THE OHIO STATE UNIVERSITY
WEXNER MEDICAL CENTER

# CORD 560 Adult Learners: Successfully Flipping the Classroom for ***YOUR*** Conference

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## Adult Learning Problem Identified to Address

Transitioning from a traditional lecture based didactic curriculum to a literature based self-directed learning and small group based curriculum promoting "flipped" classroom concepts. Our curricular innovation also utilizes frequent simulation sessions held during weekly conference to assess milestones routinely identified as difficult to assess which include:

- Emergency Stabilization (PC1) Level 3 – evaluates the validity of a DNR order
- Professional Values (PROF1) Level 3 and 4 – alternative care plans (level 3) and ethical issues in complicated and challenging clinical settings (level 4)
- Patient Safety (SBP1) Level 4 – leads team reflections
- Patient Centered Communication (ICS1) Level 4 – flexible communication strategies to resolve specific ED challenges such as delivering bad news and drug seeking behavior

## Overview of The Ohio State University Self-Directed Learning and "Flipped" Classroom Model

Our didactic curriculum is designed to teach the Core Content of Emergency Medicine over an 18 month period, which allows residents to see each topic twice over the course of their residency training. Prior to weekly small group discussions, resident learners complete an education faculty developed self-directed learning exercise pertaining to the small group topics of focus that week. A sample of our self-directed learning exercise is detailed later in this handout. Residents are asked to submit completed assignments on E-Value, the medical education software our department utilizes, and includes the development of an ABEM style question. Resident authored questions are reviewed by members of the program leadership and the best questions are used to create a quiz which is administered to residents at the end of each conference as an additional measurement of medical knowledge.

Weekly conference (figure 1) begins with a resident driven "rapid-fire" case conference focusing on both interesting and core emergency medicine cases. This session is preceded by a trauma case conference once per month; trauma sessions discuss trauma related core-content. Also once per month, morbidity and mortality conference replaces "rapid fire" case conference. During monthly morbidity and mortality sessions, ED cases are critically analyzed using a cognitive autopsy approach (figure 2). Residents then divide into their assigned small groups which consist of residents at varying levels of training. Small group sessions are led by senior residents and facilitated by education faculty members who provide feedback on resident leader teaching abilities. Small group sessions focus on clinical controversies and questions identified by residents after reviewing the material. Each small group session is 45 minutes in length and residents rotate amongst the three different session. One session is comprised of simulation/procedure or evidence-based medicine (EBM) topics. During simulation and procedure sessions, residents are taught and assessed on all core procedures of emergency medicine; simulation sessions are utilized to assess milestones identified as routinely difficult to assess in the emergency department. EBM topics discuss Annals of Emergency Medicine Journal Club articles in addition to EBM concepts which are vital to research and understanding medical literature. After small group sessions end, the entire group reconvenes for a guest lecture, wellness discussion, and other unique topics.

Following each weekly conference, residents complete a quiz which provides program leadership with additional data points for the medical knowledge milestone. Resident learners also complete an independent learning plan (ILP) following conference which is meant to encourage learners to identify further knowledge gaps and questions after completing both the self-assessment exercise and small group discussions. They are required to create a plan on how to remedy their knowledge gap or answer their question - once completed, ILPs are submitted for review by program leadership and education faculty.

**Why is The Ohio State University Self-Directed Learning and "Flipped" Classroom Model Successful?**

Since the inception of our innovated curriculum model, residency program leadership has received overwhelmingly positive feedback. Resident learners candidly express that they are learning a great deal and enjoy learning the material using this model. Faculty members genuinely enjoy the increased resident interaction and educational discussions. Our "flipped" classroom model has remained successful because our department is entirely dedicated to resident education and this curricular innovation, meaning all residents and faculty are truly committed. Program leadership encourages continuous feedback and makes changes meant to further improve the educational product. The curricular innovation will remain dynamic to welcome and commit to changes recommended by faculty and residents meant to further improve our design. Our "flipped" classroom approach requires a large amount of organization given the large number of activities and facilitators involved. Our residency coordinator is instrumental in maintaining organization, record keeping, and scheduling. She also maintains a ledger of faculty involvement in order to maintain accountability. The curricular organization is aided by the use of E-Value, our institution's chosen medical education software platform.

