

# Edward Via College of Osteopathic Medicine

MED 8005

Foundations of Clinical Medicine I

Academic Year 2021 - 2022

---

## COURSE SYLLABUS

---

### Course Directors



**Sofia Abraham-Hardee, DO,  
PhD**  
Associate Dean for Clinical Affairs  
Virginia Campus  
Phone: 540-231-6298  
[sabraham@vt.vcom.edu](mailto:sabraham@vt.vcom.edu)



**Patricia Matto, DO**  
Associate Dean for Clinical Affairs  
Auburn Campus  
Phone: (334) 442-4026  
[pmatto@auburn.vcom.edu](mailto:pmatto@auburn.vcom.edu)



**Lindsay Tjiattas-Saleski, DO**  
Associate Dean for Clinical Affairs  
Carolinas Campus  
Phone: (864) 327-9832  
[ltjiattassaleski@carolinas.vcom.edu](mailto:ltjiattassaleski@carolinas.vcom.edu)

### Research Administration



**Ramu Anandakrishnan,  
PhD**  
Research Instructor  
Phone: 703-403-0234  
[ranandakrishnan@vt.vcom.edu](mailto:ranandakrishnan@vt.vcom.edu)

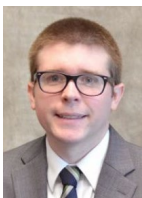


**Gunnar Brolinson, DO**  
Vice Provost for Research  
Phone: 540-231-3041  
[pbrolins@vt.vcom.edu](mailto:pbrolins@vt.vcom.edu)



**Harold "Skip" Garner**  
Clinical Assessment Coordinator  
Carolinas Campus  
Phone: 214-924-8364  
[sgarner@vt.vcom.edu](mailto:sgarner@vt.vcom.edu)

### Course Administrators



**Sam Kuhn, BS**  
Clinical Assessment Coordinator  
Auburn Campus  
Phone: 334-442-4071  
[skuhn@auburn.vcom.edu](mailto:skuhn@auburn.vcom.edu)



**Sena Mazzoleni, AS**  
Clinical Assessment Coordinator  
Carolinas Campus  
Phone: 864-327-9994  
[smazzoleni@carolinas.vcom.edu](mailto:smazzoleni@carolinas.vcom.edu)



**Lauren Woodcock**  
Clinical Assessment Coordinator  
Virginia Campus  
Phone: 540-231-0915  
[lwoodcock@vcom.vt.edu](mailto:lwoodcock@vcom.vt.edu)

## I. Course Description

The Foundations of Clinical Medicine (FCM) I course provides a comprehensive curriculum designed to assist students in improving their mastery of core fundamental concepts applicable to clinical rotation. FCM-I 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 I Requirements

All components of FCM I must be completed and submitted by 5 PM, Friday, July 30, 2021.

- **Choosing Wisely® Physician Communication Modules**
  - Completion of all 10 Choosing Wisely® Physician Communication Modules and associated content.
  - Completion of a 50 question, time-limited (2 hour) multiple choice “open book” exam in an unproctored setting. Each student must complete the exam on their own. The content of the exam is derived from these 10 modules. A grade of 70% or better is passing.
- **CDC Opioid and Pain Management Education Module**

Completion of the CDC Opioid and Pain Management Educational Module, answering the knowledge assessment questions, and providing their home campus clinical assessment coordinator the certificate of completion from the CDC website.

  - Register and create a free account at: <https://tceols.cdc.gov/>
  - 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**

