



INNOVATORS in EDUCATION

Shaping Digital Health Professions
Education in the Pandemic



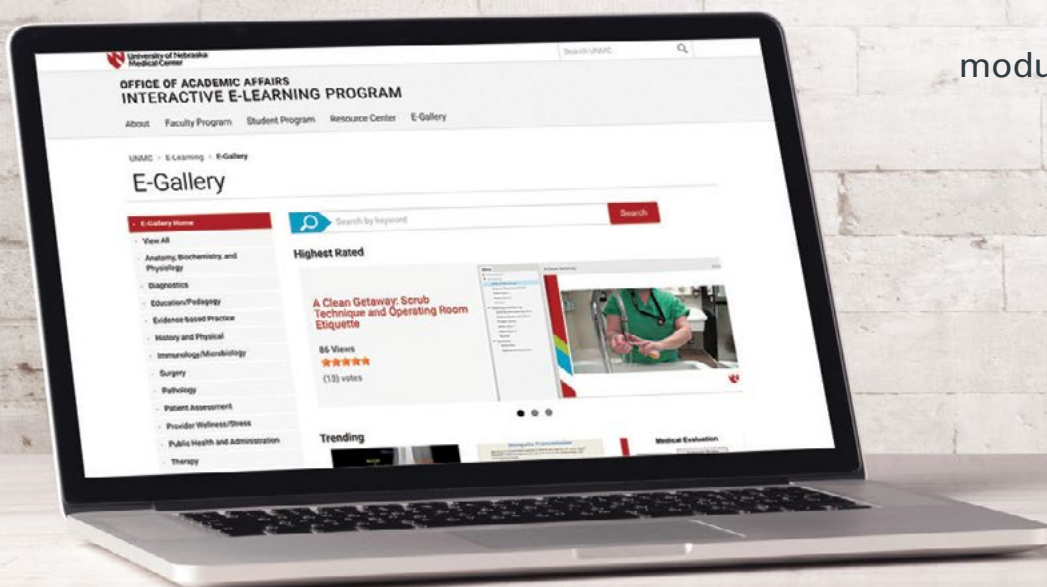
A MESSAGE FROM **H. DELE DAVIES, MD, MS, MHCM** Senior Vice Chancellor for Academic Affairs

I am proud to introduce our 2020-2021 Innovators in Education. This booklet highlights our tenth cohort in the UNMC Funded E-Learning Module Awards Program, which comprises 17 teams of 43 student developers and 35 faculty advisors from Omaha, Lincoln and Kearney.

As with other cohorts, a major success factor was the collaborative partnership between the student and faculty groups. Faculty led the projects with the commitment to incorporate the e-modules into their courses and consulted with the students to generate creative ideas. In turn, the students offered creative engagement and e-learning development skills.

The contributions and value of the e-modules created by our faculty and students are more important than ever in light of the seismic shift in our educational delivery landscape as a result of the COVID-19 pandemic.

I want to express my gratitude and appreciation for all the hard work and innovation that went into the creation of these e-learning projects. I hope you enjoy viewing them as much as I do.



THE E-GALLERY:
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modules — anytime, anywhere
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Respirators and Their Use in Agriculture

- Provides a barrier from droplets
- Not effective against smaller particles
- Disposable



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Lung diseases are the most common cause of occupational illnesses in the United States. Many occupations use respirators to protect against respiratory hazards, as required by the OSHA Respiratory Protection Standard. Although many agricultural workers are exempt from these requirements, respiratory protection is valuable for maintaining lung health.

Respirator terminology can be confusing, leading to some misuse. This module aims to discuss differences between masks and respirators and highlight some of their features. Additionally, reviewing the maintenance and storage for reusable respirators is beneficial to ensure proper working order and longevity.

This module divides the course content into sections, each addressing one of the objectives: differences between respirators and other face coverings, proper storage and maintenance, and use in agriculture. There is an assortment of interactions including matching, animation, sorting and review questions that require the application of previously presented material. These interactions enhance traditional learning methods and encourage participation. They reinforce key concepts and help gauge the learner's understanding of the presented material.

