

Title: Artificial Intelligence–Assisted Chest X-ray Analysis for Early Detection of Pneumonia

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Structured Abstract

Background: Pneumonia remains a leading cause of hospital admissions. Artificial intelligence (AI) may improve early detection on chest radiographs.

Objectives: To evaluate the diagnostic performance of an AI algorithm.

Materials and Methods: A prospective study of 200 patients compared AI results with radiologist reports.

Results: AI achieved 92% sensitivity, 89% specificity and an AUC of 0.93.

Conclusion: AI can support radiologists and improve reporting efficiency.

Keywords: Artificial Intelligence; Chest X-ray; Pneumonia; Radiology; Diagnostic Accuracy

1. Introduction

Chest radiography is the first-line imaging modality for suspected pneumonia. Recent advances in AI have shown promise in assisting radiologists by improving detection accuracy and reducing reporting time.

2. Materials and Methods

Study Design: Prospective observational study.

Study Setting: Tertiary care hospital.

Sample Size: 200 patients.

Inclusion Criteria: Adults with suspected pneumonia.

Exclusion Criteria: Poor-quality radiographs. Statistical Analysis: Sensitivity, specificity, PPV, NPV, ROC analysis.

Ethical Approval: Approved by the Institutional Ethics Committee.

3. Results

Sample Results Paragraph: The AI-based chest X-ray analysis system demonstrated strong diagnostic performance in detecting pneumonia. It achieved a sensitivity of 92%, correctly identifying most

patients with pneumonia, and a specificity of 89%, indicating a high ability to correctly classify patients without the disease. The overall diagnostic accuracy was 90.5%, reflecting reliable performance across the study population. Furthermore, the area under the receiver operating characteristic (ROC) curve (AUC) was 0.93, demonstrating excellent discriminative ability. These findings suggest that the AI model can accurately differentiate between normal and abnormal chest radiographs and may serve as a valuable decision-support tool for radiologists in routine clinical practice.

Figure 1. Placeholder for ROC Curve

4. Discussion

The AI model demonstrated high diagnostic accuracy comparable with experienced radiologists. Similar findings have been reported in recent literature.

5. Conclusion

AI-assisted chest X-ray interpretation has the potential to improve workflow while maintaining high diagnostic performance.

6. Declarations

Ethical Approval: Obtained.

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Conflict of Interest: None.

Author Contributions: All authors contributed.

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Data Availability: Available on reasonable request.

7. References

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