Report Interpretation Times for Radiology Residents and Attendings Before and After Deployment of a Triaging Model for Pulmonary Embolism and Intracranial Hemorrhage Detection in a Large Academic Center

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Introduction

Artificial intelligence (AI) models for detection of critical findings, such as pulmonary embolism (PE) and intracranial hemorrhage (ICH), hold potential to improve workflow efficiency. This is traditionally measured in turnaround time from exam completion, but little data exists on actual interpretation time by radiologists. In this project we evaluate the impact of an FDA-approved AI triage model for PE and ICH deployed in a large academic center for one year on report interpretation times for radiology residents and attendings, comparing pre- and post-deployment periods for both PE and ICH cases.

Hypothesis

We hypothesize that an FDA-approved triage model for ICH and PE reduces exam interpretation times for both attending radiologists and residents.

Methods

We performed a retrospective analysis comparing exam interpretation time (EIT) before and after implementation of an FDA-cleared AI tool for ICH detection on non-contrast head CT (NCCT) and PE detection on CT angiography of the chest (CTPA). The pre-AI period was April 17, 2022–April 16, 2023, and the post-AI period was April 17, 2023–April 16, 2024. The number of cases analyzed for attending radiologists and residents in each period is summarized in Table 1. EIT time was defined as the timestamp from when the report was initially open to the time the report was signed (for an attending) or prelimed (for a resident). EIT was compared pre- vs. post-AI for attending radiologists and residents for each exam type. Statistical significance was assessed using the Kruskal-Wallis test.

Results

For NCCT, attending radiologists median EIT decreased from 193.81s (IQR: 208.36) pre-deployment to 182.63s (IQR: 212.57) post-deployment, while resident median EIT decreased from 282.06s (IQR: 200.06) to 271.32s (IQR: 204.44). For PE cases, attendings median EIT decreased from 351.73s (IQR: 207.09) to 341.61s (IQR: 195.23), and residents' from

390.58s (IQR: 214.72) to 374.42s (IQR: 217.66) following implementation. All decreases were statistically significant ($p < 0.05$).

Conclusion

AI-assisted interpretation yielded statistically significant but modest reductions in exam interpretation time for both attending radiologists and residents across for NCCT and CTPA. Our results are consistent with other published studies showing minimal time savings to the radiologist. Reduction in cognitive burden may be a greater benefit; however, it is difficult to measure. Our ongoing work will evaluate model performance and EIT in exams that are positive and negative for ICH and PE to further delineate benefit.

Figure(s)

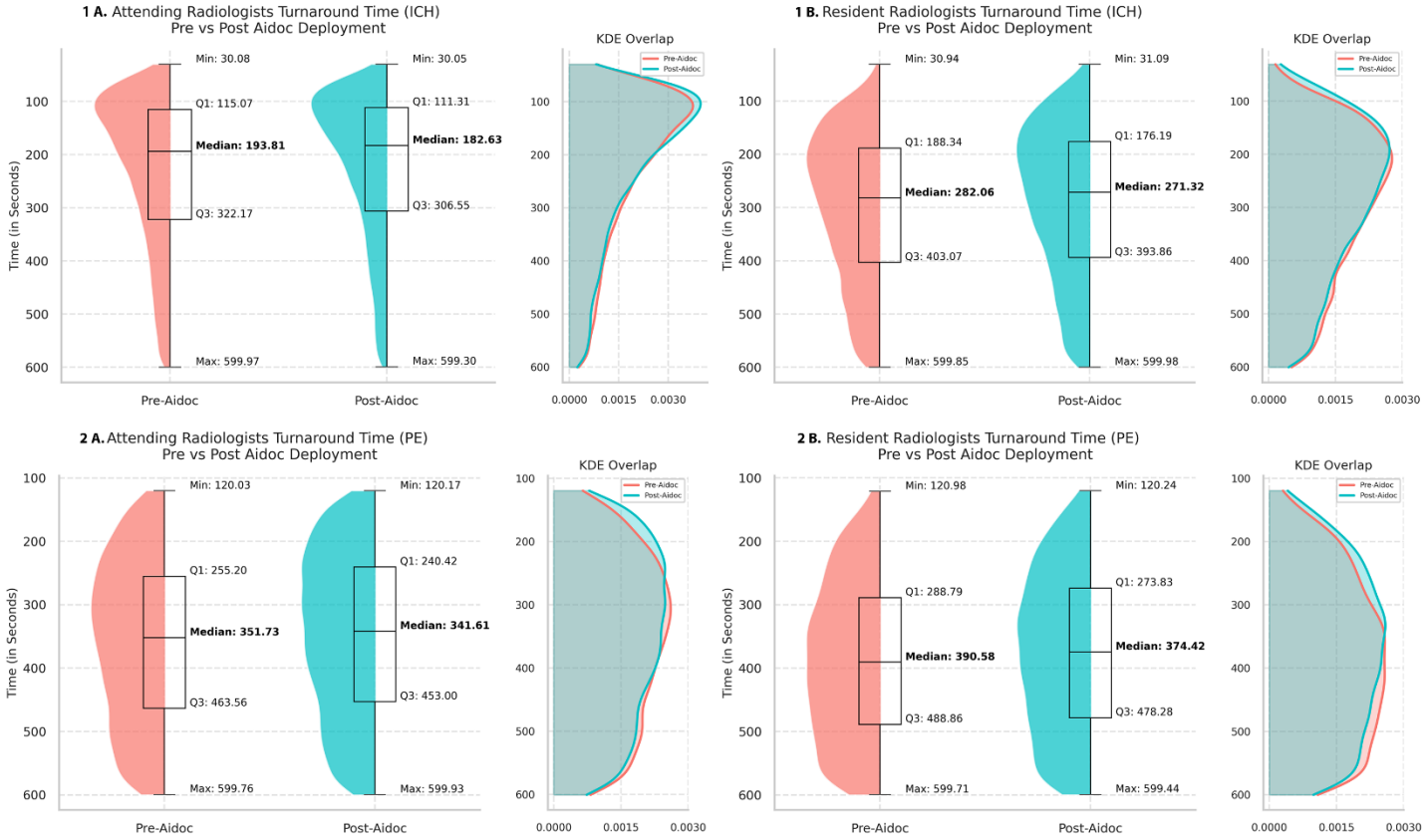

Figure 1. Box plots with KDE distributions comparing turnaround times before and after AI deployment for (A) attending radiologists and (B) residents in ICH (1) and PE (2) cases.

Exam Type	Radiologist Type	Pre-AI Cases	Post-AI Cases
NCCT	Attending	25399	30363
NCCT	Resident	11050	16042
CTPA	Attending	7022	9978
CTPA	Resident	4061	5874

Figure 2. Number of Pre- and Post-AI Cases by Exam Type and Radiologist Role.

Keywords

Artificial Intelligence/Machine Learning; Clinical Workflow & Productivity; Educational Systems