There is a summative assessment at the end of the module. Outcomes will be statistically analyzed to determine the usefulness of the module for enhancing respirator knowledge. Other metrics, such as time of completion, will also be gathered.

The module may be used in addition to lecture material or as part of a flipped learning format. It is designed for use by students and agricultural workers alike. Understanding personal protective equipment is beneficial for public health professionals working to improve workplace safety. It can also provide a short, educational session for workers who want to learn more about respirators or to just get a review.

 **CLICK HERE**
to view the module

Digital Design – Occlusal Splint



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Bruxism is a physiologic action that typically occurs overnight when patients clench or grind their teeth involuntarily. A bruxism orthotic is intended for the patient to wear overnight to distribute the occlusal forces over the entire dentition rather than on individual teeth. Orthotics can be made by students in one appointment using new 3D scanning technology coupled with state-of-the-art software and a stereolithography apparatus (resin 3D printer).

This e-module provides UNMC College of Dentistry students and faculty a step-by-step protocol to scan, design and print their own bruxism orthotic in conjunction with two courses offered to dental students: TMJ Disorders and Digital Dentistry.

Through quiz questions strategically placed throughout the module and a final summative assessment, participants shift their focus to the most important concepts/protocols as well as common mistakes in the design and printing process. At the completion of the e-module, clinicians are able to offer their patients an accurate and effective orthotic at reduced cost and time as compared to the traditional means of production.

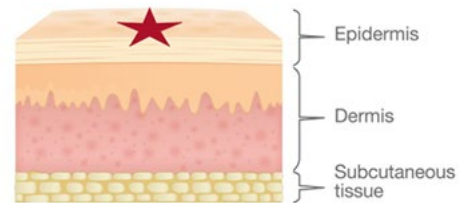
Modern dentistry continues to embrace innovative technology to provide a more effective and convenient treatment for today's patients. With the College of Dentistry's focus on providing students the opportunity to use and learn these exciting technologies, it ensures patients receive the highest level of care and students receive the highest-level education to succeed in this modern dental age.

Staging of Pressure Injuries

Epidermis

- Top/outer layer of the skin
- Thin, ranging from 0.05 mm (eyelids) – 0.1 mm (soles of feet)

The Layers of Skin



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This project was chosen to better facilitate learning to nursing students about staging of pressure injuries.

This interactive module guides learners in the staging of pressure injuries through thorough content explanation and interactive learning checkpoints.

It also covers the common terminology used when determining the stage of a pressure injury.

This interactive module is supplemental to the pressure injury content provided to semester 1 nursing students during their Patient Centered Care 1 course.

In this module, we check the learner's knowledge with interactive drag and drop, hot spot, and matching quizzes. After completion of this module, learners are able to identify the different characteristics of pressure injuries and to properly stage pressure injuries.



CLICK HERE

to view the module

TWO-PART SERIES:

- » Diabetes Medication Therapy
- » How to Use Various Diabetes Essentials

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Demonstration Video



The prevalence of diabetes continues to increase in the United States. Currently, 12.5% of the U.S. population has diabetes, and this number is projected to continue to increase.

With the prevalence of diabetes increasing, it is important for future pharmacists to understand the pharmacotherapy used to manage patients with diabetes and educate patients on diabetes medications and devices.

These two modules contain application of evidence-based pharmacotherapy, animations, quizzes and patient education videos. They also serve as a refresher for students to be able to apply this pharmacotherapy in class and in practice. The modules are a further resource for students to review drug information in didactic courses and reinforce application of the pharmacotherapy with embedded assessments.

These projects bring visual representations and interactivity to the course material and assist learners better understand the pharmacotherapy of diabetes.

