A Real-World Insight into Application of an Artificial Intelligence Algorithm for the Analysis of Chest Radiographs

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Purpose:

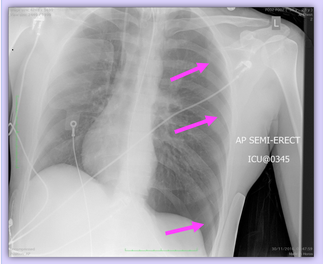
Artificial intelligence (AI) integration in chest radiograph evaluation offers promise for improving diagnostic precision and streamlining radiology workflows[1-4]. However, its implementation across radiology departments in England varies significantly, necessitating the need for assessment in clinical settings.

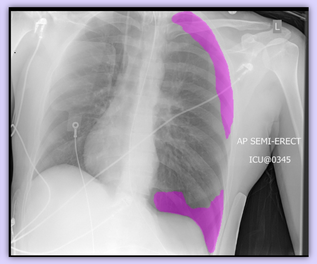
Study Design and Key Findings:

A commercially available AI system was evaluated for chest radiograph interpretation through retrospective analysis of 300 emergent and non-emergent cases (2005–2023) from a secured teaching archive. Cases included normal and abnormal radiographs, with AI outputs validated against CT scans and blinded review by two consultant radiologists. The AI Algorithm demonstrated high diagnostic accuracy in identifying acute pathologies and normal radiographs, emphasising its complementary role in supporting emergency radiology workload and workflow triaging. Eight cases are presented to showcase its real-world strengths and limitations.

Positive AI Impact: Cases of Success

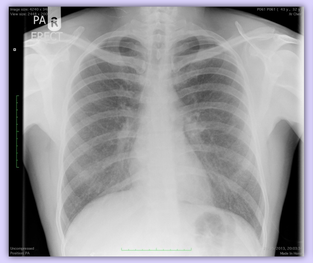
Case 1: Pneumothorax Detected

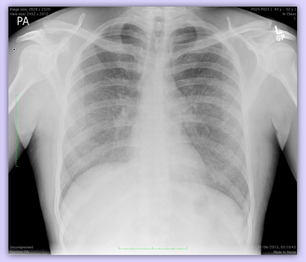




Finding: Subtle left-sided pneumothorax with a deep sulcus sign missed by junior intensive care clinicians. Supine position of the patient contributed to unusual X-ray appearance.
AI Impact: Correctly identified by AI in retrospect, which could have altered patient management.

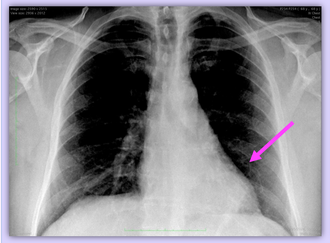
Case 2: Earlier TB Diagnosis

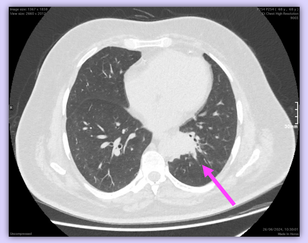




Finding: Diffuse miliary nodularity indicative of active TB missed initially. Subsequent repeat imaging showing markedly progressive innumerable miliary nodularity.
AI Impact: Detected nodularity retrospectively on initial radiograph, emphasising AI's role in earlier TB diagnosis.

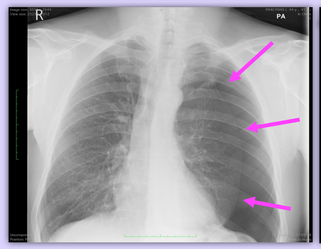
Case 3: Breast Cancer Metastasis

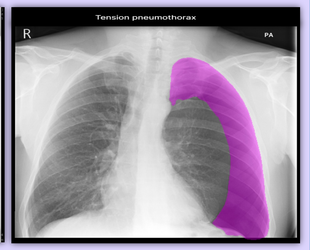




Finding: Retrocardiac lesion linked to locally advanced breast cancer overlooked initially, until 6 months later where it was larger and more conspicuous, subsequently confirmed as metastasis.
AI Impact: The initial radiograph was retrospectively interpreted by AI which detected the retrocardiac lesion. Early detection could have prompted re-staging and chemotherapy adjustments.

Case 4: Highlighting Urgent Cases

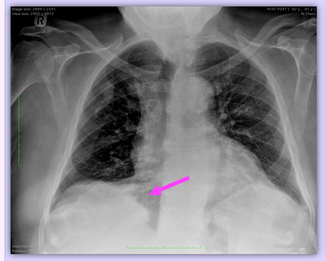




Finding: Large left-sided pneumothorax reported after a 6-day delay due to waiting list of radiographs to be reported, prompting delayed management.
AI Impact: Retrospective analysis confirmed pneumothorax; AI triaging could have expedited reporting and intervention.

