Improving Patient Outcomes with an AI-Enhanced Pulmonary Embolism Response Team in a Large Healthcare Network

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Anne Scheid MSN AGACNP-BC Odai Alhasanat, MD. Chandra Kunavarapu, MD. Eric Nelson R.Ph.
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Background

Artificial Intelligence (AI) has the potential to significantly enhance the effectiveness of Pulmonary Embolism Response Teams (PERTs) by streamlining their workflow and improving patient care. AI algorithms can prioritize cases based on urgency, ensuring that the most critical patients receive prompt attention. Additionally, AI can optimize triage processes, facilitate real-time communication, and enhance collaboration among team members, leading to more coordinated and efficient responses. This study investigates the impact of integrating an AI-based PERT system (Aidoc, Tel Aviv) within a large healthcare network, focusing on clinical outcomes and overall patient wellbeing. By leveraging AI to refine decision-making and resource allocation, the goal is to improve treatment timeliness and efficacy, thereby elevating patient outcomes in the management of pulmonary embolism.

Materials & Methods

Data for this study were collected from patients with suspected acute pulmonary embolism (PE) within a large healthcare network. The study cohort was divided into two distinct periods: the pre-AI implementation phase (November 2022 to February 2023) and the post-AI implementation phase (November 2023 to February 2024), each lasting four months. For both cohorts, comprehensive reviews of medical records were conducted to assess key metrics. These included the type of intervention administered, the time taken to initiate the intervention, and the length of stay in the intensive care unit (ICU). By comparing these parameters before and after the implementation of the AI-enhanced PERT system, the study aims to evaluate changes in clinical efficiency and patient outcomes attributable to the AI-driven enhancements in the PERT workflow.

Results

A total of 61 patients that underwent mechanical thrombectomy were identified (pre-AI 25, post-AI 36), which resulted in an observed 44.0% percentage increase for post-AI period compared to the pre-AI period. The mean time to thrombectomy was 22.0 hours for the pre-AI period and 16.8 hours for the post-AI period, resulting in a 24.0% reduction for the post-AI period. The mean ICU length of stay was 80.2 hours for the pre-AI period compared to 35.8 hours for the post-AI period, resulting in a 55.4% reduction for thrombectomy patients (Figure 1.0). A total of 20 patients that underwent ultrasound assisted catheter-directed thrombolysis (USAT) were identified (pre-AI 10, post-AI 10), resulting in no observed percentage change between the two periods. The mean time to USAT was 22.6 hours for the pre-AI period and 11.6 hours for the post-AI period, resulting in a 48.8% reduction for the post-AI period. The mean ICU length of stay was 89.0 hours for the pre-AI period compared to 34.0 hours for the post-AI period, resulting in a 61.8% reduction for USAT patients (Figure 1.1).

Conclusion

The integration of AI-triggered Pulmonary Embolism Response Team (PERT) activation has demonstrated substantial improvements in patient management within our healthcare network. The AI system facilitated the timely initiation of advanced therapies, such as thrombectomy and Ultrasound-Assisted Thrombolysis (USAT), significantly reducing the time to intervention. Additionally, the implementation of AI was associated with a marked decrease in the length of stay in the intensive care unit (ICU) due to decrease in time to intervention seen in post-AI period. These findings underscore the transformative potential of AI solutions in optimizing the response to pulmonary embolism, ultimately leading to enhanced patient outcomes. By accelerating critical interventions and improving resource allocation, AI technology plays a crucial role in advancing the standard of care for this high-risk patient population.

