BACKGROUND

Accurate, independent interpretation of thoracic imaging is an essential skill for pulmonary and critical care medicine (PCCM) physicians, as they often have to make clinical decisions based on their interpretation of imaging. Clinical decisions based on improper interpretation leads to delayed or misdiagnoses, and potential patient harm, which is magnified in the intensive care setting.

Although, competency in thoracic imaging is important, training varies widely among PCCM fellowship programs due to lack of national emphasis, standards, and competency framework, including how competencies should be achieved or assessed. Most PCCM fellowship programs rely on clinical exposure for radiographic learning. In a recent national survey, almost half of fellows cited a lack of imaging curricula as a barrier to their education.

METHODS

After reviewing the national cardiothoracic curricula and competencies for radiology residents, thoracic radiology resources, PCCM board blueprints, and interdisciplinary collaboration with thoracic radiology and PCCM experts, we developed a syllabus of thoracic radiology competencies with associated goals and objectives for PCCM fellowship.

To achieve these competencies, we developed a systematic, yearlong chest-imaging curriculum comprised of weekly ~30-minute self-paced online didactics (predominantly from the Society of Thoracic Radiologists) and one-hour case-based pulmonary-radiology conferences (Table 1). Self-paced online didactics increased flexibility and provided lectures from nationally renowned experts.

The first two months of self-paced didactics encompassed a foundational phase of chest X-ray and CT interpretation basics. The subsequent ten-months focused on specific disease processes, their clinical and radiologic correlates, and imaging-based quizzes.

Fellows lead and pulmonary and radiology faculty facilitate the weekly case conference, which focuses on fellows working through complex cases with a specific emphasis on integrating thoracic radiology interpretation into clinical reasoning and differential development. The curricular design utilizes evidenced-based techniques to enhance learning and recall, including interactive quizzes, spaced repetition, and interleaving topics.

Fellows were assessed at the beginning and end of the 2020-2021 and 2021-2022 academic years with a 33-question board-style assessment, specifically crafted to require integration of radiographic interpretation with the clinical history provided. The assessment was developed by the lead author and was adjudicated by two content experts: a senior PCCM faculty member and a cardiothoracic radiologist.

The assessment also captured data on the fellows' career goals and comfort level in independently interpreting thoracic imaging modalities and disease processes.

RESULTS

Average **pre**-test scores (N = 13) were 44% (14.5/33) overall, 38% (12.5/33) in first-year fellows, and 53% (17.6/33) in senior fellows. Average **post**-test scores (N = 5) increased by 8% overall (52%, 17.2/33), 9% in first-year fellows (47%, 15.3/33), and 8% (61%, 20/33) in senior fellows (Chart 1).

The average and median **pre**-test confidence of fellows to independently interpret chest x-rays and chest CTs was "somewhat confident." The average and median **post**-test confidence of the fellows increased to "fairly confident."

There was no correlation between confidence interpreting a modality of imaging (chest x-ray or CT chest) or disease process and score.

CONCLUSION

We created a comprehensive, innovative, sustainable, and transferable chest imaging curriculum utilizing evidence-based teaching methods, and we objectively assessed fellows' knowledge and ability to integrate thoracic radiology interpretation with clinical decision-making. Initial assessment showed that fellows have lower than expected proficiency in radiology interpretation, and fellows' confidence and knowledge do not correlate.
With this curriculum, all fellows improved their skills and confidence in independently interpreting chest x-rays and CT chests. Further study will examine how scores change after multiple years of this competency-based curriculum and developing a three-year curriculum and assessing its impact. The curriculum provides standardized thoracic radiology competencies for PCCM fellows and a systematic process to advance and evaluate radiographic knowledge in PCCM fellowships nationally.