



Integrating AI into Echocardiography Education for Improved Technique and Scalability

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BACKGROUND

Focused transthoracic echocardiography (FTTE) enables rapid, point-of-care assessment of cardiac function and volume status in perioperative and critical care settings.¹

Traditional FTTE training relies heavily on direct faculty supervision, limiting its scalability and feasibility across residency programs. AI-assisted ultrasound guidance may enhance novice performance by providing real-time feedback on probe positioning, anatomy recognition, and image optimization.

Objective: To evaluate whether AI-guided FTTE training improves image quality and efficiency while reducing faculty supervision requirements compared to standard instruction.

METHODS

Residents from internal medicine and anesthesiology completed a standardized 4-day FTTE curriculum consisting of SCCM web-based lectures moderated by a critical-care echocardiography instructor, followed by hands-on scanning practice.

After training, the intervention group performed FTTE parasternal long and short axis, apical, and subcostal views on standardized patients using real-time AI ultrasound guidance.

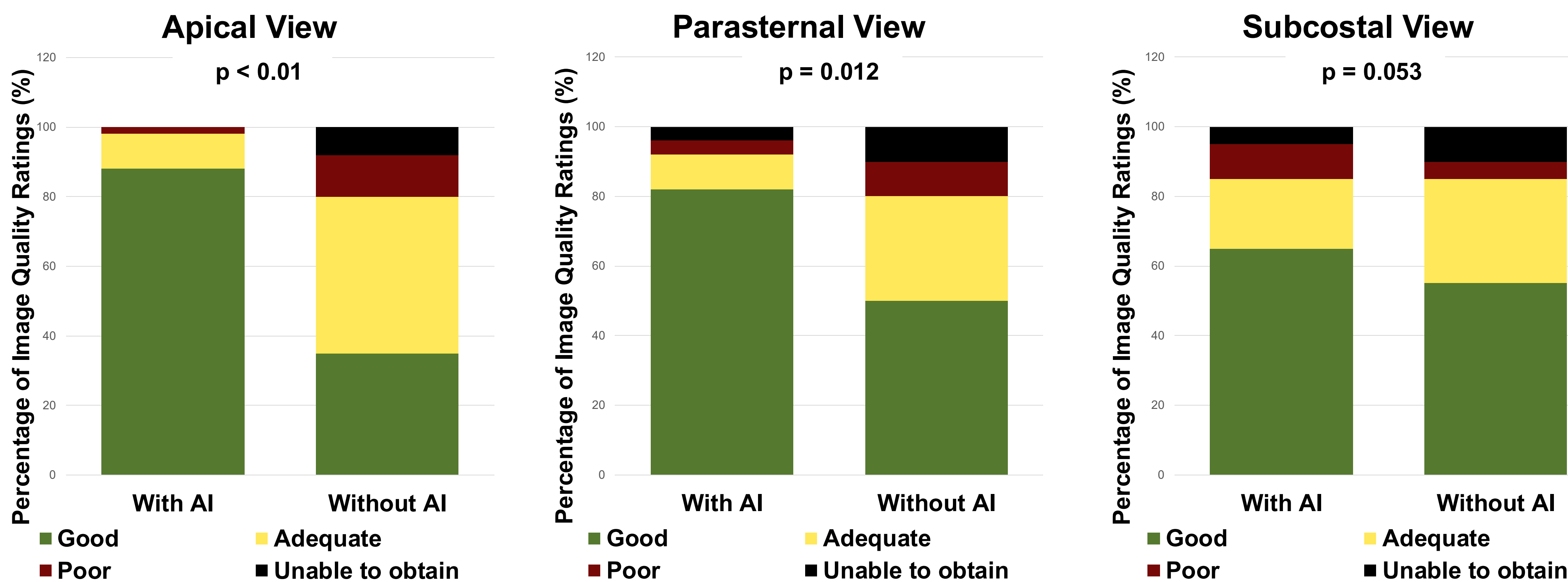
Their performance was compared to historical controls who completed the same curriculum without AI support. The AI group received 80 minutes of direct faculty supervision per trainee, whereas the non-AI group received 400 minutes. All scans were de-identified and reviewed by three blinded, board-certified echocardiography faculty, who scored image quality using a standardized rubric. Scan completion time and image-quality scores were compared between groups.