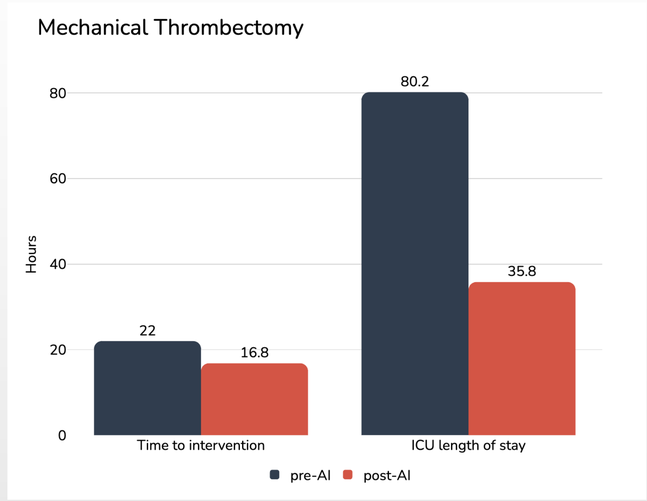

Figure 1.0: Overview of the pre-AI to the post-AI time to intervention and intensive care unit (ICU) length of stay for mechanical thrombectomy and ultrasound assisted catheter directed thrombolysis.

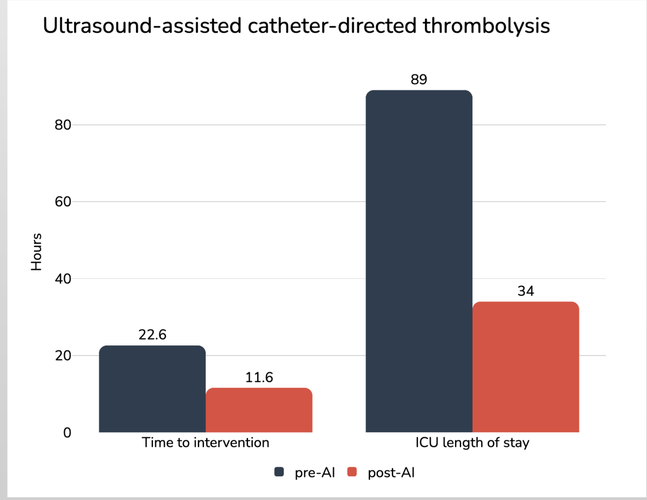

Figure 1.1: Comparison of pre-AI to post-AI time to intervention and ICU length of stay for ultrasound assisted catheter-directed thrombolysis.

		pre-AI	post-AI	difference	% difference
Mechanical Thrombectomy	Time to intervention (hrs)	22.0	16.8	-5.3	-24.0%
	ICU length of stay (hrs)	80.2	35.8	-11.0	-48.0%
Ultrasound assisted catheter directed thrombolysis	Time to intervention (hrs)	22.6	11.6	-44.4	-55.4%
	ICU length of stay (hrs)	89.0	34.0	-55.0	-61.8%

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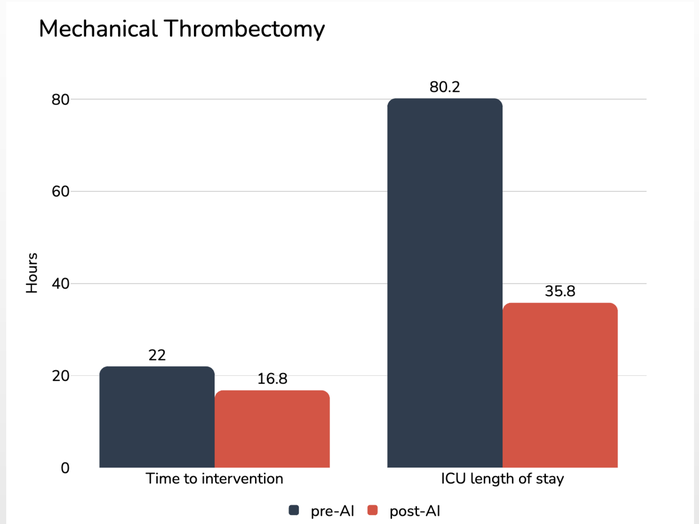

