RETROSPECTIVE ASSESSMENT OF LUNG CANCER DETECTION OF AI SOFTWARE FOR CHEST RADIOGRAPHS

Dr. Alice Giucca [1], Dr. Ayodele Oluboyede [1], Michael Jones [1]

[1] Royal Surrey County Hospital

Introduction

Annalise AI was implemented in our local trust in August 2024 as a diagnostic support assistant and triage tool for chest radiograph interpretation. We wished to retrospectively assess its lung cancer detection ability by analysing its interpretations in proven lung cancer cases, compared to the interpretations of the existing report.

Materials and Methods

Histopathological diagnoses of lung cancer was retrieved from our local database between 01/10/2022 and 30/09/2023 (a period of 12 months), resulting in a total of 149 patients. Patients who had a chest radiograph in the 6 months preceding the diagnosis were manually included (a total of 91 radiographs). The radiographs were then analysed by Annalise AI and the interpretations findings were recorded and compared to the existing report. When required, subsequent cross-sectional imaging reports were consulted.

Results

Annalise incorrectly interpreted 8 radiographs (9%) when compared to existing reports and subsequent cross-sectional imaging. In 7 of these cases the airspace opacification was not identified; inconspicuous locations included the right apex/retroclavicular area (4), right hilum (2) and below the right diaphragm (1). In the last case, whilst the human reporter appropriately flagged extensive reticular shadowing when compared to previous imaging and advised a respiratory review, Annalise AI failed to make this comparison. Human reporters incorrectly interpreted 1 radiograph where there was a subtle retrocardiac density; this was acknowledged by the AI programme. Detection rates were 71% for human reporters and 66% for the AI software; many malignancies were not appreciated on radiography.

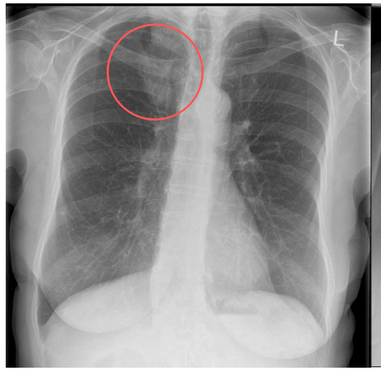


Figure 1: Example of right apical/retroclavicular opacity missed by Annalise AI

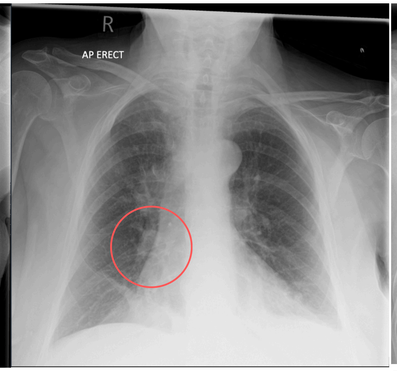


Figure 2: Example of right hilar opacity missed by Annalise AI

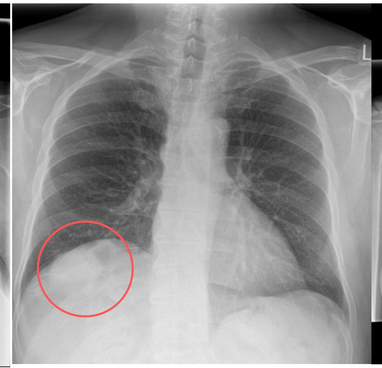


Figure 3: Example of right opacity below the diaphragm missed by Annalise AI

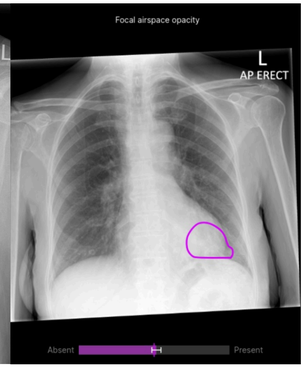


Figure 4: Subtle retrocardiac opacity picked up by Annalise AI and missed by human reporter

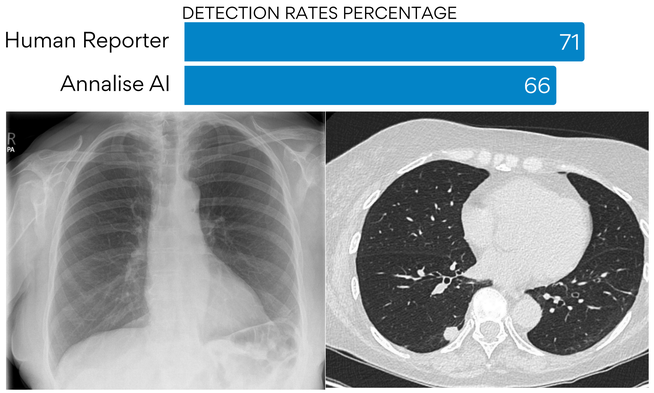


Figure 5: Example of a normal chest radiograph reported by both human and AI which subsequently showed a malignant focus

Conclusion

The interpretation of Annalise AI in chest radiographs remains currently below human sensitivity (9% versus 1%) of incorrect interpretations in cases of proven lung cancer. Most notably it failed to detect airspace opacifications in inconspicuous areas and showed an inability to compare to previous imaging. Detection rates for Annalise AI were below human reporters.