

When early AI adoption doesn't bear fruit and how to plant seeds of future success

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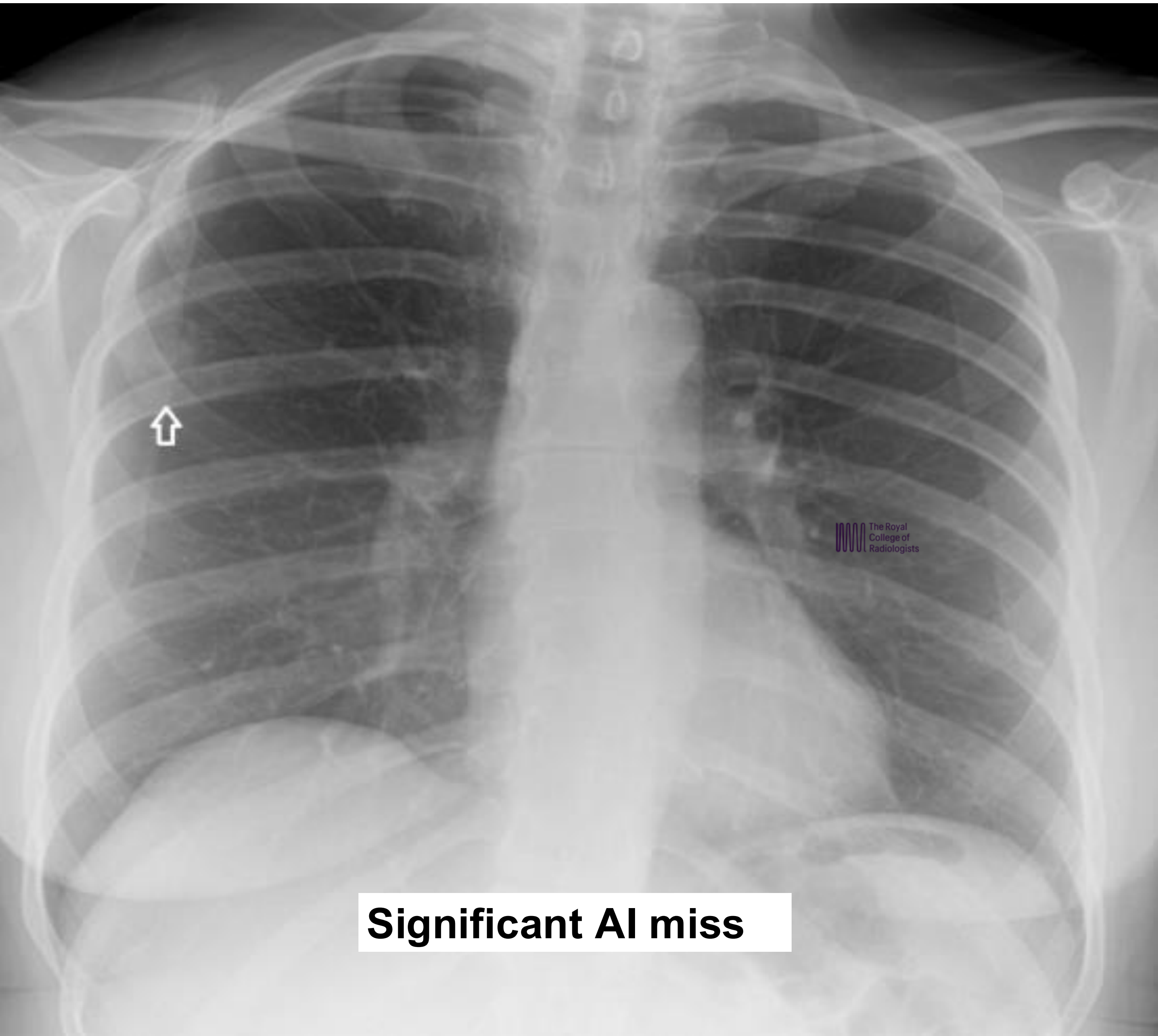


