria: Abnormally high protein in the urine
- Nocturia: Having to get up at night to urinate
- Dysuria: Pain or burning with urination
- Nocturnal Enuresis: Involuntary bedwetting at night
- Urinary Tract Infection (UTI): Infection involving any of the structures that form the urinary tract
- Nephritis: General term for kidney inflammation
- Pyelonephritis: Infection of the kidneys, often caused by bacteria that enter through the urethra and travel across the bladder and up the ureters
- Glomerulonephritis: Inflammatory condition that affects the glomeruli in the kidney
- Nephrosis: Noninflammatory kidney condition
- Hydronephrosis: Fluid buildup and dilation of the tubular system in the kidneys from urinary retention and obstruction
- Nephrotic Syndrome: Disorder characterized by proteinuria (abnormally elevated protein in the urine); hypoproteinemia (abnormally low protein in the blood); tissue edema (swelling), particularly of the feet and ankles; and hypercholesterolemia (elevated cholesterol in the blood)
- Cystitis: Inflammatory condition of the bladder
- Nephrolithiasis: Medical term for kidney stones or calculi
- Urethritis: Inflammatory condition of the urethra
- Diuresis: Loss of fluid through increased urination
- Vesicoureteral Reflux (VUR): Abnormal retrograde (backward) movement of urine from the bladder back into the ureters, which may be due to infection or a birth defect

Slides 16-17: Urinary Tract Cancers

- Renal Cell Carcinoma: This is a type of cancer formed from malignant kidney cells; it is relatively rare and affects men more than women. In most cases, it is histologically identified as an adenocarcinoma (a cancer derived from glandular tissue), which can be further subdivided into granular cell and clear cell types, which may sometimes commingle together in the same tumor.
- Wilms Tumor: This is a type of kidney that almost exclusively affects children and is histologically distinct. Although it can be bilateral (affecting both kidneys), it is usually unilateral (affecting only one kidney).
- Bladder Carcinoma: This is a general term for cancer affecting the bladder. This type of cancer can be histologically classified as urothelial carcinoma (the most common subtype, aka as transitional cell carcinoma), squamous cell carcinoma, or adenocarcinoma (glandular).
- Urethral Carcinoma: This is a general term for cancer affecting the urethra. This type of cancer can be histologically classified as urothelial carcinoma, squamous cell carcinoma (the most common subtype), or adenocarcinoma.

Slides 18-20: Urinary-Related Procedures

- Intravenous Pyelogram (IVP): Visualizing the urinary tract by taking an X-ray of it after administering contrast dye intravenously (IV contrast)
- Renal Biopsy: This procedure involves removing tissue from the kidney so pathology can be visualized under a microscope to make a diagnosis. Special stains may be applied to highlight specific molecules.
- Cystourethrogram: This is a term for a procedure used to visualize the bladder and urethra by taking an X-ray of them after administering contrast dye through a catheter (hollow tube). Pictures of the bladder are taken after both filling and

emptying to look for vesicoureteral reflux.

- Urinalysis: Laboratory evaluation of urine looking for cells, pathogens (such as bacteria), protein, and other cellular byproducts and chemicals
- Dialysis: A machine filters the blood and removes waste products in patients who no longer have functioning kidneys
 - Hemodialysis is a hospital or clinic-based dialysis where a person's blood is run through a machine, filtered, and then returned to the body
 - Peritoneal dialysis is a type of home-based dialysis where a person's abdominal wall lining is used to filter waste products from the blood
- Extracorporeal Shock Wave Lithotripsy (ESWL): Using shock waves to destroy kidney stones lodged in the ureters or elsewhere in the urinary tract
- Renal Transplantation: Implanting a donor kidney in someone who no longer has functioning kidneys
- Urinary Catheterization: Placing a catheter through the urethra into the bladder to remove urine
- Cystoscopy: Placing a flexible tube attached to a camera through the urethra to visualize the bladder and urinary tract from the inside to assess for areas of pathology
- Renal Ultrasound: Noninvasive test that involves visualizing the kidney by detecting the reflection of sound waves bouncing off the kidney
- Kidney, Ureters, Bladder (KUB): An X-ray taken to visualize the urinary tract
- Renal Arteriogram: Injecting contrast dye through a catheter to assess the integrity of the blood vessels supplying blood to the kidneys

Slide 21: Urinary-Related Treating Specialists

- Urologist: Physician who specializes in treating the male and female urinary tract and the male reproductive system

- Nephrologist: Physician who specializes in treating kidney diseases, kidney failure, and the administering dialysis

Flashcard Practice:

1. Distribute the Medical Terminology Urinary System Printable Flashcards to each participant. The flashcards can be found at this link:
www.realityworks.com/medicalterminology-kit-downloads
2. Have students cut out the flashcards along the designated lines.
3. Have students pair up and quiz each other on the vocabulary words.

As an alternative independent practice method, give each student access to the online flashcards for this lesson. Students will read the online flashcard, click on the term/suffix and then the card will flip and reveal the definition.

Context Card Practice:

1. After students become familiar with the vocabulary terms in this lesson, have them access the context cards.
 - a. Share the card with participants using a document projector. Read the card aloud to the group while students observe. Pair students up and while the card is projected, have each student read the contents aloud to each other.

Alternatively, you could have students pair up and read the card aloud to each other. Thereafter follow-up with reading the card contents to the class while students self-check their pronunciation.

- b. Divide the class into small groups. Give each group a different context card for that specific lesson content. Everyone in the small groups should read the context card aloud to another member of their group. All students should have the opportunity to read the card. Then have

each group rotate to another card. The goal is for each student to read each of the cards aloud to each other. At the end, the instructor will read all context cards for the lesson to model appropriate pronunciation for the class.

- c. Share online access to the context cards for this lesson. This can be done as independent practice. It could even be assigned as work outside of class time. At the access site provided, students read the context card aloud. Then they may click on the audio icon and the card will be read back to them. They may self-check their pronunciation of the key vocabulary terms found in the context card.

Lesson Twelve – Urinary System

REVIEW: Urinary System Quiz

10 minutes

Purpose:

To test the participants' knowledge of the urinary system.

Materials:

- *Urinary System Quiz*
- *Urinary System Quiz – Answer Key*

Facilitation Steps:

1. Distribute the *Urinary System Quiz* and have participants complete it.
2. Grade the quiz results according to the *Urinary System Quiz – Answer Key*.
3. Have participants review their answers and ask questions as needed.

Name: _____ Class: _____

Urinary System Quiz

Instructions: Select or write in the best answer for each question below.

1. True or False? (circle one) Wilms tumor primarily affects adults.
2. _____ is a cup-shaped section of the renal tubule that surrounds the glomerulus.
3. The _____ is a U-shaped section of the renal tubule that connects the proximal and distal convoluted tubules.
4. Filtration, reabsorption, and secretion are the primary functions of the _____, the functional unit of the kidney.
5. True or False? (circle one) A nephrologist is a physician who specializes in treating kidney diseases.
6. _____ is a type of cancer formed from malignant kidney cells; it is relatively rare and affects men more than women.
7. _____ is a type of home-based dialysis where a person's abdominal wall lining is used to filter waste products from the blood.
8. True or False? (circle one) Hydronephrosis is a disorder characterized by **proteinuria**, **hypoproteinemia**, tissue **edema**, particularly of the feet and ankles, and **hypercholesterolemia**.
9. This is a network of interwoven capillaries within the nephron:

10. An _____ is a procedure used to visualize the urinary tract by taking an X-ray of it after administering contrast dye intravenously (IV contrast).

Urinary System Quiz – Answer Key

1. True or **False**? Wilms tumor primarily affects adults.
2. **Bowman's capsule** is a cup-shaped section of the renal tubule that surrounds the glomerulus.
3. The **loop of Henle** is a U-shaped section of the renal tubule that connects the proximal and distal convoluted tubules.
4. Filtration, reabsorption, and secretion are the primary functions of the **nephron**, the functional unit of the kidney.
5. **True** or False? A nephrologist is a physician who specializes in treating diseases of kidneys.
6. **Renal cell carcinoma** is a type of cancer formed from malignant kidney cells; it is relatively rare and affects men more than women.
7. **Peritoneal dialysis** is a type of home-based dialysis where a person's abdominal wall lining is used to filter waste products from the blood.
8. True or **False**? Hydronephrosis is a disorder characterized by proteinuria, hypoproteinemia, tissue edema, particularly of the feet and ankles, and hypercholesterolemia.
9. This is a network of interwoven capillaries within the nephron: **the glomerulus**
10. An **intravenous pyelogram (IVP)** is a procedure used to visualize the urinary tract by taking an X-ray of it after administering contrast dye intravenously (IV contrast).

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Lesson Thirteen – Reproductive System

Lesson Overview

Due to its vital role in the survival of the species, many scientists feel that the reproductive system is one of the most important systems in the entire body. It is very important for healthcare professionals to understand the terminology related to the reproductive system.

Lesson Objectives

After completing this lesson, participants will be able to:

- Explain what medical terms relate to the reproductive system and how they are used in medical settings
- Identify the meaning behind common reproductive system terms
- Accurately read reproductive system vocabulary terms in context

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• Internet access • Smart devices (2 per group) • Suggested websites: https://www.dmu.edu/medterms/female-reproductive-system/ https://www.dmu.edu/medterms/male-reproductive-system/	1. Access the websites for research.	10- 15 minutes
LEARN	• <i>Reproductive System</i> slide presentation • Medical Terminology Reproductive System Printable Flashcards • Online flashcards for Lesson 13 • Online context cards for Lesson 13 • Context card deck (Reproductive System cards for Lesson 13) • <i>Medical Terminology Student Glossary</i>	1. Prepare to share the <i>Reproductive System</i> slide presentation. 2. Print the Medical Terminology Reproductive System Flashcards. 3. Prepare online access to the flashcards and context cards. 4. Access the Reproductive System terms section of the student glossary.	30-45 minutes
REVIEW	• <i>Reproductive System Quiz</i> • <i>Reproductive System Quiz – Answer Key</i>	1. Print/photocopy the <i>Reproductive System Quiz</i> for each participant.	10 minutes

Note: See the Medical Terminology Block Instructions at the end of this curriculum. These blocks provide hands-on experience constructing and deconstructing medical terms. There are many ways that the blocks may be used at the end of each lesson to provide additional practice for learning medical terminology.

Lesson Thirteen – Reproductive System

FOCUS: Male and Female Reproductive Organs

10-15 minutes

Purpose:

Discuss the organs composing the male and female reproductive systems.

Materials:

- Internet access
- Smart devices (2 per group)
- Suggested websites:
<https://www.dmu.edu/medterms/female-reproductive-system/>
<https://www.dmu.edu/medterms/male-reproductive-system/>

Facilitation Steps:

1. Have participants gather in small groups of three.
2. Each group should have at least two devices with internet access.
3. Each participant will look up, name, and describe one male reproductive organ and one female reproductive organ.
 - Male Reproductive Organs: Penis, testes, vas deferens, and accessory organs (including the seminal vesicle, ejaculatory duct, and prostate gland)
 - Female Reproductive Organs: Vagina, cervix, uterus, fallopian tubes, and ovaries

Lesson Thirteen – Reproductive System

LEARN: Reproductive System

30-45 minutes

Purpose:

During this section, students will learn to recognize prefixes, suffixes, and root words relating to the reproductive system.

Materials:

- *Reproductive System* slide presentation
- Medical Terminology Reproductive System Printable Flashcards
- Online flashcards for Lesson 13
- Online context cards for Lesson 13
- Context card deck (Reproductive System cards for Lesson 13)
- *Medical Terminology Student Glossary*

Facilitation Steps:

1. Give each participant their own *Medical Terminology Student Glossary*. Students should record their definition for the various reproductive system terms as the slide presentation is shared.
2. Share the following information with students as you show the slide presentation.

Slide 1: Introduction slide

Slide 2: Prefixes

- an- = without, the absence of
- crypto- = hidden, obscure
- dys- = abnormal, ill
- end-, endo- = internal, within
- epi- = upon, overlying
- hyper- = excessive, too much
- hypo- = insufficient, underneath
- peri- = around
- trans- = across, through
- ultra- = beyond, further than

Slides 3-4: Root Words

- andr/o = male
- balan/o = glans penis

- cervic/o = cervix (entrance to the uterus)
- colp/o, vagin/o = vagina
- endometri/o = endometrium (inner lining of the uterus)
- epididym/o = epididymis (convoluted network of ducts behind testis that connect with the vas deferens)
- episi/o, vulv/o = vulva
- gonad/o = gonad (pertaining to the reproductive system)
- gyn/o, gynec/o = woman
- hymen/o = hymen
- hyster/o, metr/o = uterus
- mamm/o, mast/o = breast
- men/o = menstruation
- oophor/o = ovary
- orch/o, orchid/o = testes
- pelv/i = pelvis
- pen/o, phall/o = penis
- perine/o = perineum
- prostat/o = prostate gland
- salping/o = uterine tube, fallopian tube
- scrot/o = scrotum
- semin/i = semen
- sperm/o, spermat/o = sperm, sperm cell
- test/o, testicular/o = testis, testicle

Slide 5: Suffixes

- -al, -ar, -atic, -ic, -ile, -ferous = relating to
- -ectomy = surgical removal
- -genesis = creation of
- -gram = recording, image
- -graphy = process of recording
- -ia, -osis, -iasis = condition or state, often abnormal
- -itis = inflammation
- -logy = science, study of
- -oid = resembling, having feature of
- -oma = bulging, swelling, tumor
- -pexy = surgical fixation

- -pathy = disease, illness
- -plasty = surgical repair
- -ptosis = falling, drooping
- -rrhea = flow, passage
- -scope = lighted instrument for visualization
- -scopy = visual examination
- -salpinx = uterine/fallopian tube
- -tomy = cutting into

Slides 6-9: Female Reproductive Organs/Anatomy

- Vulva: External genitalia of the female reproductive system
- Vestibule of the Vagina: This includes the opening to the vagina and urethra and a thin tissue lining covering the vaginal opening in some women.
- Labia Minora: This is the inner ring of tissue “lips” surrounding the vestibule that extends down at an angle from the clitoris. It is free from pubic hair.
- Labia Majora: This is the outer ring of tissue “lips” surrounding the labia minora. The outer surface is covered with pubic hair, while the inner surface is covered with sudoriferous (sweat) and sebaceous (sebum oil) glands.
- Clitoris: This is a projection of erectile tissue at the uppermost peak of the labia minora. It functions analogous to the penis in the male and contains a very high density of nerve endings important in female sexual arousal and orgasm.
- Ovaries: These are egg-shaped structures lying above and lateral to both sides of the uterus connected to the uterus by the fallopian tubes. They are the organs in which egg cells are produced.
 - Follicles: These are the site of oogenesis, or egg cell production, within the ovary. Normally only one mature follicle is released during ovulation every month.
- Fallopian Tubes/Uterine Tubes: These are tube shaped structures that provide a path for the mature follicle released

from the ovary to reach the uterus. It is generally divided into three parts.

- Isthmus: Narrowest section of the fallopian tube that joins with the uterus
- Ampulla: Central section of the fallopian tube and frequently the region where fertilization with a sperm cell occurs
- Infundibulum: Most distal and dilated section of the fallopian tube that extends out fingerlike processes called fimbriae that overlie the ovaries
- Uterus: This is the hollow organ that houses and nourishes the developing fetus. It is positioned between the rectum and bladder.
 - Endometrium: This is the highly vascularized inner lining of the uterus that sheds every month during the menstrual cycle if the egg released during ovulation is not fertilized. A fertilized egg will implant within the endometrium and arrest menstruation.
 - Myometrium: Muscular layer of the uterus composed of smooth muscle that provides the force behind contractions during childbirth
- Cervix: Most inferior tapered section of the uterus that connect with and opens to the vagina
- Vagina: The vagina connects the uterus to the outside of the body. It serves as the birth canal and receives the penis during sexual intercourse. It also provides an opening for the outflow of endometrial blood and tissue during menstruation.