CLICK HERE



to view part one



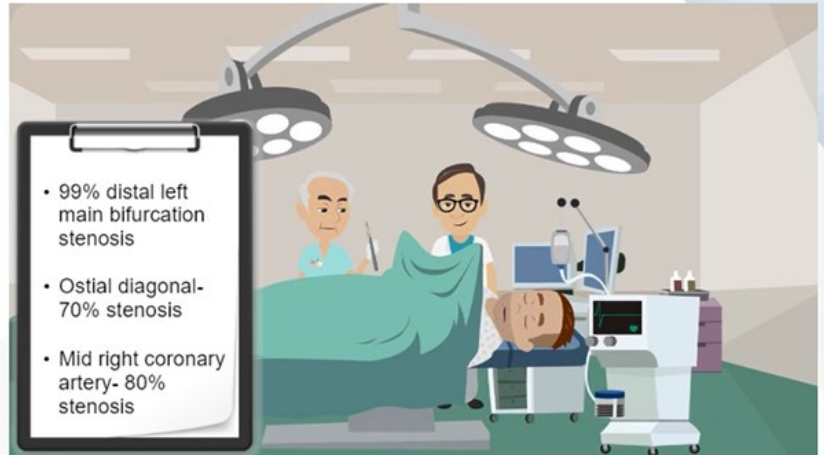
to view part two

Interprofessional Team-Based Care of a Patient with Cardiovascular Disease



Interprofessional Topic

The Operating Room



- 99% distal left main bifurcation stenosis
- Ostial diagonal- 70% stenosis
- Mid right coronary artery- 80% stenosis

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This module will be used for the Interprofessional Education Coil for the College of Medicine within the circulatory block of Phase 1 of the curriculum. Students will review the team-based interprofessional delivery of care of a patient with cardiovascular disease using a case-based approach.

This module introduces students to the roles and responsibilities of non-physician professionals who contribute to the care of the patient. This topic was chosen in order to highlight numerous members of the healthcare team that students may work with in a similar situation in the future.

The interactive module has knowledge checkpoints and a summative assessment to evaluate student learning of the module content and information that coincides with content covered in prior lectures received in class. This module is used in conjunction with an in-person activity in order to further solidify concepts.



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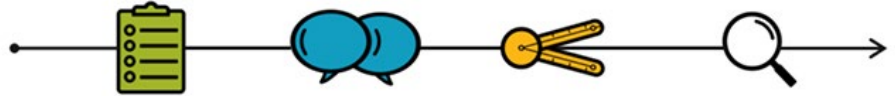
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Differential Diagnosis: Low Back Pain vs. Hip Pain

Hypothesis List

Based on the patient's objective exam, finalize your hypothesis list below. Then, click next to continue.

| Hypotheses After Objective | | |
|--|--|--|
| Most Likely Hypothesis: (2 Primary Hypotheses) | Less Likely Hypothesis: (3 Secondary Hypothesis) | Remote Hypothesis: (at least one non-MSK or hypothesis requiring referral) |
| 1. <input type="text" value="type hypothesis here"/> | 1. <input type="text" value="type hypothesis here"/> | 1. <input type="text" value="type hypothesis here"/> |
| 2. <input type="text" value="type hypothesis here"/> | 2. <input type="text" value="type hypothesis here"/> | 2. <input type="text" value="type hypothesis here"/> |
| | 3. <input type="text" value="type hypothesis here"/> | 3. <input type="text" value="type hypothesis here"/> |



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Exposure to a complex clinical case scenario introduces clinical challenges that are difficult to simulate in an academic environment. The ability to differentiate between similar presentations, such as with hip and low back pain, is the foundation to providing individualized care.

This module simulates three initial clinical evaluation processes: review of patient intake paperwork, subjective interview and objective examination. To further simulate a clinic environment, the learner creates an on-going differential diagnosis list from scratch, rather than a pre-made list of options. With these components, students can observe how a differential diagnosis list evolves and apply their knowledge to a patient case.

Throughout the module, course material is integrated into interactive learning elements, such as quizzes and text fields to promote content retention. After completing the project, a classroom discussion will review the module's main topics. Students then build off the case by developing a treatment plan for the patient's final diagnosis.

There is an exit survey with a written feedback option. Analytics, including answers to questions throughout the e-module, will be collected for research purposes.

The ever-growing need for accessible learning material sets a precedent for e-modules that prepare learners for clinical environments. Clinical readiness is assessed throughout the curriculum in the form of written and practical exams. However, there are limited opportunities to self-evaluate problem-solving skills. This module helps fulfill this need by providing a flow that is analogous to that of the clinical environment. The embedded videos and layout provide a digestible canvas for the contemporary learner.

