

Edward Via College of Osteopathic Medicine

MED 8000

Foundations of Clinical Medicine

Academic Year 2023 – 2024 – Spring Semester

COURSE SYLLABUS

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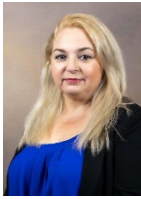
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I. Course Description

The Foundations of Clinical Medicine (FCM) course provides a comprehensive curriculum designed to assist students in improving their mastery of core fundamental concepts applicable to clinical rotation. FCM emphasizes diagnostic medicine, physician-patient communication, research basics and responsible opioid prescribing.

II. Course Design

A. Educational Modules

Online educational modules using cases and other formats of delivery are used. Each student must complete all designated components of each module to assure the expected basic content or medical knowledge has been acquired during the course.

III. Credits

MED 8005 - 2 credit hours

IV. Course Grading and Requirements for Successful Completion

A. FCM Requirements

- **Clinically Relevant Modules**
 - Completion of all 11 Clinically relevant Modules and associated content.
 - Completion of a 50 question, time-limited (2 hour) multiple choice “open book” exam in an unproctored setting in ExamSoft. Each student must complete the exam on their own. The content of the exam is derived from these materials A grade of 70% or better is passing.
- **AMA Ed Hub Opioid Therapy and Pain Management Modules**

Completion of the 5 assigned AMA Ed Hub Opioid Therapy and Pain Management Modules, completion of the module quizzes, and submission of the certificate of completion for each module to CANVAS.

 - Register and create a free account at: <https://fssso.ama-assn.org/login/account/login>
 - Completion certificates must be submitted to Canvas by the end of the course at: <https://canvas.vcom.edu/login/ldap>
- **CITI Training: Protection of Human Research Subjects and OSHA Bloodborne Pathogens**

All students must complete CITI Training. Students must complete the Protection of Human Research Subjects and OSHA Bloodborne Pathogens CITI Training Course and submit their

certificates of completion to CANVAS. Follow the steps below to create an account affiliated with VCOM, which will allow you to complete CITI Training.

- By following the link below, you will access the CITI Training website where you will register for an account. Once you have reached this link, perform the following actions to create an account affiliated with VCOM:
 - <https://www.citiprogram.org>
 - Click “Register” on the top right side of the page.
 - Under “Select Your Organization Affiliation,” type “Edward Via College of Osteopathic Medicine” in the box and choose this selection from the drop-down menu.
 - Check the box to agree to the Terms of Service and Privacy Policy.
 - Check the box to affirm that you are an affiliate of VCOM.
 - Click, “Create a CITI Program account”.
 - Complete the Personal Information section, taking care to enter data into all of the required fields. Click “Continue to Step 3.”
 - Create your Username, Password and Security Question and Answer. Click “Continue to Step 4.”
 - If you have an ORCID iD and wish to connect, you may do so, but this is not a requirement and can be done at any time. Enter applicable demographic data into the required fields and click “Finalize Registration.”
 - Complete CE Credit Status request and then click “Submit.”
 - The Affiliate with an Institution page requests information required by VCOM as part of the member profile affiliation. Once complete, click “Next.”
 - Select Curriculum: In this section, **select the Protection of Human Research Subjects course and the OSHA Bloodborne Pathogens course**. If you wish to add other courses, you may at any time; however, these are the only training courses required. Note that some Questions require answers (marked with an asterisk). Once done, click “Submit.”
 - You will now see the notice that you are enrolled in your selected courses and your registration is complete.
 - You will see your “Courses Ready to Begin” list and the “Start Now” button.
 - Note that a course does not need to be completed all at one time. There are 19 modules total in this course, and your progress will be saved whenever you exit.
 - You must achieve an average score of at least 80% on all quizzes to pass the course.
 - Once complete, submit your certificates of completion to Canvas by the end of the course at: <https://canvas.vcom.edu/login/ldap>
 - If you have any questions about registration or course selection, please contact Eryn Perry, eperry@vcom.edu

- **Research Primer Modules**

Completion of all 16 VCOM Research Primer Modules. The modules are located on [VCOMTV](#) under the following pathway: VCOM-CC > Foundations of Clinical Medicine > Research Modules. A report will be generated from VCOMTV to ensure completion by each student. To be sure you get credit for completion, do not use an external accelerator to view the modules. Viewing through an external accelerator will show as incomplete and you will not receive credit for having completed the modules as required.

- Introduction to Research
- Types of Research
- Research Yield
- Research Ethics and Compliance
- Background Research and Literature
- Developing a Hypothesis

- Developing Your Research Plan With Your Research Mentor
 - Conducting a Research Project
 - Research in Clinical Practice
 - How to Write a Scientific Manuscript
 - Scientific Publishing
 - How to Give an Effective Presentation
 - Scientific Meetings
 - Journal Club and Lectures
 - Grantsmanship
 - Commercializing Research
- **Aquifer Radiology**

Completion of 10 of the 21 available Aquifer Radiology cases and associated knowledge assessment questions. As this content is considered pertinent for COMLEX Level 2 CE, students should select cases in the areas in which they feel particularly weak. Students are encouraged to complete more than 10 modules depending upon their needs and interests.

 - Progress will be reviewed by the online administrator to ensure students have met the completion requirements.
 - To get full credit for each case completed, please be sure to click forward to the page at the end of the case that states “Summary of Your Case Session” in the upper left-hand corner.
 - Register for the Aquifer cases at: <https://www.aquifer.org>
Your email has been pre-loaded into Aquifer, and you should have received an email about how to set up your account.
 - If you are a first-time user:
 - Click “Sign in” in the top right corner.
 - Enter your institutional email address in the email box. Then click on the “Register” button at the bottom of the page.
 - You will be sent an email with a link to complete registration. Upon receipt of the registration email, click on the link “Click Here”. You will then be brought to the profile setup page. An email will be sent to you. Follow the instructions in the email to setup your account.
 - You will be asked to fill in your profile information and set up a password (8 character minimum). Once you have completed your user profile and created a password, you will receive a welcome email with links to useful information and guides. You would also be logged into the Aqueduct learning management system.
 - Once your profile is completed successfully, you will be brought to your institution’s Course page.
 - You will also receive a “Thank you for registering with Aquifer” email with links to tools, resources, and Aquifer news.
 - If you are a returning user:
 - Click “Sign in” in the top right corner.
 - Please log in with your institutional email and account password and click “Sign In”.
- **HIPAA Basics**

Completion of the HIPAA Basics course and associated knowledge assessment questions from Vector Solutions. Students will receive an email from Vector Solutions with a link and instructions for completing the course. Students must submit their completion certificate to CANVAS.

- **Residency Preparation**

Completion of the two Residency Preparation modules in VCOMTV (link provided in Canvas). A report will be generated from Canvas to ensure completion by each student. To be sure you get credit for completion, do not use an external accelerator to view the modules. Viewing through an external accelerator will show as incomplete and you will not receive credit for having completed the module as required.

- **Fatigue Mitigation**

Completion of the Fatigue Module. Students will complete a quiz in Canvas where they attest to reviewing the module in order to receive credit for completion of this component of the course.

C. Grading

FCM is a Pass/Fail course. Students must complete all course requirements to pass the course. The following requirements must be met to pass FCM:

FCM Course Item	Grade Required
11 Clinically Relevant Modules	Pass
Clinically Relevant Modules Multiple Choice Exam	Minimum of 70%
5 AMA Ed Hub Opioid Therapy and Pain Management Modules	Pass
16 Research Primer Modules	Pass
CITI Training: Protection of Human Research Subjects	Pass
CITI Training: OSHA Blood Borne Pathogens	Pass
10 Aquifer Radiology Cases	Pass
HIPAA Basics Module	Pass
2 Residency Preparation Modules	Pass
Fatigue Module	Pass

D. Remediation

Students who fail the course will be referred to the Promotion Board. No grade will be changed unless the Office of Clinical Affairs certifies to the Registrar, in writing, that an error occurred or that the remediation results in a grade change.

- **Failure of the Clinically Relevant Modules Exam**

Students must pass the Clinically Relevant Modules 50-question exam with a C (70%) or better to receive a passing grade for this component of FCM. Students who fail the open-book exam will be informed of the questions they got wrong and will have 2 hours to correct their answers and pass the exam within the remediation period (e.g., students do not have to retake the whole exam, only correct their wrong answers). If the student successfully passes the remediation exam with a C (70%) or better, they will receive a “P” grade for the exam. If the student fails to remediate the exam as described above, an “F” grade is recorded for the exam grade, and the student will be brought before the Promotion Board.