Slides 10: Male Reproductive Organs/Anatomy

- Testicles/Testes: Organs contained within the scrotal sac below the penis where sperm cells are generated; they are the male gonads
 - Seminiferous Tubules: Generation of sperm cells

- (singular spermatozoon), a process called spermatogenesis, occurs within these tubules, which compose each testicle
- Epididymis: This organ consists of a heavily coiled duct that rests on each testicle and serves as a site of sperm cell maturation. It connects with the vas deferens.
 - Vas Deferens: This elongated excretory duct carries sperm over the bladder and down to the prostate gland; it provides a passageway for the flow of semen during ejaculation
 - Seminal Vesicle: Sac-shaped structures (two in total) that are located posterior to the bladder and merge with the vas deferens, forming the ejaculatory duct
 - Ejaculatory Duct: Travel through the prostate and connect with the urethra, enabling the transport of sperm out of the urethra during ejaculation
 - Prostate: This is a gland that generates a milk-colored, alkaline fluid that nourishes and protects sperm once it has been ejected into the female reproductive tract. The prostate surrounds the uppermost section of the urethra.
 - Bulbourethral/Cowper's Glands: Tiny pea-shaped glands that secrete a lubricating and cleansing fluid before and during ejaculation
 - Penis: Organ formed from erectile tissue that deposits seminal fluid into the vagina during sexual intercourse
 - Corpus Cavernosum: This structure is composed of two columns of erectile tissue that form the superior aspect of the penile shaft. It engorges with blood when the penis becomes erect.
 - Corpus Spongiosum: This structure is composed of a single column of erectile tissue that forms the inferior aspect of the penile shaft. It engorges with blood when the penis

becomes erect and surrounds the urethra.

- Glans Penis: This is the tip of the penis. It is also composed of erectile tissue. A covering of loose and retractable skin, called the foreskin, covers the glans penis in uncircumcised males.
- Scrotum: External sac composed of skin and a thin layer of muscle, in which the testicles reside

Slides 12-15: Reproductive System Conditions

- Endometritis: Inflammation of the endometrial layer of the uterus
- Salpingitis: This is an inflammation of the fallopian tubes. An inflammation of both the ovaries and the fallopian tubes is oophorosalpingitis.
- Hematosalpinx: Blood in the fallopian tubes
- Dysmenorrhea: Painful menstruation
- Dyspareunia: Painful sexual intercourse
- Endometriosis: This is a painful condition caused by ectopic endometrial-like tissue that travels to abnormal, widespread locations throughout the pelvic and even the abdominal cavity. It can cause sterility, amongst other complications.
- Ovarian Cysts: These are spherical, fluid-filled structures that develop on the ovary. They are typically benign.
- Mastitis: Breast tissue inflammation
- Polycystic Ovarian Syndrome (PCOS): This is a condition characterized by obesity, overproduction of insulin, and elevated male sex hormones (androgens). The androgens cause eggs in the ovaries to develop into cysts that enlarge instead of being released during ovulation. Hirsutism, the abnormal growth of male-pattern body hair, and menstrual irregularities are other features of the condition.
- Pelvic Inflammatory Disease (PID): Infection, usually bacterial (such as chlamydia), that enters the upper reproductive tract, via the vagina, to involve the uterus, fallopian tubes,

ovaries, the abdominal cavity, and the lining of the abdominal and pelvic cavities, called the peritoneum

- Uterine Fibroids: These are common, benign tumors that grow within the muscular layer (myometrium) of the uterus. They are often asymptomatic but can cause abdominal pain and irregular bleeding.
- Uterine Prolapse: A prolapse occurs after stretching or breakage of the ligaments holding the uterus in place above the vagina, which normally keeps the location of the cervix of the uterus at the proximal end of the vagina. Without the pull of the ligaments, the uterus will herniate into the vagina. It can also be called hysteroptosis.
- Vulvovaginitis: Inflammation involving the vagina and female external genitalia (vulva)
- Hypospadias: Congenital condition wherein the opening of the urethra forms below the tip of the penis
- Hydrocele: This is a fluid-filled sac within the scrotum that can partially enclose the testicle. Sometimes it is painful.
- Varicocele: This is the equivalent of “hemorrhoids” that involve the veins supplying the testicles. The veins become dilated and convoluted. By raising testicular temperature, which results from pooling blood in this location, it can reduce sperm count and lead to sterility.
- Cryptorchidism: This is a congenital condition where the testicles fail to fully descend into the scrotal sac. If it is not surgically corrected prior to the onset of puberty, it will lead to sterility. The condition also raises the risk of testicular cancer.
- Azoospermia: Complete absence of sperm in ejaculated semen
- Balanitis: Inflammation of the glans penis and surrounding foreskin
- Benign Prostatic Hypertrophy (BPH): This condition refers to swelling and enlargement of the prostate that occurs

as men age. It can compromise urine flow since the prostate surrounds the urethra.

- Orchiditis: Testicle inflammation that can cause sterility
- Prostatitis: Prostate inflammation
- Erectile Dysfunction: Inability to maintain an erection of sufficient hardness to allow vaginal penetration during sexual intercourse

Slides 16-17: Reproductive System Cancers

- Breast Carcinoma: This type of cancer includes ductal cell carcinoma (most common), lobular carcinoma, and inflammatory breast cancer (the rarest form that derives mainly from an aggressive ductal carcinoma). It is the number one type of cancer for women between the ages of 35 and 54. Treatment will depend on the type and stage of cancer but can include chemotherapy, radiation, and surgical resection.
- Cervical Carcinoma: This is a common type of cancer that may be detected from a Pap smear during a vaginal speculum exam. Human papillomavirus (HPV) increases the risk of developing this type of cancer.
- Ovarian Carcinoma: This is a common gynecologic cancer that can be epithelial (derived from the lining of the ovary) or nonepithelial (including stromal cell germ cell). Unfortunately, it tends to have a poorer outcome due to delayed diagnosis. The vast majority are epithelial (around 90%). Epithelial ovarian carcinoma is usually found in women above the age of forty while non-epithelial ovarian cancer affects primarily young women and girls.
- Vaginal Carcinoma: This is a relatively rare gynecologic cancer with two broad histologic subtypes, adenocarcinoma (glandular) and squamous cell, which is the most common subtype. Adenocarcinoma primarily affects younger women under 30, while women between 60 and 80 years of age are at

highest risk for vaginal squamous cell carcinoma.

- Endometrial Carcinoma: This type of cancer is the most diagnosed gynecologic cancer and forms from the inner lining of the uterus. It most frequently affects women over age 50. Symptoms can include pelvic pain and uterine bleeding.
- Testicular Carcinoma: This is the leading type of cancer in men between 15 and 35 years of age. The two major histologic subtypes are seminoma and nonseminoma. This type of cancer is screened through testicular palpation.
- Prostate Carcinoma: This is a very common type of cancer, accounting for more than 25% of all cancer affecting men. Risk increases with age, with elderly men at greatest risk; it rarely affects men younger than age 50.

Slides 18-19: Reproductive System Diagnostic Procedures

- Colposcopy: Visualization of the interior surface of the vagina and cervix using a magnifying instrument called a colposcope
- Mammogram: Radiographic image of the breast used to identify breast cancer
- Hysterosalpingogram: X-ray image of the uterus and fallopian tubes taken after administering contrast dye injected through the cervix
- Dilation and Curettage (D & C): This procedure involves expanding the cervical opening to scrape off the uppermost layer of the endometrium. It can be performed diagnostically or as a therapeutic abortion.
- Ultrasound: This test uses the reflection of sound waves to visualize the uterus and other organs in the reproductive tract as well as to image the fetus during pregnancy. Abdominal ultrasound is used during pregnancy while transvaginal ultrasound is used to obtain greater resolution in reproductive organ imaging.

- Prostate-Specific Antigen (PSA): This is a biomarker lab test used to screen for prostate cancer. It can also be elevated in the setting of benign prostatic hypertrophy but generally the elevation is greater in prostate cancer.
- Rectal Exam: Finger palpation of the rectum that also involves palpation of the prostate in males to assess prostate size and the presence of hard lumps that might be suspicious for prostate cancer
- Sperm Count Test/Semen Analysis: This is an assessment of semen that involves counting and analyzing spermatozoa (sperm cells). It is performed in the setting of a male fertility evaluation.

Slide 20: Reproductive System Treating Specialists

- Obstetrician: Physician who received specialty training in the diagnosing pregnancy complications and the management of delivering babies
- Gynecologist: Physician who received specialty training in medical and surgical management of the female reproductive tract
- Urologist: Physician who received specialty training in the medical and surgical treatment of conditions affecting the urinary tract and male reproductive system

Slides 21-23: Reproductive System Treatment Procedures

- Colporrhaphy: Surgical repair of the vaginal wall to treat prolapse of the bladder or rectum, which droop into the vaginal wall when the wall's muscle is weak
- Colpoplasty: Plastic surgery of the vagina
- Episiotomy: Obstetrical surgical procedure that involves cutting down from the vaginal opening toward the anus to provide room for the baby's head and minimize tearing of tissue
- Oophorectomy: Surgical removal of the ovary, which may be necessary in the setting of ovarian cancer, for example

- Oophoropexy: Surgical fixation of the ovary to the abdominal wall to prevent recurrence of ovarian torsion, a twisting of the ovary around the ovarian ligaments that cuts off the blood supply to the ovary
- Hysterectomy: Surgical removal of the uterus, which may be necessary in the setting of ovarian cancer, for example.
- Mastectomy: This is the term for surgical resection of the breast, which may be necessary in the setting of breast cancer. It can be complete (known as radical mastectomy) or partial.
- Orchidectomy: Surgical resection of the testes, which would be necessary in the setting of testicular cancer, for example
- Prostatectomy: Surgical resection of the prostate, which might be necessary in the setting of prostate cancer
- Vasectomy: This is a surgical procedure that involves cutting the vas deferens to induce sterility by preventing sperm cells from being ejaculated during sexual intercourse. It is usually reversible.
- Transurethral Resection of the Prostate (TURP): This is a surgical procedure that involves removing prostate tissue using an instrument inserted through the urethra. It is used as a treatment for benign prostatic hypertrophy.
- Laparoscopy: This is a surgical procedure where the abdominal wall is punctured, and a flexible tube attached to a camera is inserted to inspect the abdominal or upper reproductive organs for lesions or damage. It is used to diagnose endometriosis.

Flashcard Practice:

1. Distribute the Medical Terminology Reproductive System Printable Flashcards to each participant. The flashcards can be found at this link:
www.realityworks.com/medicalterminology-kit-downloads

2. Have students cut out the flashcards along the designated lines.

3. Have students pair up and quiz each other on the vocabulary words.

As an alternative independent practice method, give each student access to the online flashcards for this lesson. Students will read the online flashcard, click on the term/suffix and then the card will flip and reveal the definition.

Context Card Practice:

1. After students become familiar with the vocabulary terms in this lesson, have them access the context cards.
 - a. Share the card with participants using a document projector. Read the card aloud to the group while students observe. Pair students up and while the card is projected, have each student read the contents aloud to each other.

Alternatively, you could choose to have students pair up and read the card aloud to each other. Then read the card contents to the class while students self-check their pronunciation.

- b. Divide the class into small groups. Give each group a different context card for that specific lesson content. Everyone in the groups should read the context card aloud to another member of their group. All students should have the opportunity to read the card. Then have each group rotate to another card. The goal is for each student to read each of the cards aloud to each other. At the end, read all context cards for the lesson to model appropriate pronunciation for the class.
- c. Share online access to the context cards for this lesson. This can be done as independent practice. It could even be assigned as work

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outside of class time. At the access site provided, students read the context card aloud. Then they may click on the audio icon and the card

will be read back to them. They may self-check their pronunciation of the key vocabulary terms found in the context card.

Lesson Thirteen – Reproductive System

REVIEW: Reproductive System Quiz

10 minutes

Purpose:

To test the participants' knowledge of the reproductive system.

Materials:

- *Reproductive System Quiz*
- *Reproductive System Quiz – Answer Key*

Facilitation Steps:

1. Distribute the *Reproductive System Quiz* and have participants complete it.
2. Grade the quiz results according to the *Reproductive System Quiz – Answer Key*.
3. Have participants review their answers and ask questions as needed.

Name: _____ Class: _____

Reproductive System Quiz

Instructions: Select or write in the best answer for each question below.

1. True or False? (circle one) Uterine fibroids are rare, malignant tumors of the myometrium.
2. _____ is the term for the surgical fixation of the ovary to the abdominal wall to prevent recurrence of ovarian torsion, a twisting of the ovary around the ovarian ligaments that cuts off the blood supply to the ovary.
3. The _____ is the most inferior tapered section of the uterus that connects with and opens to the vagina.
4. The _____ consists of a heavily coiled duct that rests on each testicle and serves as a site of sperm cell maturation. It connects with the vas deferens.
5. True or False? (circle one) An obstetrician is a physician who received specialty training in diagnosing pregnancy complications and the management of delivering babies.
6. _____ is the most diagnosed gynecologic cancer and forms from the inner lining of the uterus. It most frequently affects women over age 50.
7. A _____ is a surgical procedure that involves cutting the vas deferens to induce sterility by preventing sperm cells from being ejaculated during sexual intercourse. It is usually reversible.
8. True or False? (circle one) Hematosalpinx is an inflammation of the fallopian tubes.
9. This is a condition characterized by obesity, overproduction of insulin, and elevated male sex hormones (androgens). The androgens cause eggs in the ovaries to develop into cysts that enlarge instead of being released during ovulation. _____
10. The _____ is the most distal and dilated section of the fallopian tube that extends out fingerlike processes called **fimbriae** that overlie the ovaries.

Reproductive System Quiz – Answer Key

1. True or **False**? Uterine fibroids are rare malignant tumors of the myometrium.
2. **Oophoropexy** is the term for the surgical fixation of the ovary to the abdominal wall to prevent recurrence of ovarian torsion, a twisting of the ovary around the ovarian ligaments that cuts off the blood supply to the ovary.
3. The **cervix** is the most inferior tapered section of the uterus that connects with and opens to the vagina.
4. The **epididymis** consists of a heavily coiled duct that rests on each testicle and serves as a site of sperm cell maturation. It connects with the vas deferens.
5. **True** or False? An obstetrician is a physician who received specialty training in the diagnosis of pregnancy complications and the management of delivering babies.
6. **Endometrial carcinoma** is the most diagnosed gynecologic cancer and forms from the inner lining of the uterus. It most frequently affects women over age 50.
7. A **vasectomy** is a surgical procedure that involves cutting the vas deferens to induce sterility by preventing sperm cells from being ejaculated during sexual intercourse. It is usually reversible.
8. True or **False**? Hematosalpinx is an inflammation of the fallopian tubes.
9. This is a condition characterized by obesity, overproduction of insulin, and elevated male sex hormones (androgens). The androgens cause eggs in the ovaries to develop into cysts that enlarge instead of being released during ovulation. **polycystic ovarian syndrome (PCOS)**
10. The **infundibulum** is the most distal and dilated section of the fallopian tube that extends out fingerlike processes called **fimbriae** that overlie the ovaries.

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Lesson Fourteen – Skeletal System

Lesson Overview

Due to it being your body's central framework, the skeletal system is a very important body system. It is critical for healthcare professionals to understand the terminology related to this system.

Lesson Objectives

After completing this lesson, participants will be able to:

- Explain what medical terms relate to the skeletal system and how they are used in medical settings
- Identify the meaning behind common skeletal system terms
- Accurately read skeletal system vocabulary terms in context

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• Internet access • Smart devices (1-2 per group) • Suggested website: https://pressbooks-dev.oer.hawaii.edu/anatomyandphysiology/chapter/bone-structure/#	1. Access the websites for research.	10- 15 minutes
LEARN	• <i>Skeletal System</i> slide presentation • Medical Terminology Skeletal System Printable Flashcards • Online flashcards for Lesson 14 • Online context cards for Lesson 14 • Context card deck (Skeletal System cards for Lesson 14) • <i>Medical Terminology Student Glossary</i>	1. Prepare to share the <i>Skeletal System</i> slide presentation. 2. Print the Medical Terminology Skeletal System Printable Flashcards. 3. Prepare online access to the flashcards and context cards. 4. Access the Skeletal System terms section of the student glossary.	30-45 minutes
REVIEW	• <i>Skeletal System Quiz</i> • <i>Skeletal System Quiz – Answer Key</i>	1. Print/photocopy the <i>Skeletal System Quiz</i> for each participant.	10 minutes

Note: See the Medical Terminology Block Instructions at the end of this curriculum. These blocks provide hands-on experience constructing and deconstructing medical terms. There are many ways that the blocks may be used at the end of each lesson to provide additional practice for learning medical terminology.