 **CLICK HERE**
to view the module

Vascular Supply to the Central Nervous System

Vertebral Artery

Posterior Inferior Cerebellar Artery

Basilar Artery

Anterior Inferior Cerebellar Artery

Superior Cerebellar Artery

Posterior Cerebral Artery

Hover over a term to review its location!



Posterior Communicating Artery

Internal Carotid Artery

Middle Cerebral Artery

Anterior Cerebral Artery

Anterior Communicating Artery

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This e-module focuses on the vasculature of the central nervous system (CNS). In addition to enhancing comprehension of the neurovasculature, the e-module provides students with an opportunity to apply this knowledge in formative and summative assessments.

This content is covered in lecture format, but it is a challenging topic, and an e-module that allows students to review this content at their own pace is extremely valuable.

In this e-module, students are guided through key lecture content to facilitate identification of the vasculature in the CNS and recognition of the structures that are perfused by specific arteries/branches using an interactive format.

Students complete a series of integrated quiz questions to aid in self-assessment of their content knowledge. The students' ability to apply this knowledge is tested using questions focused on the identification of arteries and the region(s) of the CNS supplied by a specific artery or branch. Such questions help the students connect their understanding of the vasculature of the CNS with the relevant neuroanatomy.

The e-module utilizes digital images of gross brains, magnetic resonance angiographies, and animated cartoon images to engage the students and cultivate their understanding.

A Physicist's Primer for Effective Patient Communication



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Medical physicists are often thought of as behind-the-scenes members of the Radiation Oncology team, even stereotyped as poor communicators. However, communication skills are essential to a medical physicist's job, and there are strong ethical and clinical reasons to offer physicist-patient consultations.

This module presents the learner with the justification for physicists to consult with patients, as well as the strategies and skills they need to be effective communicators in this context. It also allows the learner to practice through an interactive simulation exercise.

The module guides the learner through essential communication skills and strategies specific to their role as a Radiation Oncology physicist, incorporating interactions that keep the learner engaged. We employ a unique assessment tool by showing the learner a physics-patient consultation and asking them to identify effective and ineffective uses of these strategies.

A branched-scenario simulation exercise is incorporated into the module, so the learner can apply their knowledge and see the potential consequences of how they communicate. The learner views a prompt from the patient such as "Does radiation hurt?" and chooses the physicist response. The response and the patient's reaction are displayed, followed by the next prompt. Through this exercise, the learner engages in a patient consultation, receiving immediate feedback about their choices and the impact they have on patient care.

This module will be incorporated into UNMC's Medical Physics Residency Program, but may also serve as a training tool for practicing physicists or to help justify the utility of physicist-patient consultations to any Radiation Oncology department.

 **CLICK HERE**
to view the module

Radiation Detection & Measurement



Interprofessional Team

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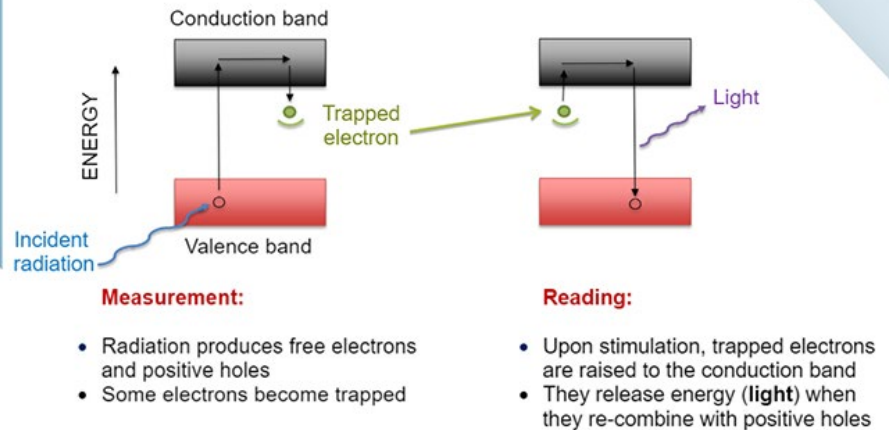
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TLD Operating Principles



Radiation can be used for the diagnosis and treatment of disease, but it is invisible to the casual observer. The measurement and detection of radiation is therefore a critical yet challenging aspect of medical physics.