- **Failure of the Course**

If a student fails to complete any portion of the course or fails to earn a C (70%) or better on the Clinically Relevant component of FCM, the student will receive an “F” grade for the course and will be brought before the Promotion Board. If the student is allowed to repeat the course, all components of the course must be repeated. In this case, the “F” grade remains the permanent grade for the initial course and the student will receive a new grade for the repeated course. The grade will be recorded in a manner that designates that it is a repeated course (eg. R-pass).

V. Academic Expectations

Grading policies, academic progress, and graduation requirements may be found in the *College Catalog and Student Handbook* at: <http://www.vcom.edu/handbooks/catalog/index.html>

A. Prohibited Use of External Accelerators

At times, there may be lectures on VCOMTV where completion will be documented as part of passing the course (these will be clearly indicated in the course syllabus). For these lectures, the use of an external accelerator is prohibited, as VCOMTV is unable to track completion through these programs. If a student uses an external accelerator for these assignments, they will be required to re-watch the lecture(s) in VCOMTV within the required timeline. Failure to document a student's completion of these assignments within the required timeline due to use of an external accelerator may result in failure of the course.

VI. Professionalism and Ethics

It is advised that students review and adhere to all behavioral policies including attendance, plagiarism, dress code, and other aspects of professionalism. Behavioral policies may be found in the *College Catalog and Student Handbook* at: <http://www.vcom.edu/handbooks/catalog/index.html>

A. VCOM Honor Code

The VCOM Honor Code is based on the fundamental belief that every student is worthy of trust and that trusting a student is an integral component in making them worthy of trust. Consistent with honor code policy, by beginning this exam, I certify that I have neither given nor received any unauthorized assistance on this assignment, where "unauthorized assistance" is as defined by the Honor Code Committee. By beginning and submitting this exam, I am confirming adherence to the VCOM Honor Code. A full description of the VCOM Honor Code can be found in the *College Catalog and Student Handbook* at: <http://www.vcom.edu/handbooks/catalog/index.html>

VII. Syllabus and Rotation Schedule

Please use this syllabus as a guide, paying particular attention to the learning objectives as an outline of what you are expected to know for each topic/module. Refer to the rotation calendar for specific dates of exams.

The faculty of the course will make every effort to adhere to the syllabus and rotation schedule; however, the Office of Clinical Affairs reserves the right to make changes to the syllabus; including changes to examinations, quizzes, modules, homework, or other assignments; and/or the schedule with as much advance notice as possible. These changes will be communicated to the students in writing via Canvas or email.

VIII. FCM Modules

A. Clinically Relevant Modules

One of the goals of FCM is to provide students with an overview of clinical medicine during third year. These modules allow students to gain an understanding of the appropriate use of diagnostic technology available to them and to ensure they are using this technology in a safe, efficient and evidence-based manner. These modules are a collaborative representation from different medical societies addressing different topics relevant within the medical field.

Students must complete all 11 clinically relevant modules listed below. The end-of-FCM exam will come directly from the below objectives based on the recommendations from each specialty society and their accompanying material. The exam will be administered in ExamSoft. Students must pass the exam with a grade of 70 or better.

1. ABIM Foundation

Reading Assignments:

- [The Primary Care Office Visit: Antibiotics](#)
- [Promote Patient-Physician Conversations to Improve Patient Engagement and Choose Appropriate Care](#) (pdf document in Canvas)
- [Communicating About Overuse with Vulnerable Populations](#) (pdf document in Canvas)
- [Unnecessary Tests and Procedures in the Health Care System](#) (pdf document in Canvas)

Learning Objectives:

- i. Articulate strategies to implement Choosing Wisely® conversations.
- ii. Identify the structural and personal barriers to implementing the Choosing Wisely® recommendations in the care of patients.
- iii. List the reasons physicians should order tests and prescribe medications utilizing the best evidence available.
- iv. Discuss 4 basic communication skills utilized in explaining and reassuring patients regarding the physician's decision to utilize or not utilize certain tests or treatments following evidence-based medicine.
- v. Navigate a simulation case patient encounter about antibiotic prescribing.

2. American Academy of Allergy, Asthma, and Immunology

Video and Reading Assignments:

- [Hives \(Chronic Urticaria\) & Dermatographism](#)
- [Allergy Testing](#)
- [Chronic Hives](#)
- [Allergy Shots \(Immunotherapy\)](#)
- [Asthma Overview](#)
- [Sinusitis](#)
- [Allergic Rhinitis](#) (pdf document in Canvas)

Learning Objectives:

- i. Discuss the AAP criteria for diagnosis, treatment and management of allergic rhinitis in the pediatric population?
- ii. Discuss AAAAI guidelines for the appropriate use of diagnostic tests in the evaluation of allergies.
- iii. Explain the etiology of most cases of sinusitis and recall the AAAAI recommendations regarding treatment and imaging for uncomplicated acute rhinosinusitis.
- iv. Understand the etiology and evaluation of patients presenting with chronic urticaria.
- v. Discuss and apply the AAAAI recommendations for the use of immunoglobulin therapy for recurrent infections.
- vi. Identify the appropriate diagnostic test that should be utilized for the diagnosis of patients suspected of having asthma.

3. American Academy of Family Physicians

Reading Assignments:

- [Cervical Cancer Screening](#) (pdf document in Canvas)
- [Exercise Stress Testing: Indications and Common Questions](#) (pdf document in Canvas)
- [Mechanical Low Back Pain](#) (pdf document in Canvas)
- [Osteoporosis](#) (pdf document in Canvas)
- [Osteoporosis: Common Questions and Answers](#) (pdf document in Canvas)
- [Acute Rhinosinusitis in Adults](#) (pdf document in Canvas)

Learning Objectives:

- i. Review and apply the AAFP recommendations for the use of imaging for acute back pain.
- ii. List the red flags associated with back pain that indicate a potentially serious cause and should prompt the consideration for imaging.
- iii. Identify the indications for the utilization of antibiotics for acute sinusitis according to the AAFP recommendations.
- iv. Discuss and summarize the indications for the use of DEXA scanning to screen for osteoporosis. Identify the groups of patients for which DEXA is not cost effective or indicated.
- v. List the recommendations for the prevention of osteoporosis.
- vi. Summarize the AAFP guidelines for the utilization of ECG or other cardiac screening tests for low-risk patients without symptoms.
- vii. List the potential harms of false-positive tests when ECGs or other cardiac screening exams are utilized in low-risk patients.
- viii. Discuss and summarize the AAFP indications for the use of Pap smears and HPV testing. Identify the groups of patients for which Pap smears and HPV testing are not indicated.

4. American Academy of Pediatrics

Reading Assignments:

- [The Common Cold and Decongestant Therapy](#) (pdf document in Canvas)
- [Seizures in Children](#) (pdf document in Canvas)
- [Pediatric Head Trauma: A Review and Update](#) (pdf document in Canvas)
- [Upper Respiratory Tract Infections](#) (pdf document in Canvas)
- [Pediatric Outpatient Treatment Recommendations](#)

Learning Objectives:

- i. Review and apply the AAP recommendations for the use antibiotics in the treatment of URI's.
- ii. Review and apply the AAP recommendations for the use of cough and cold medicines for the treatment of respiratory illnesses in children < 4 years of age.
- iii. Discuss the potential harm in the use of cough and cold medicines in young children.
- iv. List alternative treatments to cough and cold medicines in the management of symptoms associated with respiratory illnesses.
- v. Review and apply the AAP recommendations for the use of CT scanning in the evaluation of head injuries.
- vi. Summarize and apply the PECARN criteria for determining the need for CT scanning in children <2 and children > 2.
- vii. List the red flags associated with the need for head CT in pediatric patients.
- viii. Review and apply the AAP recommendations to the approach to a child with seizures.
- ix. Discuss and apply the AAP recommendations for the utilization of CT in the routine evaluation of abdominal pain in pediatric patients.

5. American College of Cardiologists

Reading Assignments:

- [Chest Pain Evaluation: Updated Guidelines from the AHA/ACC](#) (pdf document in Canvas)

Learning Objectives:

- i. Review and apply the ACC recommendations for the use of stress or non-invasive imaging in the evaluation of patients.
- ii. Identify various clinical decision pathways for the evaluation of chest pain.
- iii. Determine when CCTA should be utilized versus stress testing.

6. Review of ECG

Video Assignment: [Understanding the ECG: A Comprehensive Course \(Parts 1 - 4\)](#)

Learning Objective:

- i. Review basic electrophysiological concepts.
- ii. Review methods in systematic interpretation of ECGs.
- iii. Review arrhythmias, special disease states, and other ECG changes.

