Impact of an AI-Driven Pulmonary Embolism Response Team Workflow on Procedural Volume and Timeliness

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INTRODUCTION

The activation of PERT teams to relevant cases requires rapid identification of PEs and complex coordination of specialized clinicians. Artificial intelligence (AI) has the capability to enhance both the identification of PE cases requiring intervention as well as the speed of team deployment by aiding in prioritization and communication. An AI-powered PERT workflow solution (Aidoc, Tel Aviv, Israel) was deployed at Temple University Hospital in May 2022 with the goal of assisting radiologists and PERT teams more easily and rapidly attend to patient needs. This study evaluates the improvements provided by the solution in a real-world clinical setting, focusing on the speed and number of interventions.

METHODOLOGY

A retrospective review of all CTPA scans (N = 140,752) was conducted in the two years immediately before and after the implementation of the AI based PERT solution. Only unique patients were analyzed within each cohort. The study periods spanned May 2020 - 2022 (pre-AI, N = 37,672) and May 2022 - 2024 (post-AI, N = 47,781). Patient demographics and clinical settings are summarized in Table 1. Radiological reports for each CTPA scan were analyzed by a text-based NLP algorithm to identify patients with central PEs and right heart strain (RV/LV ratio >1) in both pre- and post-AI cohorts.

EHR data was collected via FHIR for all patients. Patients with no EHR data accessible were excluded from further analysis. Finally, an additional LLM model was used on this patient subset to detect patients who underwent thrombectomy from the clinical notes. Patient and case counts at each of these analysis stages are shown for pre- and post-AI populations in Figure 2. Primary outcomes for this analysis were differences in procedural volume and imaging-to-intervention time pre- and post-AI deployment. These outcomes are shown in Table 2 with values and difference percentages.

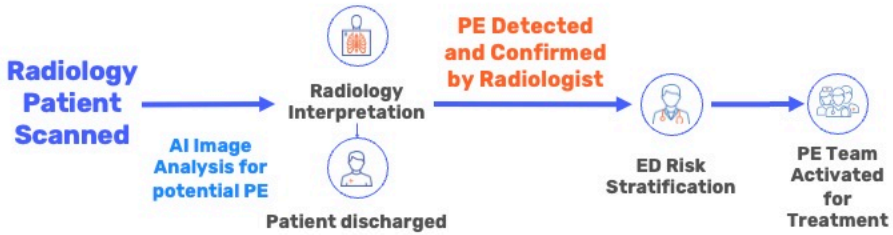

Figure 1. AI-Enhanced PERT Workflow

RESULTS

The number of patients at each analysis stage in each cohort are shown in Figure 2. Despite a lower percentage of patients with central PE and right ventricle strain in the post-AI cohort (0.69%) compared to the pre-AI cohort (0.79%), a greater percentage of the post-AI PE patients received thrombectomies. Of the patients with central PE, RV strain, and EHR data available, 8.8% of pre-AI and 11.3% of post-AI patients received thrombectomies. Additionally, the time to intervention from patient scan to thrombectomy decreased by 19% from 14.9 hours to 12.1 hours with the addition of the AI workflow, as shown in Table 2.

Table 1. Patient Demographics and Clinical Settings

	Pre-AI	Post-AI
Age	59.5 +/- 16.4	62.3 +/- 15.8
Gender	50.1% M (18,857) 49.9% F (18,807)	49.5% M (23,641) 50.5% F (24,076)
Clinical Setting	ED: 32.5% (12,233) Inpatient : 16.8% (6,328) Outpatient: 50.7% (19,103)	ED: 27.3% (13,064) Inpatient : 17.0% (8,099) Outpatient: 55.7% (26,617)

Table 2. Volume and Intervention Time Differences

	Advanced Intervention Volume	Median Time to Intervention (hours)
Pre-AI	19	14.9
Post-AI	36	12.1
Percent Difference	**89%**	**-19%**

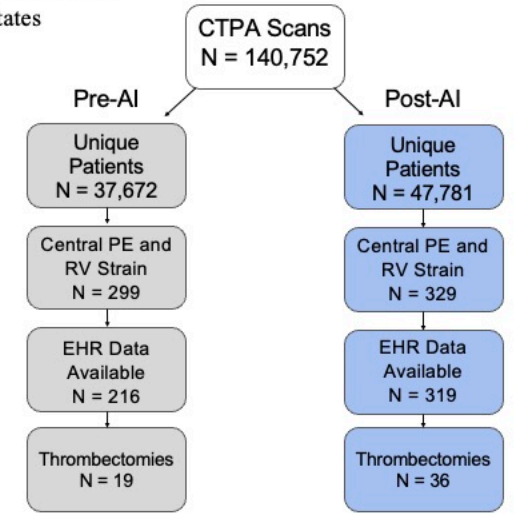

Figure 2. Patient Volumes and Analysis Stages

CONCLUSION

The AI-driven PERT workflow was associated with a marked increase in intervention volume and a meaningful reduction in time to treatment. This increase in intervention volume persists through normalization of interventions by patient volume. These findings support the role of AI in improving the speed and scale of acute PE management, thereby improving patient outcomes.

Figure 3. AI-Enhanced PERT Workflow Interface