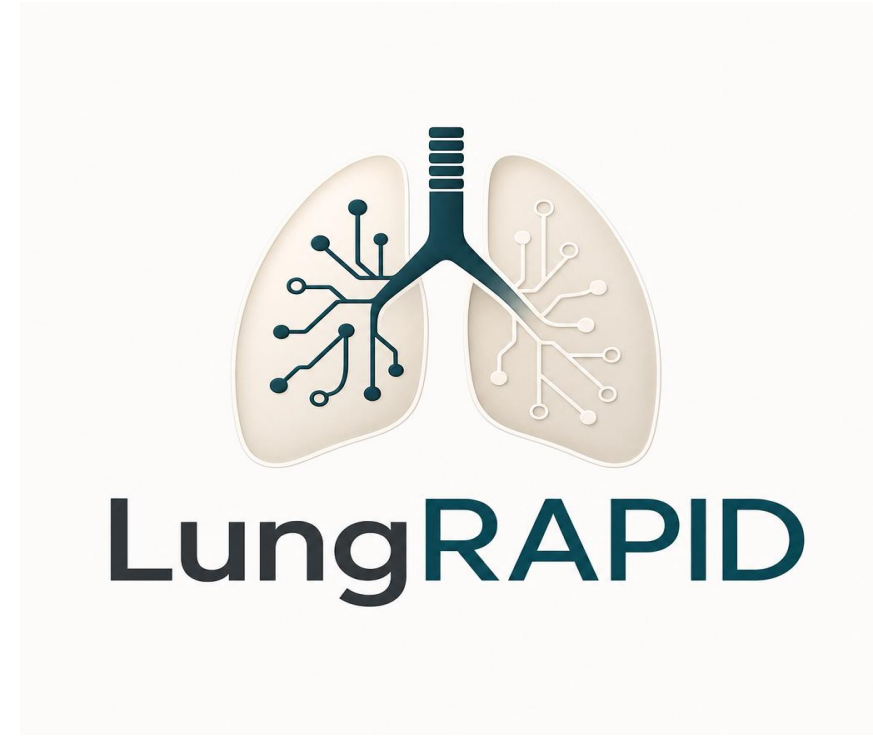




Risk stratification, AI evaluation, Pathway Innovation and Diversity assessment for Thoracic imaging: LungRAPID

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Why change is needed

Early identification of people with symptoms of lung cancer is essential to improve outcomes.

Rapid and accurate diagnosis in the UK is supported by an accelerated timed pathway, the National Optimal Lung Cancer Pathway (NOLCP).

The NOLCP mandates chest X-ray (CXR) to reported chest CT (CCT) within 3 days; however, median performance is 22 days, a seven-fold delay that causes patient harm.

Radiologist shortfalls, combined with escalating CT demand and growing straight-to-CT pathways, create unsustainable capacity constraints.

This work addresses whether an integrated thoracic imaging pathway combining AI-assisted risk stratification, radiographer-led triage, and optimised resource allocation can reduce diagnostic delays whilst maintaining equitable accuracy and patient acceptability.

Research question

Can an integrated thoracic imaging pathway combining risk stratification, AI-assisted triage, and radiographer-led CT reporting reduce time to diagnosis in the lung cancer pathway while ensuring equitable accuracy, appropriate resource utilisation, and patient acceptability?

Approach

Integrate AI

Identify and prioritise
Equity

Transform Workforce

Upskill
Utilise

Optimise Pathway

Escalate or reassure
Communication

Methods

This mixed-methods programme comprises 5 complementary work packages utilising large, rich existing datasets: LungIMPACT trial¹ (93,326 CXRs, 558 lung cancers, 5 NHS Trusts), RADICAL trial² (87,893 CXRs, 365 lung cancers), and MEDLEY trial³ (900 CCTs). Three MHRA-registered, CE/UKCA-approved commercial CXR AI systems will be deployed.

Work Package 1 AI risk assessment

Develop and validate a risk stratification model determining which AI-detected CXR findings require urgent CCT.

A risk prediction tool will be developed using the LungIMPACT data with biopsy proven lung cancer as the outcome. Potential predictors include demographic and clinical characteristics, and features determined by the AI systems. The model will be validated using the RADICAL data. The TRIPOD guidelines will be used for reporting.

Work Package 2 Training

Develop and pilot an educational intervention supporting reporting radiographers (RRs) in CCT triage (n=5 RRs).

Work Package 3 Radiographer + AI for chest CT

Conduct a cross-sectional diagnostic accuracy study (24 RRs, 300 CCTs) comparing RR and AI performance in triaging cases for urgent referral, follow-up, normal, or other findings.

A cohort of 24 chest X-ray RRs will participate in a MRMC diagnostic accuracy study. Three assessments will take place (n=100 CCT with 4 lung cancers), all 24 RRs will complete baseline reads, with RRs randomised (50:50) to either education and then AI or AI then education. The primary outcome will be the accuracy of RR CCT triage

Work Package 4 Patient Engagement

Explore patient acceptability of AI-supported pathways, autonomous CXR AI, and communication preferences through patient panels and discrete choice experiments.

Work Package 5 Equity + AI

Perform an exploratory diversity assessment of imaging datasets to identify and mitigate potential AI performance disparities across ethnicities and socioeconomic groups.

We will gather ethnicity and deprivation data, examine the cohort sizes from different groups and compare with census data. Recorded ethnicity data will be extracted and postcode used as a proxy for socioeconomic status using the Lower Layer Super Output Areas.

References

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2 – Duncan SF, McConnachie A, Blackwood J, *et al.* Radiograph accelerated detection and identification of cancer in the lung (RADICAL): a mixed methods study to assess the clinical effectiveness and acceptability of Qure.ai artificial intelligence software to prioritise chest X-ray (CXR) interpretation. *BMJ Open* 2024 doi:10.1136/bmjopen-2023-081062
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