Lesson Fourteen – Skeletal System

FOCUS: Components of a Long Bone

10-15 minutes

Purpose:

Discuss the different anatomical components of a long bone

Materials:

- Internet access
- Smart devices (1-2 per group)
- Suggested website:

<https://pressbooks-dev.oer.hawaii.edu/anatomyandphysiology/chapter/bone-structure/#>

Facilitation Steps:

1. Have participants gather in groups of three.
2. Each group should have at least one device with internet access.
3. Each participant will look up, name, and describe two components of a long bone.
 - Components: Diaphysis, epiphysis, metaphysis, medullary cavity, compact bone, articular cartilage

Lesson Fourteen – Skeletal System

LEARN: Common Medical Terms of the Skeletal System

30-45 minutes

Purpose:

During this section, participants will learn to recognize prefixes, suffixes, and root words relating to the skeletal system.

Materials:

- *Skeletal System* slide presentation
- Medical Terminology Skeletal System Printable Flashcards
- Online flashcards for Lesson 14
- Online context cards for Lesson 14
- Context card deck (Skeletal System cards for Lesson 14)

Facilitation Steps:

1. Give each participant their own *Medical Terminology Student Glossary*. Students should record their definition for the various skeletal system terms as the slide presentation is shared.
2. Share the following information with students as you show the slide presentation.

Slide 1: Introduction slide

Slide 2: Prefixes

- a- = without, the absence of
- dys- = abnormal, ill
- end-, endo- = internal, within
- epi- = upon, overlying
- hyper- = excessive, too much
- hypo- = insufficient, underneath
- peri- = around
- trans- = across, through
- ultra- = beyond, further than

Slides 3-4: Root Words

- arthr/o = joint
- burs/o = bursa
- carp/o = wrist

- chondr/o = cartilage
- clavicul/o = clavicle
- coccyg/o = coccyx
- cost/o = ribs
- crani/o = skull
- femor/o = femur
- fibul/o = fibula
- humer/o = humerus
- Ili/o = ilium
- ischi/o = ischium
- mandibul/o = mandible
- myel/o = bone marrow
- oste/o = bone
- patell/o = patella/ knee
- pelv/i = pelvis
- radi/o = radius
- sacr/o = sacrum
- scapul/o = scapula
- spondyl/o = vertebra
- stern/o = sternum
- ten/o = tendon
- tibi/o = tibia
- uln/o = ulna
- vertebr/o = vertebra

Slide 5: Suffixes

- -al, -ar, -ary, -ac, -ic, -ous = relating to
- -ectomy = surgical removal
- -genesis = creation of
- -graphy = process of recording
- -ia, -osis, -iasis = condition or state, often abnormal
- -itis = inflammation
- -logy = science, study of
- -oid = resembling, having features of
- -oma = bulging, swelling, tumor
- -pathy = disease, illness
- -plasty = surgical repair

- -scope = lighted instrument for visualization
- -scopy = visual examination
- -tomy = cutting into

Slides 6-8: Skeleton Anatomy

- Axial Skeleton: Part of the skeleton that underlies the central core of the body and includes the bones of the head, neck, chest, and back
- Skull Bones: Includes the cranium, or part of the skull enclosing the brain, and the bones of the face and jaw
- Frontal Bones: Cranial bones that make up the forehead
- Parietal Bones: Located at the lateral upper posterior aspect of the cranium
- Occipital Bones: Located at the posterior pole of the cranium and run to the base of the skull
- Temporal Bones: Make up the lateral borders of the cranium, superior and anterior to the ear
- Maxilla: Immobile upper jaw, a fusion of two maxillary bones
- Mandible: Mobile lower jaw, a fusion of two mandibular bones
- Vertebral Column: Consists of a series of vertebral bones, or vertebrae, that surround and protect the spinal cord, serving as a rigid central core to support the rest of the skeleton
- Cervical Vertebrae: 7 vertebrae that form the neck, C1 through C7
- Thoracic Vertebrae: 12 vertebrae, T1 through T12, that lie directly inferior to the cervical vertebrae and are responsible for the outward curvature of the spine
- Lumbar: 5 vertebrae, L1 through L5, that lie directly inferior to the thoracic vertebrae and are responsible for the inward curvature of the spine
- Sacrum: Fused, wedge-shaped bone that lies directly inferior the lumbar vertebrae at the base of the spine
- Coccyx: Tail bone and terminal end of the spine

Slide 8: Skeleton Anatomy

- Thoracic Cage: Bones that enclose and safeguard the major organs of the respiratory and circulatory systems, namely the heart and lungs
- Ribs: 12 pairs of horizontally oriented, long, curved bones that serve as the walls of the thoracic cage
- Sternum: This is the vertically oriented, fused, flat bone at the center of the chest to which the ribs attach. It consists of the manubrium superiorly, the body or corpus, and the xiphoid process.

Slides 9-14: Appendicular Skeleton

These bones attach to the axial skeleton, enabling movement and activity.

- Shoulder (pectoral) Girdle: Groups of bones provide the structure for shoulder movements
 - Scapula: This triangular bone forms the posterior border of the shoulder girdle. It contains a bony projection called the acromion that articulates with the clavicle, and it forms the ball and socket joint that articulates with the humerus.
 - Clavicle: Horizontally oriented, curved bone that articulates with the acromion laterally and the manubrium of the sternum medially
- Arm bones: These are the bones that constitute the upper arm and forearm.
 - Humerus: This bone forms the upper arm and articulates with the radius and ulna. It is greater in size and length than any other bone of the arm.
 - Radius: This bone forms the lateral edge of the forearm. It articulates with the carpals distally and humerus proximally.
 - Ulna: This bone forms the medial edge of the forearm. It articulates with the carpals distally and humerus proximally.

- Hand bones: Bones that form the structure of the hand
 - Carpals: 8 bones that articulate with the radius and ulna, forming the wrist of the hand
 - Metacarpals: Bones that form the palm of the hand
 - Phalanges: Bones that form the digits or fingers of the hand that enable manipulation of objects
- Pelvic girdle: Fused bones that form the support structure for the lower limbs to join the axial skeleton at the hip joint
 - Ilium: Bone that makes up the superior aspect of the pelvic girdle and articulates with the sacrum of the vertebral column
 - Ischium: Bone that makes up the inferior aspect of the pelvic girdle
 - Pubis: Bone that makes up the anterior aspect of the pelvic girdle
 - Acetabulum: Large socket that articulates with the head of the femur
- Leg Bones: Constitute the thigh and lower leg
 - Femur: Bone that forms the thigh and is the longest bone in the body
 - Patella: Bone that forms the kneecap
 - Tibia: This bone forms the shin and carries the weight of the body in the lower leg. It articulates with the femur proximally and the talus distally.
 - Fibula: Bone that is the lateral smaller bone of the lower leg and serves as an articulation point with the talus of the foot
- Ankle/Feet Bones: Form the structure of the foot and ankle
 - Tarsals: 7 bones that form the ankle and heel of the foot
 - Metatarsals: Bones that make up the central portion of the foot

- Phalanges: Bones that make up the toes of the foot
- Talus: Superior tarsal bone that articulates with the tibia and fibula
- Calcaneus: Tarsal bone that forms the heel

Slides 15-17: Bone Structure and Physiology

- Diaphysis: Cylindrical midsection of a long bone
 - Compact Bone: Tough, dense bone that forms the walls of the diaphysis
- Epiphysis (epiphyses, plural): Expanded end of a long bone that serves as a joint articulation point
 - Cancellous or Spongy Bone: Organized in a mesh-like honey-comb matrix, called trabeculae, and found within the epiphysis
- Metaphysis: Area between the epiphysis and metaphysis that contains the growth plate, which is made up of layer of cartilage that is replaced by bone in early adulthood
- Medullary Cavity: Hollow interior of the diaphysis that contains yellow marrow
- Periosteum: Fibrous membrane that surrounds the outer surface of bone
- Endosteum: Fine inner lining of a bone's medullary cavity
- Bone Cells: Compose bone
 - Osteoblasts: Cells that generate a new bone matrix of calcium and collagen fibers and are found in areas of bone growth, including the periosteum and endosteum
 - Osteoclasts: These cells are responsible for breaking down or resorbing bone. Bone is continually being slowly reshaped by an interplay between breakdown and regrowth.
 - Osteocytes: These cells are mature osteoblasts that get trapped in the matrix of calcium

- and collagen fibers. They are the most plentiful bone cell type.
- Osteogenic Cells: Bone cells that are responsible for generating new cells since neither osteoblasts nor osteocytes replicate
- Ligaments: Strong yet elastic segments of connective tissue uniting bones
- Joints: These are articulation points between bones. They can be mobile or immobile.
- Cartilage: This is an elastic type of connective tissue that provides a cushioning function as well as structure. It can be found at the ends of bones, at the tip of the nose, and other places.

Slides 18-19: Skeletal System Conditions

- Arthritis: General term for joint inflammation that includes both osteoarthritis and rheumatoid arthritis, among other conditions
- Osteoarthritis, also known as wear and tear arthritis, develops from repeated mechanical stress or injury to joints over time.
- Rheumatoid arthritis is an autoimmune condition, in which the body's immune system mistakes joint tissue for a foreign invader and attacks it
- Arthralgia: Joint pain
- Bursitis: This is a term for inflammation of a bursa. A bursa is an enclosed sac of lubricating fluid that protects mobile joints against damage by acting as a shock absorber.
- Carpal Tunnel Syndrome: This is a condition that develops from repetitive bending of the wrist in some people. It results from inflammation of a wrist ligament that runs across a nerve innervating the medial digits of the hand, called the median nerve. The inflamed, swollen ligament compresses the nerve causing symptoms of numbness, tingling, pain, and potentially weakness in the affected digits.

- Chondritis: Inflammation of structures made of cartilage
- Chondromalacia: Softening of cartilage
- Contracture: Abnormally immobilized joint in flexed position due to atrophy and muscle shortening
- Dislocation: Displacement of bone outside of its normal position, such as within a socket joint
- Kyphosis: This is an abnormally prominent downward curvature of the thoracic spine resulting in a hunchback posture, seen most frequently in the elderly. It is also characteristic of a type of arthritis that leads to spinal fusion, called ankylosing spondylitis.
- Ligamentous Injury: Ligament tissue injury
- Lordosis: Abnormally prominent upward curvature of the lumbar spine
- Osteitis: Bone inflammation
- Osteomalacia: Also called rickets, this is a condition characterized by softening of bone that can occur from inadequate calcium and vitamin D levels during development
- Osteoporosis: This is a condition characterized by pathologic loss of bone density that greatly increases the risk of bone fracture following a fall or other injury. Elderly women are most at risk.
- Scoliosis: Developmental condition that results in abnormal lateral curvature of the spine

Slide 20: Skeletal System Cancers

- Osteogenic Sarcoma (osteosarcoma): This is a bone-producing tumor and the leading type of bone cancer. It primarily affects people between 15 and 25 years old and frequently affects the leg bones.
- Ewing's Sarcoma: This is the leading bone cancer affecting children and young adults. The most common bones affected are the pelvis, femur, tibia, and fibula. Often metastases to another bone or the lungs are identified at the time of diagnosis.
- Chondrosarcoma: This is a type of cancer derived from cartilage cells. It

mostly affects people between 50 and 75 years old and is rare under age 40.

- Paget's Disease: This is a bone condition characterized by abnormal bone mineralization resulting in disordered areas of hardening and softening. Caucasians above the age of 40 are most likely to be affected. Paget's disease significantly increases the risk of developing bone sarcomas, with rates as high as 10%.

Slides 21-22: Skeletal System Diagnostic Procedures

- Arthrocentesis: Puncturing a joint with a needle to obtain fluid, which is then analyzed to help diagnose certain joint conditions
- Arthrography: X-ray image of the joint visualized with radiocontrast dye
- Arthroscopy: Inserting an arthroscope (a tube attached to a camera) to visualize a joint from the inside
- Bone Scan/Bone Scintigraphy: Injecting a radioactive dye with a predilection for bone to diagnose bone tumors and other bone conditions
- Bone/Bone Marrow Biopsy: Obtaining tissue from the surface of the bone or the bone marrow to diagnose bone or blood disorders
- Bone/Joint X-Ray: Standard radiographic image of the bone or joint used to diagnose a fracture or other conditions

Slide 23: Skeletal System Treating Specialists

- Orthopedist/Orthopedic Surgeon: Specialist physician trained in the surgical treatment of bone diseases and injuries
- Rheumatologist: Physician who received specialty training in the medical treatment of joint and connective tissue diseases after a residency in internal medicine
- Osteopathic Physician: Physician who received medical training very similarly to traditional allopathic physicians but

with additional training on musculoskeletal manipulations

- Podiatrist: A "foot doctor" who is specialty trained to treat foot conditions medically and surgically
- Physical Therapist: Medical provider trained to treat medical conditions that affect gait use of the lower extremities with rehabilitation therapies

Slides 24-25: Skeletal System Treatment Procedures

- Arthroplasty: Surgical reconstruction or replacement of a joint
- Prosthesis Implantation or Placement: Replacing part of a bone involved in a joint or a complete limb with a prosthesis (an artificial substitute)
- Bone Graft: Surgical transplantation of bone tissue from one bone to another to repair a skeletal defect or damage from injury
- Carpal Tunnel Release: Surgical procedure involving the incision of the carpal tunnel ligament in the wrist to release its compression of the median nerve
- Percutaneous Discectomy: Excising an intervertebral disc through a small opening in the skin
- Tenorrhaphy: Surgical repair of a torn tendon

Flashcard Practice:

1. Distribute the Medical Terminology Skeletal System Printable Flashcards to each participant. The flashcards can be found at this link: www.realityworks.com/medicalterminologykit-downloads
2. Have students cut out the flashcards along the designated lines.
3. Have students pair up and quiz each other on the vocabulary words.

As an alternative independent practice method, give each student access to the online flashcards for this lesson. Students

will read the online flashcard, click on the term/suffix and then the card will flip and reveal the definition.

Context Card Practice:

1. After students become familiar with the vocabulary terms in this lesson, have them access the context cards. There are five for this lesson with a few different ways you can use them.
 - a. Share the card with participants using a document projector. Read the card aloud to the group while students observe. Pair students up and, while the card is projected, have each student read the contents aloud to each other.

Alternatively, have students pair up and read the card aloud to each other. Then read the card contents to the class while students self-check their pronunciation.

- b. Divide the class into five groups. Give each small group a different context card for that specific lesson content. Everyone in the groups should read the context card aloud to another member of their group. All students should have the opportunity to read the card. Then have each group rotate to another card. The goal is for each student to read each of the five cards aloud to each other. At the end, read all five context cards for the lesson to model appropriate pronunciation for the class.
 - c. Share online access to the context cards for this lesson. This can be done as independent practice. It could even be assigned as work outside of class time. At the access site provided, students read the context card aloud. Then they may click on the audio icon and the card will be read back to them. They may self-check their pronunciation of the key vocabulary terms found in the context card.

Lesson Fourteen – Skeletal System

REVIEW: Skeletal System Quiz

10 minutes

Purpose:

To test the participants' knowledge of the skeletal system.

Materials:

- *Skeletal System Quiz*
- *Skeletal System Quiz – Answer Key*

Facilitation Steps:

1. Distribute the *Skeletal System Quiz* and have participants complete it.
2. Grade the quiz results according to the *Skeletal System Quiz – Answer Key*.
3. Have participants review their answers and ask questions as needed.

Name: _____ Class: _____

Skeletal System Quiz

Instructions: Select or write in the best answer for each question below.

1. True or False? (circle one) Arthralgia is a term for joint inflammation.
2. _____ is a procedure that involves excising an intervertebral disc through a small opening in the skin.
3. The _____ is the vertically oriented, fused, flat bone at the center of the chest to which the ribs attach.
4. The _____ is a fibrous membrane that surrounds the outer surface of bone.
5. True or False? (circle one) A rheumatologist is a specialist physician trained in the surgical treatment of bone diseases and injuries.
6. _____ is a type of cancer derived from cartilage cells. It mostly affects people between 50 and 75 years old and is rare under age 40.
7. An _____ is a procedure that involves puncturing a joint with a needle to obtain fluid, which is then analyzed to help diagnose certain joint conditions.
8. True or False? (circle one) A contracture is a term for an abnormally immobilized joint in a flexed position due to atrophy and muscle shortening.
9. This is a condition characterized by pathologic loss of bone density that greatly increases the risk of bone fracture following a fall or other injury. Elderly women are most at risk.