This module helps learners understand how four types of radiation detectors “see” radiation, the pros and cons of each type, and how these detectors are used in a clinical setting.

Animations and demonstration videos present the material in a visually stimulating way that enhances retention of the material and shows the learner how the knowledge will be helpful in their clinical role. Interactive assessments are incorporated for each detector type to help the learner recall the properties and operating principles. At the end of the module, the learner has the opportunity to bring everything together by selecting the most appropriate device for several clinical applications and by recognizing the detector properties that contribute to these decisions.

The module is aimed at radiation therapist students and is intended to serve as an engaging alternative to a recorded lecture, allowing a flipped-classroom model where classroom time is spent on active learning activities. However, the module may also be used as a stand-alone review for medical physics and radiation oncology residents.

Results from the module assessments, in addition to a post-module survey, will be analyzed to ascertain the effectiveness of the material for each group of learners.

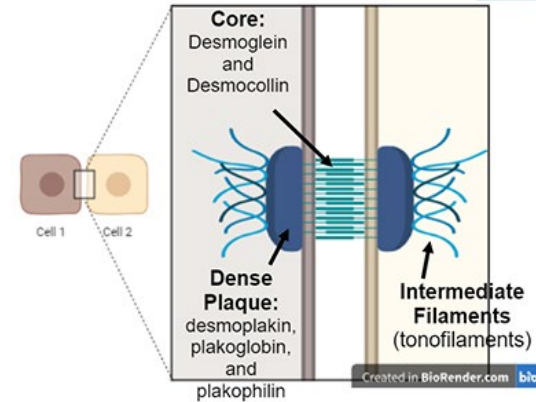
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Cellular Junctions

Desmosomes (Macula Adherens)

Functions:

- Focal junctions
- Strong cell to cell adhesion
- Resist abrasion or shear forces



Hover over the different proteins to discover its unique role.

FACULTY PROJECT DIRECTOR

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Cellular Junctions was created to provide students with a basic overview of the complex, multiprotein cellular structures between adjacent cells or between cells and the extracellular matrix collectively known as cell junctions.

Specifically, this e-module covers several junctions including tight junctions, adherent junctions, desmosomes, gap junctions, hemidesmosomes and focal adhesions. The functional and molecular components of each of these junctions, as well as some of their unique features, are discussed.

By providing relatable examples, interactive slides and frequent review questions, this e-module can serve either as the foundation that can be built upon in the traditional lecture setting or as a supplement to a traditional lecture to clarify these fundamental concepts. In addition, a summative review at the end of the module requires critical thinking and synthesis of concepts to answer higher-order application questions.

As such, almost everyone can benefit from the *Cellular Junctions* e-module including but not limited to medical students, physical therapists, physician's assistants, nurses, allied health professionals and graduate students. The concepts covered within the e-module are critical for a basic understanding of cell structure and function, an area of study applicable in many disciplines, and will contribute to a better-prepared health care professional and scientific researcher.

Non-Invasive Ventilation (NIV) and Pressure Injury (PI) Prevention

Location of Pressure Injuries due to NIV

- Where NIV contacts the skin
- Bridge of the Nose



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This project was designed to address the issue of pressure injury (PI) development in patients requiring non-invasive ventilation (NIV).

Due to COVID-19, the use of NIV has increased, leading to heightened rates of PIs. This module provides a high-level overview that focuses on key areas for PI prevention in this vulnerable population. It focuses the learner's attention on simple, evidence-based interventions that can improve patient outcomes.

Content is provided in short segments, followed by review questions to promote retention. Review questions dispersed throughout the module are designed to provide a variety of engagement methods and are utilized to reinforce learning.

The topic of NIV use is taught in a variety of programs, including undergraduate nursing, graduate nursing, respiratory therapy and medicine, although PIs associated with NIV is not frequently discussed. This module serves as an adjunct lesson to cover this topic. Knowledge of risks and implementation of the interventions discussed in this module can promote better patient satisfaction, comfort and outcomes.