**Challenges Experienced in the Development and Execution of Our Curricular Model**

Challenges arise and are an integral component of any major change. Prior to our recent curricular innovation, our residency didactic program was primarily lecture based for approximately 30 years. This traditional style "worked" and led to complacency within the department and a "if it isn't broke then don't fix it" mentality. GME faculty and residents (especially PGY-3 residents) were initially resistant to this change because it required much more effort on their part and they were skeptical on the concept. It took frequent evidence-based discussions and a couple of pilot small group sessions to educate members of the department that this curricular model is indeed the method to maximize adult learning. The amount of scheduling and organization required also posed a challenge initially. We designed various google documents that faculty could use to sign up to write and lead various small group sessions. We also had to work with E-Value to create an interface that could manage our curricular documents and components.

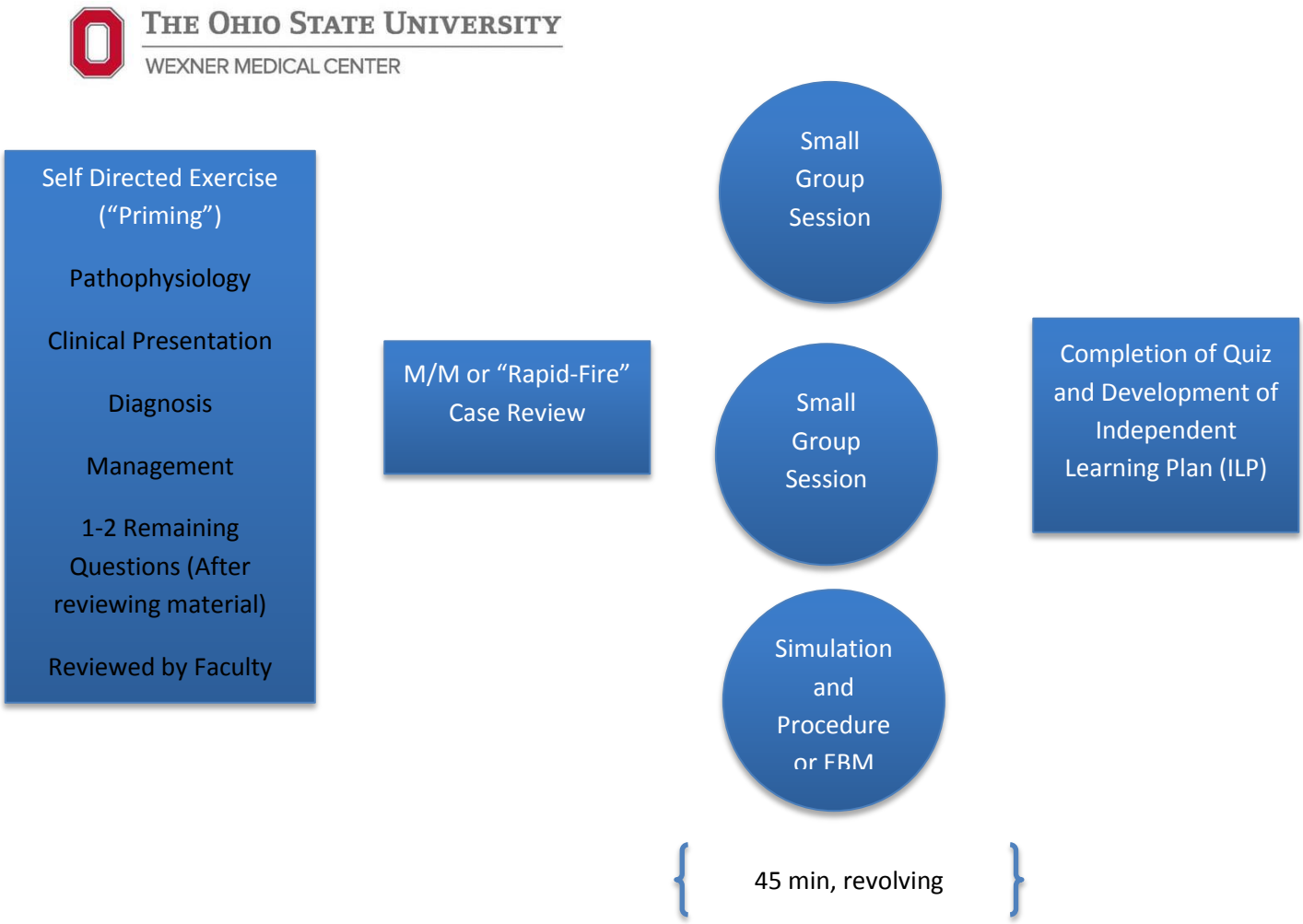



*Figure* 1: The Ohio State University Department of Emergency Medicine Self-Directed Learning and "Flipped" Classroom Approach