10. The _____ attaches to the axial skeleton, enabling movement and activity.

Skeletal System Quiz – Answer Key

1. True or **False**? Arthralgia is a term for joint inflammation.
2. **Percutaneous discectomy** is a procedure that involves excising an intervertebral disc through a small opening in the skin.
3. The **sternum** is the vertically oriented, fused, flat bone at the center of the chest to which the ribs attach.
4. The **periosteum** is a fibrous membrane that surrounds the outer surface of bone.
5. True or **False**? A rheumatologist is a specialist physician trained in the surgical treatment of bone diseases and injuries.
6. **Chondrosarcoma** is a type of cancer derived from cartilage cells. It mostly affects people between 50 and 75 years old and is rare under age 40.
7. An **arthrocentesis** is a procedure that involves puncturing a joint with a needle to obtain fluid, which is then analyzed to help diagnose certain joint conditions.
8. **True** or False? A contracture is a term for an abnormally immobilized joint in a flexed position due to atrophy and muscle shortening.
9. This is a condition characterized by pathologic loss of bone density that greatly increases the risk of bone fracture following a fall or other injury. Elderly women are most at risk. **osteoporosis**
10. The **appendicular skeleton** attaches to the axial skeleton, enabling movement and activity.

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Lesson Fifteen – Endocrine System

Lesson Overview

The endocrine system is important for the control and regulation of all the major functions and processes of the body. It is very important for healthcare professionals to understand the terminology related to the endocrine system.

Lesson Objectives

After completing this lesson, participants will be able to:

- Explain what medical terms relate to the endocrine system and how they are used in medical settings
- Identify the meaning behind common endocrine system terms
- Accurately read endocrine system vocabulary terms in context

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• Internet access • Smart devices (1-2 per group) • Suggested website: https://www.hopkinsmedicine.org/health/wellness-and-prevention/anatomy-of-the-endocrine-system	1. Access the websites for research.	10- 15 minutes
LEARN	• <i>Endocrine System</i> slide presentation • Medical Terminology Endocrine System Printable Flashcards • Online flashcards for Lesson 15 • Online context cards for Lesson 15 • Context card deck (Endocrine System cards for Lesson 15) • <i>Medical Terminology Student Glossary</i>	1. Prepare to share the <i>Endocrine System</i> slide presentation. 2. Print the Medical Terminology Endocrine System Printable Flashcards. 3. Prepare online access to the flashcards and context cards. 4. Access the Endocrine System terms section of the student glossary.	30-45 minutes
REVIEW	• <i>Endocrine System Quiz</i> • <i>Endocrine System Quiz – Answer Key</i>	1. Print/photocopy the <i>Endocrine System Quiz</i> for each participant.	10 minutes

Note: See the Medical Terminology Block Instructions at the end of this curriculum. These blocks provide hands-on experience constructing and deconstructing medical terms. There are many ways that the blocks may be used at the end of each lesson to provide additional practice for learning medical terminology.

Lesson Fifteen – Endocrine System

FOCUS: Endocrine Organs

10-15 minutes

Purpose:

Discuss the organs composing the endocrine system.

Materials:

- Internet access
- Smart devices (1-2 per group)
- Suggested website:
<https://www.hopkinsmedicine.org/health/illness-and-prevention/anatomy-of-the-endocrine-system>

Facilitation Steps:

1. Have participants gather in groups of five.
2. Each group should have at least one device with internet access.
3. Each participant will look up, name, and describe two endocrine organs.
 - Endocrine Organs: Hypothalamus, pineal gland, pituitary gland, thyroid gland, parathyroid gland, thymus gland, adrenal gland, pancreas, ovary, and testis

Lesson Fifteen – Endocrine System

LEARN: Common Medical Terms of the Endocrine System

30-45 minutes

Purpose:

During this section, participants will learn to recognize prefixes, suffixes, and root words relating to the endocrine system.

Materials:

- *Endocrine System* slide presentation
- Medical Terminology Endocrine System Printable Flashcards
- Online flashcards for Lesson 15
- Online context cards for Lesson 15
- Context card deck (Endocrine System cards for Lesson 15)
- *Medical Terminology Student Glossary*

Facilitation Steps:

1. Give each participant their own *Medical Terminology Student Glossary*. Students should record their definition for the various endocrine system terms as the slide presentation is shared.
2. Share the following information with students as you show the slide presentation.

Slide 1: Introduction slide

Slide 2: Prefixes

- an- = without, the absence of
- crypto- = hidden, obscure
- brady- = too slow
- dia- = across, through
- end-, endo- = internal, within
- epi- = upon, overlying
- hyper- = excessive, too much
- hypo- = insufficient, underneath
- para- = alongside
- pan- = all, total
- physio-, physi- = natural, physiological
- poly- = many

- pro- = initial, preliminary
- sub- = below, under
- syn- = together, along with
- tachy- = too fast
- trans- = across, through
- ultra- = beyond, further than

Slide 3: Root Words

- acr/o = extremities
- aden/o = gland
- adren/o, adrenal/o = adrenal gland
- cort/i = cortex (outer layer of an organ)
- crin/o = secrete
- gluc/o, glyc/o, glycos/o = glucose, sugar
- hypophys/o, pituitar/o = pituitary gland
- oophor/o, ovari/o = ovary
- orch/o, orchid/o = testes
- pancreat/o = pancreas
- parathyroid/o, parathyr/o = parathyroid gland
- phe/o = great or dark color
- thym/o = thymus gland
- thyroid/o = thyroid gland

Slide 4: Suffixes

- -ac, -al, -ar, -ary, -ic, -ous = relating to
- -ectomy = surgical removal
- -genesis = creation of
- -gram = recording, image
- -graphy = process of recording
- -ia, -ism, -osis = condition or state, often abnormal
- -itis = inflammation
- -ologist = one who studies
- -ology = science or study of
- -oid = resembling, having features of
- -oma = bulging, swelling, tumor
- -pathy = disease, illness

- -plasty = surgical repair
- -stasis = state of being
- -tension = pressure
- -therapy = treatment
- -tomy = cutting into
- -ule = small-scale

Slides 5-8: Endocrine System Organs/Anatomy

- Hypothalamus: This is a deep collection of neurons (nerve cells) at the base of the brain that is roughly the size of an almond. It is located below another structure of the brain, called the thalamus, near the site where the optic nerves that connect with the eyeballs split and cross to the opposite side of the brain, called the optic chiasm. The hypothalamus intimately connects with the pituitary gland and regulates its functions.
- Pineal Gland: Centrally positioned in the brain, this gland is important to the sleep-wake cycle, aka the circadian rhythm. The suprachiasmatic nucleus of the hypothalamus directs pineal gland function.
- Pituitary Gland: This is a pea-sized gland, sometimes called the hypophysis, located below the hypothalamus. Because of its control over other endocrine glands, it is known as the master gland.
 - Anterior Pituitary: This is the anterior lobe of the pituitary gland regulated by releasing and, in some cases, inhibiting hormones secreted by the hypothalamus. Anterior pituitary hormones regulate hormone release from multiple endocrine organs throughout the body.
 - Posterior Pituitary: Posterior lobe of the pituitary gland, also called the neurohypophysis, that stores two hormones produced in the hypothalamus
- Thyroid Gland: This gland plays a key role in regulating the body's metabolism. It is in the anterior neck, inferior to the larynx, or voice box.

- Parathyroid Glands: These miniscule glands, usually four in total, are located on the surface of the thyroid gland and help regulate calcium levels.
- Thymus Gland: This gland is located inferior to the thyroid gland in the upper chest. It helps regulate immune system function and atrophies with age.
- Adrenal Glands: Sit atop the kidneys and release hormones that help regulate blood pressure, fluid balance, the stress response, and metabolism
- Pancreas: Plays an important role in the food digestion by releasing digestive enzymes (an exocrine function) in addition to releasing hormones (an endocrine function) to help regulate blood sugar levels
- Ovaries: Primary female reproductive organs that produce eggs cells and release the hormones estrogen and progesterone
- Testes: Primary male reproductive organs that produce sperm cells and release the hormone testosterone

Slides 9-15: Endocrine Hormones

- Posterior Pituitary Hormones: Created in the hypothalamus and stored in the posterior pituitary, where the nerve endings from specific neurons in the hypothalamus reside
 - Antidiuretic Hormone (ADH): This is a hormone that acts on the kidneys to increase their water permeability. Consequently, more water is reabsorbed from urine, resulting in less urine and more reclaimed water for the body to use.
 - Oxytocin: This hormone serves multiple functions. In women, it acts on smooth muscle to stimulate uterine contractions and milk ejection during breastfeeding. It is also important in human bonding, particularly parent-child bonding.
- Hypothalamic/Anterior Pituitary Hormones: These are the hormones produced by the hypothalamus and the anterior pituitary. The hypothalamus

secretes releasing hormones and, in some cases, inhibits hormones that orchestrate the release (or cessation) of anterior pituitary hormones that in turn act on endocrine glands to stimulate them to release hormones.

- Gonadotropin-Releasing Hormone (GnRH): Hypothalamic hormone that triggers the release of gonadotropins by the anterior pituitary, which regulate the function of the primary reproductive organs, namely the ovaries and testes
- Luteinizing Hormone (LH): In women, this hormone works in concert with FSH to stimulate ovulation (release of egg cells) in the ovaries and prepares the uterus for pregnancy. In men, this hormone stimulates testosterone production.
- Follicle Stimulating Hormone (FSH): Acts on the ovaries in concert with LH to stimulate ovulation in women and on the testes to stimulate sperm production in men
- Thyrotropin-Releasing Hormone (TRH): Released by the hypothalamus, triggers release of TSH from the anterior pituitary
- Thyroid Stimulating Hormone (TSH): Anterior pituitary hormone that triggers thyroid hormone release from the thyroid gland
- Prolactin-Releasing Hormone (PRH)/Prolactin-Inhibiting Hormone (PIH), aka Dopamine: These hypothalamic hormones regulate prolactin release by the anterior pituitary. Dopamine also serves as an important neurotransmitter (neuronal chemical messenger) in the brain involved in motivation and motor control.
- Prolactin: This hormone affects follicular maturation as well as estrogen and progesterone release. It also stimulates milk production in glandular breast tissue.
- Growth Hormone-Releasing Hormone (GHRH)/Growth Hormone-Inhibiting Hormone (GHIH), aka Somatostatin: GHRH is a hypothalamic hormone that stimulates the anterior pituitary to release GH. GHIH is a hormone that is secreted by the hypothalamus in reaction to insulin-like growth factor (IGF) released by the liver in response to GH. It serves in negative feedback fashion to inhibit release of GH by the anterior pituitary.
- Growth Hormone (GH): Aka somatotrophic hormone, GH stimulates the growth of long bones and muscles while triggering gluconeogenesis (the formation of glucose from amino acids, the building blocks of proteins) and the breakdown of glycogen to glucose in the liver
- Corticotropin-Releasing Hormone (CRH): Hypothalamic hormone that triggers ACTH release by the anterior pituitary
- Adrenocorticotrophic Hormone (ACTH): Anterior pituitary hormone that stimulates the release of cortisol and other corticosteroid hormones from the adrenal cortex, which play an important role in the stress response
- Pineal Gland Hormone: Pineal gland produces the hormone, melatonin, which plays a key role in inducing sleepiness at night, thus regulating the sleep-wake cycle
- Thyroid Hormones:
 - Thyroxine: This hormone, which contains four iodine atoms, regulates growth and metabolism and even differentiation (specialization) of tissues. It is an inactive form for the most part.
 - Triiodothyronine: Active form of thyroxine, formed by the removal of an iodine atom from thyroxine, a process called de-iodination

- Calcitonin: This thyroid hormone lowers levels of calcium in the blood by decreasing its reabsorption in the kidneys. It also blocks breakdown of bone by osteoclasts.
- Parathyroid Hormone (PTH): This hormone functions to increase levels of calcium and phosphorus in the blood. Calcitonin and PTH work in concert with opposing actions to maintain calcium levels in a normal range.
- Pancreatic Hormones: Produced by clusters of endocrine cells (known as the islets of Langerhans or pancreatic islets) scattered along the length of the pancreas that control glucose metabolism
 - Glucagon: Hormone that stimulates the breakdown of glycogen in the liver into glucose
 - Insulin: This hormone promotes the uptake of glucose into the cells of the body so they can be used for energy. It also stimulates the liver to store glucose in glycogen form.
- Adrenal Cortex Hormones: Produced in the outer layer of the adrenal glands, called the cortex
 - Mineralocorticoids: The major mineralocorticoid is aldosterone, which acts on the kidneys to retain sodium and excrete potassium, promoting fluid retention and thereby raising blood volume and pressure
 - Glucocorticoids: The major glucocorticoid is cortisol. These hormones promote metabolic breakdown of fats, carbohydrates, and proteins, which is critical during times of stress. Glucocorticoids, such as cortisol, also suppress immune system function.
 - Adrenal Androgens: These hormones include dehydroepiandrosterone (DHEA). Androgens can be converted into estrogens in the tissues. Adrenal androgens supplement the sex hormone activity of the gonads (the testes and ovaries).
- Adrenal Medulla Hormones: These hormones are created in the central regions of the adrenal glands. They stimulate the sympathetic nervous system, which controls the automatic “fight or flight” response to stress or danger.
 - Adrenaline (aka epinephrine): Formed from the amino acid, tyrosine, adrenaline also functions as a neurotransmitter. It raises glucose levels and increases heart rate and blood pressure and dilates the air passageways. Adrenaline is produced in higher quantities and its effects are stronger than that of noradrenaline.
 - Noradrenaline (aka norepinephrine): Also formed from the amino acid tyrosine, noradrenaline has similar effects to adrenaline, but its effects are weaker (it only binds to alpha receptors on autonomic nervous system cells, while epinephrine binds to both alpha and beta receptors)

Slides 16-19: Endocrine System Conditions

- Acromegaly: Disease characterized by excessive bone growth in the face, hands, and feet caused by abnormally elevated levels of growth hormone after puberty
- Addison Disease: Results from impaired function of the adrenal cortex resulting in a constellation of symptoms that can include weakness, hyperpigmentation (skin darkening), anorexia (loss of appetite), depression, and other mood problems
- Cushing Syndrome: Caused by excessive secretion of cortisol leading to hyperglycemia (abnormally high blood glucose) and abnormal deposition of fat in the face (so-called moon facies) and neck areas
 - Cushing’s disease is caused by a pituitary tumor that secretes excessive ACTH

- **Diabetes Insipidus:** This condition results from insufficient activity of ADH. Diabetes insipidus could result from impaired ADH production or secretion in the brain or insensitivity to ADH in the kidney. The result is dilute urine and excessive urination.
- **Diabetes Mellitus (DM):** This is a condition characterized by insensitivity to insulin leading to hyperglycemia, which can damage nerves and blood vessels over time. Eventually DM can result in loss of limbs and organ failure if hyperglycemia remains uncontrolled long term.
- **Diabetic Nephropathy:** Damage to the kidneys that can result from DM
- **Diabetic Neuropathy:** Peripheral nerve damage that can result from DM
- **Dwarfism:** Characterized by an overall decrease in body size due to insufficient GH secretion prior to puberty
- **Gigantism:** Characterized by an overall increase in body size due to excessive GH secretion prior to puberty
- **Grave's Disease:** Autoimmune condition that results in excessive thyroid hormone activity (hyperthyroidism)
- **Hashimoto's Thyroiditis:** Autoimmune condition that destroys healthy thyroid tissue, leading to insufficient hormone production (hypothyroidism)
- **Hyperparathyroidism:** Characterized by excessive parathyroid hormone secretion that results in abnormally elevated blood calcium levels
- **Hyperthyroidism:** Characterized by excessive thyroid hormone activity
- **Hypoparathyroidism:** Characterized by insufficient parathyroid hormone secretion that results in inadequate blood calcium levels
- **Hypothyroidism:** Characterized by insufficient thyroid hormone activity
- **Panhypopituitarism:** Rare condition describing globally insufficient secretion of pituitary hormones, which can result from traumatic brain injury or a tumor, for example

- **Syndrome of Inappropriate Antidiuretic Hormone (SIADH):** Characterized by too much ADH secretion, leading to concentrated, less voluminous urine and dilute concentrations of electrolytes in the blood, such as low blood sodium (hyponatremia)
- **Thyrotoxicosis:** Hypermetabolic toxic state resulting from excessive thyroxine and triiodothyronine release

Slides 20-23: Endocrine System Cancers

- **Adrenocortical Carcinoma:** This is a rare deadly cancer that develops in the outer layer of the adrenal gland. Certain genetic syndromes increase the risk of getting this cancer.
- **Pancreatic Carcinoma:** These are cancers that develop within the cells of the pancreas and usually affect individuals that are 40 years old or older. Histologically, most are ductal adenocarcinomas and involve cells responsible for the exocrine function of the pancreas (the secretion of digestive enzymes). However, pancreatic endocrine cancers do occur.
 - **Islet Cell Carcinoma:** Tumor that develops from pancreatic endocrine cells in the islets of Langerhans that can cause hyperinsulinemia (excessive insulin levels in the blood) and resultant hypoglycemia
- **Pituitary Adenoma:** This is a typically benign and slowly growing tumor of pituitary gland cells that occurs more frequently in women than in men, primarily between the ages of 30 and 60. Pituitary carcinoma is a rare, more aggressive pituitary tumor.
 - **Prolactinoma:** Subtype of pituitary adenoma where the tumor cells produce excessive levels of prolactin
- **Thyroid Carcinoma:** This is the most frequent cancer of the endocrine system, affecting women more than men and those between the ages of 25 and 60. It develops from the cells of the thyroid

gland and can take on multiple histologic subtypes.