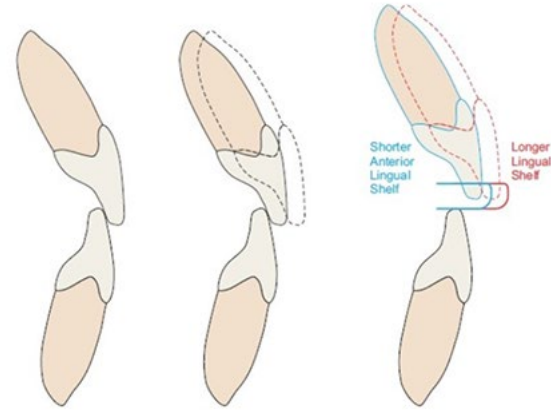
Bruxism Oral Appliances

Maxillary OR Mandibular



Maxillary

- Ability to achieve occlusal contact with all opposing teeth
- Works well with all Angle's classifications



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Diagnosis and treatment of patients exhibiting bruxism can be challenging and may be associated with many other complex conditions. It is vital to recognize appropriate treatment modalities including the selection of proper oral appliance design, fabrication materials, CDT coding and when referral to an Orofacial Pain specialist is indicated. Although oral appliances may have similar features, each of them has a different purpose. They can be designed to manage signs of bruxism or to provide an adjunctive role for other complex orofacial conditions.

This e-module is a visual and auditory interactive guide to support learners in their understanding of bruxism and associated oral appliances. It guides the learner to select the appropriate oral appliance based on patient needs. Hot buttons provide visual examples and comparisons to enhance understanding.

The content can be used as supplemental acquisition of foundational knowledge during a preclinical Temporomandibular Disorders course for dental students, as an adjunct to seminar discussions with postgraduate dental residents, and as a review for both novice and experienced clinicians prior to patient care.

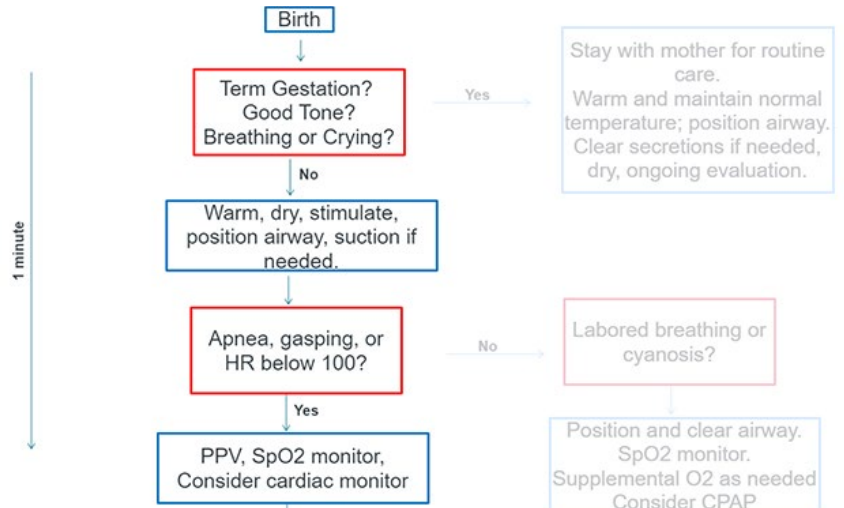
The module contains short questions/quizzes used after each topic and provides feedback to retain key points on each section. The two patient case-based summative assessments with five questions each test the learners' retention and challenge their critical thinking.

Upon completion of this e-module the learners will be able to identify signs and symptoms of bruxism more easily during their patient assessments, educate patient about bruxism and select the appropriate appliance according to their patient needs.