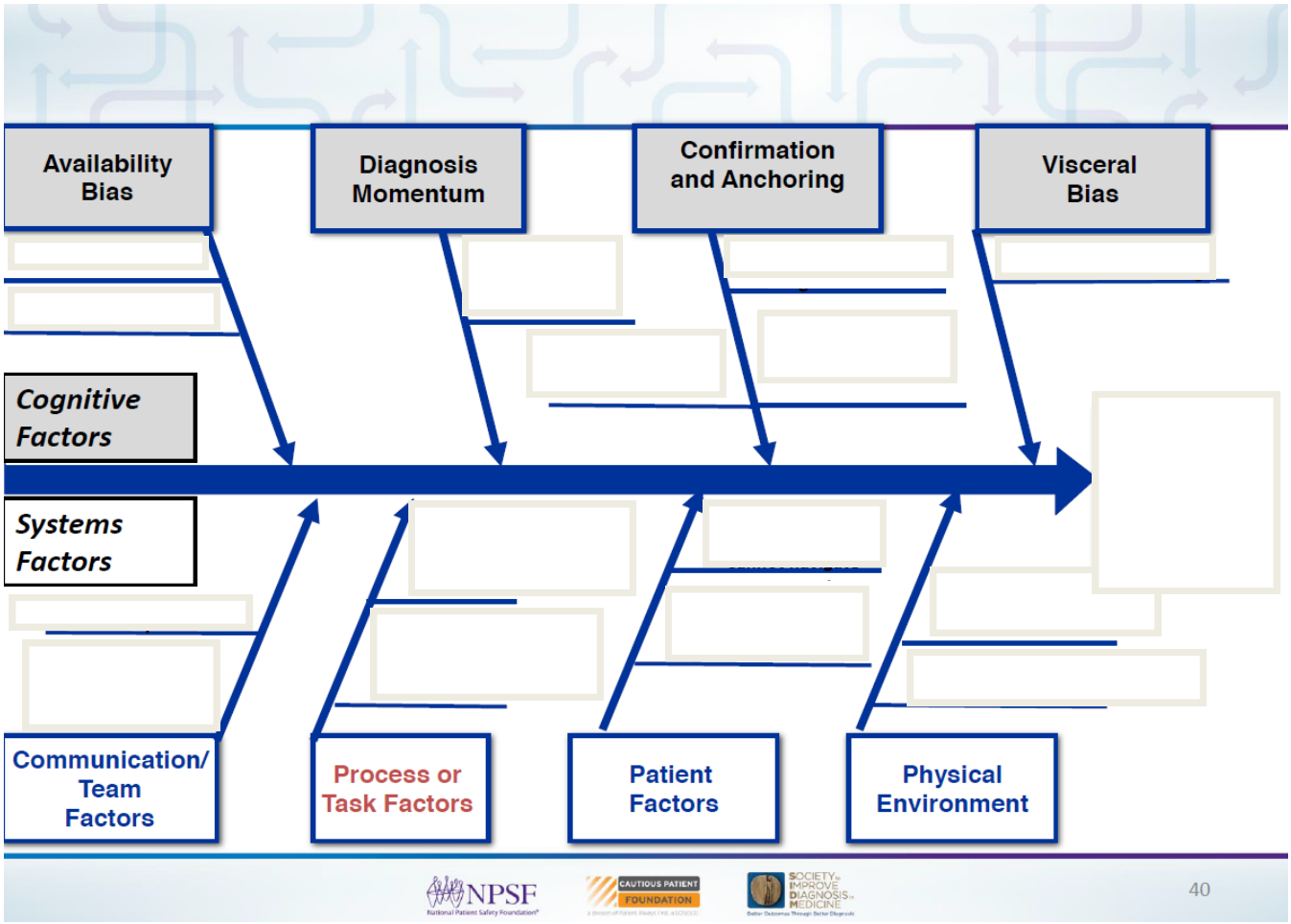



*Figure* 2: Fishbone Diagram Utilized for Cognitive Autopsy of Errors Resulting in Morbidity and Mortality Case Discussions

**SAMPLE Self-Directed Exercise Prior to Weekly Small Group Discussions**
(Developed by Ohio State University Emergency Medicine Education Faculty)

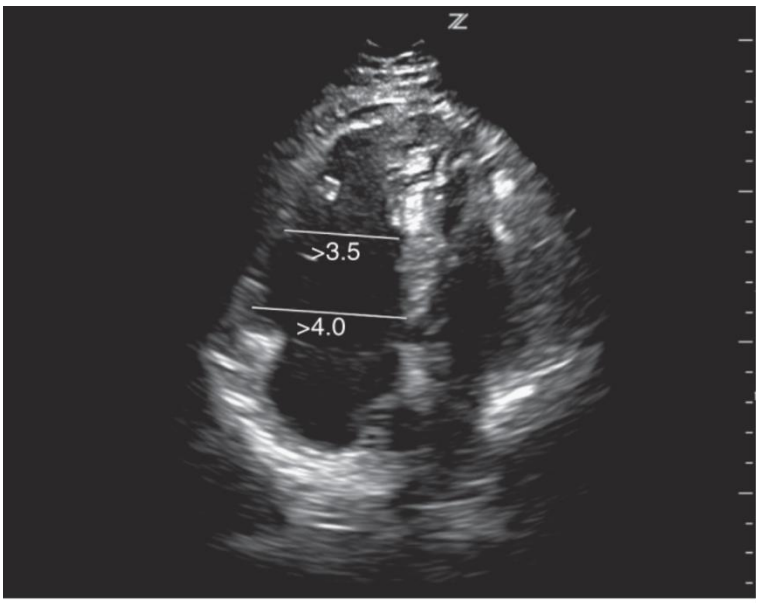
**Pulmonary Embolism**

**Objectives and Clinical Controversies for Small Group Discussion**

1. Review pathophysiology, diagnosis and treatment of pulmonary embolism.
2. Review and discuss the indications for various imaging modalities, systemic thrombolytic administration, and catheter assisted thrombolytic administration.
3. Discuss questions posed by residents in their pre-work assignments.
4. Critically discuss the ADJUST-PE study assessing age-adjusted d-dimer cutoff levels to rule out PE.
5. Critically discuss the use of trimester adjusted d-dimer in pregnancy to clinically rule out PE.
6. What patients, if any, diagnosed with an acute PE in the emergency department would you consider outpatient anticoagulation v admission?
7. Debate the role of heparin v enoxaparin and warfarin v newer oral anticoagulants in the treatment of PE.
8. Discuss the role of bedside ultrasound in the diagnosis of massive pulmonary embolus.
9. Summarize key learning points