- Parathyroid Carcinoma: Rare form of cancer that develops from the cells of the parathyroid glands
- Pheochromocytoma: Benign tumor of the adrenal medulla that makes excessive amounts of adrenaline and noradrenaline, leading to severe hypertension as well as other symptoms and signs, including flushing, heart palpitations, headaches, hyperhidrosis (excessive sweating), and hyperglycemia
- Thymoma: This is a type of cancer that develops from cells of the thymus gland and can range in severity from benign to malignant. Thymomas can be associated with an autoimmune neuromuscular disease that causes weakness, called myasthenia gravis.

Slide 24: Endocrine System Treating Specialists and Diagnostic Procedures

- Endocrinologist: Physician who specializes in diagnosing and treating endocrine system diseases
- Fasting Blood Glucose Level: Taken in the morning after an overnight fast
- Oral Glucose Tolerance: Test that measures insulin sensitivity and the body's ability to bring down blood glucose levels 2 hours after an oral glucose load in the form of a syrupy drink

Slides 25-26: Endocrine System Diagnostic Procedures

- Glycosylated Hemoglobin (HbA1C): Measurement that is used as a three-month average of one's blood glucose levels based on the quantity of sugar molecules that attached to hemoglobin, a component of red blood cells
- Computed Tomography (CT Scan): This is a scan that takes multiple X-rays to visualize cross-sections of tissue using computer analysis. An abdominal CT can be used to find pancreatic tumors,

for example. Any part of the body can be visualized this way.

- Serum Adrenocorticotropic Hormone (ACTH) Stimulation with Cosyntropin: Test that evaluates for impairment of adrenal cortical function
- Serum ACTH Suppression: Test that evaluates for hyperactive adrenal cortical function and Cushing's syndrome
- Growth Hormone Stimulation Test: Test uses insulin or arginine (an amino acid), which normally promotes growth hormone release, to evaluate for growth hormone deficiency
- Magnetic Resonance Imaging (MRI): This imaging modality uses the movement of molecules within a magnetic field to create detailed, three-dimensional images of internal organs. It can image the pituitary gland and hypothalamus within the brain, for example.
- Radioactive Iodine Uptake: This test measures uptake of ingested iodine into the thyroid gland, which is used in the production of thyroid hormone. Thus, it measures thyroid gland activity.
- Thyroid Scan: Like a radioactive iodine uptake scan, this test also uses radioactive iodine, but this time it uses emitted radiation (gamma rays) to visualize the thyroid and assess thyroid nodules
- Thyroid Ultrasound: Scan that uses the reflection of sound waves to visualize the thyroid and evaluate thyroid nodules
- Urine Ketones: In the setting of inaccessibility to glucose, as can happen in uncontrolled diabetes mellitus or extended fasting, cells start breaking down fats into ketone bodies for energy, which can be measured in the urine. In severe diabetes, runaway ketone body formation can become life threatening, a phenomenon known as diabetic ketoacidosis.

Slide 27: Endocrine System Treatment Procedures

- Adrenalectomy: Surgical removal of the adrenal gland, which may be necessary in the setting of an adrenal tumor
- Hypophysectomy: Surgical removal of the pituitary gland, which may be necessary in the setting of a pituitary tumor
- Pancreatectomy: This is the term for the surgical removal of the pancreas, which may be partial or total. It may be necessary in the setting of a pancreatic tumor or severe infection.
- Parathyroidectomy: Surgical removal of one or more of the parathyroid glands, which is performed in the setting of hyperparathyroidism
- Thyroidectomy: Surgical removal of the thyroid gland, which may be necessary in the setting of a thyroid tumor

Flashcard Practice:

1. Distribute the Medical Terminology Endocrine System Printable Flashcards to each participant. The flashcards can be found at this link: www.realityworks.com/medicalterminologykit-downloads Have students cut out the flashcards along the designated lines.
2. Have students pair up and quiz each other on the vocabulary words.
3. As an alternative independent practice method, give each student access to the online flashcards for this lesson. Students will read the online flashcard, click on the term/suffix and then the card will flip and reveal the definition.

Context Card Practice:

1. After students become familiar with the vocabulary terms in this lesson, have them access the context cards. There are five for this lesson with a few different ways you can use them.
2. Share the card with participants using a document projector. Read the card aloud to the group while students observe. Pair students up and while the card is projected, have each student read the contents aloud to each other.
3. Alternatively, have students pair up and read the card aloud to each other. Then read the card contents to the class while students self-check their pronunciation.
4. Divide the class into five groups. Give each group a different context card for that specific lesson content. Everyone in the small groups should read the context card aloud to another member of their group. All students should have the opportunity to read the card. Then have each group rotate to another card. The goal is for each student to read each of the five cards aloud to each other. At the end, read all five context cards for the lesson to model appropriate pronunciation for the class.
5. Share online access to the context cards for this lesson. This can be done as independent practice. It could even be assigned as work outside of class time. At the access site provided, students read the context card aloud. Then they may click on the audio icon and the card will be read back to them. They may self-check their pronunciation of the key vocabulary terms found in the context card.

Lesson Fifteen – Endocrine System

REVIEW: Endocrine System Quiz

10 minutes

Purpose:

To test the participants' knowledge of the endocrine system.

Materials:

- *Endocrine System Quiz*
Endocrine System Quiz – Answer Key

Facilitation Steps:

1. Distribute the *Endocrine System Quiz* and have participants complete it.
2. Grade the quiz results according to the *Endocrine System Quiz – Answer Key*.
3. Have participants review their answers and ask questions as needed.

Name: _____ Class: _____

Endocrine System Quiz

Instructions: Select or write in the best answer for each question below.

1. True or False? (circle one) Parathyroid carcinoma is the most frequent cancer of the endocrine system.
2. A _____ is the surgical removal of the pituitary gland, which may be necessary in the setting of a pituitary tumor.
3. The _____ produces the hormone, melatonin, which plays a key role in inducing sleepiness at night, thus regulating the sleep-wake cycle.
4. The _____ sit atop the kidneys and release hormones that help regulate blood pressure, fluid balance, the stress response, and metabolism.
5. True or False? (circle one) An endocrinologist is a physician who specializes in the diagnosing and treating endocrine system diseases.
6. A _____ is a benign tumor of the adrenal medulla that makes excessive amounts of adrenaline and noradrenaline, leading to severe hypertension and other symptoms and signs, including flushing, heart palpitations, headaches, hyperhidrosis (excessive sweating), and hyperglycemia.
7. _____ measures uptake of ingested iodine into the thyroid gland, which is used in the production of thyroid hormone. Thus, it measures thyroid gland activity.
8. True or False? (circle one) Gigantism is a disease characterized by excessive bone growth in the face, hands, and feet caused by abnormally elevated levels of growth hormone after puberty.
9. This is a condition characterized by too much ADH secretion, leading to concentrated, less voluminous urine and dilute concentrations of electrolytes in the blood, such as low blood sodium (hyponatremia): _____
10. The hormone _____ lowers levels of calcium in the blood by decreasing its reabsorption in the kidneys. It also blocks breakdown of bone by osteoclasts.

Endocrine System Quiz – Answer Key

1. True or **False**? Parathyroid carcinoma is the most frequent cancer of the endocrine system.
2. A **hypophysectomy** is the surgical removal of the pituitary gland, which may be necessary in the setting of a pituitary tumor.
3. The **pineal gland** produces the hormone, melatonin, which plays a key role in inducing sleepiness at night, thus regulating the sleep-wake cycle.
4. The **adrenal glands** sit atop the kidneys and release hormones that help regulate blood pressure, fluid balance, the stress response, and metabolism.
5. **True** or False? An endocrinologist is a physician who specializes in the diagnosing and treating diseases affecting the endocrine system.
6. A **pheochromocytoma** is a benign tumor of the adrenal medulla that makes excessive amounts of adrenaline and noradrenaline, leading to severe hypertension and other symptoms and signs, including flushing, heart palpitations, headaches, hyperhidrosis (excessive sweating), and hyperglycemia.
7. **Radioactive Iodine Uptake** measures uptake of ingested iodine into the thyroid gland, which is used in the production of thyroid hormone. Thus, it measures thyroid gland activity.
8. True or **False**? Gigantism is a disease characterized by excessive bone growth in the face, hands, and feet caused by abnormally elevated levels of growth hormone after puberty.
9. This is a condition characterized by too much ADH secretion, leading to concentrated, less voluminous urine and dilute concentrations of electrolytes in the blood, such as low blood sodium (hyponatremia): **Syndrome of inappropriate antidiuretic hormone (SIADH)**
10. The hormone **calcitonin** lowers levels of calcium in the blood by decreasing its reabsorption in the kidneys. It also blocks breakdown of bone by osteoclasts.

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Lesson Sixteen – Nervous System

Lesson Overview

The nervous system helps all the parts of the body to communicate with each other. It also reacts to changes both outside and inside the body. It is very important for healthcare professionals to understand the terminology related to the nervous system.

Lesson Objectives

After completing this lesson, participants will be able to:

- Explain what medical terms relate to the nervous system and how they are used in medical settings
- Identify the meaning behind common nervous system terms
- Accurately read nervous system vocabulary terms in context

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• Internet access • Smart devices (2 per group) • Suggested website: https://openeducationalberta.ca/medicalterminology/chapter/6-9-nervous-system/	1. Access the websites for research.	10- 15 minutes
LEARN	• <i>Nervous System</i> slide presentation • Medical Terminology Nervous System Printable Flashcards • Online flashcards for Lesson 16 • Online context cards for Lesson 16 • Context card deck (Nervous System cards for Lesson 16) • <i>Medical Terminology Student Glossary</i>	1. Prepare to share the <i>Nervous System</i> slide presentation for viewing. 2. Print the Medical Terminology Nervous System Printable Flashcards. 3. Prepare online access to the flashcards and context cards. 4. Access the Nervous System terms section of the student glossary.	30-45 minutes
REVIEW	• <i>Nervous System Quiz</i> • <i>Nervous System Quiz – Answer Key</i>	1. Print/photocopy the <i>Nervous System Quiz</i> for each participant.	10 minutes

Note: See the Medical Terminology Block Instructions at the end of this curriculum. These blocks provide hands-on experience constructing and deconstructing medical terms. There are many ways that the blocks may be used at the end of each lesson to provide additional practice for learning medical terminology.

Lesson Sixteen – Nervous System

FOCUS: Components of the Nervous System

10-15 minutes

Purpose:

Discuss the two major divisions of the nervous system and their components.

Materials:

- Internet access
- Smart devices (2 per group)
- Suggested website:
<https://openeducationalberta.ca/medicalterminology/chapter/6-9-nervous-system/>

Facilitation Steps:

1. Have participants gather in groups of four.
2. Each group should have at least two devices with internet access.
3. These divisions of the nervous system work in a hierarchical structure, and thus will require coordination between the students to plan out and assign tasks.

One participant will describe the two major divisions of the nervous system in broad terms, another will further divide the appropriate division into its components and describe them broadly, the third will further divide the appropriate component into its subcomponents, the fourth will further divide the appropriate subcomponent into its branches and describe each branch.

- Major Divisions: Central nervous system (composed of the brain and spinal cord) and the peripheral nervous system
- Peripheral Nervous System
Components: Sensory (afferent) and motor (efferent)
- Efferent Nervous System: Somatic and autonomic
- Autonomic Nervous System Branches
Sympathetic and parasympathetic

Lesson Sixteen – Nervous System

LEARN: Common Medical Terms of the Nervous System

30-45 minutes

Purpose:

During this section, participants will learn to recognize prefixes, suffixes, and root words relating to the nervous system.

Materials:

- *Nervous System* slide presentation
- Medical Terminology Nervous System Printable Flashcards
- Online flashcards for Lesson 16
- Online context cards for Lesson 16
- Context card deck (Nervous System cards for Lesson 16)
- *Medical Terminology Student Glossary*

Facilitation Steps:

1. Give each participant their own *Medical Terminology Student Glossary*. Students should record their definition for the various nervous system terms as the slide presentation is shared. Share the following information with students as you show the slide presentation.

Slide 1: Introduction slide

Slide 2: Prefixes

- an- = without, the absence of
- crypto- = hidden, obscure
- brady- = too slow
- dys- = abnormal, painful
- end-, endo- = internal, within
- epi- = upon, overlying
- hyper- = excessive, too much
- hypo- = insufficient, underneath
- intra- = within
- para- = alongside
- physio-, physi- = natural, physiological
- pan- = all, total

poly- = many

pre-, pro- = initial, before

post- = after

sub- = below, under

syn- = together, along with

tachy- = too fast

trans- = across, through

ultra- = beyond, further than

Slide 3: Root Words

- caud- = tail, in reference to the tailbone
- cerebell/o = cerebellum
- cerebr/o = cerebrum
- cephal/o = head
- crani/o = cranium, skull
- dendr- = branch
- encephal/o = brain
- equine- = horse
- gangli/o = ganglion
- medull/o = medulla oblongata (a component of the brainstem)
- mening/o = meninges (layers of thin tissue that cover the brain)
- myel/o = spinal cord
- neur/o = nerve, nerve cell/ neuron
- radicul/o = nerve root
- spin/o = spine, spinal cord
- phas/o = speech
- psych/o = mind

Slide 4: Suffixes

- -ac, -al, -ar, -ary, -ic, -ous = relating to
- -algia = pain
- -cele = herniation or protrusion

- -cyte = cell
- -ectomy = surgical removal
- -genesis = creation of
- -gram = recording, image
- -graphy = process of recording
- -ia, -ism, -osis = condition or state, often abnormal
- -ictal = seizure, paroxysmal event
- -itis = inflammation
- -ologist = one who studies
- -ology = science or study of
- -oid = resembling, having features of
- -oma = bulging, swelling, tumor
- -paresis = weakness
- -pathy = disease, illness
- -plasty = surgical repair
- -plegia = paralysis
- -stasis = state of being
- -tension = pressure
- -therapy = treatment
- -tomy = cutting into
- -ule = small-scale

Slides 5-6: Nervous System Organization

- Central Nervous System (CNS): The CNS is composed of the brain and spinal cord. It is the central processor of information and makes decisions regarding behavior.
- Peripheral Nervous System (PNS): Composed of all the peripheral nerves in the body that connect to the CNS
- Sensory (afferent) Nervous System: Part of the nervous system that carries sensory information about the external environment to the spinal cord and brain
- Motor (efferent) Nervous System: Part of the nervous system transmits information from the CNS to muscles and glands
 - Somatic Motor System: Part of the nervous system sends signals to the skeletal muscles of the body to carry out movements designated by the CNS

- Autonomic Motor System: This part of the nervous system works “automatically” to maintain survival and optimize function. It transmits signals from the CNS to the cardiac muscles and glands.
- Sympathetic Nervous System: This part of the nervous system is responsible for the “fight or flight response” to stress. It raises the heart rate, increases blood flow to the muscles, and dilates the pupils, amongst other activities.
- Parasympathetic nervous system: This part of the nervous system is responsible for the “rest and digest” relaxed state. It lowers the heart rate, increases blood flow to the digestive system, and constricts the pupils, amongst other activities.