Neonatal Resuscitation



Interprofessional Team



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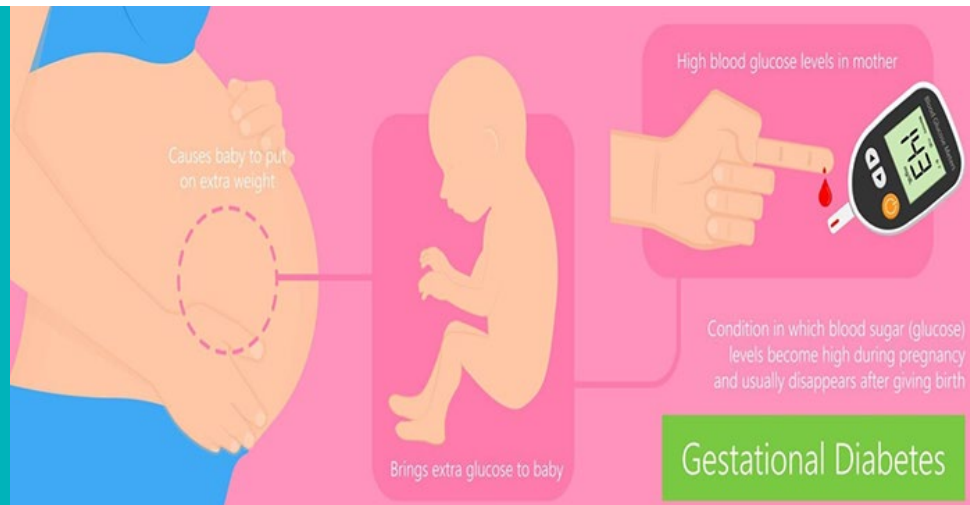
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Neonatal resuscitation is a vital part of pediatric training for both medical students and residents. Approximately 10% of 4 million babies born in the U.S. each year require resuscitation at the time of birth, which necessitates skilled attendees at every single delivery. Neonatal resuscitation has a recommended step-wise approach for care focusing on assessment, interventions and monitoring their response through positive pressure ventilation, intubation, chest compressions and administration of epinephrine.

This topic was chosen to aid pediatric residents in a refresher during their month-long rotation in the neonatal intensive care unit (NICU). Their dedicated neonatal resuscitation training occurs every two years and does not correlate with their clinical time in the NICU. This course will provide the background refresher knowledge before they do hands-on skills and simulation. Currently, the information review requires faculty time that could be better served with hands-on training, simulation and debriefing.

The assessment of the module will look for understanding of key factors of neonatal resuscitation, such as the need for positive pressure ventilation, the importance of thermoregulation, and how to identify the steps (including when to initiate chest compressions and provide epinephrine). Current training includes monitoring of neonatal simulation for learners. We plan to monitor learner's simulation performance techniques comparing learners who received a standard lecture and those who go through the e-learning module.

Prenatal Screening



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Prenatal care is a complex but important aspect of medicine that physician assistants must be proficient in for use in their practice and on certification board testing.

*The **Prenatal Screening** module uses a patient case to walk the learner through the three trimesters of pregnancy while introducing the important aspects of prenatal screening. Learning the proper screenings by trimester will help learners remember when and why each test should be conducted.*

Following each trimester, a three-question review will be completed to assess understanding of the given material. At the completion of the module, a final quiz of six questions will be completed to assess overall comprehension of prenatal screening. The goal of the questions is to offer feedback to both correct and incorrect answers, so the learner can identify gaps in their knowledge and learn why the answer was right or wrong.

This module is meant to supplement the obstetrics material discussed in lectures during the Adult and Pediatric medicine course. The use of a patient scenario with supplemental questions serves as an interactive, real-world approach in which learners can reinforce the key concepts of prenatal screenings.

Principles of Ethical Research in Clinical Trials



Interprofessional Team

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Historical Events/ The evolution of ethics in clinical research



Principles of Ethical Research in Clinical Trials is an online module covering the ethical perspectives of conducting clinical research. The module lays the foundation for conducting clinical research by providing historical background, defining clinical research ethics and principles, and highlighting their importance in today's world.

The historical events that led to the Nuremberg Code, Belmont Report, and Institutional Review Board formation will be described. Furthermore, the module will explain the three ethical principles (Beneficence, Justice, and Respect for Persons) in the Belmont Report and describe the eight ethical requirements for clinical research (collaborative partnership, social value, scientific validity, fair subject selection, favorable risk-benefit ratio, independent review, informed consent and respect for human subjects). An example will be shown, applying the ethical principles/requirements to a case study.

Students will then consider a series of case studies where they will be asked to consider which ethical principles/requirements apply to various scenarios by selecting all that apply format. At the end of the module, there will be multiple-choice questions to evaluate the students' understanding of clinical research ethics.

