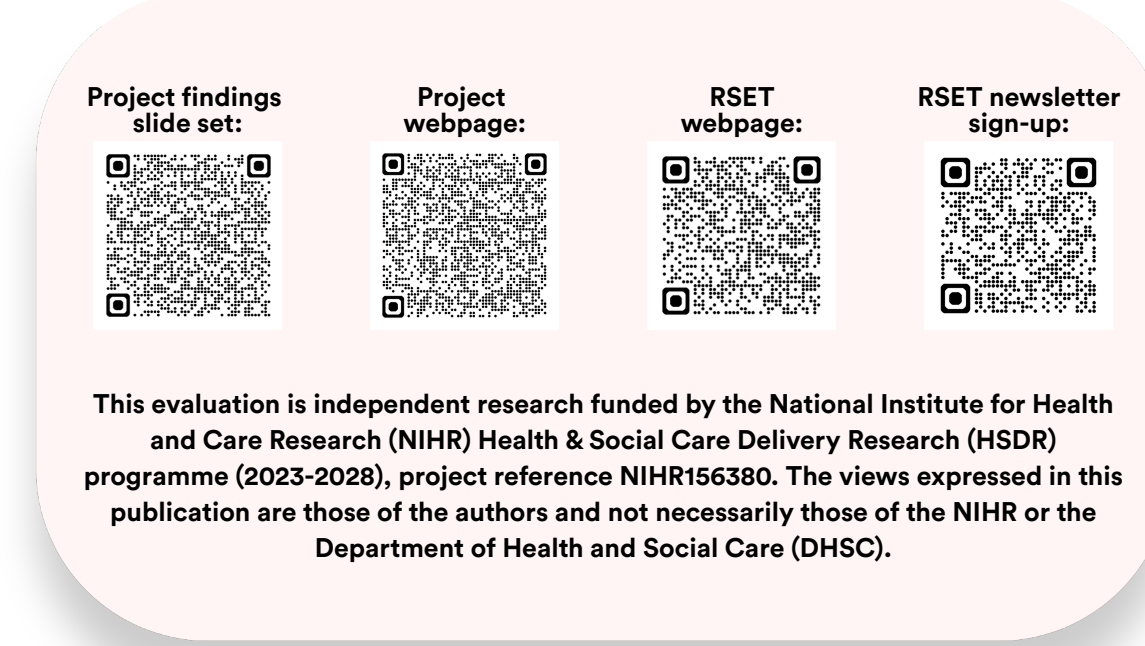


Economic evaluation of artificial intelligence deployment in lung cancer chest diagnostic imaging