Slides 7-12: Brain Regions/Nuclei

- Brainstem: Lowest portion of the brain closest to the spinal cord and is composed of three structures
 - Medulla Oblongata: The medulla is the most inferior section of the brainstem that joins the spinal cord inferiorly and the pons superiorly. It helps to regulate breathing, respiration, and basic functions, such as swallowing.
 - Pons: This is the midsection of the brainstem and forms important interconnections with the cerebellum to convey information to and from the body. It also helps to regulate breathing patterns.
 - Midbrain: Also known as the mesencephalon, the midbrain sits atop the pons and below the thalamus

- Tectum: This is the “roof” or superior portion of the midbrain. It helps to coordinate motor reflexes in response to auditory and visual stimuli.
- Tegmentum: The “floor” or inferior portion of the midbrain involved in motor reflexes and prevents undesired movements of the body
- Substantia Nigra: This part of the brain, itself a member of a network of brain areas known as the basal ganglia, plays an important role in movement and reward. It is damaged by Parkinson’s disease.
- Diencephalon: Deep region of the forebrain with three primary components (thalamus, hypothalamus, and epithalamus)
 - Thalamus: Relay station in the brain that interconnects sensory information from the brainstem with regions of the cerebral cortex that process that data
 - Hypothalamus: Essential for regulating biological rhythms, such as sleep and appetite, and it controls the endocrine system
 - Epithalamus: Contains the pineal gland and the subthalamic nucleus
 - Pineal Gland: This gland produces the hormone, melatonin. Melatonin plays a key role in inducing sleepiness at night, thus regulating the sleep-wake cycle.
 - Subthalamic Nucleus: Grouping of brain cells, is part of a network of brain nuclei, known as the basal ganglia, important in regulating purposeful movements of the body
- Cerebellum: The cerebellum is the “little brain” covered in tiny folds and grooves, called gyri and sulci, resembling the cerebral cortex, that is located posterior to the brainstem. It processes sensory feedback from the environment to coordinate smooth, accurate movements and maintain balance and posture.
- Cerebrum: Largest and outermost segment of the brain composed of two cerebral hemispheres
 - Cerebral Cortex: This is the outer layer of the cerebrum composed of gray matter (where the neuronal cell bodies that contain the nucleus of the cell reside as opposed to where the fatty cables, called axons, that come off the neuronal cell bodies, reside, called white matter). It is covered with folds and grooves, known as gyri and sulci, and is divided into different lobes based on location and function.
- Frontal Lobes: These are the most anterior lobes of the cerebral cortex. These are responsible for voluntary movements, planning, speech production, and impulse control.
- Parietal Lobes: These lobes are located behind the frontal lobes of the brain, at its posterior superior aspect, above the temporal lobes. They are important for visual spatial processing and locating objects in space, processing tactile information (the sense of touch), and determining one’s body position in space.
- Temporal Lobes: These lobes, located at the temples, are important to auditory and language processing. The medial temporal lobe contains the hippocampus, a key brain structure necessary for forming new memories.
- Occipital Lobes: Located at the very back of the cerebral cortex, primary center for conscious visual processing

- Deep Nuclei: Deep grouping of neurons in the brain that perform important behavioral functions
 - Basal Nuclei/Basal Ganglia: The basal ganglia are a network of brain nuclei important in regulating purposeful movements of the body
 - Medial Forebrain Bundle: Forebrain pathway reinforces certain pleasurable behaviors and is known as the brain's "reward" center
 - Limbic System: The limbic system contains a network of brain structures important to emotional processing and memory. It contains the amygdala, the brain's fear center, and the hippocampus, the brain's memory center.
- Cerebrovascular Accident (CVA): Aka a stroke, this condition is characterized by destruction of brain tissue due to impaired blood flow or hemorrhage (bleed). Most CVAs are ischemic, meaning they are the result of a blood clot or other compromise to blood flow.
- Concussion/Traumatic Brain Injury (TBI): This is a condition that results from head injury where brain function becomes impaired, even if transiently, such as feeling dazed or confused. Mild TBI is also known as concussion and is a frequent injury in contact sports, such as American football.
- Coma: Unconscious state from severe brain injury, where the affected individual is unresponsive to their environment, outside of brainstem and spinal cord reflexes
- Dyskinesia: Characterized by abnormal movements
- Epilepsy: Characterized by recurrent unprovoked (spontaneous) seizures that is usually treated with anti-epileptic drugs (AEDs)
- Guillain-Barre Syndrome: This is an autoimmune condition affecting peripheral nerves (typically the fatty insulation surrounding the nerves called myelin). It is characterized by ascending weakness and is usually self-limited (meaning it only lasts a certain duration of time and then goes away).
- Hemiplegia and Hemiparesis: These are conditions characterized by paralysis (plegia) or weakness (paresis) of one side of the body. It can result from a stroke.
- Hydrocephalus: This is a condition that occurs when the cerebrospinal fluid (CSF), the fluid that bathes the brain and spinal cord, does not drain properly, or CSF flow becomes obstructed. This results in enlargement of the ventricles, called ventriculomegaly. The ventricles

Slides 13-18: Nervous System Conditions

- Agnosia: This is a condition characterized by being unable to recognize an object. It may involve any sensory modality, including visual (sight), auditory (perception of sound), or tactile (touch).
- Aphasia: Characterized by an impairment in language comprehension or expression
- Apraxia: Characterized by impairment in purposeful tool use or manipulation of objects to complete a task
- Ataxia: Characterized by incoordination and impaired balance
- Alzheimer's Disease: Neurodegenerative disease that is characterized by progressive memory loss, particularly the laying down of new memories, and eventually impairs all aspects of cognition

are the open spaces of the brain where CSF flows.

- Intracranial hematoma: Broad term that refers to bleeding within the skull
 - When the bleeding occurs in the layers of tissues surrounding the brain, called the meninges, it can compress brain tissue
 - One example is a subdural hematoma, where blood accumulates below the outermost layer of the meninges, called the dura mater
 - Another example is a subarachnoid hemorrhage, where bleeding occurs within or below the subarachnoid space, the middle meningeal layer
 - When bleeding occurs within the brain tissue itself, it is called a cerebral hemorrhage.
- Meningitis: Characterized by inflammation of the meninges
 - Meningoencephalitis: When meningitis also involves inflammation of the brain tissue itself, it is called meningoencephalitis
- Multiple Sclerosis (MS): This is an autoimmune condition characterized by damage to the white matter fibers in the CNS, primarily myelin (the fatty sheath covering neuronal “cables”). It is typically “relapsing-remitting,” meaning there is an acute attack of one part of the CNS and then a period of inactivity before another attack in another part of the CNS.
- Myasthenia Gravis: This is an autoimmune condition characterized by damage to the neuromuscular junction where peripheral nerves communicate with muscle fibers. It can be limited to

eye movement weakness or affect the entire body (which occurs in most affected individuals).

- Paraplegia: Characterized by leg paralysis, often due to spinal cord injury
- Paresthesia: Numbness and tingling in an extremity, which could be due to peripheral nerve or nerve root (the nerve as it comes off the spinal cord) injury
- Parkinson’s Disease: This is a progressive neurodegenerative condition caused by loss of neurons in the substantia nigra resulting in motor and often cognitive impairment. It is characterized by bradykinesia (slowed/small amplitude movements), resting tremor, and a ratcheting muscle stiffness, known as cogwheel rigidity.
- Quadriplegia: Characterized by both arm and leg paralysis, often due to spinal cord injury
- Transient Ischemic Attack (TIA): Often called a “mini-stroke,” a TIA occurs when blood flow to a certain area of brain tissue is compromised, leading to stroke-like symptoms. However, blood flow returns quickly enough that permanent tissue loss does not occur. A TIA is a warning sign that the affected individual is at high risk for having a CVA.

Slides 19-20: Nervous System Cancers

- Medulloblastoma: This type of tumor almost always affects children or young adults, and 80% of cases occur in children younger than 15 years old. It develops in the medulla and then can metastasize, or spread, to the spinal cord or other areas of the body.
- Brainstem Glioma: This type of tumor develops in the midbrain, pons, or medulla and can vary in their rate of growth and spread depending on its grade. Prognosis is usually worse than with cerebellar astrocytoma.

- **Cerebellar Astrocytoma:** This type of tumor is formed in the cerebellum from neuronal helper cells in the brain called astrocytes. Most often, it grows slowly and rarely metastasizes.
- **Oligodendroglioma:** This type of tumor is formed from neuronal helper cells in the brain called oligodendrocytes. Its growth can be slow or fast, depending on its grade. Even when it is lower grade, it frequently spreads to nearby tissues.
- **Meningioma:** This is a type of tumor that develops from cells that form the meninges, the thin tissue layers that cover the brain within the skull and the spinal cord within the vertebral column. Most often the outermost meningeal layer, called the dura mater, is involved. Most meningiomas are benign (meaning they do not invade into surrounding tissue), although they can still cause damage by compressing surrounding tissue.
- **Glioblastoma Multiforme (GBM):** GBM is the leading malignant brain tumor in adults and forms from astrocytes. It grows rapidly and readily invades surrounding tissues. Prognosis is poor.
- **Craniopharyngioma:** This is a rare, benign tumor that develops just superior to the pituitary gland and can compress nearby structures, such as the pituitary gland, hypothalamus, or optic chiasm, where the optic nerves cross. It primarily affects children and young adults.

Slide 21: Nervous System Treating Specialists

- **Neurologist:** Physician who specializes in the diagnosis and treatment of diseases affecting the nervous system
- **Neurosurgeon:** Surgeon who received specialty training in diagnosing and treating nervous system diseases that can be treated surgically

- **Neuroradiologist:** Radiologist (a physician who interprets medical imaging tests) who received specialty training in evaluating images of the brain and spinal cord
- **Psychologist:** Medical professional who obtained a terminal degree (usually a PhD but could also be a PsyD) in the diagnosis and nonmedical treatment of mental health conditions
- **Psychiatrist:** Physician who specializes in diagnosing and treating psychiatric diseases, such as depression or schizophrenia

Slides 22-23: Nervous System Diagnostic Procedures

- **Cerebral Angiography:** Imaging technique that uses multiple X-rays and contrast dye to visualize blood vessels both within the brain and that supply the brain in the neck
- **Cerebrospinal Fluid Analysis (Lumbar puncture):** This is a procedure that involves inserting a thin needle in the lower lumbar spine below the spinal cord to retrieve CSF. Analysis of the CSF can be used to detect infection, cancer, bleeding, and autoimmune conditions within the central nervous system.
- **Computed Tomography (CT scan) of the Head:** This is a common imaging technique that creates a three-dimensional image of the brain by taking multiple X-rays from different angles. It is particularly sensitive for detecting fresh blood within the skull.
- **CT Angiogram of the Head and Neck:** This is computed tomography (CT) imaging of the blood vessels within the brain and neck after administration of contrast dye. It is faster and less invasive (poses minimal risk of injury) compared to conventional cerebral angiography.

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- **Electroencephalogram (EEG):** This test measures electrical activity on the surface of the brain through the placement of scalp electrodes. Its primary use is the detection of seizures.
- **Electromyography (EMG):** Inserting a needle into a muscle to analyze its electrical activity, which can be used to help diagnose certain muscular or peripheral nerve conditions
- **Magnetic Resonance Imaging (MRI) of the Brain:** Common imaging technique that analyzes the movement of molecules that compose brain tissue within a magnetic field to create detailed structural images of the brain
- **Myelography:** Imaging technique that uses an X-ray of the spinal cord and vertebral column after injection of contrast dye in the subarachnoid space, the mesh-like middle layer of the meninges
- **Positron Emission Tomography (PET scan) of the Brain:** Imaging technique that uses emission of radioactive material to detect and quantify metabolic activity in the brain to identify brain dysfunction

Slides 24-25: Nervous System Treatment Procedures

- **Craniectomy:** Surgical removal of a part of the skull for an extended duration of time, which might be necessary to relieve buildup of intracranial pressure from a severe traumatic brain injury, for example
- **Craniotomy:** This is the term for surgical opening of the skull to get access to brain contents for surgery. The piece of the skull that was opened is replaced at the end of the surgery.
- **Ventriculostomy:** Surgical placement of a drain to relieve buildup of fluid within the brain's ventricles
- **Gamma Knife:** This surgical technique uses gamma radiation to destroy

targeted tissue, such as a tumor within the brain. Gamma knife is a type of stereotactic radiosurgery, which is the targeted delivery of radiation to remove cancer that works within the physical frame of a detailed, three-dimensional “map” of the involved organ, such as the brain.

- **Endovascular Mechanical Thrombectomy:** This is a procedure that involves removal of a clot using a mechanical device attached to a tube called a catheter that is threaded through cerebral arteries to the point where blood flow is being obstructed. It is used to treat large vessel ischemic strokes.
- **Intravenous (IV) Thrombolysis:** Administering an IV blood thinner used to treat ischemic strokes

Flashcard Practice:

1. Distribute the Medical Terminology Nervous System Printable Flashcards to each student. The flashcards can be found at this link: www.realityworks.com/medicalterminologykit-downloads
2. Have students cut out the flashcards along the designated lines.
3. Have students pair up and quiz each other on the vocabulary words.

As an alternative independent practice method, give each student access to the online flashcards for this lesson. Students will read the online flashcard, click on the term/suffix and then the card will flip and reveal the definition.

Context Card Practice:

1. After students become familiar with the vocabulary terms in this lesson, have them access the context cards. There are five. There are a few different ways you can use these.

- a. Share the card with participants using a document projector. Read the card aloud to the group while students observe. Pair students up and, while the card is projected, have each student read the contents aloud to each other.

Alternatively, you could choose to have students pair up and read the card aloud to each other. Read the card contents to the class while students self-check their pronunciation.

- b. Divide the class into five groups. Give each small group a different context card for that specific lesson content. Everyone in the groups should read the context card aloud to another member of their group. All students should have the opportunity to read the card. Then have each group rotate to another card. The goal is for each student to read each of the five cards aloud to each other. At the end, read all five context cards for the lesson to model appropriate pronunciation for the class.
- c. Share online access to the context cards for this lesson. This can be done as independent practice. It could even be assigned as work outside of class time. At the access site provided, students read the context card aloud. Then they may click on the audio icon and the card will be read back to them. They may

self-check their pronunciation of the key vocabulary terms found in the context card.

Lesson Sixteen – Nervous System

REVIEW: Nervous System Quiz

10 minutes

Purpose:

To test the participants' knowledge of the nervous system.

Materials:

- *Nervous System Quiz*
- *Nervous System Quiz – Answer Key*

Facilitation Steps:

1. Distribute the *Nervous System Quiz* and have participants complete it.
2. Grade the quiz results according to the *Nervous System Quiz – Answer Key*.
3. Have participants review their answers and ask questions as needed.

Name: _____ Class: _____

Nervous System Quiz

Instructions: Select or write in the best answer for each question below.

1. True or False? (circle one) Meningiomas are the most common malignant brain tumor in adults.
2. A _____ is the term for surgical removal of a part of the skull for an extended duration of time, which might be necessary to relieve buildup of intracranial pressure from a severe traumatic brain injury.
3. The _____ processes sensory feedback from the environment to coordinate smooth, accurate movements and maintain balance and posture.
4. The _____ contains a network of brain structures important to emotional processing and memory.
5. True or False? (circle one) A neurologist is the term for a surgeon who received specialty training in diagnosing and treating nervous system diseases that can be treated surgically.
6. An _____ is formed from neuronal helper cells in the brain, called oligodendrocytes.
7. An _____ measures electrical activity on the surface of the brain through the placement of scalp electrodes. It is primarily used to detect seizures.
8. True or False? (circle one) Paraplegia is a condition characterized by both arm and leg paralysis, often due to spinal cord injury.
9. A _____ occurs when blood flow to a certain area of brain tissue is compromised, leading to stroke-like symptoms. However, blood flow returns quickly enough that permanent tissue loss does not occur.
10. This part of the nervous system is responsible for the “rest and digest” relaxed state. It lowers the heart rate, increases blood flow to the digestive system, and constricts the pupils, among other activities. _____

Nervous System Quiz – Answer Key

1. True or **False?** Meningiomas are the most common malignant brain tumor in adults.
2. A **craniectomy** is the term for surgical removal of a part of the skull for an extended duration of time, which might be necessary to relieve buildup of intracranial pressure from a severe traumatic brain injury, for example.
3. The **cerebellum** processes sensory feedback from the environment to coordinate smooth, accurate movements and maintain balance and posture.
4. The **limbic system** contains a network of brain structures important to emotional processing and memory.
5. True or **False?** A neurologist is the term for a surgeon who received specialty training in diagnosing and treating nervous system diseases that can be treated surgically.
6. An **oligodendroglioma** is formed from neuronal helper cells in the brain called oligodendrocytes.
7. An **electroencephalogram (EEG)** measures electrical activity on the surface of the brain through the placement of scalp electrodes. It is primarily used to detect seizures.
8. True or **False?** Paraplegia is a condition characterized by both arm and leg paralysis, often due to spinal cord injury.
9. A **transient ischemic attack (TIA) occurs** when blood flow to a certain area of brain tissue is compromised, leading to stroke-like symptoms. However, blood flow returns quickly enough that permanent tissue loss does not occur.
10. This part of the nervous system is responsible for the “rest and digest” relaxed state. It lowers the heart rate, increases blood flow to the digestive system, and constricts the pupils, amongst other activities. **parasympathetic nervous system**

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Lesson Seventeen – Sensory Systems

Lesson Overview

The sensory system is a very important part of human physiology, associated with very peculiar arrangements. Knowledge of this system is essential to differentiate multiple types of sensations. It is very important for healthcare professionals to understand the terminology related to the sensory systems.