All students must complete CITI Training. Students must complete the Protection of Human Research Subjects CITI Training Course and submit their certificate of completion to the Clinical Assessment Coordinator. 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/index.cfm?pageID=14&languagePreference=English&region=1>
    - Click “Register”.
    - Under the heading “Select Your Organization Affiliation,” type in “Edward Via College of Osteopathic Medicine”. When prompted, 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, “Continue to Create Your CITI Program Username/Password”.
- Complete the Personal Information section, taking care to enter data into all of the required fields (marked with an asterisk). Click “Continue to Step 3.”
- Create your Username and Password (be certain to retain this information for your personal records). Complete all required fields (marked with an asterisk). Click “Continue to Step 4.”
- Enter applicable personal demographic data into the required fields (marked with an asterisk). Click “Continue to Step 5.”
- In Step 5, indicate your preference for enrollment to receive Continuing Education credits, as well as your preference to allow CITI to contact you regarding participation in research surveys. Click “Continue to Step 6.”
- Complete the required fields (marked with an asterisk) to provide information requested by VCOM as part of the member profile for affiliation with this institute. Click “Continue to Step 7.”
- Select Curriculum: In this section, you will answer the required questions (marked with an asterisk) as follows:
  - Human Subject Research
    - ❖ Do you want to take the Protection of Human Research Subjects Course? Answer, “Yes”.
    - ❖ Do you want to take the IRB Members Course? Answer, “No”.
    - ❖ Would you like to take the IRB Chair course? Answer, “No”.
  - Biosafety/Biosecurity
    - ❖ Please select your lab or group below. Select, “No thank you”.
  - Responsible Conduct of Research
    - ❖ Would you like to take the Conflicts of Interest Course? Answer, “No”.
- Click “Complete Registration.”
- Once registration is complete, you can log in to your account and (as a result of the answers you provided in the Curriculum Selection section of the registration process), the required module(s) will appear in your queue.
- Click on the module entitled “Protection of Human Research Subjects” and complete all of the required training modules within. Once complete, download your certificate of completion to Canvas by the end of the course at: <https://canvas.vcom.edu/login/ldap>

- **Research Primer Modules**

Completion of all 16 VCOM Research Primer Modules. The modules are located on VCOMTV. 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 (CORE) Requirements**

Completion of 10 of the 19 available Aquifer Radiology (CORE) 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>
      - 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”.

### C. Grading

FCM I and II are Pass/Fail courses. Students must complete all course requirements to pass the course. The following requirements must be met to pass FCM I:

FCM I Course Item	Grade Required
10 Choosing Wisely ® Physician Communication Modules	Pass
Choosing Wisely ® Physician Communication Multiple Choice Exam	Minimum of 70%
CDC Opioid and Pain Management Educational Module (includes completion of knowledge assessment questions and submission of the certificate of completion)	Pass
16 Research Primer Modules	Pass
CITI Training: Protection of Human Research Subjects	Pass
10 Aquifer Radiology (CORE) Cases	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 Choosing Wisely ® Physician Communication Exam**

Students must pass the Choosing Wisely ® Physician Communication 50 question exam with a C (70%) or better to receive a passing grade for the Choosing Wisely component of FCM 1.

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 Choosing Wisely component of FCM I, 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 I Modules

### A. Choosing Wisely® Physician Communication Modules

One of the goals of FCM is to ensure students 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. As noted by the Choosing Wisely® campaign, the overuse of health care resources is an issue of considerable concern. Some experts contend that as much as 30 percent of all health care delivered is duplicative or unnecessary and may not improve people’s health. Physicians and patients must work together to ensure that care choices are supported by evidence, are not duplicative of other tests or procedures already received, minimize the risk of harm and are truly necessary.

The ABIM (American Board of Internal Medicine) Foundation funded the Drexel University College of Medicine to develop a set of interactive instructional modules to enhance physician and patient communication around the specialty society recommendations from the Choosing Wisely campaign. Developed in collaboration with nine medical specialty societies, these modules are designed to help physicians, patients and other health care stakeholders think and talk about overuse of health care resources by providing strategies for physicians to build trust and to address patient attitudes and beliefs that more care is not always better care.

Students must complete all 10 physician communication modules listed below. The end-of-FCM-I exam will come directly from the below objectives based on the 5 recommendations from each specialty society and their accompanying material. Students must pass the exam with a grade of 70 or better.

Students should review all material found in each specialty society module. A menu of each module’s components can be located on the left-hand side of each module’s page.

## 1. ABIM Foundation

**Online Module:** [ABIM Foundation](#)

### 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.

## 2. American Academy of Allergy, Asthma, and Immunology

**Online Module:** [American Academy of Allergy, Asthma, and Immunology](#)

### Learning Objectives:

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

## 3. American Academy of Family Physicians

**Online Module:** [American Academy of Family Physicians](#)

### 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 low 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 identified in the AAFP recommendations 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 EKG or other cardiac screening tests for low-risk patients without symptoms.
- vii. List the potential harms of false-positive tests when EKG's or other cardiac screening exams are utilized in low-risk patients.
- viii. Discuss and summarize the AAFP indications for the use of Pap smears. Identify the groups of patients identified in the AAFP recommendations for which Pap smears are not indicated.

