Ai-enhanced chest radiography for respiratory infections.

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Introduction

Recent advancements explore the advancements of deep learning models for automating pneumonia detection from chest radiographs. It highlights the promising potential of AI in augmenting diagnostic accuracy and efficiency, discussing various architectural approaches and their performance metrics. The insights emphasize the ongoing need for large, diverse datasets and robust validation to ensure clinical applicability and reduce diagnostic variability.[1].

An extensive evaluation of the performance of computer-aided detection (CAD) systems in identifying tuberculosis on chest radiographs. It concludes that CAD systems hold significant promise as a screening tool, particularly in resource-limited settings, by improving detection rates and reducing the workload for human readers. However, the review also points out the variability in CAD performance across different populations and algorithm types.[2].

Assessments have been made regarding the predictive value of various chest X-ray scoring systems in pediatric pneumonia. It reveals that while several scoring systems exist, their consistent application and standardized interpretation remain challenging. The findings suggest that incorporating objective X-ray scores can aid in predicting disease severity and guiding management, but further research is needed to validate and standardize these tools across diverse pediatric populations.[3].

Examination of the characteristic features of chest radiography in COVID-19 patients and their correlation with disease severity. It identifies common radiographic patterns such as ground-glass opacities and consolidations, emphasizing their utility in assessing disease extent. The review concludes that chest X-rays serve as a crucial initial imaging modality for triaging patients and monitoring disease progression, particularly in resource-limited settings where CT might not be readily available.[4].

Distinct chest radiography patterns in drug-resistant tuberculosis (DR-TB). It identifies common findings like cavitations, extensive lung involvement, and bilateral disease as indicators, which can help clinicians suspect DR-TB earlier. The review suggests that while chest X-rays cannot definitively diagnose DR-TB, they provide valuable clues that warrant further microbiological testing, thus influencing treatment decisions and public health strategies.[5].

An exploration into the current role of chest radiography in diagnosing and managing community-acquired pneumonia (CAP) in adults. It reaffirms that chest X-rays are fundamental for confirming the diagnosis, assessing disease severity, and excluding other pathologies. The review emphasizes the importance of interpreting radiographic findings in conjunction with clinical presentation and laboratory results for optimal patient care and appropriate antibiotic stewardship.[6].

The application of artificial intelligence (AI) in chest radiography for various respiratory infections. It highlights AI's capability to improve diagnostic accuracy, reduce interpretation time, and potentially serve as a rapid screening tool. The review underscores the need for standardized development, rigorous testing, and ethical considerations for widespread clinical integration, suggesting AI can complement human expertise rather than entirely replace it.[7].

Exploring the distinctive chest radiographic features associated with pulmonary non-tuberculous mycobacterial (NTM) disease. It identifies patterns such as bronchiectasis, multiple small nodules, and cavities, which can differentiate NTM from tuberculosis and other respiratory conditions. The findings emphasize the importance of recognizing these radiographic signs to guide appropriate diagnostic work-up and treatment, given the rising incidence of NTM infections globally.[8].

An overview of imaging modalities for recurrent pneumonia in children, focusing primarily on chest radiography. It discusses how X-rays can identify underlying structural abnormalities, foreign body aspiration, or immunodeficiencies contributing to recurrent episodes. The review stresses the need for a systematic approach to imaging and correlation with clinical history to unravel the etiology of recurrent pneumonia and guide further investigations.[9].

The utility of chest radiography as a predictive tool for tuberculosis (TB) in people living with HIV (PLHIV). It reveals that specific radiographic features, even subtle ones, can predict active TB in this vulnerable population, thereby facilitating earlier diagnosis and treatment. The review advocates for enhanced training in radiographic interpretation and the integration of AI-assisted tools to im-

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prove TB detection in HIV-positive individuals, especially in high-burden settings.[10].

Conclusion

Deep learning models demonstrate promising potential for automating pneumonia detection from chest radiographs, enhancing diagnostic accuracy and efficiency, though they require large, diverse datasets and robust validation for clinical use. Computer-aided detection (CAD) systems are valuable screening tools for tuberculosis, particularly in resource-limited settings, improving detection rates and reducing human workload, despite performance variability across populations. Research also assesses the predictive value of chest X-ray scoring systems in pediatric pneumonia, which can aid in disease severity prediction and management, but challenges remain in their consistent application and standardization. In COVID-19 patients, chest radiography reveals common patterns like ground-glass opacities, serving as a crucial initial imaging modality for triaging and monitoring disease progression, especially where Computed Tomography is scarce. Investigations into drug-resistant tuberculosis (DR-TB) highlight distinct radiographic patterns such as cavitations and extensive lung involvement, providing clues for earlier suspicion and guiding further testing. The fundamental role of chest radiography in diagnosing and managing community-acquired pneumonia in adults is reaffirmed, emphasizing the need to interpret findings alongside clinical and laboratory results. Artificial Intelligence (AI) in chest radiography for various respiratory infections shows capability to improve diagnostic accuracy and reduce interpretation time, suggesting AI can complement human expertise with standardized development and ethical considerations. Distinctive chest radiographic features are also associated with pulmonary non-tuberculous mycobacterial (NTM) disease, aiding in differentiation from other conditions and guiding treatment. For recurrent pneumonia in children, chest X-rays identify underlying structural abnormalities or immunodeficiencies, stressing a systematic imaging approach linked with clinical history. Furthermore, chest radiography serves as a predictive tool for tuberculosis in people living with Human Immunodeficiency Virus, with specific features signaling active TB and advocating for AI-assisted tools to improve detection in high-burden settings.

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