

Poullos—GRANT PROPOSAL

The Acute Abdomen Small Group On-Call Simulation: A Flipped Classroom Approach To Teaching Radiology

I. Specific Educational Aims:

The aim of this project is to utilize the “flipped classroom” (FC) approach with immersive role-play simulations to teach students and residents how to utilize and interpret radiologic studies in patients with acute abdominal pathology. This is a proposed continuation/expansion of a project funded (\$7329.00) by the TMA and completed in 2017. This project contributes to improving teaching and mentoring at Stanford and beyond by filling a large gap in durable self-guided and interactive learning. This project addresses three of the four TMA funding priorities:

Collaboration-Radiology is at the intersection of multiple subspecialties and populations. The course can be used in other clerkships (surgery and emergency medicine, for example), as well as radiology.

Diversity and inclusion-We treat male and female, adult and children, disabled and able-bodied, minority and nonminority, and all socioeconomic classes. The case mix reflects that. Additionally, the structure of the material itself supports diversity; digital media allows students to control the pace, and to replay as needed. This is of value to learners with a variety of accessibility concerns. From personal experience living with a spinal cord injury, this control is helpful when one cannot write quickly. It is also helpful for the hearing impaired and those less fluent in English. Using class time to apply concepts gives faculty an opportunity to detect and counteract errors or misconceptions, and to facilitate inter-learner instruction, which is beneficial to those both above and below average mastery of the material.

Impact and sustainability- Making the course available beyond Stanford will have a much greater impact. Once created, the modules are a durable resource that is easily sustainable.

Objectives for students-

- To learn the fundamentals of radiology as it pertains to the diagnosis of the acute abdomen in the emergency department. This will include radiography, CT, MRI, and ultrasound.
- Learn basics of scanning protocols and contrast media usage and administration.
- Collaboratively relate and incorporate clinical information to modify exam ordering, triage, protocolling and interpretation. Advocate for quality care, particularly imaging utilization.
- Make core observations, formulate differential diagnoses, and management recommendations.
- Simulate team-based coordination of activities, including those relating to interpersonal and communication skills with patients, family, and caregivers, as well as ancillary staff.
- Diagnose more common pathologic conditions and understand their pathophysiology.
- Understand the role of imaging in the evaluation of specific diseases and among varied patient populations, and how timely image interpretation affects patient care and outcomes.

II. Project Rationale:

The FC approach, also called “blended learning,” is an effective and engaging learning model whereby students cover material on their own before class, and class time is transformed into an interactive workshop. It is more effective than traditional learning, and has been adopted by many educators. (Belfi, Bartolotta, Giambone, Davi, & Min, 2015; Makhdoom, Khoshhal, Algaidi, Heissam, & Zolaly, 2013). My course was selected as an educational exhibit at the Radiologic Society of North America Annual (RSNA) meeting in 2016, and as a workshop at the Society of Abdominal Radiology meeting in 2017. Feedback

from the pilot (below) was very positive, but there are specific issues (*italicized*) I would like to address.

“...forcing us to put our nickel down is particularly helpful;” “Love the interactive case based nature;” “*Would be nice if the ‘radiologist’ could point or highlight areas they are looking at on the iPad;*” “Nice to have experience scrolling ..., but only 1 person was able to do it at once. *It would be cool if everyone had their own PACS;*” “... This is the way all the classes...should be taught;” “I appreciated the opportunity to think through cases in real time. *Having a high volume of ... ‘already read’ images would be very helpful;*” “I liked the questions....*it would be nice to be able to speed or slow down video.*”

Approach:

1. Online interactive instructional course-*The Acute Abdomen* <http://theacuteabdomen.stanford.edu>
Introduction and instructional video at <https://youtu.be/pia5rftHQ7Y>
The online modules consist of didactics, case presentations, “scrollable” CT cases, and self-assessment questions. There are currently modules for appendicitis, diverticulitis, and other intestinal pathologies. I would like to add liver, gallbladder, pancreas, stomach and spleen.
2. On-call simulation. Learners are immersed in role-play, tailored to their level and specialty. They rotate roles as ordering clinician, radiologist, and radiology nursing and technologists. New material will need to be developed for the simulation, focusing on the organ systems listed in #1.

Timeline and plan for implementation:

1. Video self-production utilizing PowerPoint (free) and Camtasia (paid for already by TMA).
2. Online class construction to be done on Articulate 360 (\$1597.00 for 1 year subscription for 3 users). I will need instructional designer support (\$2000) to help create the modules, embedding video, uploading cases, designing interactive questions, and creating an evaluation system.
3. Cases are uploaded into Osirix MD (paid) on a Macintosh (paid), and then synced with the iPad Pro (paid), which the students will use to review cases “in real time.”
4. Cases will be uploaded into ClariPACS (\$1990 for unlimited users), which we will use to embed the images into the Articulate 360 system. Students will review them both in the modules and in the simulation. Supplemental teaching cases will be available for use online.
5. The scripts for the simulation will be done on my own and loaded onto the iPad Minis (paid).

Completion timeline is liver (12/18), biliary (2/19), pancreas (4/19), stomach (6/19) and spleen (7/19).

Anticipated work product:

1. Online course-*Radiology of the Acute Abdomen*.
2. Full simulation of radiology on-call experience.

Evaluation Plan:

The students and residents will evaluate both the online and classroom portions. Learner feedback and instructor experience will inform improvements in subsequent iterations.

Dissemination of results:

- The project will be presented as an educational exhibit at the Association of University Radiologists Annual Meeting in April 2019.
- The online course will be made available to anyone online, potentially having a worldwide impact.