7. American College of Physicians

Reading Assignments:

- [Cardiac Screening with Electrocardiography, Stress Echocardiography, or Myocardial Perfusion Imaging: Advice for High-Value Care from the American College of Physicians](#) (pdf document in Canvas)
- [Diagnosis of Deep Venous Thrombosis and Pulmonary Embolism](#) (pdf document in Canvas)
- [Perioperative Testing Before Noncardiac Surgery: Guidelines and Recommendations](#) (pdf document in Canvas)
- [Efficient Approach to the Evaluation of Syncope](#) (pdf document in Canvas)
- [Ruling Out Pulmonary Embolism in the Primary Care Setting](#) (pdf document in Canvas)
- [Syncope: Evaluation and Differential Diagnosis](#) (pdf document in Canvas)

Learning Objectives:

- i. Utilize the risk calculators and risk factors to determine utility of screening exercise electrocardiogram testing for patients who are asymptomatic and at low risk for coronary heart disease.
- ii. Apply the ACP recommendations for exercise electrocardiography in asymptomatic and low-risk patients.
- iii. Summarize and apply the European Society of Cardiology and 2017 American College of Cardiology/American Heart Association/Heart Rhythm Society recommendations for the use of brain imaging in simple syncope.
- iv. Define simple syncope or uncomplicated faint or situational syncope.
- v. Utilize the Wells score to define pretest probability for venous thromboembolism.
- vi. Apply the American Academy of Family Physicians recommendation against using imaging studies to diagnose DVT or PE in patients with low clinical probability.
- vii. Summarize the indications for a pre-operative chest x-ray according to the American College of Radiology, American College of Physicians, and American Academy of Family Physicians.
- viii. Utilize communication concepts to aid in implementation of the recommendations.

8. American College of Radiology

Reading Assignments:

- [Tintinalli's Emergency Medicine Chapter 56 and 165](#) (ebook in VCOM electronic library)
- [Avoid Using CT Scan as the First-Line Imaging Modality in the Evaluation of Suspected Appendicitis in Children. Ultrasound Should be Done First with a CT Scan or MRI Considered in Equivocal Cases](#)
- [American College of Radiology ACR Appropriateness Criteria – Suspected Appendicitis: Child](#)
- [Perioperative Testing Before Noncardiac Surgery: Guidelines and Recommendations](#) (pdf document in Canvas)

Learning Objectives:

- i. Review and apply the ACR recommendations for the use of imaging in the evaluation of patients presenting with uncomplicated headaches.

- ii. List the red flags associated with headache that indicate a potentially serious cause and should prompt the consideration for imaging.
- iii. Summarize the recommendations regarding the evaluation and work up of patients presenting with suspected pulmonary embolus.
- iv. Identify the role of D-dimer testing in the evaluation of suspected pulmonary embolus.
- v. Discuss and apply the ACR recommendations for the utilization of admission or preoperative chest x-rays for ambulatory patients.
- vi. List the 2 situations/conditions in which preoperative and admission chest x-rays should be utilized.
- vii. Summarize and apply the ACR guidelines for obtaining imaging in children with suspected appendicitis.

9. American Gastrointestinal Association

Reading Assignments:

- [AGA Clinical Practice Update on Approach to the Use of Noninvasive Colorectal Cancer Screening Options: Commentary](#) (pdf document in Canvas)
- [American Gastroenterological Association Medical Position Statement on the Management of Gastroesophageal Reflux Disease](#) (pdf document in Canvas)
- [Clinical Guidelines Update on the Diagnosis and Management of Barrett's Esophagus](#) (pdf document in Canvas)
- [The Risks and Benefits of Long-term Use of Proton Pump Inhibitors: Expert Review and Best Practice Advice from the American Gastroenterological Association](#) (pdf document in Canvas)

Learning Objectives:

- i. Summarize the AGA recommendations for the pharmacological treatment of gastroesophageal reflux disease.
- ii. List and discuss the risks of short- and long-term proton pump inhibitor (PPI) use as described in the AGA recommendations.
- iii. Review and apply the AGA colorectal cancer screening recommendations following a high-quality negative colonoscopy.
- iv. Review and apply the AGA recommendations following the removal of adenomatous polyps during a high-quality colonoscopy.
- v. Apply the AGA recommendations for the follow-up surveillance of patients diagnosed with Barrett's esophagus.
- vi. Describe the AGA's recommended approach to the use of CT scanning in patients diagnosed with functional abdominal pain.

10. American Society of Nephrology

Reading Assignments:

- [Effects of a More Selective Arteriovenous Fistula Strategy on Vascular Access Outcomes](#) (pdf document in Canvas)
- [Considerations in the Optimal Preparation of Patients for Dialysis](#) (pdf document in Canvas)
- [Five Things Physicians and Patients Should Question](#) (pdf document in Canvas)
- [PICC Line Management Among Patients with Chronic Kidney Disease](#) (pdf document in Canvas)

Learning Objectives:

- i. Summarize and apply the ASN recommendations for routine cancer screening in dialysis patients.

- ii. Review and apply the ASN recommendations for the use of erythropoiesis-stimulating agents (ESA's) in patients with chronic kidney disease.
- iii. Summarize and apply the ASN recommendations for the use of NSAIDs.
- iv. Describe the ASN recommendations in regard to the utilization of PICC lines in patients with stage III-IV CKD.
- v. List the benefits of the use of an AV fistula over a central venous catheter for dialysis.
- vi. Describe the importance of a shared decision-making process between patients, their families and their physicians in regard to the initiation of chronic dialysis.

11. American Society of Nuclear Cardiology

Reading Assignments:

- [Patient-Centered Imaging](#) (pdf document in Canvas)
- [Contemporary Cardiac SPECT Imaging – Innovations and Best Practices: An Information Statement from the American Society of Nuclear Cardiology](#) (pdf document in Canvas)
- [Appropriate Use Criteria for Cardiac Radionuclide Imaging](#) (pdf document in Canvas)
- [The Role of Radionuclide Myocardial Perfusion Imaging for Asymptomatic Individuals](#) (pdf document in Canvas)

Learning Objectives:

- i. Review and apply the ASNC recommendations for the use of stress imaging in the evaluation of patients without cardiac symptoms.
- ii. List the high risk findings that ASNC states indicate the need for Myocardial Perfusion Imaging for coronary disease.
- iii. Summarize and apply the ASNC recommendations for the performance of radionuclide imaging in the routine follow up of asymptomatic patients.
- iv. Summarize and apply the ASNC recommendations for the performance of cardiac imaging in patients who are at low risk for cardiac disease. List the 2 exceptions to their recommendations that would warrant testing.
- v. Review and apply the ASNC recommendations for the performance of stress or non-invasive imaging in the pre-operative assessment of patients scheduled to undergo low or intermediate-risk, non-cardiac surgery.
- vi. Summarize and apply the ASNC recommendations regarding methods for reducing radiation exposure in cardiac imaging.

B. AMA Ed Hub Opioid Therapy and Pain Management Modules

In an era when prescription drug abuse is the nation's fastest growing drug problem, it is imperative that all medical students understand the critical role physicians play in reducing prescription drug misuse and abuse. While many prescription drugs have the great potential to relieve pain and suffering, they can also lead to adverse effects, abuse, diversion and addiction. A 2015 report from federal health officials shows that 92 million American adults used a prescription opioid, more than 11 million reported to the misuse of opioids and nearly two million report addiction. It has been shown that even brief interventions by primary care providers have proven effective in reducing or eliminating substance abuse in people who abuse drugs but are not yet addicted. In addition, prescription drug abuse education helps to promote awareness of this growing problem among prescribers to prevent inappropriate over prescription of these medications.

This component of the FCM curriculum will provide students with information regarding the guidelines for prescribing opioids for chronic pain. Students must complete the 5 assigned educational modules, complete the quiz for each module, and submit the certificate of completion for each module to Canvas.

1. Understanding Pain and Conducting a Pain Assessment: Practical Guidance for Pain Management

Online Module: <https://edhub.ama-assn.org/interactive/17579464>

Learning Objectives:

- i. Define and discuss classifications of pain.
- ii. Describe strategies for assessing pain.
- iii. Explain the rationale and approaches for mental health assessment as it relates to pain.

2. Using Non-Opioid Medications: Practical Guidance for Pain Management

Online Module: <https://edhub.ama-assn.org/interactive/17579479>

Learning Objectives:

- i. Identify non-opioid medication options for pain management.
- ii. Discuss mechanism of action, interactions, and recommendations for NSAIDs, acetaminophen, SNRIs, antiepileptics, antidepressants, and topical agents for pain management.

3. Treating Older Adults: Practical Guidance for Pain Management

Online Module: <https://edhub.ama-assn.org/interactive/17579490>

Learning Objectives:

- i. Describe management strategies for common side effects and risks associated with opioid use. Describe strategies for assessing and managing pain in older adults;
- ii. Discuss treatment options for managing pain in older patients, including non-pharmacologic treatments, non-opioid pharmacologic treatments, and opioids.