#### 4. American Academy of Pediatrics

**Online Module:** [American Academy of Pediatrics](#)

**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 minor 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 for the use of MRI in the evaluation of children with simple febrile 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

**Online Module:** [American College of Cardiologists](#)

**Learning Objectives:**

- i. Review and apply the ACC recommendations for the use of stress or non-invasive imaging in the evaluation of patients.
- ii. List the findings that ACC states indicate the need for testing for coronary disease.
- iii. Summarize and apply the ACC recommendations for the performance of stress or non-invasive imaging in the routine follow up of asymptomatic patients. List the 2 exceptions to their recommendations that would warrant testing.
- iv. Summarize and apply the ACC recommendations for the performance of echocardiography in the routine follow-up for mild, asymptomatic native valve disease in adult patients with no change in signs or symptoms.
- v. Review and apply the ACC recommendations for the performance of stress or non-invasive imaging in the pre-operative assessment of patients scheduled to undergo low-risk, non-cardiac surgery.
- vi. Summarize and apply the ACC recommendations for the utilization of stenting of non-culprit lesions during PCI for uncomplicated STEMI.

#### 6. American College of Physicians

**Online Module:** [American College of Physicians](#)

**Learning Objectives:**

- i. Utilize the Framingham risk calculator and its 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. Recognize indications for imaging for acute low back pain.
- iv. List potential harms associated with inappropriate imaging of low back pain.
- v. Summarize and apply the National Clinical Guidelines Center and the European Society of Cardiology recommendations for the use of brain imaging in simple syncope



- vi. Define simple syncope or uncomplicated faint or situational syncope.
- vii. Utilize the Wells score to define pretest probability for venous thromboembolism
- viii. Apply the American College of Physicians and American Academy of Family Physicians recommendation against using imaging studies to diagnose DVT or PE in patients with low clinical probability
- ix. Summarize the indications for a pre-operative chest x-ray according to the American College of Radiology and the Institute for Clinical Systems Improvement
- x. Utilize communication concepts to aid in implementation of the recommendations.

## 7. American College of Radiology

**Online Module:** [American College of Radiology](#)

### **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 ACR 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.
- viii. Discuss and apply the ACR recommendations for the use of follow-up imaging for clinically inconsequential adnexal cysts.

## 8. American Gastrointestinal Association

**Online Module:** [American Gastrointestinal Association](#)

### **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.
- vii. Define "functional abdominal pain" using the ROME III criteria.

## 9. American Society of Nephrology

**Online Module:** [American Society of Nephrology](#)

### 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. List the adverse effects of NSAID use and list alternative treatment options.
- v. Describe the ASN recommendations in regards to the utilization of PICC lines in patients with stage III-IV CKD.
- vi. List the benefits of the use of an AV fistula over a central venous catheter for dialysis.
- vii. Describe the importance of a shared decision-making process between patients, their families and their physicians in regards to the initiation of chronic dialysis.

## 10. American Society of Nuclear Cardiology

**Online Module:** [American Society of Nuclear Cardiology](#)

### 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. Opioid and Pain Management Educational 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. VCOM has made a commitment to educate all students in the Centers for Disease Control and Prevention (CDC) Guideline for Prescribing Opioids for Chronic Pain. 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 I curriculum will provide students with information regarding the CDC guidelines for prescribing opioids for chronic pain.

**1. Addressing the Opioid Epidemic: Recommendations from the CDC**

**Online Module:** [Complete Module #1 \(WB2857\)](#)

**Learning Objectives:**

- i. Determine when to initiate or continue opioids for chronic pain
- ii. Become familiar with opioid selection, dosage, duration, follow-up and discontinuation
- iii. Assess risk and address harms of opioid use.