Case 1

A 30-year-old female presents to the emergency department complaining of acute onset dyspnea and palpitations which began five hours prior to arrival. The patient was recently evaluated by orthopedics and placed in a knee brace for an injury she sustained while playing soccer two weeks prior. Shortness of breath is worse with exertion and she has associated pleuritic chest pain. She also states that some swelling persists in her injured leg at the knee, shin, and calf. She has no medical problems and her only medication is an oral contraceptive. On examination, the patient appears anxious and has an initial heart rate of 120 and a blood pressure of 146/54 with an oxygen saturation of 96%. Shortly after beginning the ED evaluation, the patient became more tachypneic and her oxygen saturation dropped to 92% on 2L nasal cannula. He repeat blood pressure was 88/54. Bedside cardiac ultrasound is shown below.




Source: Ma OJ, Mateer JR, Reardon RF, Joing SA: *Ma and Mateer's Emergency Ultrasound, Third Edition*: www.accessemergencymedicine.com


Question Prompts

1. What is the most appropriate emergency management of this patient?
2. What other imaging is necessary in the ED, if any?
3. What are the indications for systemic thrombolytics? Catheter assisted thrombolytics?
4. Would management change if the patient maintained stable vital signs?

Case 2

A 68-year-old male presents to the emergency department for evaluation of chest pain and shortness of breath. He has a history of hypertension and hypercholesterolemia but denies cardiac history. Complains of diffuse chest pain that is worse with breathing and with coughing. Also has some mild associated shortness of breath. He has had a cough and congestion for the past week where he has intermittent paroxysms of violent coughing. Vital signs are entirely normal and his pain is reproducible on palpation. Lungs are diminished but clear. CXR and ECG performed in triage were reviewed and normal. Given the pleuritic chest pain, PE enters the differential diagnosis. PERC is unable to be utilized, so a d-dimer is ordered in association with other laboratory tests. All laboratory studies are negative except for the d-dimer which returned elevated at 0.67 (normal is <0.50)

Question Prompts

1. What is the likely diagnosis for this patient?
2. After critically reviewing the ADJUST-PE study, is it likely for this patient to have a PE? Does he warrant imaging?

3. Is the use of clinical gestalt/decision rules accurate and supported by the literature?

Case 3

A 13-year old female presents to the emergency department accompanied by her mother stating that her "chest hurts" when she breathes. She was started on an oral contraceptive medication 2 weeks ago for her menstrual periods. The pain has gotten progressively worse throughout the day and she has since developed some shortness of breath. She has an anaphylactic reaction to CT contrast dye and nuclear medicine is not available. Her vital signs and physical examination are normal.

Question Prompts

1. What is the likelihood that this patient has a PE? Are clinical decision rules applicable in this patient?
2. What diagnostic studies are necessary for this patient?
3. The d-dimer returns at 1.32 – what imaging modalities should be considered for this patient?

**Expectation: Independently review the pathophysiology, diagnosis, and treatment of pulmonary embolism.**

**Recommended Reading:**

Tintinalli's Emergency Medicine 7th Edition Chapter 60 Thromboembolism

Ma and Mateer's Emergency Ultrasound 3rd Edition Chapter 6 Massive PE Section

ACEP Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients Presenting to the Emergency Department with Suspected Pulmonary Embolism (Briefly Review)

Righini M, et al. Age-adjusted D-dimer cutoff levels to rule out pulmonary embolism: the ADJUST-PE study. JAMA. March 19, 2014; 311 (11); 1117-1124