Introduction

Lung cancer is the leading cause of cancer-related death in the United Kingdom, where 5-year survival rates are among the lowest compared with similarly developed nations¹. The National Optimised Lung Cancer Pathway (NOLCP) seeks to address this inequality with two key diagnostic goals to improve outcomes: **Rapid diagnosis** (within 3 days) and **Early-stage diagnosis** (Stage I–II), when curative treatments are most effective². Artificial Intelligence (AI) shows early promise in supporting these goals, but real-world validation is critically lacking³. Our project represents the largest real-world study to date investigating the use of a commercial product, Annalise CXR Enterprise V2.3⁴, in addressing these national targets.

Methods

Prospective pre-post study over 3 years, comparing NOLCP target outcomes (time to diagnosis and stage at diagnosis) with and without AI triage of consecutive GP-referred chest X-rays (CXR) showing features of cancer



Significant AI miss

Discussion

Rapid diagnosis may improve early access to treatment and subsequent survival⁵. However, this surrogate outcome is confounded by concurrent service developments and relies on several assumptions to demonstrate survival benefit. Contrary to prior claims and reports⁶, implementation of AI triage did not increase the detection of early-stage cancers, likely reflecting the well-established limitations of chest radiography in this task⁷. Without an impact on early-stage diagnosis, AI triage of CXRs alone is unlikely to meet cost-effectiveness thresholds for lung cancer. Other use cases—such as nasogastric tube detection, critical finding alerts, and exclusion of normal radiographs—may offer additional utility. High-risk screening programmes and improved access to CT imaging are likely more effective avenues for improving lung cancer outcomes.

Recommendations

Several lessons can be taken from this AI deployment to inform future use:



1. **Clinical experts** must lead AI deployment within bespoke pathways with narrow outcomes and supported by robust scientific evidence.



2. **Post-deployment surveillance** is paramount using clinically meaningful outcome metrics and avoiding the biased review of only positive cases



3. **Pay-for-outcome** schemes are powerful motivators linking procurement to performance. Pay for product schemes with vague objectives are inadequate and instead, incentives such as additional payment for the detection of early-stage cancer, when used within an appropriate framework, incentivise vendors to provide the best possible outcomes for patients.

Rapid Diagnosis				
Days to CT diagnosis for suspected cancer	2022 (Pre AI)	2023 (With AI)	2024 (With AI)	p
All	6.0	4.7	3.6	<0.01
- General Hospital	5.9	3.9	3.0	<0.01
- Community Centre	6.3	6.2	4.8	0.15

- Improved time to diagnosis, more so in General hospitals
- 7-day improvements linked with better outcomes⁵

Early Diagnosis		
	2022 (Pre AI)	2023 (With AI)
GP CXR	16,654	19,449
Suspected Cancer	349 (2.1%)	364 (1.8%)
-Stage 1-2 Lung	11	11
-Stage 3-4 Lung	32	43
-Non-lung & mets.	3	10

- Only improved detection of late cancers and metastasis.
- Early cancers unchanged - Contradicts previous reports⁶

References: 1. Cancer Research UK. Lung cancer statistics. 2024. 2. NHS England. National optimal lung cancer pathway for suspected and confirmed lung cancer: referral to treatment. 2020. 3. National Institute for Health and Care Excellence (NICE). Health Technology Evaluation 12. Published 28 September 2023. 4. Seah J, et al. Lancet Digit Health. 2021. 5. Hall H. Association between time-to-treatment and outcomes in non-small cell lung cancer: a systematic review. Thorax. 2022. 6. Scottish Health Technologies Group. Innovative Medical Technology Overview. March 2024. 7. Bradley S. Sensitivity of chest X-ray for detecting lung cancer in people presenting with symptoms: a systematic review. Journal of General Practice. 2019.