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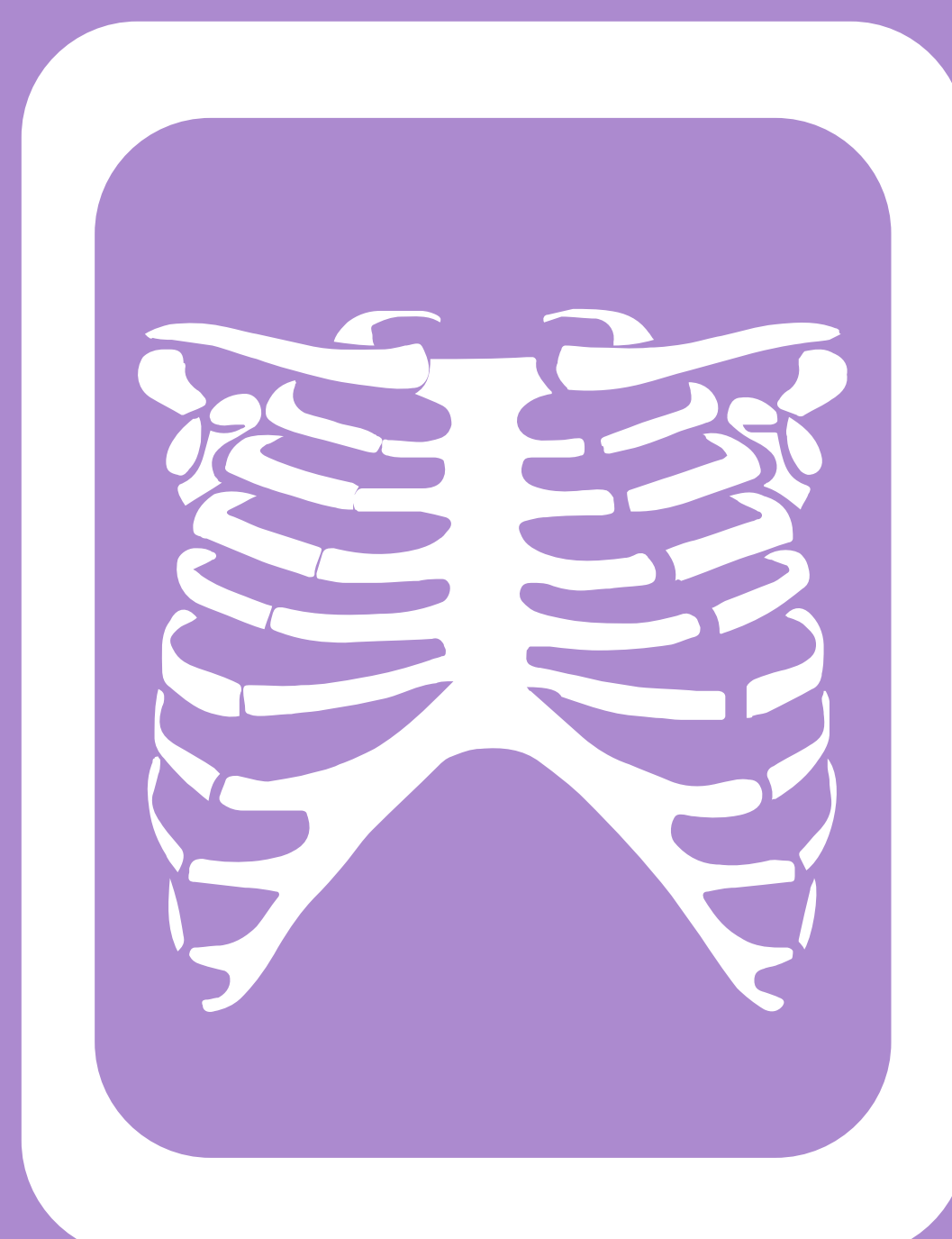
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Background

- AI for chest diagnostics has been proposed to support:
 - Faster and more accurate diagnoses
 - Reduced pressure on healthcare services and reductions in healthcare costs
- However there is little real-world evidence
- for the cost and cost-effectiveness of AI

AIDF

- NHS England programme to pilot AI in chest imaging (June 2023)
- NIHR RSET was commissioned to independently evaluate the AIDF implementation