4. Treating Common Pain Conditions: Practical Guidance for Pain Management

Online Module: <https://edhub.ama-assn.org/interactive/17579505>

Learning Objectives:

- i. Define the characteristics of common chronic pain conditions.
- ii. Describe ways to diagnose common chronic pain conditions.
- iii. Identify management strategies for treating common chronic pain conditions.

5. Using Opioids Safely: Practical Guidance for Pain Management

Online Module: <https://edhub.ama-assn.org/interactive/17579512>

Learning Objectives:

- i. Discuss factors that contribute to the epidemic of opioid morbidity and mortality.
- ii. Describe the purpose and practices of universal precautions for opioid prescribing.
- iii. Explain the classification of opioid analgesics and their pharmacologic effects.
- iv. Describe management strategies for common side effects and risks associated with opioid use.

C. CITI Training: Protection of Human Research Subjects

Students must complete the Protection of Human Research Subjects CITI Training Course and submit their certificate of completion to CANVAS.

1. Belmont Report and Its Principles

Online Module: [Belmont Report and Its Principles](#)

Learning Objectives:

- i. Identify the three principles discussed in the Belmont Report.
- ii. Apply the principles to human subjects research.

2. History and Ethics of Human Subjects Research

Online Module: [History and Ethics of Human Subjects Research](#)

Learning Objectives:

- i. Discuss the historical basis for regulations governing human subjects research.
- ii. Identify the ethical principles underlying research involving human subjects.
- iii. Explain how the U.S. federal regulations are designed to implement those ethical principles and preserve the public trust.
- iv. Discuss the current regulatory environment for human subjects research.

3. Basic Institutional Review Board (IRB) Regulations and Review Process

Online Module: [Basic Institutional Review Board \(IRB\) Regulations and Review Process](#)

Learning Objectives:

- i. Describe the role, authority, and composition of the IRB.
- ii. List the IRB requirements for conducting research involving human subjects.
- iii. Describe the types of IRB review.
- iv. Describe the process of working with the IRB.
- v. Identify other regulations and regulatory groups that require compliance based on the type of research being conducted.

4. Informed Consent

Online Module: [Informed Consent](#)

Learning Objectives:

- i. Describe the requirements for complying with informed consent regulations.
- ii. Describe the process for obtaining informed consent.
- iii. Discuss when subjects may be vulnerable to undue influence or coercion.
- iv. Describe the regulations for waiving informed consent.

5. Social and Behavioral Research (SBR) for Biomedical Researchers

Online Module: [Social and Behavioral Research \(SBR\) for Biomedical Researchers](#)

Learning Objectives:

- i. Describe some of the areas of study where SBR techniques are used.
- ii. Discuss the types of data collection associated with SBR.
- iii. Identify the risks and benefits that are unique to SBR.

6. Records-Based Research

Online Module: [Records-Based Research](#)

Learning Objectives:

- i. Discuss the risks associated with conducting records-based research.
- ii. Identify the types of review that apply to records-based research.

7. Genetic Research in Human Populations

Online Module: [Genetic Research in Human Populations](#)

Learning Objectives:

- i. Discuss the risks associated with genetic and genomic research.
- ii. Describe the difference between privacy and confidentiality with genetic and genomic research.
- iii. List the information in genetic and genomic research that should be disclosed to subjects during the consent process.
- iv. Identify the risks and regulatory issues relevant to research using biospecimens.

8. Populations in Research Requiring Additional Considerations and/or Protections

Online Module: [Populations in Research Requiring Additional Considerations and/or Protections](#)

Learning Objectives:

- i. Describe the different sources of vulnerability.
- ii. Distinguish between vulnerable populations in research who are specifically protected in the federal regulations and those who are not.
- iii. Identify additional protections for vulnerable populations who are not specifically protected in the federal regulations.
- iv. Explain the effect on autonomy, beneficence, and justice that may arise due to research on vulnerable individuals or groups.

9. Research Involving Prisoners

Online Module: [Research Involving Prisoners](#)

Learning Objectives:

- i. Describe the regulatory definition of a prisoner.
- ii. List the categories of research permitted with prisoners.
- iii. Identify the IRB membership requirements required for approval of research with prisoners.
- iv. Describe the items the IRB must determine in order to approve research involving prisoners.

10. Research Involving Children

Online Module: [Research Involving Children](#)

Learning Objectives:

- i. Describe the major historical events that influenced how research with children as subjects is currently conducted.
- ii. Identify the types of research with children permitted under 45 CFR 46, Subpart D.
- iii. Discuss the assent and informed consent requirements for different types of studies involving children.
- iv. Recognize the current efforts by the FDA to ensure the inclusion of children in studies on the safety and efficacy of new drugs.

11. Research Involving Pregnant Women, Fetuses, and Neonates

Online Module: [Research Involving Pregnant Women, Fetuses, and Neonates](#)

Learning Objectives:

- i. Describe the types of research permitted with pregnant women, fetuses, and neonates under federal regulations.
- ii. Identify from whom consent is needed when conducting research with fetuses under 45 CFR 46, Subpart B.
- iii. Discuss the requirements under Subpart B for conducting research with neonates of uncertain viability.

12. FDA-Regulated Research

Online Module: [FDA-Regulated Research](#)

Learning Objectives:

- i. Recognize when an Investigational New Drug (IND) application is and is not necessary.
- ii. Describe the role of Form FDA 1572.
- iii. Define what constitutes a medical device.

- iv. Identify the responsibilities of sponsors and researchers as they relate to FDA-regulated research.

13. Research and HIPAA Privacy Protections

Online Module: [Research and HIPAA Privacy Protections](#)

Learning Objectives:

- i. Summarize HIPAA's additional privacy protections for individually identifiable health data that are used for human subjects research, including authorizations and accountings of disclosures.
- ii. Describe situations where full HIPAA privacy protections are required, and those which can qualify for waivers, alterations, or exemptions with more limited requirements.
- iii. Explain the responsibilities of researchers and organizations for meeting HIPAA's privacy requirements and for appropriate data security protections that are necessary to protect privacy.

14. Conflicts of Interest in Human Subjects Research

Online Module: [Conflicts of Interest in Human Subjects Research](#)

Learning Objectives:

- i. Define interests and relationships that may result in a conflict of interest.
- ii. Distinguish different types of COIs in research.
- iii. Identify federal regulations that govern disclosure and management of individual conflicts of interest.
- iv. Discuss challenges and strategies to manage individual and institutional COIs (ICoIs) in research.
- v. Recognize the ethical concerns associated with COIs in research.

15. International Studies

Online Module: [International Studies](#)

Learning Objectives:

- i. Describe ethical issues that may affect planning research outside the U.S.
- ii. Identify published international research ethics guidelines.
- iii. Describe specific ethical issues that have been raised in international research.
- iv. Describe U.S. government regulations for ethical review of international projects.
- v. Understand the responsibilities of researchers seeking ethical review in host countries.

16. Avoiding Group Harms - U.S. Research Perspectives

Online Module: [Avoiding Group Harms - U.S. Research Perspectives](#)

Learning Objectives:

- i. Discuss what is meant by the term "group" in research.
- ii. Describe how members of groups may be vulnerable in research.
- iii. Identify examples of research practices that have harmed groups.
- iv. Identify strategies that researchers can take to reduce the risk of group harms.

17. Avoiding Group Harms – International Research Perspectives

Online Module: [Avoiding Group Harms – International Research Perspectives](#)

Learning Objectives:

- i. Describe some distinct groups or communities of people who might be vulnerable to group harms.
- ii. Identify examples of research that have caused harm to groups.
- iii. Identify strategies that researchers can take to reduce the risk of group harms.

18. Students in Research

Online Module: [Students in Research](#)

Learning Objectives:

- i. Discuss the historical development of regulations associated with protecting human research subjects.
- ii. Identify considerations in defining what constitutes “human subjects research.”
- iii. Describe standard categories of review regarding risks to subjects.
- iv. Review general IRB submission procedures for projects involving human research subjects.
- v. Discuss strategies for best practices in creating an accurate, robust submission and conducting responsible, ethical research.

D. CITI Training: OSHA Bloodborne Pathogens

OSHA Bloodborne Pathogens is designed as initial training or annual retraining to meet the requirements of the U.S. Occupational Safety and Health Administration’s (OSHA) Bloodborne Pathogen Standard. Directed at researchers, employees, and students who handle or have contact with human blood, tissues, bodily fluids, or other potentially infectious materials. Students must complete the OSHA Bloodborne Pathogens CITI Training Course and submit their certificates of completion to CANVAS.