RESULTS

A total of 99 FTTE scans were completed by 25 residents, including 17 AI-guided scans (17 residents) and 82 non-AI scans (8 historical control residents).

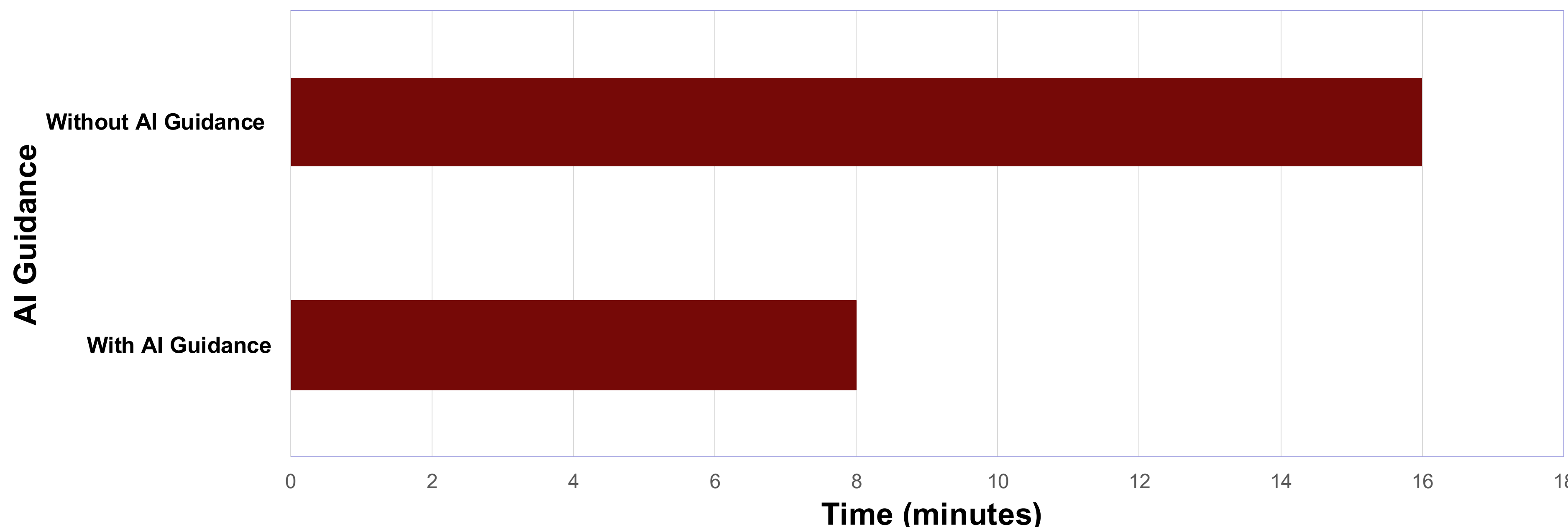
Image Quality

Figure 1. Image Quality per view



Exam Efficiency

Figure 2. Mean FTTE Exam Completion Time With vs. Without AI Guidance



DISCUSSION

AI-guided feedback enhanced performance for **apical** and **parasternal** views which both require fine probe manipulation and multi-chamber visualization.²

Subcostal views showed a non-significant trend, consistent with prior literature showing novices find this view easier to acquire.²

80% reduction in supervision time highlights scalability benefits for residency programs.

Skill decay at 1 month remains a known issue in FTTE learning.³

Implications:

AI can improve early skill acquisition and reduce faculty burden, supporting broader FTTE integration into anesthesiology training.

CONCLUSION

AI improved FTTE scan quality, efficiency, and reduced supervision demands. AI-augmented training may enable scalable, high-quality ultrasound education in anesthesiology, particularly for complex cardiac views.

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