SUPPLEMENTARY MATERIAL: 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.

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About qXR

qXRv4.0, serving as a workflow aid, integrates into the Radiologist's reporting process. It identifies abnormalities within the lung field by pinpointing the specific regions of concern and prioritising chest X-rays for review. These findings are presented as Secondary Captures, comprising single series with outlined and labeled target abnormalities. These captures can be viewed independently on Radiology PACS as thumbnails and assign a Triage priority on CRIS.

A dataset containing 4.2 million Chest X-rays was used for training and validating the algorithms, it is based on deep learning algorithms, a form of machine learning where the hypothesis set is composed of neural networks (Convolutional Neural Networks in this case). qXRv4.0 consists of separate detection pipelines for each target abnormality, as there are several details pertaining to the location, size and texture that vary across abnormalities.

qXR has undergone training to identify artefacts and suboptimal X-rays These quality checks include unsupported modality, anatomy, views, inadequate resolution, sub-optimal DICOM quality, for which an invalid or a warning message will be provided on the secondary capture to inform end-user, as this may impact the accuracy of the AI output.

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Data collection overview

NHS GGC network

PACS

Modality

CRIS

Safe Haven

Wellbeing Gateway

1. CXR aquired and stored in PACS

2. Radiographer updates CRIS with aquisition information

3. Notification that imaging study matching criteria for qXR is available

4. Relevant CXR DICOM extracted from PACS

10. Secondary capture stored in PACS

11. Priority set in CRIS

Wellbeing cloud

Wellbeing AI Connect

5. DICOM transmitted across VPN

9. Result and secondary capture reidentified and transmitted

12. Feature-level results reidentified and transmitted

Qure.ai cloud

qXR

6. DICOM deidentified and transmitted to qXR

7. DICOM processed; result and secondary capture generated

8. Result and secondary capture transmitted