1. OSHA Bloodborne Pathogens Standard

Online Module: [OSHA Bloodborne Pathogens Standard](#)

Learning Objectives:

- i. Describe the overall requirements for employers and their responsibilities for workers who have occupational exposure to bloodborne pathogens.
- ii. Discuss the topics required to train employees who have occupational exposure to human blood or OPIM.
- iii. Describe an Exposure Control Plan and its required contents.

2. Hepatitis B Virus (HBV) Vaccination: Routes of Exposure and Routes of Transmission

Online Module: [Hepatitis B Virus \(HBV\) Vaccination](#)

Learning Objectives:

- i. Describe how the Occupational Safety and Health Administration (OSHA) Bloodborne Pathogens Standard requirements pertain to the HBV vaccine.
- ii. Explain the HBV vaccine administration schedule.
- iii. Differentiate between workplace exposures and general exposures to bloodborne pathogens outside of work.

3. Labels and Engineering Controls

Online Module: [Labels and Engineering Controls](#)

Learning Objectives:

- i. Recognize the required color and configuration of the universal biohazard symbol.
- ii. Describe the equipment and containers that require labeling with the biohazard symbol.
- iii. Discuss a few of the common engineering controls and examine the recommended work practices associated with their use.

4. Universal Precautions and Work Practices

Online Module: [Universal Precautions and Work Practices](#)

VCOMTV: [Occupational Exposure/Needle Stick](#)

Learning Objectives:

- i. Define universal precautions.
- ii. Recognize the types of PPE used for protection against exposure to bloodborne pathogens and when to select them.
- iii. Identify biomedical wastes and treatment and disposal protocols for the various waste types.

5. Emergency Response Procedures

Online Module: [Emergency Response Procedures](#)

Learning Objectives:

- i. Recognize various emergency incident and exposure response situations.
- ii. Demonstrate how to respond to minor laboratory spills involving biological materials.
- iii. Assemble a biohazard spill response kit for a work area.

E. Research Primer Modules

The modules in the Research Primer will instruct you on the basics of identifying a research idea/hypothesis, conducting background literature studies, conducting the research project, and reporting on the research outcomes. Concepts presented will help you establish a strong skills base in basic and clinical research. The modules are located on VCOMTV under the following pathway: VCOM-CC > Foundations of Clinical Medicine > Research Modules.

1. Introduction to Research

VCOMTV: [Introduction to Research](#)

Learning Objectives:

- i. Recognize the types of scholarly research activities.
- ii. Identify opportunities and resources for research.
- iii. Recognize how technology and time have and are changing the nature of science and how it is conducted.

2. Types of Research

VCOMTV: [Types of Research](#)

Learning Objectives:

- i. Select which form of research would best relate the intended information.
- ii. Discriminate various forms of research if necessary (e.g., translational and educational).

3. Research Yield

VCOMTV: [Research Yield](#)

Learning Objectives:

- i. Compare and formulate your options for what you want out of your research experience.
- ii. Recognize that different research output has different levels of impact and recognition.

4. Research Ethics and Compliance

VCOMTV: [Research Ethics and Compliance](#)

Learning Objectives:

- i. Identify morally acceptable research.
- ii. Identify which committees and agencies need to be contacted before, during, and after research is conducted.

- iii. Recognize groups of individuals who need to special protection as research subjects and the criteria to follow to protect these individuals.

5. Background Research and Literature

VCOMTV: [Background Research and Literature](#)

Learning Objectives:

- i. Identify sources of scientific information.
- ii. Recognize features of a good journal and a good paper.

6. Developing a Hypothesis

VCOMTV: [Developing a Hypothesis](#)

Learning Objectives:

- i. Identify a novel and/or interesting idea.
- ii. Devise, clearly and concisely, a hypothesis and its significance.

7. Developing Your Research Plan with Your Research Mentor

VCOMTV: [Developing Your Research Plan with Your Research Mentor](#)

Learning Objectives:

- i. Define the differences between different types of studies.
- ii. Develop a plan for testing your hypothesis.
- iii. Clearly formulate your research plan.
- iv. Develop a research plan for your OMS 4 paper.

8. Conducting a Research Project

VCOMTV: [Conducting a Research Project](#)

Learning Objectives:

- i. Analyze your thoughts and record them along with data and observations.
- ii. Interpret the significance of your data using statistics.
- iii. Synthesize and breakdown your observations to new knowledge.

9. Research in Clinical Practice

VCOMTV: [Research in Clinical Practice](#)

Learning Objectives:

- i. Select ways to remain current with the latest research developments that impact clinical practice.
- ii. Identify opportunities to start a research project from within your clinical practice.
- iii. Devise how to best use and interpret information for your patients.

10. How to Write a Scientific Manuscript

VCOMTV: [How to Write a Scientific Manuscript](#)

Learning Objectives:

- i. Select for and evaluate example publications that you can use as models for your manuscript.
- ii. Categorize your information before you start writing.
- iii. Arrange your manuscript beginning with the title, abstract, figures and tables.
- iv. Extend your manuscript to include all important components, and then modify manuscript drafts through many iterations.

11. Scientific Publishing

VCOMTV: [Scientific Publishing](#)

Learning Objectives:

- i. Choose a target journal for your publication and identify predatory journals.
- ii. Distinguish and contrast among the various types of publications and how each differs in its content.

12. How to Give an Effective Presentation

VCOMTV: [How to Give an Effective Presentation](#)

Learning Objectives:

- i. Choose the various presentation types that are best for you and your science.
- ii. Discriminate good from bad presentations.
- iii. Develop high quality presentation materials, either as a projection or a poster.

13. Scientific Meeting

VCOMTV: [Scientific Meeting](#)

Learning Objectives:

- i. Recognize why to attend scientific conferences and who attends them.
- ii. Compare the difference between a conference, symposium, colloquium, and specialty conferences
- iii. Recall what to do before, during and after a conference.
- iv. Identify online tools to search for conferences and attendees.

14. Journal Club and Lectures

VCOMTV: [Journal Club and Lectures](#)

Learning Objectives:

- i. Recognize the brief history of journal clubs.
- ii. Identify the reasons for participating in a journal club.
- iii. Identify how to start, run, participate in a journal club.
- iv. Recognize common formats: clubs, rounds, grand rounds, etc.
- v. Recognize how to prepare a journal club article for evidence based medicine.

15. Grantsmanship

VCOMTV: [Grantsmanship](#)

Learning Objectives:

- i. Define how to choose among the various grant funding agencies to target your application.
- ii. Recall several examples of grant applications to properly write your grant application.
- iii. Predict weaknesses in your hypothesis, approach and methods and make adjustments to optimize success.

16. Commercializing Research

VCOMTV: [Commercializing Research](#)

Learning Objectives:

- i. Recognize that only a small fraction of research findings can be commercialized.
- ii. Be able to recall the steps for advancing a research finding out of the research environment into a commercial environment.
- iii. Choose the most appropriate approach to Intellectual Property for your product.

F. Aquifer Radiology

Aquifer Radiology is a case-based virtual course that provides realistic case scenarios that demonstrate best-practices, helping students develop clinical reasoning skills that bridge the gap from content to practice. In an era of the increasing importance of evidence-based decision making and reliance on imaging, an understanding of the principles and applications of radiology is vital for today's healthcare professionals. The 21 interactive virtual patient cases in Aquifer Radiology deliver on the learning objectives of the Association of University Radiologists (AUR) and the Alliance of Medical Student Educators in Radiology (AMSER) medical student curriculum.

Upon completion of the cases, students should have a basic understanding of the principles and applications of medical imaging and be able to interpret common radiological studies in the context of presenting patient conditions. In addition, students should be able to recognize common osteopathic structural and viscersomatic/somatosomatic changes that correlate to specific radiographic findings.

In order to receive credit for the radiology cases and meet the requirements for passing the rotation, students must complete 10 of 21 available cases including all associated components of the online program such as the knowledge assessment questions associated with the cases. Progress will be reviewed by the online administrator to ensure completion of these requirements. Students must successfully complete all the CORE cases and knowledge assessment questions by the deadline.

If you have any questions regarding access to the CORE cases, please contact the clinical coordinator for your campus.

1. Chest: Infection

Online Case: [Aquifer Radiology Case 1](#)

Learning Objectives:

- i. List the indications for imaging in patients with suspected chest infections.
- ii. Demonstrate how to effectively utilize the ACR AC website to select appropriate imaging.
- iii. Illustrate on a chest radiograph the anatomic locations of the lobes and fissures of the lungs.
- iv. Define the "silhouette sign" and "spine sign" on chest radiographs and explain how they can be used to localize abnormalities.
- v. Define the term "air bronchogram" and explain the significance of this sign.
- vi. Determine the lobar location of typical bacterial pneumonias on chest radiographs.
- vii. Explain why and when follow-up imaging is recommended in patients with pneumonia.
- viii. Compare and contrast the terminology "ground glass" and "consolidation" on CT and chest radiographs.
- ix. Describe two radiographic features that would suggest an atypical pneumonia.
- x. Identify common radiological procedures as low, medium, and high dose to patients.
- xi. Identify simple strategies to reduce radiation dose to patients.
- xii. Explain the use and describe some of the technical limitations of portable radiographs in the ICU.
- xiii. Recognize the typical appearance of a pleural effusion when the patient is upright, semi-erect and supine and a hydropneumothorax.
- xiv. Explain when image guidance can help in the drainage of pleural collections.