**C. CITI Training: Protection of Human Research Subjects**

**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. 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.

### 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

### 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.

## E. Aquifer CORE Radiology Cases

Case-based Online Radiology Education (CORE) is a virtual patient program presented by Aquifer for medical students studying Radiology. In an era of cost-containment and increasing importance of evidence-based decision making, yet with increased reliance on imaging technology, having a basic understanding of the principles and applications of medical imaging is vital. CORE currently includes several interactive virtual patient cases which encompass the learning objectives of the Alliance of Medical Student Educators in Radiology (AMSER) National Medical Student Radiology Curriculum. CORE cases teach a patient-centered approach to imaging, foster self-directed and independent study and build clinical problem-solving skills. They utilize the American College Radiology (ACR) Appropriateness criteria to teach an evidence-based approach to imaging and link to appropriate excellent interactive Radiology resources on the web.

Upon completion of the CORE 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/somatomatic 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 19 available CORE 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 CORE Radiology Case 1](#)

#### Learning Objectives:

- i. Review CXR anatomy including the location of the lobes of the lung and their relationship to fissures
- ii. Be introduced to the American College of Radiology (ACR) appropriateness criteria for imaging
- iii. Learn the indications for chest imaging in patients presenting with upper respiratory tract infection symptoms.
- iv. Learn the radiographic presentation of typical alveolar pneumonias in different lobes of the lung.
- v. Understand the concepts of “silhouette sign” and “spine sign” and how they can be used to localize abnormalities on chest radiographs.
- vi. Understand the term “air bronchograms” and the significance of this sign.
- vii. Learn how some tumors can appear similar on imaging to pneumonia.
- viii. Be introduced to the typical radiographic appearance of PCP pneumonia, and other

- opportunistic and atypical pneumonias and how they differ radiographically from typical bacterial and lobar pneumonias
- ix. Understand the meaning and appearance of “ground glass” opacities on chest radiographs and CT scans.
- x. Understand the use and limitations of portable radiographs in the ICU.
- xi. Learn the imaging features of ARDS
- xii. Acquire a basic understanding of patient radiation doses from common examinations and how we can try to limit them.
- xiii. Learn the common imaging features of various types of pleural effusion including simple, hydropneumothorax, empyema and loculated pleural fluid collections (“pseudotumors”).
- xiv. Understand how pleural fluid appears differently on erect and supine radiographs.
- xv. Learn when image guidance can help in the drainage of pleural fluid.

## 2. Chest: Masses

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

### Learning Objectives:

- i. Know the current recommendations for preoperative chest radiographs in people who are healthy and in those with underlying chest and cardiac diseases.
- ii. Understand some of the challenges in detecting small nodules on chest radiographs.
- iii. Have a concept of the different appearances of pulmonary nodules and their prognostic significance.
- iv. Understand the current status of low dose CT imaging for lung cancer screening.
- v. Understand some of the management issues related to pulmonary nodules (including the Fleischner Society recommendations).
- vi. Have a basic understanding of the use of FDG PET imaging in the management of nodules and lung malignancies.
- vii. Have reviewed the methods available for nodule biopsy.
- viii. Will understand indications for needle biopsy, how the procedure is done, and the possible complications.
- ix. Be able to recognize a pneumothorax and understand the meaning and consequences of a tension pneumothorax.
- x. Know the options for treating a pneumothorax.
- xi. Understand the purpose of TNM tumor staging and implications for long term survival.
- xii. Recognize the common appearances of lobar atelectasis on chest radiographs.
- xiii. Recognize the common appearances of linear and subsegmental atelectasis on chest radiographs.
- xiv. Know the different etiologies that may cause complete opacification of a hemithorax.
- xv. Know the expected postoperative appearance of the chest after pneumonectomy.

## 3. Chest: Trauma

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

### Learning Objectives:

- i. Know the indications, limitations and typical views obtained of a screening radiographic trauma series in major trauma.
- ii. Have a concept of the indications for and advantages of using of CT for suspected chest/abdomen/pelvis trauma.
- iii. Recognize the common radiographic and CT imaging findings seen in traumatic aortic injury.

- iv. Know alternative imaging options to evaluate the aorta in patients with contrast allergies or renal insufficiency.
- v. Understand the difference between aortic aneurysm, aortic dissection, and aortic lacerations (traumatic aortic injury).
- vi. Understand the concept and typical appearance of pulmonary contusive injuries.
- vii. Be able to recognize a tension pneumothorax on a radiograph.
- viii. Be able to recognize the ‘deep sulcus’ sign of pneumothorax on supine radiographs and its significance.
- ix. Know the correct positioning of chest tubes and how to evaluate chest tube placement on chest radiographs.
- x. Recognize the difference between skin folds and a true pneumothorax on chest radiographs.
- xi. Be able to determine correct and incorrect positioning of endotracheal tubes.
- xii. Be able to determine the correct and incorrect positioning of NG tubes and feeding tubes.
- xiii. Understand the indications for imaging in suspected rib fractures.
- xiv. Recognize a pneumomediastinum on chest radiographs.
- xv. Be able to provide a differential diagnosis of possible etiologies for a pneumomediastinum.