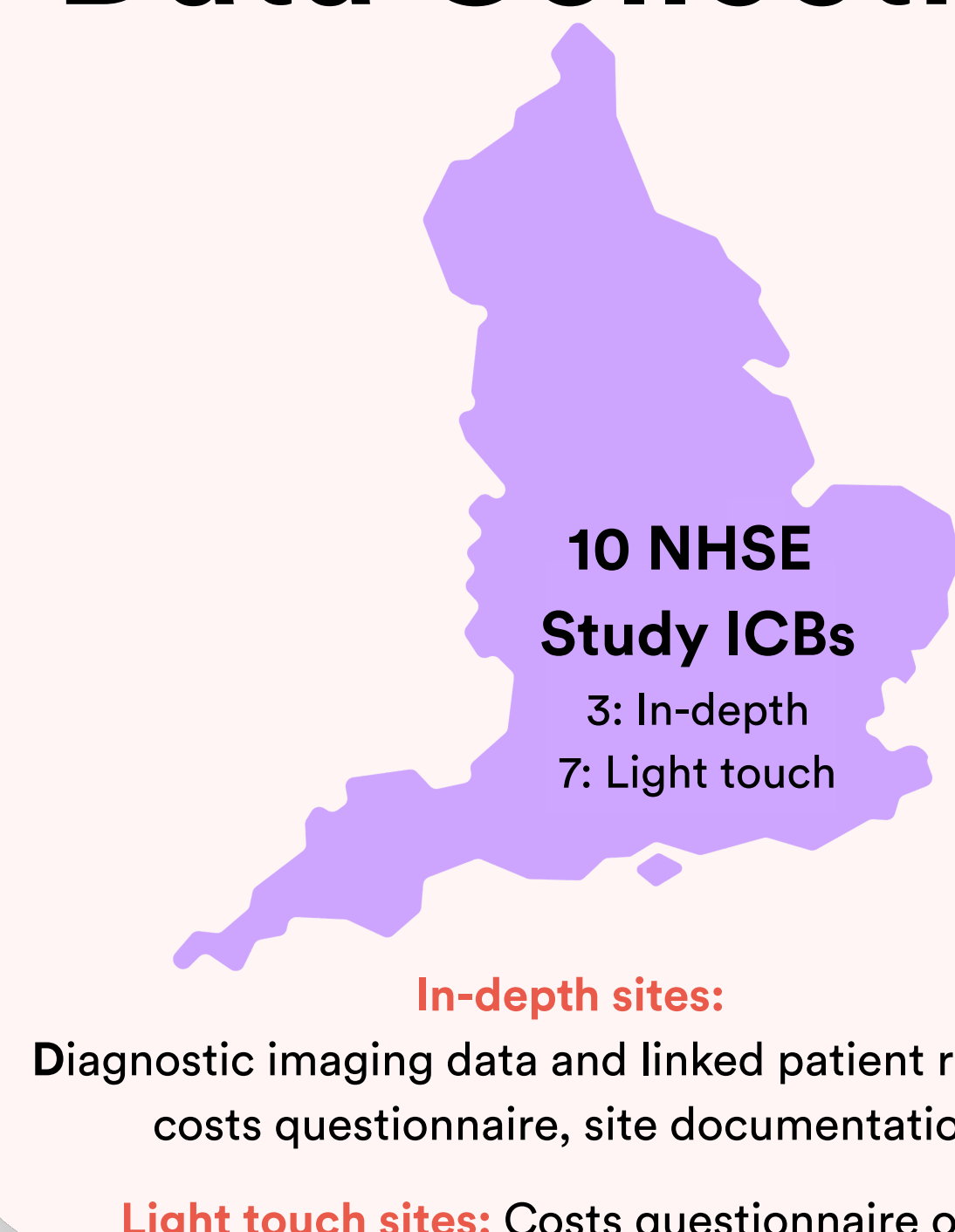
Research Questions

- What are the cost and resource implications of setting up and delivering AI for chest diagnostic imaging?
- Is AI implementation cost-effective compared with pre-AI deployment (no AI) chest diagnostic imaging

AIM

- To perform an economic evaluation of diagnostic imaging chest x-rays in the lung cancer pathway, with and without AI deployment.

Data Collection Economic Evaluation Model Settings Economic Model



Population

Patients referred (GP, A&E, Outpatients) to chest diagnostic imaging with suspected lung cancer

Comparator

Pre-AI deployment period (up to 6 months pre-deployment)

Intervention

AI in supportive role (treatment decisions always made by clinicians). Post-deployment period (from “go live” to study period end)

Outcomes

LYs, QALYs

Setting

NHSE lung cancer care pathway

Cost reference year

2024

Discounting (Costs >12 months)

3.5%

Time horizon

5 years (post diagnosis)

WTP thresholds

£15,000, £20,000 and £30,000/QALY

Decision-tree

Modelling a simplified version of the National Optimal Lung Cancer Pathway (Project findings slide set)