2. Chest: Masses

Online Case: [Aquifer Radiology Case 2](#)

Learning Objectives:

- i. Describe the current recommendations for preoperative chest radiographs.
- ii. Identify patient and technical factors that limit sensitivity for the detection of small pulmonary nodules on chest radiographs.
- iii. Recognize the term "Fleischner Society Recommendations" for follow-up of pulmonary nodules.
- iv. Describe the current recommendations for low-dose CT lung cancer screening.
- v. Explain the use of FDG PET imaging in the evaluation of pulmonary nodules.
- vi. Describe contraindications and common complications of percutaneous lung biopsies.
- vii. Recognize typical signs of a pneumothorax on upright and supine radiographs.
- viii. Recognize typical signs of a tension pneumothorax and explain its consequences.
- ix. Describe options for treating a pneumothorax.
- x. Describe and recognize the typical appearance of volume loss on chest radiographs and its significance, including lobar atelectasis.
- xi. List common etiologies that may cause complete opacification of a hemithorax.
- xii. Compare and contrast the appearances of different etiologies that may cause complete opacification of a hemithorax.

3. Chest: Trauma

Online Case: [Aquifer Radiology Case 3](#)

Learning Objectives:

- i. Define the appropriate role for CT in suspected chest/abdomen/pelvis trauma.
- ii. List the typical views obtained of a screening radiographic trauma series in major trauma.
- iii. Identify the common radiographic and CT imaging findings seen in traumatic aortic injury.
- iv. Define the appropriate role for CT in suspected chest/abdomen/pelvis trauma.
- v. Compare and contrast the terms aortic aneurysm, aortic dissection, aortic rupture and traumatic aortic injury.
- vi. Describe and recognize deep sulcus sign, tension pneumothorax, and skin fold mimics of a pneumothorax on chest radiographs.
- vii. Recognize correct and incorrect positions of chest tubes, endotracheal tubes and enteric tubes on chest radiographs.
- viii. List indications and know appropriate imaging in suspected rib fractures.
- ix. Detect and point out a pneumomediastinum on chest radiographs and list four common causes.

4. Chest: Vascular and COPD

Online Case: [Aquifer Radiology Case 4](#)

Learning Objectives:

- i. Recognize the typical changes of emphysema and COPD on chest radiographs.
- ii. Compare and contrast the Stanford A type and Stanford B type aortic dissection based on anatomy and management.
- iii. Describe the clinical settings in which the D-dimer test performs well as a screening method for PE.
- iv. Explain when a V/Q versus a CT pulmonary angiogram may be indicated for the evaluation of suspected PE.
- v. Assess the probability of PE when the V/Q scan report says normal, low, intermediate, and high probability.

- vi. Describe three managements to potentially decrease renal toxicity from IV contrast in a patient with impaired renal function.
- vii. Describe three common indications for the placement of IVC filters.
- viii. Describe the appearance and significance of septal. ("Kerley B") lines
- ix. List four imaging findings of pulmonary edema on chest radiographs
 - x. Differentiate these imaging findings in order of severity.
- xi. Describe measurements defining thresholds for normal and abnormal size of the cardiac silhouette on PA and AP chest radiographs.
- xii. List the imaging options for patients with suspected aortic dissection.

5. GI: Colon and Small Bowel

Online Case: [Aquifer Radiology Case 5](#)

Learning Objectives:

- i. Demonstrate how to effectively utilize the ACR AC website to select appropriate imaging.
- ii. Compare and contrast the terms "abdominal radiographs," "KUB," "upright" and "supine" abdominal radiographs, and "acute abdominal series."
- iii. Identify colonic wall thickening on radiographs and list the possible diagnoses.
- iv. List imaging options for evaluating inflammatory bowel disease.
- v. Describe why and when oral, rectal, and intravenous contrast is given for abdominal CT scans.
- vi. List contraindications to administering intravenous contrast.
- vii. List two risks of administering enteric contrast.
- viii. Explain when pretreatment protocols should be used in patients with known IV contrast reactions.
- ix. List common indications for a modified barium swallow, an esophagram, an upper GI series, a small bowel follow through, and a barium enema.
- x. Describe which portions of the GI tract are studied during a modified swallow, an esophagram, an upper GI series, and a small bowel follow through and a contrast enema.
- xi. Describe typical patient preparation for a double contrast barium enema.
- xii. Identify pneumoperitoneum on supine and upright radiographs.
- xiii. Compare and contrast clinical and radiographic features of small bowel obstruction and ileum.
- xiv. List the options for enteric contrast in fluoroscopic studies.
- xv. Describe features of normal anatomy on abdominal radiographs.

6. GI: Hepatobiliary and Pancreas

Online Case: [Aquifer Radiology Case 6](#)

Learning Objectives:

- i. Describe the appropriate imaging management for suspected acute cholecystitis.
- ii. Identify major abdominal organs on radiologic imaging.
- iii. Describe US findings in acute cholecystitis.
- iv. Discuss the causes of false positive and false negative ultrasound examinations when evaluating for acute cholecystitis.
- v. Describe the use of nuclear medicine hepatobiliary scanning findings in suspected acute cholecystitis.
- vi. Describe indications for and risks of imaging-guided paracentesis.
- vii. Describe the roles of US, CT, and MR in the diagnosis of appendicitis.
- viii. Describe the roles of US, CT, and MR in the diagnosis of appendicitis.
- ix. Describe when CT is helpful in the evaluation of acute pancreatitis.

- x. Describe the indications for percutaneous transhepatic biliary drain placement.
- xi. Describe what a MRCP scan is and identify the most common indication.
- xii. Describe appropriate imaging management for biliary obstruction with different presentations.
- xiii. Describe the appropriate imaging management for biliary obstruction with different presentations.
- xiv. Describe the appropriate imaging management for biliary obstruction with different presentations.

7. Renal/GU

Online Case: [Aquifer Radiology Case 7](#)

Learning Objectives:

- i. Differentiate which patients with known or suspected nephroureterolithiasis should be imaged by ultrasound or CT.
- ii. Describe the imaging findings of nephroureterolithiasis on CT and ultrasound.
- iii. Describe when imaging may be indicated in patients with pyelonephritis.
- iv. Explain what is contrast-induced nephropathy (CIN).
- v. List risk factors for CIN.
- vi. List the options for the imaging workup of suspected renovascular hypertension.
- vii. Describe the imaging workup of painless hematuria.
- viii. Compare and contrast the typical appearances of simple renal cysts versus solid masses on US and CT.
- ix. List the imaging findings in patients with nephroureterolithiasis that may indicate intervention is needed.
- x. Discuss strategies for the treatment of renal artery stenosis.

8. GI: Trauma

Online Case: [Aquifer Radiology Case 8](#)

Learning Objectives:

- i. Describe common CT findings of solid organ injury into those which may necessitate surgery and those which may be managed nonoperatively.
- ii. Describe what a "FAST" scan is, and when and how it is performed.
- iii. List the components of a typical radiographic trauma series.
- iv. Apply a search pattern for looking at trauma pelvic radiographs.
- v. Apply a search pattern for looking at supine trauma chest radiographs.
- vi. Describe how a typical CT scan for trauma is performed (contrast etc.).
- vii. Describe when bladder and urethral injuries should be suspected and further evaluated.
- viii. Describe how suspected bladder and urethral injuries should be further evaluated.
- ix. Describe the typical chest radiographic presentation of diaphragmatic injuries.
- x. Outline how the results of "FAST" scanning direct the management of trauma patients.
- xi. Describe how and when interventional radiology may aid in the management of abdominal trauma.

9. Neuro: Trauma

Online Case: [Aquifer Radiology Case 9](#)

Learning Objectives:

- i. Outline the appropriate imaging workup for patients with head trauma.
- ii. Identify different types of intracranial hemorrhage on CT, specifically epidural, subdural, subarachnoid, and intraparenchymal hemorrhage.
- iii. Identify contraindications to MR imaging.
- iv. Identify basic head CT anatomy.