#### 4. Chest: Vascular and COPD

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

##### **Learning Objectives:**

- i. Recognize the typical changes of emphysema and COPD on chest radiographs.
- ii. Recognize the classic findings of aortic dissection on CT scans.
- iii. Understand how aortic dissections are classified based on imaging.
- iv. Have a basic concept of complications of aortic dissections and how dissections can be treated.
- v. Know the different imaging options used to diagnose pulmonary embolism.
- vi. Understand the basic principles of nuclear medicine V/Q scan imaging.
- vii. Understand the significance of V/Q scan interpretations: normal, low, intermediate and high probability.
- viii. Know options to decrease renal toxicity from IV contrast in a patient with impaired renal function.
- ix. Know when a D-dimer should be measured and the significance of a raised or normal value.
- x. Know the typical appearance of pulmonary emboli on CT pulmonary angiograms.
- xi. Understand the use of IVC filters.
- xii. Recognize cardiomegaly on chest radiographic and provide a differential diagnosis.
- xiii. Know the imaging findings of pulmonary edema.
- xiv. Understand the difference between the terms "CHF" and pulmonary edema.
- xv. Recognize Kerley B lines (and what they mean).
- xvi. Know where the heart chambers are on a chest radiograph and how the chest radiographs will change with chamber enlargement.
- xvii. Know the approximate positioning of heart valves on chest radiographs.

## 5. GI: Colon and Small Bowel

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

### Learning Objectives:

- i. Learn how to use the ACR Appropriateness Criteria® website.
- ii. Be able to recognize normal anatomy on abdominal radiographs.
- iii. Understand what the terms "abdominal radiographs, KUB, upright and supine and acute .abdominal series" mean and when these studies should be performed.
- iv. Be able to recognize colonic wall thickening ("thumbprinting") on radiographs and know the possible diagnoses.
- v. Know some imaging options for evaluating inflammatory bowel disease.
- vi. Know the contraindications to administering intravenous contrast.
- vii. Know how contrast reactions may present and how to treat them.
- viii. Understand why oral, rectal and intravenous contrast is given for abdominal CT scans.
- ix. Know what the options are for oral contrast in fluoroscopic studies.
- x. Understand the differences between the different GI fluoroscopic studies that can be ordered and when they should be performed.
- xi. See what the preparation for double contrast barium enemas involves for the patient.
- xii. Learn how to recognize a pneumoperitoneum on radiographs.
- xiii. Know the options for staging colon cancer.
- xiv. Learn how to recognize and differentiate small bowel obstruction versus ileus on radiographs.

## 6. GI: Gallbladder and Pancreas

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

### Learning Objectives:

- i. Learn how to use the [ACR Appropriateness Criteria®](#).
- ii. Learn to identify gallstones and other abdominal calcifications on abdominal radiographs.
- iii. Learn basic RUQ abdominal ultrasound (US) anatomy.
- iv. Know the appropriate imaging management for suspected acute cholecystitis.
- v. Know the appropriate imaging management for biliary obstruction with different presentations.
- vi. Know what chronic cholecystitis and acute cholecystitis look like on US and nuclear medicine hepatobiliary scanning.
- vii. Know the causes of false positive and false negative ultrasound examinations when evaluating for acute cholecystitis.
- viii. Know what imaging exams can be performed portably.
- ix. Understand the use of imaging-guided paracentesis.
- x. Know the basic concepts of diagnosing appendicitis by US, CT, MR.
- xi. Understand what a MRCP scan is and when it can be a useful diagnostic tool.
- xii. Understand what an ERCP is and some of its applications.
- xiii. Know when CT is helpful in the evaluation of acute pancreatitis and recognize its classic appearance.
- xiv. Know the modalities that can be used to diagnose pancreatic carcinoma.
- xv. Understand the basic principles of treating metastatic liver lesions with Radiofrequency ablation (RFA).
- xvi. Know how percutaneous transhepatic biliary drains are placed.