**Additional Resources:**

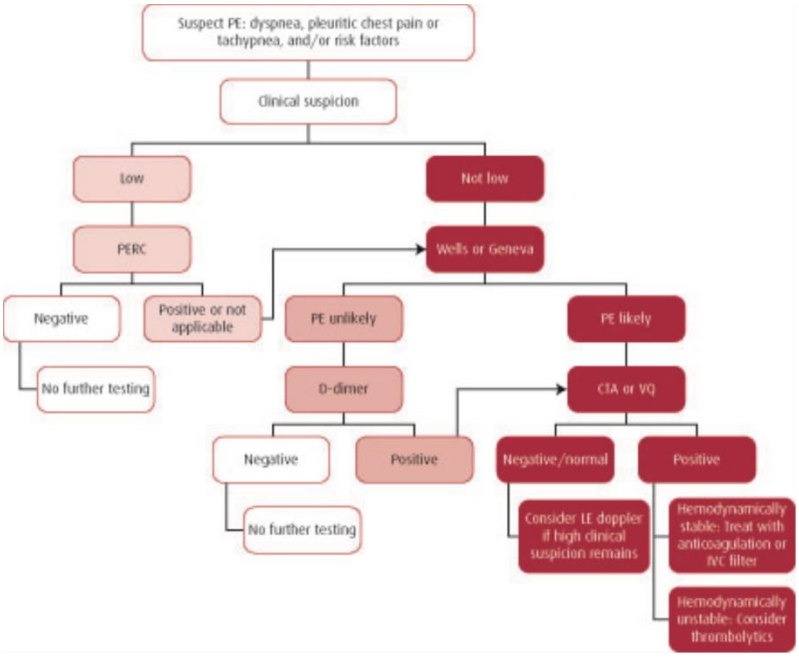
Rosen's Emergency Medicine 8th Edition Chapter 88 Pulmonary Embolism and Deep Vein Thrombosis pp 1157-1169

Emergency Medicine Clinical Essentials (Adams) Chapter 70 Pulmonary Embolism pp 602-610

OSU Clinical Practice Guideline on Pulmonary Embolism

Stein P, et al. Gadolinium-Enhanced Magnetic Resonance Angiography for Pulmonary Embolism (PIOPED III). Ann Intern Med 2010; 152; 434-443

Shalabi Agha B, et al. Pulmonary Embolism in the Pediatric Emergency Department. Pediatrics. October 4, 2013; 132 (4); 663-667




****Consider additional EBM resources and FOAMed**

**List EBM resource(s) you used to learn/review the assigned material:**

**After completing your independent learning, list one question that remains regarding pulmonary embolism:**

**Create and submit 1 ABEM style questions pertaining to pulmonary embolism (Please include explanations for correct and incorrect responses).**

**"Flipped" Classroom Resources**

Khanova J, et al. "Student experiences across multiple flipped courses in a single curriculum." *Medical Education* 2015, 49: 1038-1048. doi: 10.1111/medu.12807

Moffett J. "Twelve tips for "flipping" the classroom." *Medical Teacher* 37:4 331-336. doi: 10.3109/0142159X.2014.943710

Tan E, Brainard A, Larkin G. "Acceptability of the flipped classroom approach for in-house teaching in emergency medicine." *Emergency Medicine Australasia* (2015) 27: 453-459. doi: 10.1111/1742-6723.12454

Young T, et al. "The Flipped Classroom: A Modality for Mixed Asynchronous and Synchronous Learning in a Residency Program." *Western Journal of Emergency Medicine: Integrating Emergency Care with Population Health* 15 (7) 938-944. doi: 10.5811/westjem.2014.10.23515

Mehta N, et al. "Just Imagine: New Paradigms for Medical Education." *Academic Medicine* 2013; 88: 1418-1423. doi: 10.1097/ACM.0b013e3182a36a07

Prober C, Khan S. "Medical Education Reimagined: A Call to Action." *Academic Medicine* 2013; 88: 1407-1410. doi: 10.1097/ACM.0b013e3182a368bd