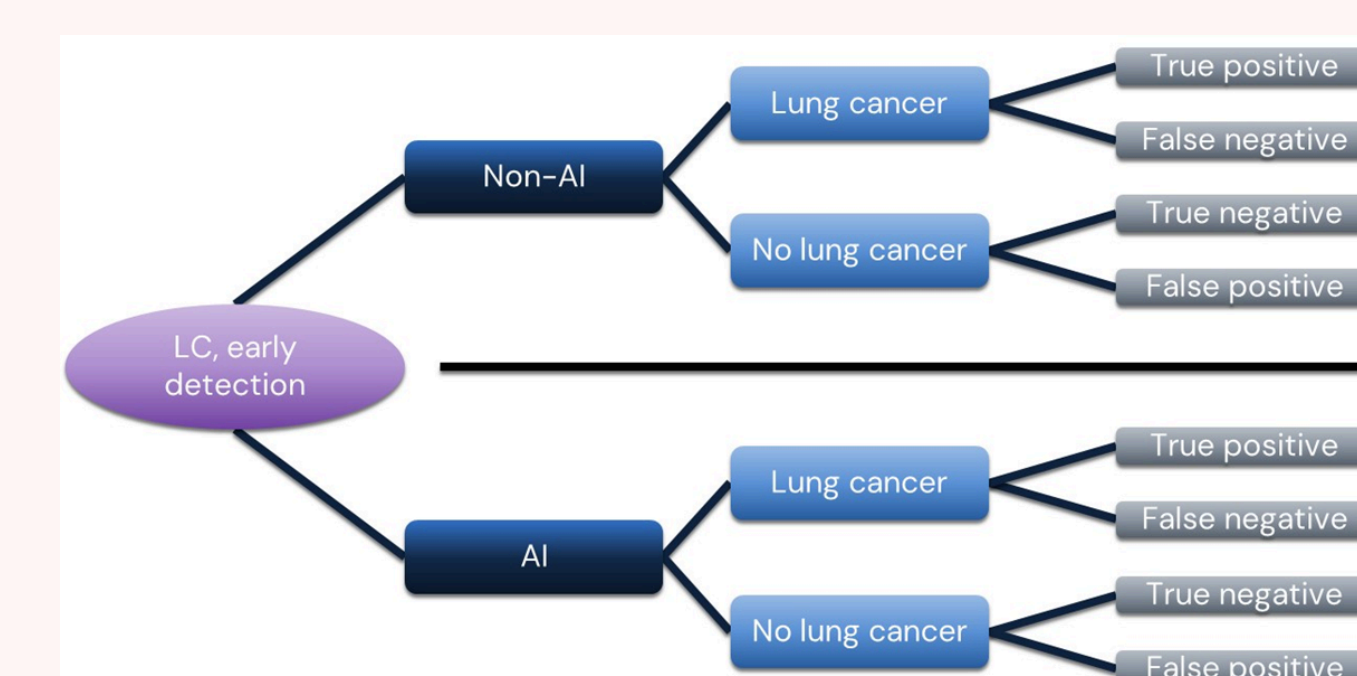


Fig 1. Decision tree model for economic evaluation of AI implementation vs pre-AI deployment.