Lesson Objectives

After completing this lesson, participants will be able to:

- Explain what medical terms relate to the sensory systems and how they are used in medical settings
- Identify the meaning behind common sensory systems terms
- Accurately read sensory systems vocabulary terms in context

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• Internet access • Smart devices (1-2 per group) • Suggested website: https://ecampusontario.pressbooks.pub/medicalterminology/chapter/sensory-systems/	1. Access the websites for research.	10- 15 minutes
LEARN	• <i>Sensory Systems</i> slide presentation • Medical Terminology Sensory Systems Printable Flashcards • Online flashcards for Lesson 17 • Online context cards for Lesson 17 • Context card deck (Sensory Systems cards for Lesson 17) • <i>Medical Terminology Student Glossary</i>	1. Prepare to share the <i>Sensory Systems</i> slide presentation. 2. Print the Medical Terminology Sensory Systems Printable Flashcards. 3. Prepare online access to the flashcards and context cards. 4. Access the Sensory Systems terms section of the student glossary.	30-45 minutes
REVIEW	• <i>Sensory Systems Quiz</i> • <i>Sensory Systems Quiz – Answer Key</i>	1. Print the <i>Sensory Systems Quiz</i> for each participant.	10 minutes

Note: See the Medical Terminology Block Instructions at the end of this curriculum. These blocks provide hands-on experience constructing and deconstructing medical terms. There are many ways that the blocks may be used at the end of each lesson to provide additional practice for learning medical terminology.

Lesson Seventeen – Sensory Systems

FOCUS: Components of the Sensory Systems

10-15 minutes

Purpose:

Discuss the six sensory systems of the body, their general function, and two structures they are associated with.

Materials:

- Internet access
- Smart devices (1-2 per group)
- Suggested websites:
- <https://ecampusontario.pressbooks.pub/medicalterminology/chapter/sensory-systems/>

Facilitation Steps:

1. Have participants gather in groups of three.
2. Each group should have at least one device with internet access.
3. Each participant will name two sensory systems, the primary organs associated with them, and two structures associated with the primary organ that process the sensation.

- Sensory systems, primary organ, and examples of accompanying structures:
 - Vision (sight): Eye; retina and optic nerve
 - Audition (hearing): Ear; tympanic membrane (eardrum) and cochlea
 - Equilibrium (balance): Inner ear; otolith organs (located in the vestibule) and semicircular canals
 - Somatosensation/Tactile Perception (touch): Skin; mechanoreceptors and nociceptors
 - Olfaction (smell): Nose; olfactory receptor neuron and olfactory bulb
 - Gustation (taste): Tongue; taste bud and glossopharyngeal nerve

Lesson Seventeen – Sensory Systems

LEARN: Common Medical Terms of the Sensory Systems

30-45 minutes

Purpose:

During this section, participants will learn to recognize prefixes, suffixes, and root words relating to the sensory systems.

Materials:

- *Sensory Systems* slide presentation
- Medical Terminology Sensory System Printable Flashcards
- Online flashcards for Lesson 17
- Online context cards for Lesson 17
- Context card deck (Sensory Systems cards for Lesson 17)
- *Medical Terminology Student Glossary*

Facilitation Steps:

1. Give each participant their own *Medical Terminology Student Glossary*. Students should record their definition for the various sensory systems terms as the slide presentation is shared. Share the following information with students as you show the slide presentation.

Slide 1: Introduction slide

Slide 2: Prefixes

- an- = without, the absence of
- bi-, bin- = two
- cryo- = cold
- dys- = abnormal, painful
- end-, endo- = internal, within
- epi- = upon, overlying
- hyper- = excessive, too much
- hypo- = insufficient, underneath
- intra- = within
- para- = alongside
- physio-, physi- = natural, physiological
- pre-, pro- = initial, before
- post- = after

- sub- = below, under
- syn- = together, along with
- trans- = across, through
- ultra- = beyond, further than

Slide 3: Roots

- audi/o- = hearing
- aur/o, aur/i = ear
- blephar/o = eyelid
- cochle/o = cochlea
- conjunctiv/o = conjunctiva
- corne/o-, kerat/o = cornea
- cry/o = cold
- diplo- = double
- ir/o, irid/o = iris
- is/o = equivalent, equal
- labyrinth/o = labyrinth
- lacrim/o, dacry/o = tear, tear duct
- ocul/o, ophthalm/o = eye
- opt/o = vision
- ot/o = ear
- phot/o = light
- pupill/o = pupil
- retin/o = retina
- rhin/o = nose
- scler/o = sclera
- ton/o = tension, pressure
- tympan/o = tympanic membrane

Slide 4: Suffixes

- -ac, -al, -ar, -ary, -ic, -ous = relating to
- -algia = pain
- -cyte = cell
- -ectomy = surgical removal
- -genesis = creation of
- -geusia = sense of taste
- -gram = recording, image
- -graphy = process of recording

- -ia, -ism, -osis = condition or state, often abnormal
- -itis = inflammation
- -ologist = one who studies
- -ology = science or study of
- -oid = resembling, having features of
- -oma = bulging, swelling, tumor
- -pathy = disease, illness
- -plasty = surgical repair
- -plegia = paralysis
- -therapy = treatment
- -tomy = cutting into
- -ule = small-scale

Slides 5-6: Sensory System Descriptions

- Vision (sight): This sense is the ability to perceive images of the world by interpreting the input of reflected and generated visible light (a narrow spectrum of electromagnetic radiation). Our perception of the spectrum of colors and brightness depends on vision and enables us to detect shapes and patterns from a distance.
- Audition (hearing): This sense is the perception of compressed air within a certain spectrum of vibration, which we perceive as sound. Human verbal communication depends on audition.
- Somatosensation (touch): Aka tactile perception, this sense is our perception of how things feel and depends on neuronal receptors that respond to pressure, light touch, pain, and temperature both internally and externally
- Equilibrium (balance): Enables us to perceive head and body position and movement to maintain an upright posture and carry out activities of daily living
- Olfaction (smell): Enables us to detect different scents or odors, both pleasant and unpleasant, through chemical receptors
- Gustation (taste): Enables us to detect the taste of ingested material, typically food, through receptors that pick up on qualities such as sweetness, bitterness, and saltiness

Slide 7: Anatomy of Sensory Organs

- Somatosensory/Tactile Receptors: These are receptors that convey the sense of touch or how something feels. While these receptors are primarily located in the skin and hair follicles, they are also in the tongue, throat, and the mucosal lining of hollow organs.
- Mechanoreceptors: These include Meissner's and Ruffini corpuscles in the skin. Meissner's corpuscles are receptors for fine, discriminative touch near the skin's surface, while Ruffini's corpuscles convey information about deeper pressure sensation.
- Thermoreceptors: Receptors that are free nerve endings, conveying temperature sensation
- Nociceptors: Receptors that are free nerve endings, conveying pain sensation

Slides 8-11: The Eye

This is the special sense organ that gathers light from the environment and focuses it to construct images that are transformed into electrical signals by photoreceptor neurons in the back of the eye. Processing of images takes place in the occipital lobes, at the back of the brain.

- Conjunctiva: Thin membrane that lines the eyelid and a section of the eyeball covered by the eyelid
- Cornea: This is the central anterior section of the outer layer of the eyeball that is completely transparent to light. It serves as a protective barrier and contributes to focusing light by bending it (a process called refraction).
- Aqueous Humor: Clear, gelatinous fluid that permeates the space between the cornea and the iris
- Pupil: Circular opening in the iris that lets light into the interior of the eye
- Iris: Colored part of the eye that surrounds the pupil composed of muscles that dilate and constrict the pupil
- Lens: Clear, curved, dome-like structure behind the pupil that further focuses

light onto the back of the eye, creating an upside-down image

- Vitreous Humor: Gelatinous fluid that fills the interior of the eye behind the lens and helps maintain the overall contour and dimensions of the eyeball
- Retina: Layer of photoreceptors at the back of the eye that translates images composed of light into electrical signals that can then be communicated to the brain
 - Rod Cells: Photoreceptors throughout the retina that respond only to light intensity, not to color
 - Cone Cells: Photoreceptors located in the center of the retina (called the fovea) that respond to color and are responsible for color vision
- Optic Nerve: At the back of the eye, transmits the electrical signals produced by photoreceptors in the retina to the brain

Slides 12-15: The Ear

- Ear: Organ that detects sound
- Tympanic Membrane (eardrum): Transmits vibrations from incoming sound waves to the bones in the inner ear
- Middle Ear: The middle ear consists of three tiny bones (called the malleus, incus, and stapes). The vibration pattern from the tympanic membrane is transmitted through the bones of the middle ear to the fluid enclosed sensory receptors in the inner ear.
- Bony Labyrinth: Network of bony tubes filled with fluid, located deep to the middle ear within the temporal bone of the skull
 - Cochlea: This is a snail-shaped bony coil that contains mechanoreceptors called hair cells. The hair cells detect fluid movements that correspond with the vibrations transmitted through the middle ear

bones. These movements are converted into electrical signals.

- Vestibule: Part of the bony labyrinth adjacent to the cochlea that mediates balance, equilibrium, and posture
 - Otolith Organs: These are groupings of receptor hair cells within the vestibule that contain tiny stones, called otoliths. The otolith organs detect both head tilt and acceleration of head movement vertically and horizontally.
- Semicircular Canals: These are bony loops that project off the vestibule. They detect rotational head movements.
- Auditory Nerve: Transmits auditory information from the cochlea to the brain's auditory processing center, the auditory cortex
- Vestibular Nerve: Transmits vestibular information (regarding head position and movement) from the otolith organs and semicircular canals to the brain's coordination center, the cerebellum

Slides 16-17: The Tongue

- Tongue: Muscular organ that aids in food consumption and communication, contains chemoreceptors that mediate the sense of taste
- Papillae: Bumps on the tongue that contain taste buds
 - Taste Buds: Structures embedded in papillae that contain chemoreceptors that translate gustatory stimuli into electrical signals
- Facial and Glossopharyngeal Nerves: Transmit taste perception information to the brain for the anterior two thirds of the tongue and the posterior one third of the tongue, respectively

Slides 18-19: The Nose

- Nose: Olfactory perception occurs in the olfactory mucosa in the nose's upper nasal cavity

- **Olfactory Receptor Neurons:** Chemoreceptors that convert olfactory information into electrical signals
- **Olfactory Bulb:** Electrical signals from the olfactory receptors are transmitted to the olfactory bulb, which lies within the skull above the cribriform plate (an area of the skull with tiny holes that lies above the nasal mucosa). These tiny holes provide an opening for processes that branch off olfactory receptor neurons, enabling them to communicate with neurons in the olfactory bulb.
- **Olfactory Tract:** Transmits olfactory information received in the olfactory bulb to the brain's olfactory processing center, the olfactory cortex

Slides 20-24: Sensory System Conditions

- **Anosmia:** Loss of the sense of smell, which can result from traumatic brain injury and other neurologic diseases, such as Parkinson's disease
- **Rhinitis:** Characterized by inflammation of the nasal mucosa
- **Otalgia:** Medical term for ear pain
- **Otitis Externa:** Inflammation of the outer ear canal due to infection, often commonly referred to as "swimmer's ear" because of its association with swimming
- **Otitis Media:** Inflammation of the middle ear canal due to infection (viral or bacterial), which is very common during childhood
- **Tinnitus:** Medical term to describe ear ringing
- **Otosclerosis:** Characterized by bony overgrowth of the middle ear bones resulting in conductive hearing loss
- **Presbycusis:** Aka age-related hearing loss, this condition is characterized by the progressive hearing loss in both ears. There are many potential causes. The biggest one is loss of sensory hair cells (mechanoreceptors) in the inner ear.
- **Myopia:** This is the medical term for being near-sighted. Distant objects appear blurry without vision correction.
- **Hyperopia:** This is the medical term for being far-sighted. Near objects appear blurry without vision correction.
- **Presbyopia:** Associated with aging, characterized by progressive loss of the ability to focus on near objects due to loss of elasticity in the lens of the eye
- **Age-Related Macular Degeneration (AMD):** This condition is the leading cause of blindness in the Western Hemisphere and has no cure. It occurs when the macula, a centrally located section of the retina responsible for high resolution visual acuity, slowly degenerates due to being cut off from its nutritional support system, a layer of cells known as the retinal pigment epithelium.
- **Cataract(s):** Corruption in the lens of the eye, wherein the lens becomes cloudy or foggy
- **Conjunctivitis:** Inflammation of the conjunctiva, which can be due to many different causes, including allergens, foreign bodies, chemicals, and infections
- **Retinopathy:** General term for a disease process affecting the retina of the eye
 - **Diabetic Retinopathy:** Due to damage to the tiny blood vessels in the retina from diabetes
- **Glaucoma:** Characterized by increased pressure within the eye (intraocular pressure), which will damage the optic nerve and cause vision loss if left untreated
- **Nystagmus:** Involuntary rhythmic movements of the eye due to many medical conditions, including vestibular disorders
- **Photophobia:** Oversensitivity to light, which can be associated with multiple conditions, such as traumatic brain injury and migraine headache
- **Strabismus:** This is a condition characterized by misalignment of the eyes. If left uncorrected, it can lead to one eye becoming dominant and the other losing vision, a condition called amblyopia, aka "lazy eye."

- Dacryoadenitis: Inflammation of the lacrimal (tear) gland
- Diplopia: Aka “double vision,” this condition results from misalignment of the eyes, leading to the perception of two (usually overlapping) images
- Anesthesia: Loss of tactile perception in a part of the body (or the whole body in the case of general anesthesia), which can be due to disease or induced medically
- Paresthesia: Numbness and tingling in an extremity, which could be due to peripheral nerve or nerve root (the nerve as it comes off the spinal cord) injury
- Dysgeusia: Loss or alteration of taste
- Labyrinthitis: Inflammation of the bony labyrinth of the inner ear
- Meniere’s Disease: Thought to be related to fluid accumulation in the inner ear that results in symptoms such as vertigo (a sense of spinning), tinnitus (ear ringing), and hearing loss
- Vertigo: Sensation of motion or spinning accompanied by loss of balance, often referred to in layman’s terms as dizziness

Slides 25-26: Sensory System Cancers

- Acoustic Neuroma (aka vestibular schwannoma): This is a benign (noncancerous) tumor that forms on the vestibular or cochlear nerves (which join to form one nerve, the vestibulocochlear nerve), which connect the inner ear to the brain. It typically grows slowly.
- Retinoblastoma: This type of tumor develops from the retinal cells in the eye and usually affects children less than five years of age. It is an uncommon tumor that is sometimes hereditary and can affect one or both eyes. Only one eye is affected more than half of the time.
- Intraocular Melanoma: This is a rare, malignant cancer that develops from melanocytes in the part of the eye that includes the iris. Melanocytes are cells that produce pigment, most often found

in the skin and hair (but also present in the iris).

- Tongue Carcinoma: This type of cancer affects the anterior two thirds of the tongue and usually forms from squamous cells, the scaly, flat cells that line the tongue. It is the most common type of mouth cancer.
- Oropharyngeal Carcinoma: This type of cancer includes the posterior two thirds of the tongue and is usually formed from squamous cells. The greatest risk factors for both oropharyngeal and tongue carcinoma include tobacco use, alcohol use, and human papilloma virus (HPV) infection.
- Olfactory Neuroblastoma: This is a rare form of cancer that develops on the olfactory nerve, usually at the roof of the nasal cavity around the cribriform plate. Symptoms include anosmia and pain around the eyes, amongst many others.

