uBEATS

uBEATS Teacher's Guide:

Routes of Administration

(Grades 11-12)

This teacher guide is a supplementary text to support the use of the uBEATS Routes of Administration module for grades 11-12.

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 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

- Describe the administration of drugs by way of the nose, eyes, and ears.
- Identify examples of topical administration: cream, ointment, patch.
- Differentiate among methods of drug injection: subcutaneous, intramuscular, intravenous, intraosseous.
- Discuss suppository medications.

Introduction

Drug administration is a very important part of the healthcare field. Every day, doctors and nurses administer drugs through various routes in the body. Drugs can be administered via the eyes, nose, or ears. Drugs can also be administered topically, such as a cream, ointment, or patch. Drugs can also be injected. There are various types of drug injection, including: subcutaneous injections, intravenous injection, intramuscular injection, and intraosseous injection. Lastly, drugs can also be administered via the rectum, which is known as suppository administration.

What does this matter? Why should the student care?

Proper drug administration is a vital skill in the healthcare field. Administering drugs via the correct route ensures the medication serves its intended purpose in the body. This module serves as an introductory course on drug administration, educating students on both an important aspect of the healthcare field but also information that could be useful to their personal lives in the future.

Why should the student care?

Prior Knowledge

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

Core Idea ETS1.B: Developing Possible Solutions A Framework for K-12 Science Education

- Complicated problems may need to be broken down into simpler components in order to develop and test solutions. When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. Testing should lead to improvements in the design through an iterative procedure.
- Both physical models and computers can be used in various ways to aid in the engineering design process. Physical models, or prototypes, are helpful in testing product ideas or the properties of different materials. Computers are useful for a variety of purposes, such as in representing a design in 3-D through CAD software; in troubleshooting to identify and describe a design problem; in running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs.

Science and Engineering Practices NGSS

- Planning and carrying out investigations

Crosscutting Concepts NGSS

- Structure and function

Key Terms/Vocabulary

Oral administration, nasal membrane, epithelial layer, nasal sinuses, endosinal, intrasinal, intraocular, intravitreal, ophthalmic, retrobulbar, otic administration, blood-brain barrier, drops, gels, foams, tympanic membrane, trans tympanic, intratympanic, cochlear delivery, diffusion, injection, topical administration, cream, ointment, patch, steroid, antibiotic, nicotine patch, transdermal, subcutaneous, superficial, intramuscular, intravenous, intraosseous, dehydration, insulin, lidocaine, suppository, rectum.

Science Standards

Nebraska Science Standards

SC.HSP.6 Structure and Function: Anatomy & Physiology

- Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the human body systems.

SC.HSP.3 Chemistry: Structure and Properties of Matter

- Evaluate a solution to a complex, real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

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 classroom word games during review sessions.
- To help the students see personal relevance, suggest that they reflect privately on the variety of routes of drug administration they have experienced.
- As student misconceptions become apparent, the teacher may need to reinforce these important concepts:
    - Drugs are often administered by mouth, but there are many other ways to get a medication into the body, depending on desired result and other circumstances.
    - Naloxone is a drug used to treat the effects of opioid overdose. This medication can be given intravenously, or delivered by subcutaneous injection or by intramuscular injection. It can also be sprayed into the nose.
    - Some medications are best administered by way of the eyes or ears.
    - Creams and ointments are both used for topical application to the skin. Creams are water-based and ointments are oil-based.

- Patches can deliver chemicals slowly and evenly through the skin.
- Injections can place medication at various depths below the skin, depending on the desired outcome.
- Intravenous injections allow the chemical to quickly circulate throughout the entire body.
- The deepest (farthest from the skin) injection is intraosseous, which goes into the blood vessels of the bone marrow.
- Drugs can also be administered by way of the rectum, vagina, or urethra.

Enrichment

- For information about career opportunities, see UNMC's Careers in Healthcare.
- Students should be watchful in current events for recent stories about the opioid crisis.
- To learn more about routes of administration see Drug Adminstration.
- To make connections in your community, contact local universities, medical centers, clinics, drug manufacturers, and pharmacists.