## 7. Renal/GU

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

### Learning Objectives:

- i. Learn how to use the American College of Radiology (ACR) Appropriate Criteria®.
- ii. Understand the imaging evaluation of nephroureterolithiasis by ultrasound and CT.
- iii. Recognize the typical appearance of nephroureterolithiasis on CT and ultrasound.
- iv. Identify the imaging findings in patients with nephroureterolithiasis that may indicate that surgical intervention is needed.
- v. Know when imaging may be indicated in patients with pyelonephritis.
- vi. See the typical appearance of pyelonephritis on CT.
- vii. Understand what contrast-induced nephropathy is, and risk factors for it.
- viii. Know the options for the imaging workup of renovascular hypertension.
- ix. Understand how Captopril renography is used to diagnose renal artery stenosis.
- x. See how renal artery stenosis can be treated by interventional radiology.
- xi. Understand the imaging workup and findings of painless hematuria.
- xii. Know how indeterminate renal masses can be further evaluated.
- xiii. Be able to differentiate renal cysts from solid masses on US and CT.
- xiv. Know the imaging workup to stage of renal cell carcinoma.

## 8. GI: Trauma

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

### Learning Objectives:

- i. List the components of a typical radiographic trauma series.
- ii. Describe a “FAST” scan, and when and how it is performed.
- iii. State how the results of “FAST” scanning alter the management of trauma patients.
- iv. Develop a search pattern for looking at trauma pelvic radiographs.
- v. Develop a search pattern for looking at supine trauma chest radiographs.
- vi. Learn how and when CT scans are performed for abdominal trauma and what contrast is necessary.
- vii. Have a basic concept of what CT findings of solid organ injury may necessitate surgery, and what may be managed non-operatively.
- viii. Know the typical CT imaging findings in liver, splenic, and kidney lacerations.
- ix. List three typical CT imaging findings of bowel injury.
- x. Know when bladder and urethral injuries should be suspected and further evaluated.
- xi. Know how to further evaluate suspected hollow viscus injuries including bowel and bladder.
- xii. See how bladder ruptures (intra- and extra-peritoneal) appear on CT scans.
- xiii. Know when a diaphragmatic injury should be suspected.
- xiv. See the typical radiographic presentation of diaphragmatic injuries.
- xv. List 3 ways to minimize radiation dose during trauma evaluation.

## 9. Neuro: Trauma

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

### Learning Objectives:

- i. Have reviewed basic head CT anatomy.
- ii. Know the appropriate imaging workup for patients with head trauma.
- iii. Recognize the appearance of intracranial hemorrhage on CT, specifically epidural, subdural, subarachnoid and intraparenchymal hemorrhage.
- iv. Be able to list criteria that are used in spinal trauma to determine if the patient should have CT of the cervical spine.
- v. Know some of the traumatic injuries than can be seen on a lateral c-spine

radiograph.

- vi. Know the various types and causes of brain herniation.
- vii. Have seen the typical appearance of brain herniation on CT scans.
- viii. Recognize the typical change in appearance of intracranial blood products with age on CT.
- ix. Be aware of the changes in appearance of intracranial blood products with age on MRI.
- x. Have seen the typical appearance of diffuse axonal injury on MRI and CT.

## 10. Neuro: Vascular and HIV

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

### Learning Objectives:

- i. Be able to categorize headache etiologies and identify dangerous causes of headaches.
- ii. Have reviewed the ACR Appropriateness Criteria for imaging work up of headache.
- iii. Be able to select appropriate diagnostic imaging studies for dangerous causes of headaches.
- iv. Recognize the appearance of subarachnoid hemorrhage on non-contrast head CT.
- v. Have a basic understanding of the different types of vascular malformations and have seen examples on CT and MRI.
- vi. Be able to differentiate T1, T2 and FLAIR MRI neuroimaging sequences.
- vii. Know what a DWI sequence on MRI is and its common uses.
- viii. Be able to name common locations of berry aneurysms.
- ix. Have reviewed the anatomy of the cerebral vasculature.
- x. Know the treatment options available for patients with cerebral aneurysm(s).
- xi. Know the common cerebral mass lesions which occur in the HIV population and have some awareness of their different appearances on MRI.
- xii. Understand the basic concept of what MR spectroscopy is and what it is used for.