The module will be integrated for the course "CPH 516/BIOS 835 – Design of Medical Studies." Students in the course will work through the module before class, leaving class time for an in-depth discussion of ethical considerations to clinical research. The module will also be distributed widely through the e-module gallery and on the biostatistics website offered to anyone interested or involved in clinical research ethics with human subjects.



CLICK HERE

to view the module

Companion Technologies: Molecular Diagnostics

(Lecture 1: video game theme)



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UNMC's Cytotechnology Program has been recognized as a leader in cytotechnology education, as well as distance education. To align with the national movement, the post-baccalaureate cytotechnology degree will transition into a Master's degree in 2022. Molecular Diagnostics is a new competency within the revised standards and guidelines as it directly correlates with cytologic diagnosis.

This e-learning module is the first lecture in the *Companion Technologies: Molecular Diagnostics* series whereby the basis of theory and analysis of molecular pathology will be explored through understanding PCR and applying that knowledge to Sanger Sequencing.

To engage the learner, the module will include interaction check-points utilizing video game elements.

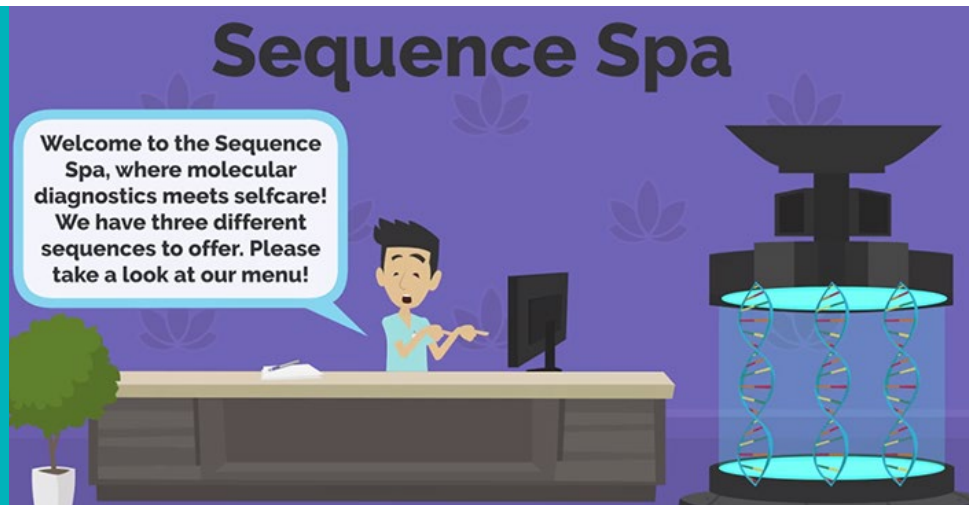
Throughout the e-module there are formative assessment questions for the learner to conceptualize one topic before moving onto the next. At the completion of the module, a summative assessment will test the learner on their retention of the material.

Along with ancillary classroom activities, the goal of this e-module is the improvement of the cytotechnology students' and pathology residents' understanding of molecular diagnostic techniques in pathology diagnosis.

This e-module will elevate the content of our Master's curriculum and benefit the online education modality for both first-year cytotechnology students as well as post-grads seeking degree completion.

Companion Technologies: Molecular Diagnostics

(Lecture 2: medical spa theme)



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This e-learning module is the second lecture in the *Companion Technologies: Molecular Diagnostics* series whereby theory and analysis of Pyro-Sequencing, Next Generation Sequencing, and informatics will be discussed in the context of a medical spa.

This relatable, engaging environment will allow students to engage with difficult concepts at their own pace as they decide which spa procedure to partake in.

Throughout the e-module there are formative assessment questions for the learner to conceptualize one topic before moving onto the next. At the completion of the module, a summative assessment will test the learner on their retention of the material.

Along with ancillary classroom activities, the goal of this e-module is the improvement of the cytotechnology students' and pathology residents' understanding of molecular diagnostic techniques in pathology diagnosis.

This e-module will elevate the content of our Master's curriculum and benefit the online education modality for both first-year cytotechnology students as well as post-grads seeking degree completion.

This publication is produced by the
Office of Interactive E-Learning at the
University of Nebraska Medical Center.

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