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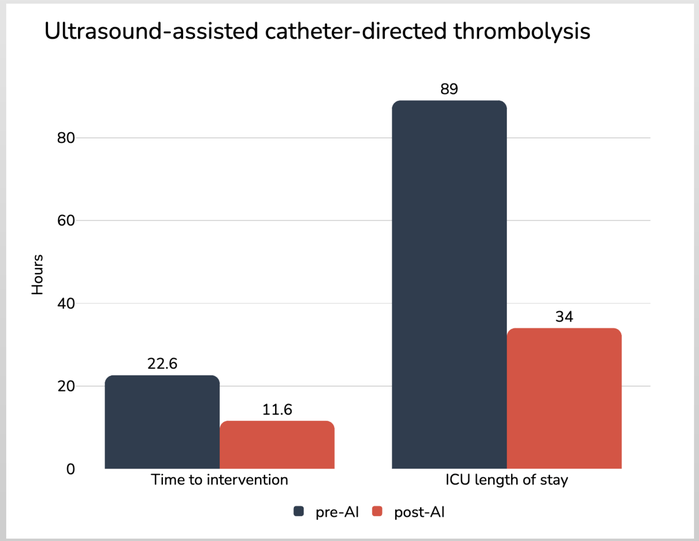

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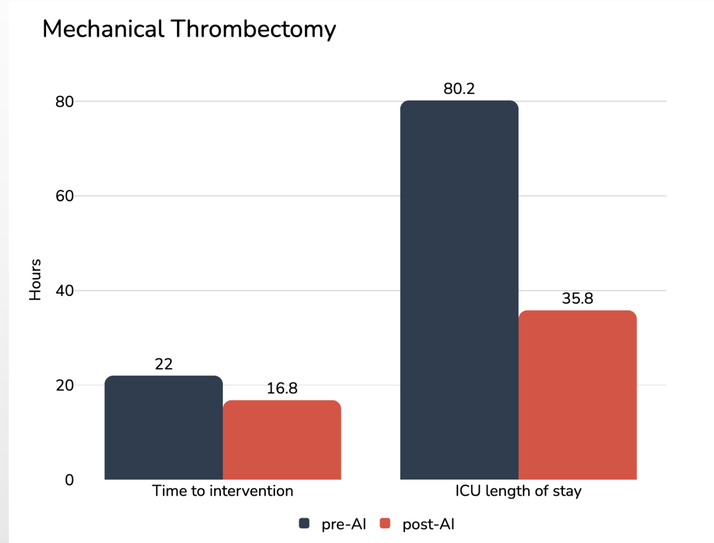

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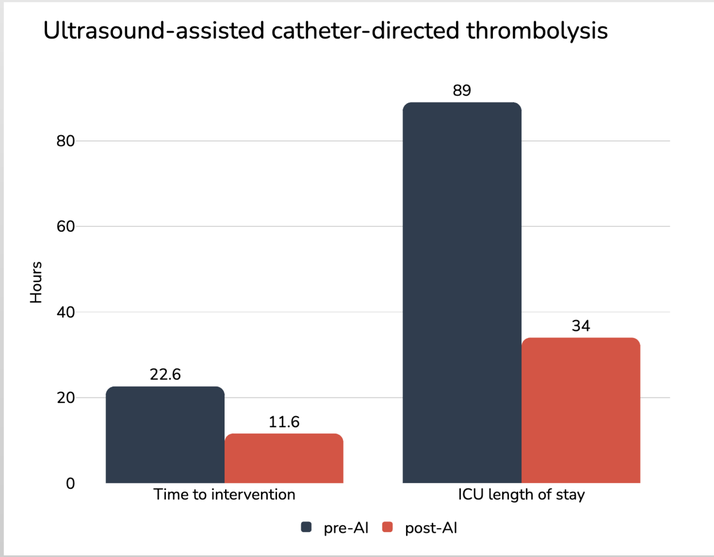

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