Implementation Costs

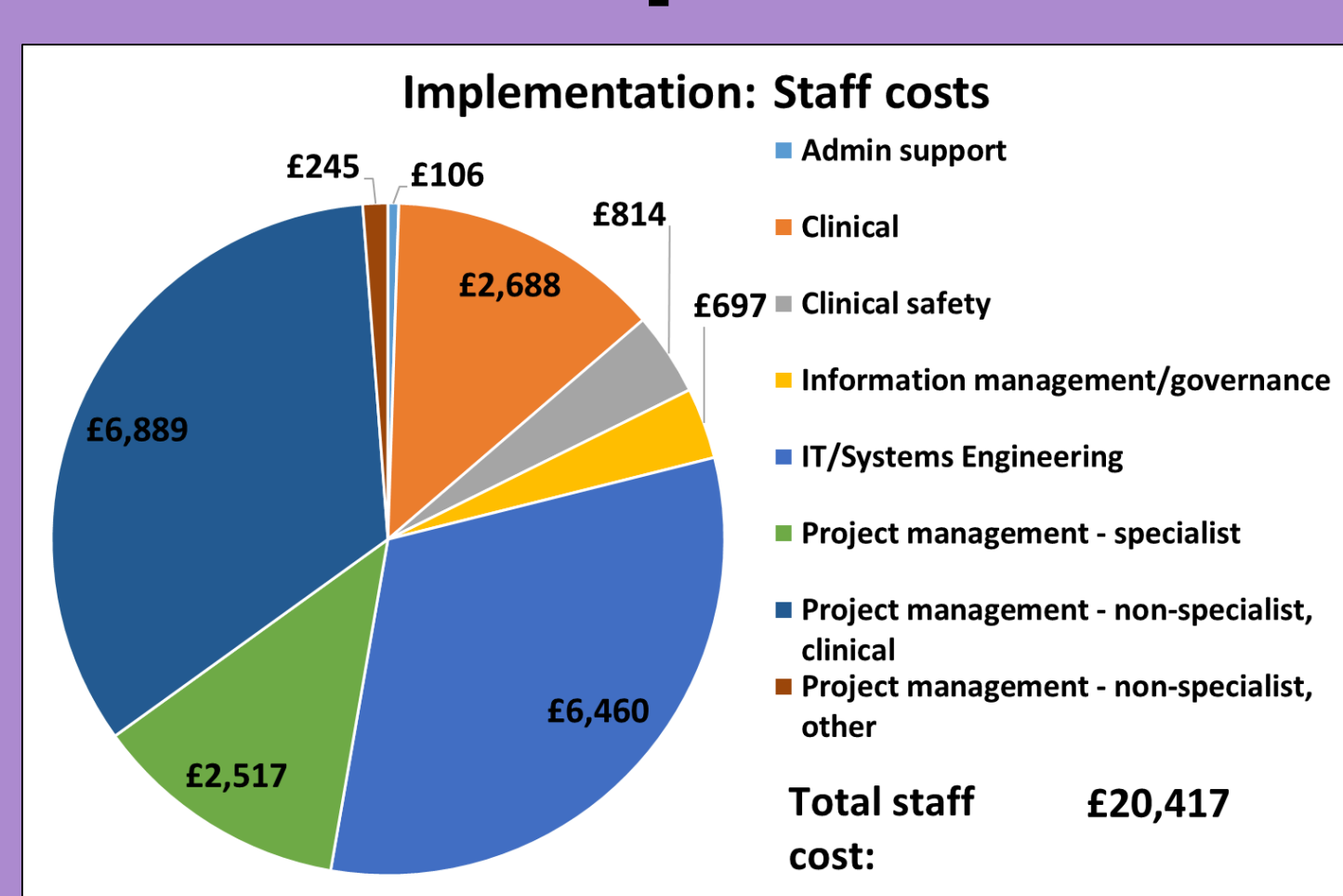


Fig 2. Staffing resource costs for AI implementation-related activities



Monthly ongoing costs: £5,163
(e.g., Reporting, performance monitoring, data management)

Strengths/Limitations

- ✓ Data from real-world implementation covering different models of deployment
- ✓ Estimation of resources use and costs for implementation activities and ongoing costs
- ✓ Economic model and data collection framework for AI-specific
- ✗ Restrospective data collection for implementation costs
- ✗ Lack of long-term (post-diagnosis) outcomes data
- ✗ Assumptions for delays and disease progression for false positive cases

Results

AI implementation DOMINATES pre-deployment (no AI) diagnostic imaging

- Less costly, due to marginal improvements in diagnostic performance (reduction in false negative cases)
- However, clinical gains were effectively zero (<0.001 incremental QALYs per patient)

