

# AI Algorithms Enhance Pulmonary Disease Management at ATS 2026

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Pulmonary diseases present diagnostic and prognostic challenges, often requiring complex data interpretation and resource-intensive workflows. The integration of artificial intelligence (AI) algorithms offers potential solutions to improve efficiency and accuracy in clinical practice.

## KEY TAKEAWAYS

- **The Pivot:** AI algorithms are moving beyond research to practical applications in pulmonary disease, aiding in early detection and personalized treatment.
- **The Data:** Specific algorithms have demonstrated improved diagnostic accuracy for interstitial lung diseases and predicted exacerbation risk in COPD.
- **The Action:** Clinicians should consider the evolving role of AI in interpreting complex imaging and physiological data, while maintaining critical oversight.

The American Thoracic Society (ATS) 2026 meeting highlighted the expanding role of artificial intelligence across various pulmonary diseases, showcasing applications from diagnostic support to prognostic prediction and treatment optimization. The clinical dilemma in many pulmonary conditions involves the timely and accurate interpretation of vast datasets, including imaging, physiological measurements, and patient history, which can be resource-intensive and subject to inter-observer variability. AI algorithms are being developed to address these challenges, aiming to enhance precision and efficiency in patient management.<sup>1</sup>

For instance, in interstitial lung diseases (ILDs), accurate diagnosis and subtyping are critical for guiding therapy. Conventional approaches rely on multidisciplinary team discussions, integrating high-resolution computed tomography (HRCT) findings, clinical data, and sometimes lung biopsy. Presentations at ATS 2026 detailed AI models trained on large datasets of HRCT scans, demonstrating their capacity to classify ILD patterns with high accuracy. One such model, utilizing deep learning for image analysis, achieved a diagnostic accuracy of 88% for distinguishing usual interstitial pneumonia (UIP) from non-UIP patterns, compared to 75% for expert radiologists in a validation cohort of N=350 patients.<sup>2</sup> This suggests a potential for AI to serve as a decision support tool, particularly in settings with limited access to specialized radiologists.<sup>2</sup>

## Applications Across Pulmonary Diseases

Chronic obstructive pulmonary disease (COPD) management often involves predicting exacerbations and tailoring therapy to individual patient risk profiles. Several studies presented at ATS 2026 focused on AI algorithms designed to predict future exacerbations. These models incorporated diverse data inputs, including electronic health record (EHR)

data, spirometry results, and patient-reported outcomes. One predictive model, leveraging machine learning on a cohort of N=5,000 COPD patients, demonstrated an area under the receiver operating characteristic curve (AUROC) of 0.82 for predicting severe exacerbations within 12 months.<sup>3</sup> The model identified key predictors such as previous exacerbation frequency, FEV1 percentage of predicted, and specific inflammatory markers.<sup>3</sup> Such tools could enable more proactive interventions and personalized treatment strategies, potentially reducing hospitalizations and improving patient quality of life.<sup>3</sup>

In the realm of pulmonary hypertension (PH), AI is being explored for early detection and risk stratification. PH diagnosis often involves invasive right heart catheterization, and non-invasive screening methods lack sufficient sensitivity and specificity. Algorithms integrating echocardiographic parameters, ECG data, and clinical variables were presented as a means to identify patients at high risk for PH, warranting further investigation. One study reported an AI model achieving a sensitivity of 91% and specificity of 85% for detecting PH in a screening population of N=1,500 patients, using only non-invasive inputs.<sup>4</sup> This could streamline the diagnostic pathway and facilitate earlier intervention for a condition where delayed diagnosis is common and associated with poorer outcomes.<sup>4</sup>

The utility of AI in oncology, specifically for lung cancer, was also a prominent theme. Beyond standard nodule detection, AI models are being developed for predicting treatment response and patient survival. Algorithms analyzing radiomic features from CT scans, combined with genomic data, showed promise in predicting response to immunotherapy in non-small cell lung cancer (NSCLC). One study indicated that an AI-driven radiomics signature could predict progression-free survival (PFS) with a hazard ratio (HR) of 0.45 (95% CI 0.31-0.65,  $p < 0.001$ ) in patients receiving checkpoint inhibitors.<sup>5</sup> This suggests a potential for AI to guide therapeutic decisions, moving towards more personalized oncology.<sup>5</sup>

Despite these advancements, limitations persist. The generalizability of AI models remains a concern, as performance can degrade when applied to patient populations different from those used for training. Data bias, particularly in EHRs, can lead to algorithms that perpetuate or amplify existing health disparities. Furthermore, the 'black box' nature of some complex AI models poses challenges for clinical interpretability and trust. Future research must focus on developing transparent, explainable AI (XAI) models and conducting rigorous external validation across diverse cohorts to ensure equitable and reliable application in clinical practice. The integration of AI into clinical workflows will also require careful consideration of regulatory frameworks, ethical implications, and the need for ongoing human oversight.<sup>6</sup>

For a deeper understanding of respiratory medicine's core principles, essential when evaluating advancements like AI, consider the Oxford Handbook of Respiratory Medicine as a useful companion.

#### CLINICAL IMPLICATIONS

The presentations at ATS 2026 underscore a clear trajectory: AI is no longer a distant concept for pulmonology, but an increasingly tangible tool. The demonstrated ability of algorithms to classify ILD patterns with higher accuracy than some human experts, or to predict COPD exacerbations with an AUROC of 0.82, means clinicians will soon face a choice: integrate these tools or risk falling behind. The immediate implication is not replacement, but augmentation. General practitioners and specialists alike will need to understand the strengths and limitations of these AI systems, particularly in interpreting complex imaging and physiological data. The onus will be on clinicians to critically evaluate AI-generated insights, rather than blindly accepting

them, maintaining the essential human element in patient care.

From an industry perspective, the push for AI integration will accelerate the development of validated, user-friendly platforms. Companies like Philips, Siemens Healthineers, and GE Healthcare, already dominant in medical imaging, are well-positioned to embed these algorithms directly into their diagnostic equipment and PACS systems. This will create a competitive landscape where the quality of AI models, their explainability, and their seamless integration into existing workflows will dictate market adoption. Regulatory bodies, such as the FDA, will need to establish clear guidelines for the approval and post-market surveillance of these AI-driven medical devices, ensuring safety and efficacy without stifling innovation. The current evidence, while promising, still necessitates robust, multi-center trials to solidify the clinical utility and cost-effectiveness of these solutions.

For patients, the promise of AI lies in earlier, more precise diagnoses and personalized treatment plans. Imagine a patient with subtle ILD symptoms receiving an accurate diagnosis months sooner due to an AI-assisted HRCT interpretation, or a COPD patient benefiting from proactive interventions that prevent a severe exacerbation. However, this also introduces new considerations regarding data privacy and the potential for algorithmic bias. Patients will need assurance that these systems are fair, transparent, and do not exacerbate existing health inequities. The medical community must proactively engage patients in discussions about AI's role, fostering trust and ensuring that technology serves to enhance, not diminish, the patient-clinician relationship.

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