## 11. Pediatrics A

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

### Learning Objectives:

- i. Be able to discuss the differential diagnosis and choose the appropriate imaging work-up for bilious vomiting in an infant.
- ii. Be able to discuss the differential diagnosis and choose the appropriate imaging work-up for NON-bilious vomiting in an infant.
- iii. Understand the concept of malrotation and midgut volvulus.
- iv. Know the typical findings of midgut volvulus on an upper GI study.
- v. See the typical appearance of duodenal atresia on radiographs.
- vi. See the typical appearance of pyloric stenosis on ultrasound.
- vii. Recognize the radiographic signs of bronchiolitis in infants.
- viii. Recognize the radiographic signs of common complications of tube and line placements in pediatric patients such as a pneumothorax.
- ix. Know the appropriate use of chest radiology in ventilator dependent pediatric patients.
- x. Be aware of the potential risks of radiation exposure in the pediatric population and the current increase in medical imaging in this age group.
- xi. Know where to obtain resources to discuss medical imaging risks with parents.
- xii. Be able to describe the common pediatric fractures.
- xiii. Be able to discuss the differential diagnosis of, and choose the appropriate imaging evaluation for, limp in young pediatric patients.

- xiv. See the typical appearance of a hip effusion on ultrasound.
- xv. Know which fractures which are pathognomonic for child abuse, and which fractures which are commonly associated with child abuse.
- xvi. Be aware of resources for the management of suspected child abuse cases.

## 12. Pediatrics B

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

### Learning Objectives:

- i. Understand the etiology and history of developmental hip dysplasia (DDH).
- ii. Know how to screen and further evaluate babies with suspected DDH.
- iii. Know how DDH is treated.
- iv. Understand the different types of hydrocephalus.
- v. Know how to evaluate for hydrocephalus in infants and young children.
- vi. Know some of the uses of transcranial ultrasound in neonates and infants.
- vii. Be familiar with the appearance of hydrocephalus on neonatal transcranial ultrasound.
- viii. List an appropriate differential diagnosis of acute abdominal pain in the pediatric patient.
- ix. Know the appropriate imaging management of pediatric patients with acute and chronic abdominal pain depending on age of presentation.
- x. Have seen the common imaging findings of acute appendicitis, intussusception and testicular torsion.
- xi. Know the typical clinical presentation and management of pediatric epiglottitis.
- xii. Have seen the typical radiographic characteristics of acute epiglottitis.
- xiii. Be aware of the entity of round pneumonia.

## 13. MSK: Arthritis and Osteomyelitis

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

### Learning Objectives:

- i. Review the typical presentation of a patient with rheumatoid arthritis
- ii. Know the common imaging findings in rheumatoid.
- iii. Understand the difference between osteoporosis, osteopenia and osteomalacia
- iv. Know who should be screened for osteoporosis.
- v. Understand the different means of screening for osteoporosis and some of their limitations.
- vi. Understand the meaning of T and Z scores on bone mineral density reports.
- vii. Have a basic concept of the imaging findings in osteomyelitis.
- viii. Know how to image the diabetic foot when osteomyelitis is suspected.
- ix. Be aware of some the radiographic findings and challenges in imaging neuropathic (Charcot) feet.
- x. Be aware of the variability in radiation doses to the patient between different common imaging exams.
- xi. Review the ACR Appropriateness Criteria for imaging patients with acute back pain.
- xii. Have seen the typical appearance of osteoporotic compression fractures of the spine on radiographs and an MRI.
- xiii. Understand how and when vertebroplasty may be performed.