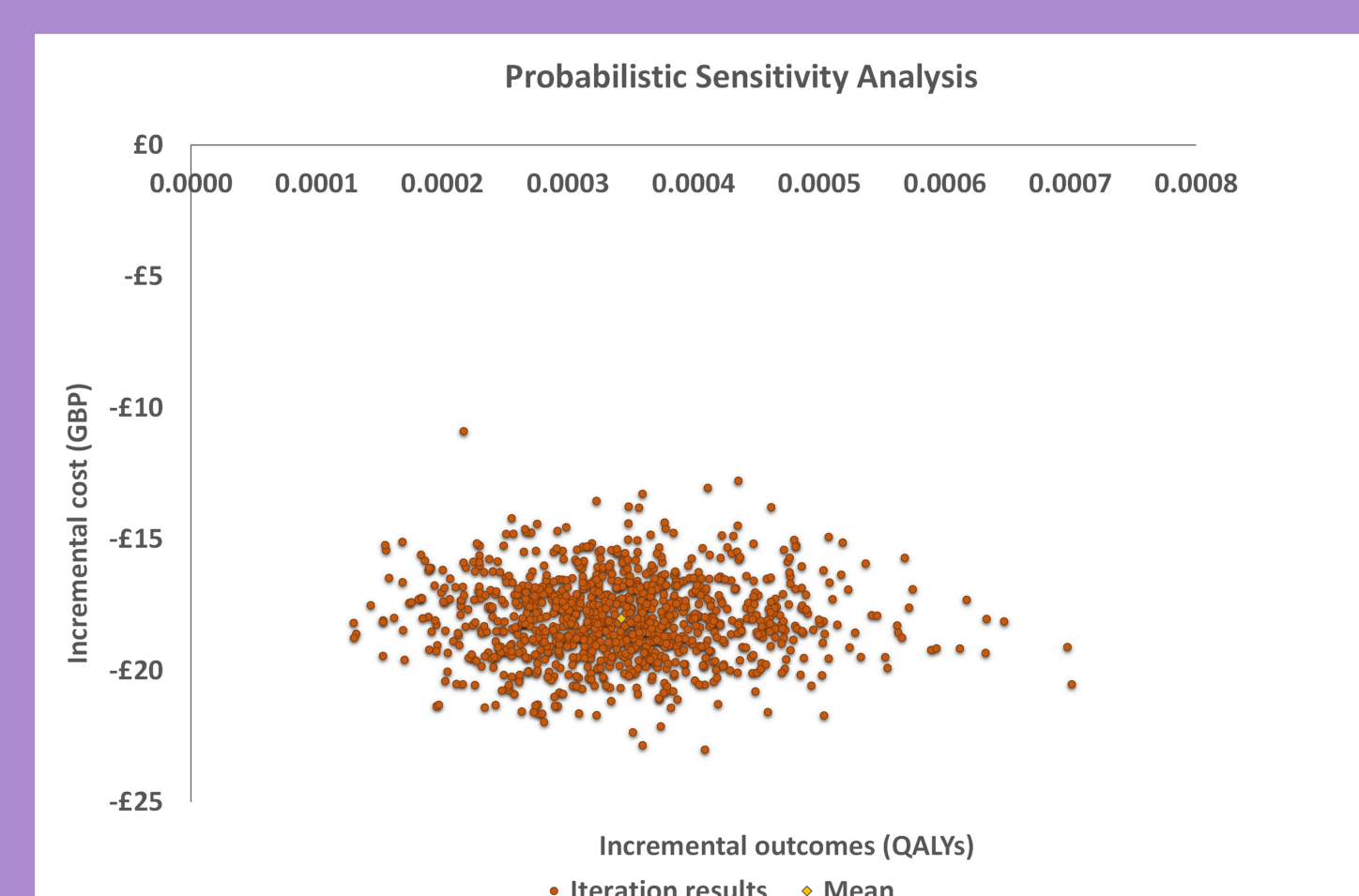


Fig 3. Cost effectiveness plane: Probabilistic sensitivity analysis, AI implementation vs pre-deployment (no AI) diagnostic imaging

