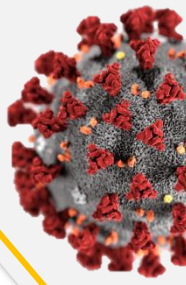
CHEST X-RAY WITH ARTIFICIAL INTELLIGENCE FOR DIAGNOSIS OF COVID-19



INTRODUCTION

Chest radiography, or X-ray, one of the most common imaging exams worldwide, is performed to help diagnose the source of respiratory symptoms like cough, fever and non-cardiac chest pain. Despite its renown roles in diagnosis of diseases, there is a lot of subjectivity in chest X-ray interpretation as it is a type of qualitative assessment and there are potentially significant inter-reader variability as well as suboptimal sensitivity for the detection of important clinical findings, which can limit its effectiveness.[1] To overcome these limitations, researchers incorporated an artificial intelligence (AI) model that would be able to rapidly identify key findings in chest X-rays of patients with specific respiratory conditions, such as pneumonia, lung fibrosis or lung cancer.

Artificial intelligence (AI) algorithms have demonstrated remarkable progress in image-recognition tasks. Traditionally, in radiology practice, trained physicians visually assessed medical images for the detection, characterization and monitoring of diseases. Using AI methods, these processes are done automatically by recognizing complex patterns in imaging data and providing quantitative, rather than qualitative, assessments of radiographic characteristics.[2] In medical imaging, one of widely used AI methods is **handcrafted engineered features** which is defined in terms of mathematical equations such as tumour texture. These features are used as inputs to state-of-the-art machine learning models that are trained to classify patients in ways that can support clinical decision making. Although such features are perceived to be discriminative, they rely on expert definition and hence do not necessarily represent the most optimal feature quantification approach for the discrimination task at hand. The second method is **deep learning algorithms** which can automatically learn feature representations from data without the need for prior definition by human experts. It has the added benefit of reducing the need for manual preprocessing steps.[2]

During this COVID-19 pandemic, the use of medical imaging with AI has been widely cited as an important approach to aid in the detection of disease and making clinical diagnosis. Though none have yet been officially announced, AI may assist in development of more accurate symptom checking in order to predict the likelihood of new infection with COVID-19 versus other benign causes of respiratory illness.[3] Therefore, we conducted systematic literature review on the effectiveness of chest X-ray with artificial intelligence for diagnosis of COVID-19.

EVIDENCE ON EFFECTIVENESS AND SAFETY

There was no article retrieved from the scientific databases such as Medline, EBM Reviews, EMBASE via OVID, PubMed and from the general search engines [Google Scholar and US Food

and Drug Administration (USFDA)] on the effectiveness and diagnostic accuracy of chest X-ray with artificial intelligence for diagnosis of COVID-19. When using the term “radiological imaging with artificial intelligence” and “COVID-19”, the most common medical imaging modality that coupled with AI is computed tomography (CT) scan. This has been reported in a separate rapid evidence review.[4]

CONCLUSION

Based on the review, no evidence retrieved from scientific databases on the effectiveness and diagnostic accuracy of chest X-ray with artificial intelligence for diagnosis of COVID-19. Further research is recommended.

REFERENCE

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Based on available evidence up to 21 April 2020

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Disclaimer: This rapid assessment was prepared to provide urgent evidence-based input during COVID-19 pandemic. The report is prepared based on information available at the time of research and a limited literature. It is not a definitive statement on the safety, effectiveness or cost effectiveness of the health technology covered. Additionally, other relevant scientific findings may have been reported since completion of this report.

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