#### 14. Women's Imaging: Pregnancy and Infertility

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

##### Learning Objectives:

- i. Know how to manage a palpable breast mass in a young patient.
- ii. Know the appearance of a simple breast cyst.
- iii. Have a basic understanding of the imaging work up for infertility, and how interventional radiology can help with tubal occlusions.
- iv. See examples of normal and abnormal hysterosalpingograms.
- v. Recognize the normal appearance of the uterus on ultrasounds.
- vi. Know the indications for first trimester ultrasound.
- vii. Have seen the normal sequence of appearance of embryonic structures on first trimester ultrasound.
- viii. Know how suspected ectopic pregnancies are managed and see examples of their typical appearances.
- ix. Know the indications for second and third trimester ultrasound imaging including morphological surveys and Down syndrome screening.
- x. Have a basic understanding of the concept of minor and major markers in morphological screening ultrasound.
- xi. See examples of normal fetal and placental structures on second trimester ultrasounds.
- xii. Learn how to image common suspected (non-pregnancy related) abdominal conditions in the pregnant patient.
- xiii. Develop a basic understanding of how common imaging modalities may produce radiation effects in the fetus, and how high that risk is.

#### 15. Women's Imaging: Malignancy and Screening

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

##### Learning Objectives:

- i. Gain familiarity with the current recommendations for screening mammography.
- ii. Be aware of some of the controversies surrounding screening mammography.
- iii. Know how mammography is performed.
- iv. Know what the BIRADS categories refer to (that are on all mammographic reports).
- v. Understand what the term 'diagnostic mammography' refers to, and when patients should be referred for diagnostic mammography.
- vi. Have a broad understanding of what kinds of abnormalities can be seen on mammograms.
- vii. Know about the use of image guided core needle breast biopsies.
- viii. Know what modalities are used to stage patients with breast cancer, including breast MRI
- ix. Have seen some examples of breast MRI images.
- x. Know how sentinel nodes studies are performed.
- xi. Understand the concept of 'neoadjuvant' chemotherapy.
- xii. Know about the availability of familial cancer assessment programs and risk assessment models such as the Gail model.
- xiii. Understand the concepts behind screening for patients who are high risk for breast cancer with mammography and MRI.
- xiv. Know when and how patients at increased risk of ovarian cancer should be screened.
- xv. Know the indications for performing pelvic ultrasound.
- xvi. Know how to evaluate post-menopausal vaginal bleeding.
- xvii. Know what is an abnormal endometrial thickness in a post-menopausal patient.
- xviii. Have seen examples of endometrial cancer on transvaginal ultrasound.



- xix. Be familiar with the term sonohysterography and its indications and have seen examples of common conditions with this modality.
- xx. Know some of the indications that can be evaluated by pelvic MRI.

## 16. MSK: Trauma

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

### Learning Objectives:

- i. Identify the anatomy and become familiar with the imaging of the upper and lower extremities on x-ray with emphasis on pelvis, knee, ankle wrist, and shoulder.
- ii. Develop a general approach to the interpretation of bone radiographs with adherence to a systemized evaluation for the diagnosis of fractures and joint dislocations.
- iii. Use proper terminology when describing fractures and develop a basic understanding of fracture mechanics.
- iv. Explain the importance of multiple x-ray views in fracture diagnosis and the need for cross sectional images in the context of suspected occult fractures.
- v. Discriminate between the use of plain film, CT or MRI for evaluating musculoskeletal injuries both osseous and ligamentous/soft tissue.
- vi. Familiarize with a number of widely used fracture classifications and understand the basic physiologic premise for which the classification were derived.
- vii. Summarize risks and contraindications of radiological examinations including fluoroscopy and MRI.

## 17. Cardiac and Cardiovascular

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

### Learning Objectives:

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

- xv. State the dose involved as an equivalent number of chest radiographs and to natural background radiation.
- xvi. Understand the anatomic basis for the common locations of bowel ischemia.

## 18. Professionalism in Radiology

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

### Learning Objectives:

- i. List 3 attributes of a professional.
- ii. Describe 3 effects on medicine when professionalism is absent.
- iii. List information to include in a radiology consult
- iv. Know how imaging critical findings are communicated and documented
- v. Discuss patient privacy issues regarding
  - a. PACS/EMR use
  - b. Discussing patients in public
  - c. De-identification of images for presentations and publications
  - d. Social media
- vi. Define what a fiduciary relationship is and what that means for physicians in managing boundaries.
- vii. Recognize the importance of honesty with patients, without overstepping boundaries as a medical student.
- viii. Describe the role of clinical decision support resources, such as the ACR Appropriateness Criteria in "just distribution of resources."
- ix. Discuss managing conflicts of interest regarding:
  - a. Gifts from patients
  - b. Gifts from Pharma

## 19. Oncology

**Online Case:** [Aquifer CORE 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.