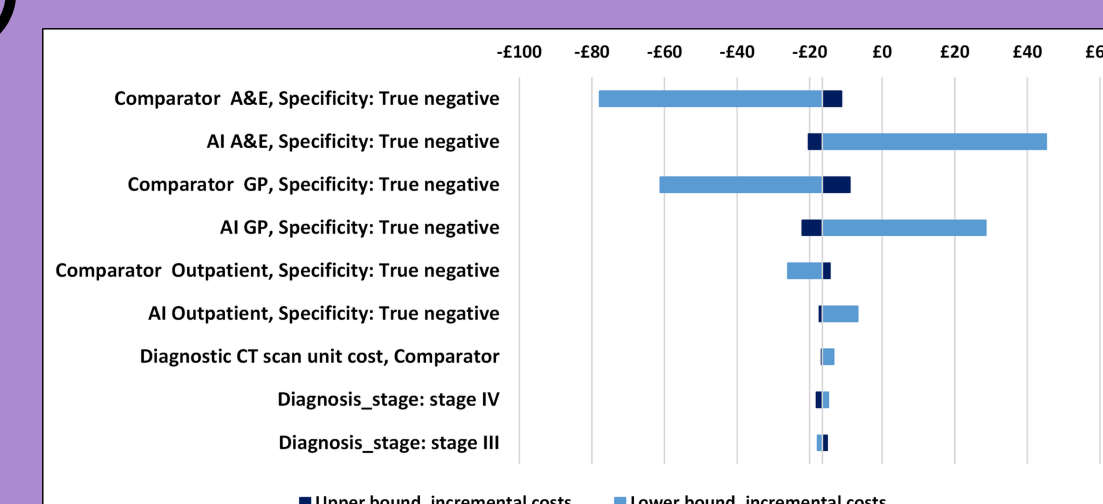


Fig 4. Tornado diagram: Top 10 most influential model parameters for incremental costs

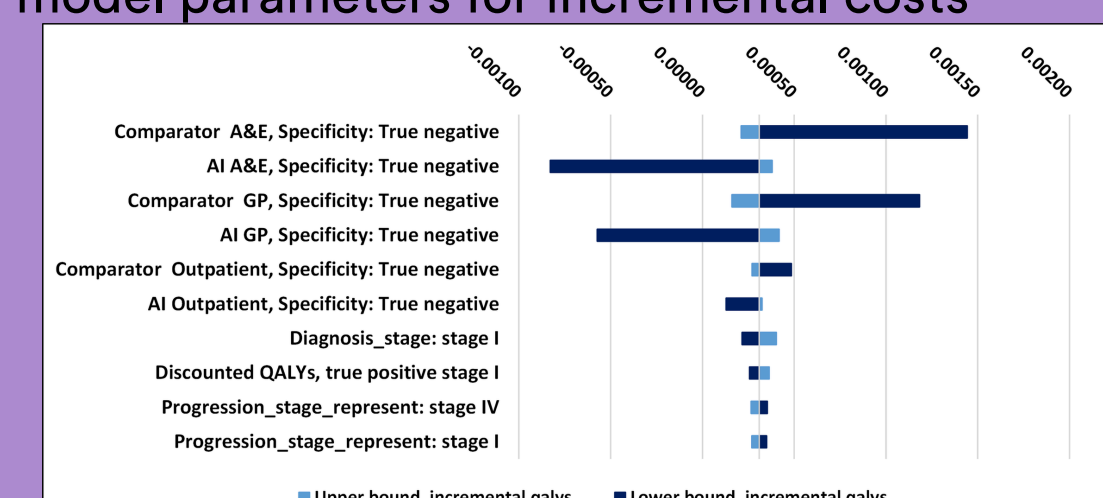


Fig 5. Tornado diagram: Top 10 most influential model parameters for incremental QALYs

Conclusions

The study findings indicate value in further deployment of AI

- Realisable gains/costs savings from AI implementation are limited by:
 - Already high levels of lung cancer diagnostic imaging performance (sensitivity/specificity)
 - Regulatory requirements for AI to perform a supporting role only

Stronger evidence is needed to fully capture costs and health outcomes upon which decision-makers rely