- v. Assess cervical spine alignment on imaging.
- vi. List the NEXUS Criteria which indicate that CT of the cervical spine should be performed.
- vii. List the mechanisms of injury which are considered to put patients at high risk by the Canadian Cervical Spine Rules.
- viii. Describe the typical appearances of brain herniation on CT scans.
- ix. Describe the mechanism of diffuse axonal injury, the prognostic implications, and the advantages of MRI for diagnosis.
- x. Recognize and discuss the typical change in the appearance of intracranial blood products with age on CT.
- xi. Appreciate that blood has variable signal on MRI dependent on chronicity.

10. Neuro: Vascular and HIV

Online Case: [Aquifer Radiology Case 10](#)

Learning Objectives:

- i. Identify appropriate imaging algorithms to evaluate headache
- ii. Describe the appearance of gray matter, white matter, and CSF on T1, T2, and FLAIR images
- iii. Describe the appearance of stroke on DWI imaging
- iv. List common sites for berry aneurysms
- v. Demonstrate localization and identification of the major intracranial vascular structures
- vi. Describe treatment options for patients with cerebral aneurysms
- vii. Outline clinical and imaging strategies to distinguish cerebral lymphoma from toxoplasmosis
- viii. Explain the concept behind MR spectroscopy of the brain and its application
- ix. Compare and contrast the techniques and applications of catheter angiography, MR angiography, and CT angiography
- x. Recognize the typical appearance and locations of subarachnoid hemorrhage on brain CT
- xi. Describe the features of mass effect on brain CT and MRI scans

11. Pediatrics A

Online Case: [Aquifer Radiology Case 11](#)

Learning Objectives:

- i. Discuss the differential diagnosis and choose the appropriate imaging workup for bilious and non-bilious vomiting in infants.
- ii. Describe the anatomic basis of malrotation and midgut volvulus.
- iii. Describe typical findings of midgut volvulus on an upper GI study.
- iv. Describe common chest radiographic findings of bronchiolitis in infants.
- v. Discuss the risks of radiation exposure in the pediatric population and the implications of the current increase in pediatric imaging.
- vi. Demonstrate awareness of strategies to decrease radiation dose to pediatric patients.
- vii. Recognize the radiographic signs of common complications of tube and line placements in pediatric patients.
- viii. Describe the Salter-Harris Classification of pediatric bone fractures and explain its implications.
- ix. Discuss the differential diagnosis of limp, and choose the appropriate imaging evaluation for limp in young pediatric patients.
 - x. Describe pediatric injuries that are highly associated with non-accidental trauma.
 - xi. Outline clinician reporting responsibilities in cases of suspected non-accidental trauma.
 - xii. Discuss imaging findings in infants with bowel obstruction.

- xiii. Discuss imaging findings differentiating midgut malrotation from volvulus.
- xiv. Describe components of the LADD procedure and its prognostic implications.
- xv. Discuss the radiographic appearance of common pediatric fractures.
- xvi. Recognize the various stages of fracture healing.

12. Pediatrics B

Online Case: [Aquifer Radiology Case 12](#)

Learning Objectives:

- i. Describe screening and further evaluation of suspected developmental dysplasia of the hip (DDH).
- ii. Select the appropriate imaging modality to evaluate suspected hydrocephalus in infants and young children.
- iii. Describe the uses of transcranial ultrasound in neonates and infants.
- iv. List common age-dependent causes of acute abdominal pain in the pediatric patient.
- v. Describe how DDH is treated.
- vi. Select the appropriate imaging management of pediatric patients with acute abdominal pain depending on age and presentation.
- vii. Describe common imaging findings on ultrasound and CT of appendicitis.
- viii. Describe common findings of testicular torsion on ultrasound.
- ix. Select the appropriate imaging management of boys with scrotal pain.
- x. Describe the typical presentation, clinical and imaging management of suspected acute epiglottitis.

13. MSK: Arthritis and Osteomyelitis

Online Case: [Aquifer Radiology Case 13](#)

Learning Objectives:

- i. Describe the common imaging findings in rheumatoid arthritis and how it differs from degenerative osteoarthritis.
- ii. Select which patients should be screened for osteoporosis.
- iii. Compare and contrast the terms osteoporosis, osteopenia, and osteomalacia.
- iv. Explain the meaning of T and Z scores on bone mineral density reports.
- v. Outline the approach to imaging in suspected osteomyelitis.
- vi. Differentiate and risk-stratify patients with acute back pain to determine imaging strategies.
- vii. Compare radiation doses to patients from common radiological exams.
- viii. Recognize the typical appearance of osteoporotic compression fractures of the spine on radiographs.
- ix. Describe indications for vertebroplasty.

14. Female Imaging: Pregnancy and Infertility

Online Case: [Aquifer Radiology Case 14](#)

Learning Objectives:

- i. Describe how to manage a palpable breast mass in a young patient.
- ii. Describe the appearance of a simple breast cyst on ultrasound.
- iii. Discuss the imaging workup for infertility.
- iv. Describe how interventional radiology can help with tubal occlusions.
- v. Describe options for imaging abdominal pain in a pregnant patient.
- vi. Describe and view the normal sequence of appearance of embryonic structures on first-trimester ultrasound.
- vii. Incorporate the ultrasound findings of an "empty uterus" with the clinical data in suspected ectopic pregnancy.

- viii. Discuss the imaging management of suspected ectopic pregnancies and the correlation with clinical data.
- ix. List four indications for first-trimester ultrasound.
- x. Discuss the concept of minor and major markers in morphological screening ultrasound.
- xi. List four indications for second- and third-trimester ultrasound imaging.
- xii. Describe potential radiation risks to the fetus and dose reduction.

15. Female Imaging: Malignancy and Screening

Online Case: [Aquifer Radiology Case 15](#)

Learning Objectives:

- i. Describe the current recommendations for screening mammography.
- ii. Differentiate between indications for "screening" and "diagnostic" mammography.
- iii. Discuss key controversies surrounding screening mammography.
- iv. Outline BIRADS categories and their implications for patient management.
- v. Describe the role of image-guided core needle breast biopsies.
- vi. Describe the approach to screening for patients who are at high risk for breast cancer, with mammography and MRI.
- vii. Discuss how sentinel nodes studies are performed.
- viii. Describe when and how patients at increased risk of ovarian cancer should be screened.
- ix. Identify the threshold for abnormal endometrial thickness in a post-menopausal patient and next step management.
- x. Describe clinical applications of sonohysterography.
- xi. Describe how to evaluate post-menopausal vaginal bleeding.
- xii. Recognize the potential consequences of a low-specificity screening examination such as mammography.
- xiii. Describe how mammography is performed.
- xiv. List common abnormalities that can be seen on mammograms.

16. MSK: Trauma

Online Case: [Aquifer Radiology Case 16](#)

Learning Objectives:

- i. Apply the Ottawa ankle rules for ankle injuries.
- ii. Outline the terminology and acquisition of common views in musculoskeletal radiography.
- iii. Apply standard terminology when describing fractures.
- iv. Explain the importance of multiple x-ray views in fracture diagnosis.
- v. Develop a systematic approach to the interpretation of bone radiographs for the diagnosis of musculoskeletal injuries.
- vi. Appreciate the views required to identify knee and elbow effusions.
- vii. Identify elbow and knee effusions.
- viii. Compare typical indications for using CT and MRI in musculoskeletal injuries.
- ix. Describe the management choices for radiographic occult musculoskeletal injuries.
- x. Apply basic patient and clinician radiation safety guidelines to c-arm fluoroscopy in the OR or clinic.
- xi. Identify the basic radiographic anatomy of the extremities and pelvis.
- xii. Appreciate the importance of supplying appropriate clinical history to guide imaging evaluation.
- xiii. Identify the basic radiographic anatomy of the extremities and pelvis.

- xiv. Appreciate how musculoskeletal injury classification schemes impact patient management and prognosis.

17. Cardiac and Cardiovascular

Online Case: [Aquifer Radiology Case 17](#)

Learning Objectives:

- i. Propose imaging strategy options for the evaluation of chest pain and dyspnea (of suspected cardiac origin).
- ii. Propose appropriate imaging for initial evaluation and follow up of a pulsatile abdominal abnormality discovered on physical exam.
- iii. Outline the potential advantages and disadvantages of US and CT in the evaluation of abdominal aortic aneurysm.
- iv. List the chest radiographic findings associated with CHF.
- v. Appreciate the difference between terms "CHF" and "pulmonary edema".
- vi. Identify the positions of cardiac chambers and heart valves on chest radiographs.
- vii. Outline the imaging alternatives for evaluation of myocardial perfusion using MR and nuclear medicine cardiac scans.
- viii. Appreciate the radiation dose involved with cardiac nuclear medicine and CT imaging.
- ix. Outline imaging strategies for evaluation of cardiac ischemia (reversible and fixed) using nuclear medicine and cardiac MR techniques.
- x. List possible advantages of lower extremity CT angiography over conventional catheter angiography.
- xi. Identify the radiographic appearance of common catheters used in the ICU.
- xii. Appreciate the use and radiographic appearance (and safe positioning) of pulmonary artery catheters (Swan-Ganz) and intra-aortic balloon pumps (IABP) in the ICU.
- xiii. Outline radiation risks for a patient regarding cardiac imaging studies (echo, MRI, CT, and nuclear medicine).
- xiv. Appreciate the anatomic basis for the common locations of bowel ischemia.
- xv. Describe the potential advantages of CT angiography versus catheter angiography in the evaluation of coronary artery disease in intermediate and low risk populations.
- xvi. Outline the surgical and endovascular treatment options for AAA.
- xvii. Recognize the ultrasound appearance of an abdominal aortic aneurysm.