Slide 27: Sensory System Treating Specialists

- Otorhinolaryngologist: Aka ENT doctor, this is a physician who specializes in the diagnosis and treatment of diseases affecting the ears, nose, and throat
- Optometrist: This is the term for an eye care provider who receives training in diagnosing eye diseases and writes prescriptions for corrective lenses after vision testing. Optometrist training is distinct from medical school.
- Ophthalmologist: Physician who receives specialty training after medical school to treat eye diseases both medically and surgically
- Neuro-otologist: Neurologist or otolaryngologist who receives advanced training in treating disorders that cause vertigo, imbalance, and disequilibrium

Slides 28-30: Sensory System Diagnostic Procedures

- Fluorescein Angiography: Imaging technique used to visualize the blood vessels supplying the retina at the back

of the eye using a yellowish fluorescent dye, called fluorescein

- Ophthalmoscopy: Visualizing the interior of the eye through the pupil using an instrument, called an ophthalmoscope, to evaluate for eye disease
- Pupillary Light Reflex: Evaluating the constriction and dilation of the pupils in response to light
- Refraction Testing: Aka “vision testing,” this evaluation tests vision in each eye under different lens shapes, allowing an eye care provider to write a prescription for lenses (either glasses or contacts) to properly correct a person's vision
- Retinoscopy: Using a retinoscope to determine the refractive error of the eye (how near-sighted or far-sighted it is)
- Tonometry: Tests intraocular pressure, which can be used to diagnose glaucoma
- Visual Field-Testing versus Visual Acuity Testing: Visual field testing evaluates the area visible to one eye in a fixed position, while visual acuity testing measures how sharply one can see written material at a fixed distance
- Audiology Testing: Measures hearing acuity in each ear
- Electronystagmography (ENG): Evaluates vertigo symptoms by measuring small electrical field changes within the eye as it responds to different stimuli. It detects nystagmus.
- MRI of the Internal Auditory Canal, Labyrinth, and Middle Ear (IAC): This imaging test measures movement of molecules from tissue within a magnetic field to evaluate the internal acoustic canal (IAC). The IAC is the canal that the vestibulocochlear nerve travels through on its way to the brain.
- Computed Tomography (CT) of the Sinuses: Imaging technique that uses multiple X-ray slices and computer processing to create three-dimensional images of tissue

Slides 31-33: Sensory System Treatment Procedures

- Cataract Extraction: Surgical removal of a cataract
- Cochlear Implantation: Surgical procedure during which a neuroprosthetic device is implanted to directly stimulate the auditory nerve, bypassing the cochlea
- Cryoretinopexy: Using extreme cold to seal up a torn or detached retina
- Epley Maneuver: This maneuver involves turning your head while on your side and then sitting up. It is used to treat a condition called benign paroxysmal positional vertigo (BPPV), which is caused by dislodged otoliths in the inner ear.
- Intraocular Lens Implantation: Implanting an artificial lens to replace the natural one, which might be necessary following cataract extraction or phacoemulsification
- Iridotomy: This procedure involves cutting into the iris of the eye, usually with a laser, to remove aqueous humor fluid. It is used to decrease elevated intraocular pressure from glaucoma.
- Laser-Assisted in situ Keratomileusis (LASIK): This procedure uses a laser to alter the shape of the cornea. It can at least partially reverse refractive errors caused by a misshapen eyeball, such as in myopia (eyeball grows too long) and hyperopia (eyeball grows too short), or a misshapen cornea, which causes astigmatism.
- Phacoemulsification: This procedure involves breaking up a cataract into tiny pieces with ultrasound waves. The pieces are suctioned out of the eye.
- Retinal Photocoagulation: Using a laser to reseal a torn or detached retina

Flashcard Practice:

1. Distribute the Medical Terminology Sensory Systems Printable Flashcards to each participant. The flashcards can be found at this link:
www.realityworks.com/medicalterminologykit-downloads
2. Have participants cut out the flashcards along the designated lines.
3. Have participants pair up and quiz each other on the vocabulary words and their meanings.

As an alternative independent practice method, give each participant access to the online flashcards for this lesson. Participants will read the online flashcard, click on the term/suffix and then the card will flip and reveal the definition.

Context Card Practice:

1. After participants become familiar with the vocabulary terms in this lesson, have them access the context cards. There are five for this lesson with a few different ways you can use them.
 - a. Share the card with participants using a document projector. Read the card aloud to the group while participants observe. Pair participants up and, while the card is projected, have each student read the contents aloud to each other.

Alternatively, you could have participants pair up and read the card aloud to each other. Then read the card contents to the class while students self-check their pronunciation.

- b. Divide the class into five groups. Give each group a different context card for that specific lesson content. Everyone in the small groups should read the context card aloud to another member of their group. All participants should have the opportunity to read the card. Then have each group rotate to another card. The goal is for each participant to read each of the five cards aloud to each other. At the end, the instructor will read all five context cards for the lesson to model appropriate pronunciation for the class.
- c. Share online access to the context cards for this lesson. This can be done as independent practice. It could even be assigned as work outside of class time. At the access site provided, participants read the context card aloud. Then they may click on the audio icon and the card will be read back to them. They may self-check their pronunciation of the key vocabulary terms found in the context card.

Lesson Seventeen – Sensory Systems

REVIEW: Sensory Systems Quiz

10 minutes

Purpose:

To test the participants' knowledge of the sensory systems.

Materials:

- *Sensory Systems Quiz*
- *Sensory Systems Quiz – Answer Key*

Facilitation Steps:

1. Distribute the *Sensory Systems Quiz* and have participants complete it.
2. Grade the quiz results according to the *Sensory Systems Quiz – Answer Key*.
3. Have participants review their answers and ask questions as needed.

Sensory Systems Quiz

Instructions: Select or write in the best answer for each question below.

1. True or False? (circle one) Retinoblastoma is a rare, malignant cancer that develops from melanocytes in the part of the eye that includes the iris.
2. An _____ is a procedure that involves cutting into the iris of the eye, usually with a laser, to remove aqueous humor fluid. It is used to decrease elevated intraocular pressure from glaucoma.
3. The _____ is the network of bony tubes filled with fluid located deep to the middle ear within the temporal bone of the skull.
4. The _____ is the gelatinous fluid that fills the interior of the eye behind the lens and helps maintain the overall contour and dimensions of the eyeball.
5. True or False? (circle one) An optometrist is the term for a physician who receives specialty training after medical school to treat eye diseases both medically and surgically.
6. An _____ is a benign (noncancerous) tumor that forms on the vestibular or cochlear nerves (which join to form one nerve, the vestibulocochlear nerve), which connect the inner ear to the brain.
7. _____ evaluates vertigo symptoms by measuring small electrical field changes within the eye as it responds to different stimuli. It detects nystagmus.
8. True or False? (circle one) Dysgeusia is a term that describes loss or alteration of the sensation of taste.
9. _____ is a condition thought to be related to fluid accumulation in the inner ear, resulting in symptoms that include vertigo (a sense of spinning), tinnitus (ear ringing), and hearing loss.
10. This is an inflammation of the lacrimal (tear) gland: _____

Sensory Systems Quiz – Answer Key

1. True or **False**? (circle one) Retinoblastoma is a rare, malignant cancer that develops from melanocytes in the part of the eye that includes the iris.
2. An **iridotomy** is a procedure that involves cutting into the iris of the eye, usually with a laser, to remove aqueous humor fluid. It is used to decrease elevated intraocular pressure from glaucoma.
3. The **bony labyrinth** is the network of bony tubes filled with fluid located deep to the middle ear within the temporal bone of the skull.
4. The **vitreous humor** is the gelatinous fluid that fills the interior of the eye behind the lens and helps maintain the overall contour and dimensions of the eyeball.
5. True or **False**? (circle one) An optometrist is the term for a physician who receives specialty training after medical school to treat eye diseases both medically and surgically.
6. An **acoustic neuroma (aka vestibular schwannoma)** is a benign (noncancerous) tumor that forms on the vestibular or cochlear nerves (which join to form one nerve, the vestibulocochlear nerve), which connect the inner ear to the brain.
7. **Electronystagmography (ENG)** evaluates vertigo symptoms by measuring small electrical field changes within the eye as it responds to different stimuli. It detects nystagmus.
8. **True** or False? (circle one) Dysgeusia is a term that describes loss or alteration of the sensation of taste.
9. **Meniere's disease** is a condition thought to be related to fluid accumulation in the inner ear, resulting in symptoms that include vertigo (a sense of spinning), tinnitus (ear ringing), and hearing loss.
10. This is an inflammation of the lacrimal (tear) gland: **dacryoadenitis**

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Medical Terminology Block Instructions

1. Divide participants into 10 groups or pairs. Give each group or pair one set of the Medical Terminology Blocks.
2. The blocks are color-coded by category:

Prefixes = green	27 blocks	108 prefixes
Suffixes = orange	21 blocks	84 suffixes
Root words = blue	79 blocks	316 root words
Combining vowels/symbols = yellow	4 blocks	16 vowels and symbols
Total blocks:	131 blocks	524 word parts printed
3. Separate the blocks by color.

Focusing on definitions by category:

1. Put all the prefixes, suffixes, or root words in the bag (only have one color of blocks in the bag).
2. Have participants choose one block randomly from the bag.
3. Have each participant lay the block down. Whatever term is face-up on the block is the word part that the participant must define.
4. Other participants in the group may confirm the correct definition by looking at their definition in the *Medical Terminology Student Glossary*.
5. The block on the table should be turned over so that a different word part is face-up. The next participant in the group must define that term.
6. Keep rotating through all four sides of the block and participants in the group.
7. When all terms on the block are complete, have a student choose another block from the bag.

Focusing on definitions overall:

1. Put all the blocks in the bag and have participants randomly choose one block.
2. Have each participant lay the block down. Whatever term is face up on the block is the word part that the student must define.
3. Other participants in the group may confirm the correct definition by looking at their definition in the *Medical Terminology Student Glossary*.
4. The block on the table should be turned over so that a different word part is face up. The next participant in the group must define that term.
5. Keep rotating through all four sides of the block and students in the group.
6. When all terms on the block are complete, have a student choose another block from the bag.

Building words:

1. Provide each individual, pair, or group with the *Master List of Medical Terminology Block Contents* handout.
2. Using the *Medical Terminology Student Glossary*, have one participant construct a word with the blocks.
3. The word builder challenges a participant in the group to define the term they constructed.
4. If the participant gives the correct definition, a point is earned.
5. Rotate to the next student in the group, who constructs a word of their choice.
6. The same process is followed until the winner reaches 25 points first.

Medical Terminology Curriculum

Reversing definitions:

1. Provide each individual, pair, or group with the *Master List of Medical Terminology Block Contents* handout.
2. Using the *Medical Terminology Student Glossary*, have one participant choose a word that could be constructed with the blocks. Do NOT use the blocks yet.
3. The participant will give the definition to the term they have chosen but not yet constructed.
4. The participant challenges another in the group to build the word that matches the definition they provided. If the student builds the correct term, a point is earned.
5. Rotate to the next student in the group, who chooses a term and states the definition.
6. The same process is followed until the winner reaches 25 points first.

Other ways to use the Medical Terminology Blocks:

1. Divide participants into 10 pairs or small groups, each with a set of Medical Terminology Blocks.
2. Set a timer for the desired number of minutes.
3. Using the blocks, have the pair or group build as many words as possible in the time given.
4. The pair or group that makes the most medical terms wins.

Medical Terminology Tumbling Tower Game

1. Each pair or group of participants builds a tower using all the Medical Terminology Blocks.
2. Each participant takes one block on a turn from any level of the tower (except the one below an incomplete top level). They need to correctly define the word part and place it on the topmost level to complete it. The definition must be accurate. If it is incorrect, the player keeps the block and may not place it on the topmost level.
 - a. Players may use only one hand at a time; either hand may be used, but only one hand may touch the tower at any time.
 - b. Players may tap a block to find a loose one. Any blocks moved but not played should be replaced, unless doing so would make the tower fall. The turn ends when the next player touches the tower, or after 10 seconds, whichever occurs first.
3. The game ends when any block falls from the tower (other than the block a player moves on a turn).
4. After the game ends, players should add up the number of blocks they have due to incorrect definitions. The player with the fewest blocks is the winner.

Master List of Medical Terminology

Block Contents

Combining Vowels & Symbols	Prefixes		Suffixes	Root Words			
-	a	pyret	acusic	abdomin	diplo	mast	ren
/	ab	quadr	al	acous	diverticul	medull	reticul
a	acr	radicul	ant	acoust	drom	megal	retin
e	ad	re	ar	acut	duoden	melan	rhin
i	aer	retro	asthenia	aden	dur	men	salping
ia	al	semi	blast	adip	dyn	mening	sarco
io	an	somat	clasia	adren	edema	menisc	scler
o	ana	son	cyte	aer	electro	mens	scoli
u	ante	sub	desis	alg	embry	morph	seb
	anti	super	e	algesi	encephal	muc	sedat
	auto	supra	ectomy	amni	enter	muscul	semin
	bi	sym	emia	amyl	ependyma	my	sial
	bili	syn	gen	ang	epididym	myc	sigmoid
	blast	tachy	genesis	aort	episi	myel	sinistr
	brady	ton	geusia	appendic	ergo	myring	somat
	celio	trans	gram	arch	erythr	myx	somn
	coccy	tri	graphy	arter	esophago	narc	son
	con	ultra	hemia	arteri	esthes	nas	sperm
	contra	un	ia	arthr	eti	nat	spir
	cortic	uni	iasis	articul	fasci	necr	splen
	de	vas	iatics	audi	feto	nephr	spondyl
	dextr	vasculo	ic	audito	fibr	neur	staped
	di	viro	ical	aur	flex	noct	staphyl
	dia	xer	ion	auscult	galact	nucle	steat
	dis		is	axi	gastr	ob	stom
	dys		ism	bacill	gene	ocul	strept
	ec		ist	bacteri	genito	odont	sudor
	echo		itis	balan	gingiv	olfact	supra
	ect		ity	bar	glauc	onych	synovi
	endo		ive	bin	glio	oo	tact
	epi		ize	bio	glomerul	oophor	tele
	equi		lalia	blephar	gloss	operat	tend
	eu		logist	brachi	gluc	ophthalm	teno
	ex		logy	bronchiol	glyc	opt	test

Medical Terminology Curriculum

exo	lys	bucc	gnath	orch	tetra
extra	malacia	cali	gnos	oro	thalam
gangli	megaly	calic	goand	orth	therap
hemi	meter	capnia	gravid	osche	therm
hidr	metry	carcin	gust	osphresi	thorac
home	ode	cardi	gyn	oss	thromb
homo	oid	cec	haphe	oste	thym
hydr	ologist	cellul	hem	ot	toco
hyp	ology	cephal	hemat	ov	tonsil
hyper	oma	ceps	hemeo	ovari	toxic
hypo	opia	cerebell	hepat	palat	tox
im	opsy	cerebr	heter	pancreat	trache
in	or	cervic	hist	papill	trich
infra	ory	chem	humer	path	troph
inter	osis	chol	hymen	ped	tympan
intra	osmia	cholangi	hypn	pelv	ur
irido	osteum	cholecyst	hypophys	perine	urethr
iro	paresis	choledoch	hyster	periton	urin
iso	pathy	chondr	ileo	phago	uter
juxta	penia	chorio	ilio	pharmac	uveo
kine	phagia	choroid	immun	pharyng	vagin
macr	phasia	chrom	insul	phas	ven
mal	phil	chrono	integument	phleb	ventil
mega	phobia	circum	ischem	phot	ventricul
mes	phylaxis	cirrh	jejun	phren	vertebro
meta	physis	clitor	kary	physic	vesic
micr	plasia	cochle	kerat	pituitar	vestibul
mon	plasm	col	kinesi	pla	vitre
multi	plegia	colono	kinet	plak	vulv
neo	poiesis	colp	kyph	pleur	xanth
non	porosis	conjunctiv	labi	pnea	
normo	ptosis	corne	labyrinth	pneum	
olig	rrhage	coron	lacrim	pod	
onco	rrhagia	corti	lact	ponto	
osmo	rrhaphy	cost	lamin	prim	
oxy	rrhea	counter	laparo	proct	
pachy	schisis	crani	laryng	prostat	
pan	scope	crin	lenti	pselaphes	
para	stasis	cry	lepsy	pseud	
per	thenia	cusis	leuk	psych	
peri	tion	cutane	lexia	pulm	
phaco	tocia	cyan	ligament	pulmon	
phon	tomy	cycl	lingu	pupill	
pneumat	tripsy	cyst	lip	py	

Medical Terminology Curriculum

	polio		trop	cyt	listhesis	pyel	
	poly		trophy	dacry	lith	pylor	
	post		ure	dactyl	lord	pyr	
	pre		uria	dent	lumb	rachi	
	pro		us	derm	mamm	radi	
	proteo		y	dermat	mania	rect	