HealthManagement
Promoting Management and Leadership

Enhancing Chest Radiograph Interpretation: Pioneering Study on AI-Assisted Double Reading Workflow

Chest radiography remains widely used for diagnosing cardiothoracic conditions due to its accessibility and affordability, but interpreting these images accurately can be challenging, leading to missed diagnoses and potential legal issues. Double reading by peers can help reduce errors, but it's time-consuming and costly. Artificial intelligence (AI) solutions show promise in improving detection rates, but integrating them seamlessly into radiologists' workflows is crucial. Current AI applications could assist in double reading by identifying discrepancies post-reporting without disrupting the primary workflow. A recent study published in European Radiology aims to assess the effectiveness of an AI-assisted double reading system in detecting missed findings on chest radiographs in both general and specialised healthcare settings.

Retrospective Observational Study: AI-Assisted Double Reading in Chest Radiography

A retrospective observational study was conducted at two medical institutions in the Netherlands: Elisabeth-TweeSteden Hospital in Tilburg (institution 1), and the Netherlands Cancer Institute in Amsterdam (institution 2). Approval was obtained from the ethics committee of institution 1 and the Institutional Review Board of institution 2, with the need for written informed consent waived due to the study's retrospective nature. Adult patients (≥ 18 years) who had undergone chest radiography were consecutively selected from April 2021 to February 2022 at institution 1 and from January to December 2018 at institution 2. Chest radiographs with posteroanterior (PA) projection were included for analysis by the AI software, excluding bedside chest radiographs. A total of 25,104 chest radiographs from 21,039 unique patients were included, with a mean age of 61.1 years ± 16.2 (SD) and 10,436 male patients. The distribution of chest radiographs was 19,637 (78.2%) from institution 1 and 5,467 (21.8%) from institution 2. Approximately 1.4% (356/25,460) of radiographs were excluded by the AI software due to age restriction or anterior-posterior (AP) projection, with the remaining cases successfully analyzed.

Pioneering Investigation: AI-Assisted Double Reading Workflow Decreases Reporting Errors

The study represents a pioneering investigation into the application of an AI-assisted double-reading workflow for chest radiography. Conducted retrospectively on a sizable cohort of 25,104 cases from two distinct medical institutions—a general hospital and a tertiary oncology centre—the study repurposed a clinically certified AI tool as a secondary reader to flag potentially missed findings on routinely reported chest radiographs. Results revealed that the AI software identified discrepancies in 21.1% of cases, prompting a further review by an external radiologist provided by the AI vendor. Clinically relevant missed findings were confirmed in 0.9% of these cases, with 74.5% deemed relevant by the institutions' radiologists, translating to 0.1% of all cases. The predominant missed findings were undetected lung nodules, alongside pneumothoraces and consolidations, with similar patterns observed across both institutions despite differences in the percentage of abnormal chest radiographs. The AI-assisted double reading system emerges as a potential quality assurance tool for chest radiograph reporting, with the study underscoring the considerable clinical impact of reducing reporting errors, particularly in high-volume settings. Identification of missed lung nodules can avert delays in diagnosing primary lung cancers or inaccuracies in cancer staging, while timely recognition of pathologies like pneumothorax can expedite treatment and diminish complications. Additionally, mitigating diagnostic errors can shield radiologists from medical malpractice claims.

Novel Approach to AI-Assisted Double Reading in Chest Radiography - Potential and Limitations

Comparisons with prior studies underscore the novelty and effectiveness of the current approach. Unlike previous studies that focused on normal chest radiographs, this study analysed all available reports and employed stricter criteria for determining clinical relevance. Additionally, the simultaneous analysis of imaging and reports facilitated by the AI software is deemed crucial for clinical adoption. Despite higher discrepancy rates compared to previous studies, the efficient review process enabled by the dedicated platform underscores the feasibility of integrating such systems into clinical workflows. However, the study has several limitations. It did not assess the standalone diagnostic performance of the AI tool, focusing solely on the benefit of the double reading system. Moreover, the system primarily targets perceptual errors, potentially overlooking cognitive errors where findings are misinterpreted. Additionally, limitations in AI software eligibility and access to prior imaging examinations may have affected the study's comprehensiveness. Future studies should address these limitations and evaluate the impact of the double reading system on patient outcomes.

The study demonstrates the potential of an AI-assisted double reading system to identify unreported findings on chest radiographs, offering a

valuable tool for mitigating diagnostic errors without disrupting radiologists' primary workflow. Despite low rates of clinically relevant missed findings, the system could serve as an effective quality assurance measure in chest radiography reporting. Future research should focus on refining the system's performance and assessing its impact on patient outcomes in clinical settings.

Source & Image Credit: **European Radiology**

Published on : Tue, 19 Mar 2024