

NHS Grampian adopts cutting edge AI radiology solution in acute care

Staff find Annalise.ai solutions can enhance diagnostic accuracy and patient outcomes, while saving time and resources at the point of care.

In 2022, NHS Grampian (NHSG), deployed Annalise Enterprise CXR, a decision support AI solution detecting up to 124 findings on chest X-rays, to radiology and emergency departments at 12 sites across North-Eastern Scotland including Aberdeen Royal Infirmary, one of Scotland's four big trauma centres.

In acute care and emergency departments, clinicians regularly interpret chest X-rays as part of their patient assessments. Clinical decision making and patient management plans are often made by the attending clinician before formal radiology reports are available. In some areas, radiology workforce challenges can contribute to case backlogs. ¹ ²

Accurate interpretation enables timely, appropriate management. Factors such as high demand, fatigue, stress, experience and human cognitive biases can increase the risk of perceptual errors during image interpretation.

Innovative providers are now using decision-support AI as assistive clinical tools in radiology departments and at the critical point of care, to support their care teams to improve diagnostic accuracy, improve workflows and support the delivery of exceptional care.

Harnessing the power of AI in acute care for better patient and staff experiences

Dr Ben Dobb is a Consultant in Acute Medicine at Aberdeen Royal Infirmary, the largest hospital within NHS Grampian. He and his team look after approximately 100 patients per day and have been using Annalise Enterprise CXR in Acute Medicine for about six months. "I've been really impressed with the results," Dobb says, noting that decision support can enhance diagnostic accuracy and clinical confidence. "It's an extra pair of eyes for us and that's very welcome."

Case Report 1

Annalise Enterprise CXR improves outcomes and saves resources by flagging a pneumothorax

A young female patient presenting with chest pain had undergone various investigations, including a chest X-ray, which appeared to be unremarkable. The patient was about to be referred for a CT scan, but Annalise Enterprise CXR flagged a small pneumothorax at the tip of the lung.

"That would've been quite a bit of radiation for the patient," explains Dobb. "It really sped up the whole process and avoided an unnecessary test," Dobb says. "The patient had a diagnosis, a management plan, and could go home that day. I think it's great for patient care. It removes a lot of those human factors and gives confidence."

About NHS Grampian (NHSG)



Supporting population of 500,000 in North-Eastern Scotland



25 hospitals providing acute care, community care, teaching and research

Source: <https://www.nhsgrampian.org/>

In most cases, the radiologist and Annalise Enterprise CXR agree on image findings, "and that's really comforting" he says. It's equally helpful in cases of disagreement. "We know humans can misinterpret things. We know the software can misinterpret things. But when you overlap the two, the chance of missing something is much, much lower."

The support of advanced technology can be especially helpful when pressures like understaffing may affect clinicians' performance. Dobb adds: "I find that you fatigue a little bit less and even by the end of the ward round you're still performing well."

Case Report 2

Annalise Enterprise CXR helps detect incidental findings

Humans are susceptible to cognitive biases, which can affect decision-making. One example relevant in medicine is premature closing – a cognitive bias in which you stop investigating once an initial diagnosis is reached.

In a complex ED case at NHS Grampian, the benefit of having a second pair of eyes available for every case and experience level was evidenced. With obvious trauma findings in the right lung, reporting time and energy was focussed on that part of the chest.

"I hadn't noticed a small pleural lump on the left lung," Dr Dobb, who experienced this case himself, explains. "Annalise picked that out for me and made it very obvious. As an experienced clinician who is fairly comfortable with how I read X-rays, I still found it very useful."

“This kind of technology is clearly the future and our first foray into seeing how it works has really excited us. Everyone’s enjoyed using it.”

Dr Ben Dobb
Consultant in Acute Medicine | NHS Grampian



Real World Impact

The acute teams at NHS Grampian now make a decision on the vast majority of chest X-rays with the support of Annalise Enterprise, significantly reducing the amount of inpatient imaging sent to the radiology team.

Annalise Enterprise CXR

An assistive clinical tool for your acute care teams, when every minute counts.