Limitations of AI: Missed or Misinterpreted Cases

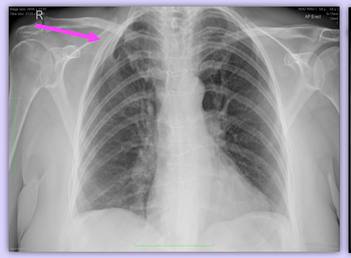
Case 5: Missing a Mass

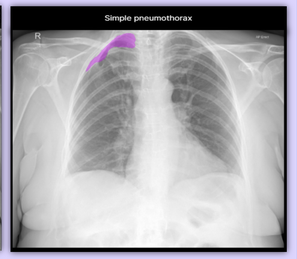




Finding: Large right hemidiaphragmatic mass in a patient with asbestos exposure not detected by AI but picked up by a radiologist.
Outcome: CT confirmed benign mass lesion - round atelectasis.

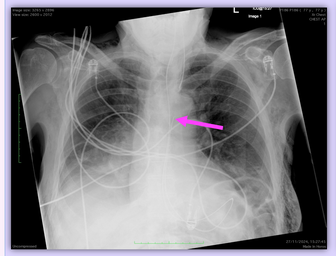
Case 6: False Positive Pneumothorax

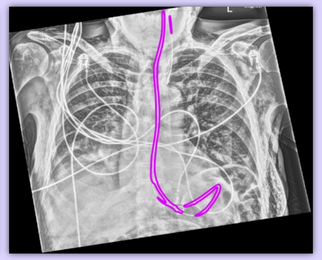




Finding: AI flagged a right apical pneumothorax, later ruled out by CT as a congenital rib anomaly – fused ribs.
Outcome: Highlights AI susceptibility to anatomical variations.

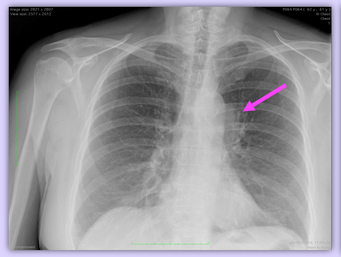
Case 7: Misinterpretation of Lines

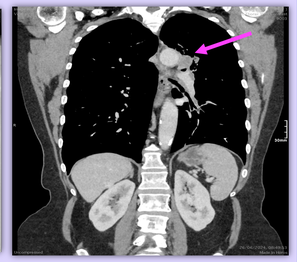




Finding: AI misinterpreted nasogastric tube position and reported a non-existent pneumothorax.
Outcome: CT confirmed nasogastric tube misplacement (which is coiled within the oesophagus) and ruled out pneumothorax.

Case 8: Missed Small Cell Lung Cancer





Finding: AI did not identify a mass in the aorto-pulmonary window in a smoker with COPD.
Outcome: Detected by a radiographer, confirmed as small cell lung cancer on biopsy

Conclusion:

AI has shown to be an important adjunct to the radiology departments for managing growing imaging workloads while maintaining reporting accuracy. It excels in detecting subtle findings (e.g., pneumothorax, TB nodularity) and triaging urgent cases but is prone to misinterpretations in complex anatomical or pathological cases, underscoring the need for clinician oversight.

References:

[1] Ahn JS, Ebrahimian S, McDermott S, et al. Association of Artificial Intelligence-Aided Chest Radiograph Interpretation With Reader Performance and Efficiency. *JAMA Netw Open.* 2022;5(8):e2229289. doi:10.1001/jamanetworkopen.2022.29289 [2] López Alcolea J, Fernández Alfonso A, Cano Alonso R, et al. Diagnostic Performance of Artificial Intelligence in Chest Radiographs Referred from the Emergency Department. *Diagnostics (Basel).* 2024;14(22):2592. doi:10.3390/diagnostics14222592. [3] Monti CB, Bianchi LMG, Rizzetto F, et al. Diagnostic performance of an artificial intelligence model for the detection of pneumothorax at chest X-ray. *Clin Imaging.* 2025;117:110355. doi:10.1016/j.clinimag.2024.110355 [4] Schalekamp S, van Leeuwen K, Calli E, et al. Performance of AI to exclude normal chest radiographs to reduce radiologists' workload. *Eur Radiol.* 2024;34(11):7255–7263. doi:10.1007/s00330-024-10794-5