



Editorial

Pulmonary Embolism: Is AI One of the Team?

Tromboembolismo pulmonar: ¿es la IA uno más del equipo?



Pulmonary embolism (PE) can be a life-threatening condition in which rapid diagnosis and treatment are critical to reducing morbidity and mortality.¹ Traditional diagnostic approaches include different clinical assessments; however, these methods can sometimes be unsatisfactory due to variability in presentation and the time-sensitive nature of PE. Recent advances in artificial intelligence (AI) have shown promise in enhancing the management of PE. Integrating AI tools within a multidisciplinary team (MDT) approach can significantly improve diagnostic accuracy and patient outcomes.

AI has the potential to transform the diagnosis and management of PE by leveraging machine learning algorithms and big data analytics. Key applications of AI in PE include early detection, enhanced imaging interpretation, clinical decision support, and predictive analytics.

AI tools can analyze electronic health records to identify patients at high risk of PE. Machine learning models can predict² the likelihood of PE based on clinical factors, laboratory results, and imaging data. Early detection enables proactive management and reduces the incidence of severe complications.

AI algorithms, particularly deep learning models, have demonstrated high accuracy in interpreting computed tomography pulmonary angiography scans.³ These tools can detect subtle signs of emboli that may be missed by human radiologists, reducing diagnostic errors and time to diagnosis. AI can also standardize interpretation, minimizing interobserver variability.

AI-driven decision support systems can assist clinicians in making evidence-based diagnostic and therapeutic decisions.⁴ By integrating patient-specific data, these systems provide personalized recommendations for imaging studies, anticoagulation therapy, and invasive interventions.

AI can analyze data from previous cases to forecast patient outcomes and potential complications. This predictive capability enables healthcare providers to tailor treatment plans, optimize resource utilization, and improve patient safety.¹

Effective management of PE requires a collaborative approach involving multiple specialties.⁵ An MDT approach ensures a thorough evaluation of the patient, taking into account comorbidities, risk factors, and the most appropriate diagnostic and therapeutic interventions.

Seamless communication and coordination among MDT members enhance the efficiency of care delivery, reduce treatment delays, and improve patient outcomes. MDTs can develop

customized treatment plans based on the patient's clinical profile, ensuring that management strategies are tailored to individual needs.

AI can facilitate communication within the MDT by summarizing patient data and generating comprehensive reports, ensuring all team members are well-informed and can make collaborative decisions efficiently.

Ongoing monitoring and follow-up are essential in PE management to detect recurrence or complications. An MDT ensures continuous care and support throughout the patient's recovery journey.

The integration of AI tools into the MDT approach can further enhance the management of PE. AI can support each stage of the patient care continuum, from diagnosis to treatment and follow-up.

AI-powered tools can rapidly analyze imaging studies and clinical data, providing the MDT with quick and accurate diagnostic information. This streamlines the diagnostic process and enables timely intervention.

By improving diagnostic accuracy, personalizing treatment, optimizing collaboration, and reducing cognitive biases, AI can help MDTs make more informed, efficient, and patient-centered decisions. However, the integration of AI must be conducted thoughtfully, with consideration of ethical, regulatory, and practical challenges to maximize its benefits.

It can predict potential outcomes and complications, allowing the MDT to proactively manage patient care. Continuous monitoring using AI tools can detect early signs of deterioration, prompting timely interventions.

Despite the promising potential of AI in PE management, several challenges remain. These include not only data privacy and security concerns, but also the need for large and diverse datasets for training AI models that we are still in the early stages of using and integrating in our hospitals. The integration of AI into existing healthcare workflows should be one of the objectives in the short and medium term. Continuous validation and regulation of AI tools are essential to ensure their safety and efficacy.

There has been a notable increase in the literature^{6–10} in terms of the number of articles addressing these issues, especially those dealing with CT diagnosis and risk stratification, for example, that seek to validate their techniques. For instance, Linfeng et al.¹¹ propose the clot quotient as a new imaging marker of clot burden that correlates with the risk stratification of patients with peripheral arterial disease. In the field of increasing radiologist efficiency, Liu

et al.¹² demonstrated that their algorithm achieved a high AUC for the detection of pulmonary emboli and can be applied to quantitatively estimate the clot burden of patients with PAD, which could contribute to reducing the workload of the clinicians.

AI-driven risk stratification models have enabled early identification of high-risk patients, leading to timely prophylactic measures and reduced PE mortality.

Future directions include the development of more sophisticated AI models capable of handling complex and dynamic clinical scenarios. Collaboration between AI developers, clinicians, and policy makers will be crucial in addressing these challenges and advancing the field.

Conclusion

Pulmonary embolism is a serious condition that requires prompt and accurate diagnosis and management. Integrating AI tools within a multidisciplinary team approach holds significant promise for improving patient outcomes. By leveraging the strengths of AI and the collaborative expertise of various specialists, healthcare providers can enhance diagnostic accuracy, streamline treatment processes, and ultimately save lives. As technology continues to advance, the synergy between AI and MDTs will play an increasingly vital role in the future of PE management.

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Conflicts of interest

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