Annalise Enterprise CXR uses deep learning to identify the suspected presence of up to 124 findings on chest X-rays. Identifying findings relevant to different care settings empowers healthcare providers to benefit from one AI algorithm that adds value across different care pathways.

124

Detect up to 124 findings on chest X-rays: Findings are available within 20s and all findings & triage categories can be configured (i.e. turned on or off) to meet local needs.



Lateral and frontal views: Annalise CXR can analyse up to three images per study, including laterals.



Identify the location of findings: In an interactive viewer, suspected findings are highlighted with a coloured overlay.



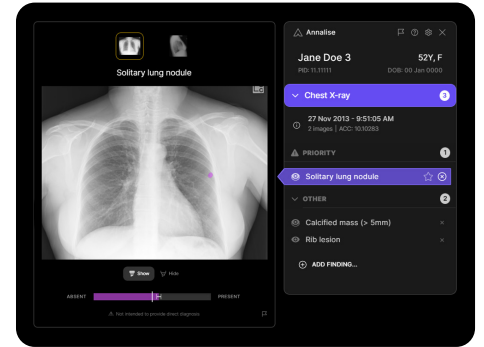
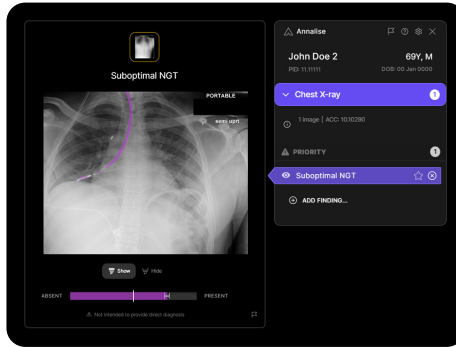
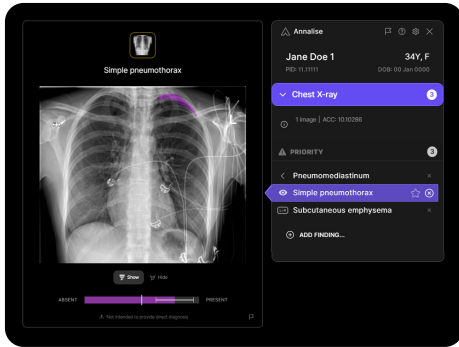
Interpret with confidence: A measure of AI model confidence is provided to support diagnostic decisions.



Trained on dataset from 3 continents: One of the world’s largest chest X-ray datasets.



Seamless workflow: The Annalise Viewer integrates directly within RIS/PACS and can be launched from either platform.



35+ Trauma Findings

An extra pair of eyes for complex and subtle cases with time sensitive findings

Identify and localise a number of time sensitive pathologies, including fractures, pneumothorax and pneumomediastinum, providing a second pair of eyes for complex trauma and subtle cases.

9 Lines and Tubes Findings

Reduce complications associated with medical device misplacement

Information is provided on the placement of lines and tubes, such as nasogastric tubes (NGT) or endotracheal tube (ETT), supporting clinicians to reduce the risk of preventable malpositioning complications and “never events”.

13+ Oncological Findings

Detect incidental findings at the point of care

Identify multiple findings suggestive of malignancy on AP, PA, and lateral chest X-rays, which could support the early detection of asymptomatic lung nodules at the point of care. 90% of cases in which a lung cancer diagnosis was missed were due to errors in the interpretation of chest X-rays.³



Improve the clinical workflow

AI can positively influence department workflow by identifying and categorising priority findings during image interpretation.



Support and training for staff

Comprehensive decision-support AI tools can also be a useful support and training resource for less experienced staff.

¹ The Royal College of Radiologists. RCR Clinical radiology census report 2021. <https://www.rcr.ac.uk/clinical-radiology/rcr-clinical-radiology-census-report-2021>. Accessed 18.4.2023.

² Public Health Scotland. NHS waiting times – diagnostics. <https://publichealthscotland.scot/publications/nhs-waiting-times-diagnostics/diagnostic-waiting-times-waits-for-key-diagnostic-tests-28-february-2023/>. Accessed 18.4.2023.

³ Del Ciello et al: Missed lung cancer: when, where, and why? *Diagn Interv Radiol.* 2017 Mar-Apr;23(2):118-126