uBEATS Teacher's Guide:

Medical Terminology Module #1

Basic Word Structure

This teacher guide is a supplementary text to support the use of the uBEATS Medical Terminology Module #1 – Basic Word Structure for grades 6-12.

To help students develop the knowledge necessary for an incredible future in health care, we created UNMC Building Excellence in Academics Through STEM (uBEATS), an online health science resource for Nebraska students.

UNMC uBEATS modules are short (15 minutes or less), interactive online health science modules to supplement curriculum taught in grades 6 – 12. These do not replace curriculum, but they are a supplement for teachers and students incorporating evidence-based information and UNMC expert guided material. Each module is chunked into sections with formative and summative assessments with immediate feedback provided.

Tips on how to utilize uBEATS modules:

- Internet access is required to view uBEATS modules.
    - For those who have access to one-to-one technology, modules can be used in or outside of the classroom as a topic introduction, extension, or review. For classrooms without individual student devices, modules can be used in whole group instruction. Formative assessment questions can use the teacher's preferred call-and-response method and summative assessment questions can be displayed on the board and answered individually by students or printed and distributed to students after viewing the module.

Objectives

1. Distinguish among word components: root, prefix, suffix, combining vowel, and combining form.
2. Pronounce and define parts of medical words: combining forms, suffixes, and prefixes.
3. Convert medical terms from singular to plural forms.

Introduction

If you work in a medical setting, you use medical terms every day. In addition, you hear medical terms in your daily life such as spoken in your doctor's office, reading about health issues, and making daily decisions about your own health care and the health care of your family. Terms such as arthritis, electrocardiogram, hepatitis, and anemia describe conditions and tests that may be familiar. Other medical words are more complicated, but as you work through this module, you will begin to understand them even if you have never studied biology, medicine, or science.

Prior Knowledge

Before beginning this module, the teacher should understand the Next Generation Science Standards (NGSS) featuring Three-Dimensional Learning.

Science and Engineering Practices NGSS

8. Obtaining, evaluating, and communicating information

Crosscutting Concepts NGSS

1. Patterns

Key Terms/Vocabulary

Word component, root, prefix, suffix, combining vowel, combining form, pro-, re-, retro-, sub-, trans-, aden/o, arthr/o, bi/o, carcin/o, cardi/o, -emia, -globin, -gram, -ia, -ic, pericardium, cardiologist, neurology, subcutaneous, carcinoma, hematology, hematologist, electrocardiogram, gastroenterology, hyperglycemia, singular < plural, -a < -ae, -is < -es, -ix/-ex < -ices, -on < -a, -um < -a, -us < -i.

Standards

Nebraska's College and Career Ready Standards for Science 2024 Nebraska Science Standards

- The Nebraska Department of Education has identified quality criteria in the development of content area standards. These criteria ensure that standards are grounded in a strong research base of human cognition, motivation, and teaching and learning and describe essential knowledge and skills for college, career, and civic readiness. The revised science standards, written by teams of Nebraska educators and reviewed by local and national experts, were developed with the following indicators of quality:
    - Measurable: Standards provide benchmarks against which student progress toward learning goals can be measured.
    - Appropriately challenging: Standards must build in complexity so that by the end of grade 12, students are prepared for postsecondary education and the workforce.
    - Connected: Student learning is most effective when it connects knowledge and skills to related topics and authentic applications.
    - Clearly worded: Content area standards must effectively communicate what students should know and be able to do.
    - Scaffolded: Indicators in the Nebraska content area standards scaffold student learning by sequencing connected knowledge and skills across grades so that students build and deepen understanding and ability over time.
    - Specific: Specificity assures that the language used in standards and indicators is sufficiently detailed to be accurately interpreted by educators.

National Consortium for Health Science Education **NCHSE**

- Foundation Standard 2: Communications
    - 2.2.1. Medical Terminology: Use common roots, prefixes, and suffixes to communicate information.
    - 2.3.1. Written Communication Skills: Use proper elements of written and electronic communication (spelling, grammar, and formatting).

Extensions of the lesson

To help students become more familiar with the Key Terms of this module, the teacher can use the vocabulary list for a classroom Word Wall, or integrate the vocabulary into review sessions.

As student misconceptions become apparent, the teacher may need to reinforce these concepts:

- Medical terms often appear to students as "big words" that belong to a unique language. This is because medical terminology comes from Greek and Latin root words, and basic pieces of words are combined to form complex words to describe special medical

situations. The goal is to have precise communication among medical professionals, but sometimes the patients and students wish the information would be easier to understand.

- Fortunately, the rules for constructing complex medical terms can help us to grasp the meanings. Every medical term can be broken down into smaller parts. These main components are like pieces of a puzzle, and they fit together to form a word that conveys a specific meaning.
    - Root words are the core of medical terms and usually describe the part of the body or the system being referred to.
    - Combining forms typically consist of a root word and a combining vowel, which makes it easier to connect with other word parts.
    - Suffixes are word endings that modify the meaning of the root word.
    - Prefixes are word beginnings that modify the meaning of the root word.
- When reading and interpreting medical terms, remember to follow these general rules:
    - Read the meaning of medical terms from the suffix first...then back to the beginning of the term...and then across.
    - Drop the combining vowel before a suffix beginning with a vowel. For example, gastritis... not gastroitis.
    - Keep the combining vowel between word roots, even if the second root begins with a vowel. For example, gastroenterology...not gastrenterology.
- Plurals are grammatical terms used to represent more than one thing. Plurals are usually formed by adding an "-s" or "-es" to the end of a singular form. However, some medical terms have various exceptions to this rule.

If the word ends in:	Do this:	And add an:	Example Singular:	Example Plural:
-a	keep the -a	-e	vertebra	vertebrae
-is	drop the -is	-es	diagnosis	diagnoses
-ex or -ix	drop the -ex or -ix	-ices	apex	apices
-on	drop the -on	-a	ganglion	ganglia
-um	drop the -um	-a	bacterium	bacteria
-us	drop the -us	-i	bronchus	bronchi

Enrichment

- Anyone can get confused when it comes to medical information — and for many reasons. It's easy to get lost in medical terminology and jargon, especially if English isn't your first language. Explore the website of the Mayo Clinic to learn more about understanding medical terminology. For example, see the article Medical information can be confusing.

- After completion of this learning module, a student may explore online sources to reinforce the concepts of the module. For example, open**md**.com offers resources such as Introduction to Medical Terminology.

- Teachers may search for classroom activities by investigating sites such as Tips for Teaching Medical Terminology.