18. Professionalism in Radiology

Online Case: [Aquifer Radiology Case 18](#)

Learning Objectives:

- i. List three attributes of professionalism.
- ii. Describe three effects on medicine when professionalism is absent.
- iii. Discuss the importance of accuracy in academic work.
- iv. Discuss the importance of honesty with patients, without overstepping boundaries as a medical student.
- v. Discuss patient privacy issues regarding discussing patients in public.
- vi. Discuss patient privacy issues regarding social media.
- vii. Define what a fiduciary relationship is and what that means for physicians in managing boundaries.
- viii. Discuss conflicts of interest regarding gifts from patients.
- ix. Describe the role of clinical decision support resources, such as the ACR Appropriateness Criteria in "just distribution of resources".
- x. Discuss managing conflicts of interest regarding: gifts from Pharma.
- xi. Discuss patient privacy issues regarding Picture Archiving and Communication Systems (PACS) and Electronic medical record (EMR) use.

- xii. Discuss patient privacy issues regarding de-identification of images for presentations and publications.
- xiii. List information to include in a radiology consult.
- xiv. Describe how critical findings in radiological imaging must be communicated and documented.

19. Oncology

Online Case: [Aquifer Radiology Case 19](#)

Learning Objectives:

- i. Characterize how to choose imaging modalities for different cancer diagnoses.
- ii. Describe methods involved in cancer surveillance.
- iii. Discuss imaging pitfalls in the care of the oncologic patient.
- iv. Describe illness scripts that suggest oncologic diagnoses.
- v. Describe how cancer is staged.
- vi. Describe how tumor treatment responses are assessed.
- vii. Discuss the role of the multidisciplinary Tumor Board in management of cancer.
- viii. Describe roles radiologists have in care of oncologic patients.
- ix. List 4 distinct roles of imaging in care of the cancer patient.
- x. Discuss how imaging helps balance beneficial & harmful effects of treatment.

20. Interventional Radiology - Vascular

Online Case: [Aquifer Radiology Case 20](#)

Learning Objectives:

- i. Identify clinical settings when it is appropriate to consult IR for vascular intervention
- ii. Apply ACR Appropriateness Criteria and other IR resources to construct appropriate vascular IR-based treatment plans for specific clinical settings
- iii. Contrast clinical and physical findings of elective and emergent vascular IR cases
- iv. Discuss basic pathophysiology, characterization, clinical reasoning, and treatment approaches for symptomatic uterine fibroids, hemorrhage in trauma, patients who require central venous access, DVT with pulmonary embolism, portal hypertension and cirrhosis, complications of arterial puncture, and limb-threatening ischemia
- v. Discuss the requirements for and elements of valid informed consent
- vi. Justify the importance of the time-out for patient safety in IR
- vii. Discuss pre-procedural and post-procedural care (diet, labs, orders, activity, etc.) for symptomatic uterine fibroids, hemorrhage in trauma, patients who require central venous access, DVT with pulmonary embolism, portal hypertension and cirrhosis, complications of arterial puncture, and limb-threatening ischemia.
- viii. Discuss possible risks and complications of treatment for symptomatic uterine fibroids, hemorrhage in trauma, patients who require central venous access, DVT with pulmonary embolism, portal hypertension and cirrhosis, complications of arterial puncture, and limb-threatening ischemia.
- ix. Describe and justify by treatment goals the sequence of basic procedural steps for symptomatic uterine fibroids, hemorrhage in trauma, patients who require central venous access, DVT with pulmonary embolism, portal hypertension and cirrhosis, complications of arterial puncture, and limb-threatening ischemia.

21. Interventional Radiology - Nonvascular

Online Case: [Aquifer Radiology Case 21](#)

Learning Objectives:

- i. Identify clinical settings when it is appropriate to consult IR for nonvascular intervention.
- ii. Apply ACR Appropriateness Criteria and other interventional radiology resources to construct appropriate nonvascular IR-based treatment plans for specific clinical settings.
- iii. Discuss basic pathophysiology, characterization, clinical reasoning, and nonvascular interventional radiology treatment approaches for abdominal fluid collections, tumor biopsies and treatments, biliary tract obstruction, portal hypertension and cirrhosis, and thoracic fluid collections.
- iv. Discuss pre-procedural and post-procedural care (diet, labs, orders, activity, etc.) for abdominal fluid collections, tumor biopsies and treatments, biliary tract obstruction, portal hypertension and cirrhosis, and thoracic fluid collections.
- v. Discuss possible risks and complications of treatment for abdominal fluid collections, tumor biopsies and treatments, biliary tract obstruction, portal hypertension and cirrhosis, and thoracic fluid collections.
- vi. Compare and contrast strengths of different modalities for guiding nonvascular interventional radiology procedures.
- vii. Describe and justify by treatment goals the sequence of basic procedural steps for interventional radiology-based nonvascular interventions for abdominal fluid collections, tumor biopsies and treatments, biliary tract obstruction, portal hypertension and cirrhosis, and thoracic fluid collections.

G. HIPAA Basics

This course focuses on the confidentiality of health care information and your role in protecting medical privacy. Used properly, information about patients and their health care can save lives. But if the same information is used for unauthorized or improper purposes, it can lead to embarrassment, criminal fraud, and legal liability. Students will receive an email with a link and instructions for completing the course. Students must submit their completion certificate to CANVAS.

Online Module: Access instructions have been sent to your email from Vector Solutions

Learning Objectives:

- i. Identify federal regulations establishing security rules for health care records.
- ii. Identify what is considered "Protected Health Information" (PHI).
- iii. Recognize when PHI may and may not be used or released.
- iv. Recognize an individual's responsibility to secure and protect PHI.
- v. Identify potential penalties for unauthorized use or disclosure.

H. Residency Preparation

These presentations will be the first in a series over your next year and a half on applying for residencies. Two important parts of a student's residency application are their curriculum vitae (CV) and having several strong letters of recommendations in their desired specialty and parallel plan.

Online Module: [Curriculum Vitae](#)

Curriculum Vitae (CV) Learning Objectives:

- i. Choose a CV format and content that creates a great first impression
- ii. Select what to include in a CV to demonstrate your abilities and achieve the best results.
- iii. Develop a CV in line with your skills, knowledge and experience.
- iv. Avoid the common pitfalls when writing your CV.

Online Module: [Letter of Recommendation \(LOR\)](#)

Letter of Recommendation (LOR) Learning Objectives:

- i. Discuss the importance, utility and timing of LOR in the residency application process.
- ii. Select letter writers to ask for a strong LOR.
- iii. Recognize the importance of letters specific to specialties of student interest.
- iv. Assemble documents to present to a letter writer including a cover letter, CV, personal statement and ERAS token.

I. Fatigue

Providing medical care to patients is physically and mentally demanding. Night shifts, even for those who have had enough rest, cause fatigue. VCOM has adopted fatigue mitigation processes and ensures that there are no negative consequences and/or stigma for using fatigue mitigation strategies. As part of these policies, students are required to receive training on fatigue. Students must complete the Fatigue Module that is part of the LIFE Curriculum created by Duke University Hospital, the UNC Hospitals, the NC AHEC, and the NC Physician's Health Program to assist GME programs, residents, and faculty to prevent, identify, and manage resident fatigue and impairment. Although the module refers to residents, the concepts apply to medical students as well.

Online Module: [Fatigue](#)

Learning Objectives:

- i. Define fatigue and sleep inertia.
- ii. Describe how to recognize excessive sleepiness.
- iii. Discuss the physical, mental, and social consequences of fatigue (i.e. traffic violations, reduced motivation, increased cynicism, increased substance abuse).
- iv. Understand the link between medical error and fatigue.
- v. Identify strategies for managing fatigue, including optimal napping and prophylactic use of caffeine.
- vi. Predict times of peak and nadir performance.
- vii. Explain the night float system and explore strategies for addressing duty hour issues.
- viii. Understand the shared responsibility of residents, faculty, and programs in managing fatigue to optimize medical care for patients, minimize errors, and enhance resident learning.
- ix. Select an appropriate evaluation for a fatigued resident.