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Introducing AI to your Radiology Practice

This white paper has been developed based on the experiences of Artificial Intelligence (AI) deployments by health-tech organisation Qure.ai in 70+ countries across multiple imaging modalities in collaboration with CaritasKlinikum Saarbrücken, Germany. It is a compilation of the best practices and intends to guide the reader to consider adopting the AI solution that works for their clinical practice.

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While there are many ongoing academic efforts to find novel use cases for **AI** in medicine, radiology is one area in which it can play a pivotal role, specifically, more precise diagnoses in the face of increasing imaging workloads and global staff shortages.



AI augments efficiency in the health system



AI-assisted insights will help reduce patient wait time and improve patient experiences.



AI can also help make precise strategic decisions at a leadership level by analysing complex data to provide strategic insights like forecasting department needs.

There are many domains in healthcare where AI is being used.

However, the field of radiology is an early adopter and one where AI has gained maximum momentum.

While many big companies and start-ups have AI algorithms, only a few have algorithms in multiple modalities, like X-ray and CT scans. Use of AI in reporting is helping to improve the productivity of radiology departments.

By helping in the diagnosis of different clinical conditions.

By playing an integral role in propelling precision medicine by integrating data from multi-modal data sources.

By reducing the time to diagnosis.

By assisting in increasing workload efficiency, like the prediction of the flow of patients in the department, which can be used for more efficient staff allocations.

However, through this white paper, we would like to re-emphasise that **AI will not replace healthcare professionals but will assist them with complex decisions** by providing simplified insights from multiple data sources.

Steps to follow if you are considering deploying AI in your clinical practice

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1

Site Selection

AI has the potential to solve multiple problems in healthcare. For example, if there is a shortage of trained radiologists, it can help address capacity constraints. AI can also help in driving efficient management of increased workloads for radiologists. It enables the system to fill that gap and is relevant if there is a backlog of work where radiologists cannot cope with the increased workload of more scans. AI can also assist radiologists in improving accuracy and the incidental discovery of findings.

Here are a few ways in which AI can specifically benefit radiology departments:



Improve
Operational Efficiency



Improve
Quality of Diagnosis



Address
Capacity Constraints



Assist in Meeting
Reporting Metrics

Example

Unilabs, Europe's largest teleradiology service provider, used Qure.ai's solutions to move their cases from a **first-in-first-out** approach to a more **patient-centric approach** by prioritising abnormal scans for immediate action.



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Artificial Intelligence is one of the most positive developments in medical imaging. I established the International Department of Artificial Intelligence in Medicine and Imaging (id:ai:mi). We are a growing clinical radiologist- and informatician-led movement to improve Artificial Intelligence for contextual reporting, knowledge extraction, and department management. Our mission is to transform radiology from evidence-based to intelligence-based, and from volume-based to value-based.

2

Site Interaction & Demo

Needs assessment is an integral part of the Standard Operating Procedure (SOP), where an AI algorithm is tweaked based on the health system's requirements. A demo of the AI algorithm's output allows the deployment team to seek and incorporate feedback. IT teams and other stakeholders engage in multiple interactions to better understand the needs of the health IT system. Teams discuss a road map and share a detailed SOP so that every step involved in and after the deployment is mapped out. It also helps coordinate functions and manage any unexpected or expected issues.

Factors that need to be considered for appropriate AI selection

Operational Metrics

Deployment Costs

Turnaround Time

Return on Investment

AI Performance Metrics

Negative Predictive Values

Positive Predictive Values

Sensitivity

Specificity

Area Under Curve



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Radiology workflow is about automating tasks and driving efficiency. The incorporation of Artificial Intelligence in radiology is a major breakthrough. AI products need to be fully embedded in the radiology workflow.

3

Small Batch Validation

A small batch validation or pilot study is done with the site's data. Based on the interaction and if requested, the results are discussed, and the proof is generated to demonstrate the algorithm's robustness on their local data. This opportunity is used to adjust AI thresholds based on feedback from specialists and stakeholders. A bigger sample size or a robust pilot study conclusion can also be used to publish results for unique conditions and use cases.

Evidence-based use of AI is the sustainable way to integrate AI in healthcare, and these studies help prove the technology's relevance in medicine.

Example

Mersin University's Faculty of Medicine initiated a study with support from AstraZeneca to use Qure.ai's AI solutions to understand the role of AI in predicting heart failures early from incidental findings on chest X-rays.

The validation study proved that AI on chest X-ray could help in the early diagnosis of heart failure even before the symptoms become evident.

Early diagnosis helps patients achieve better health outcomes and contributes to cost savings for health systems. It will also help improve the department's operational metrics and reduce patient morbidity & mortality.



Dr. Jacob J. Visser

Radiologist,
Chief Medical Information Officer
and Assistant Professor,
Value-based Imaging, Erasmus MC
Rotterdam, Netherlands

We are delighted to be partnering with Qure.ai, as we see the adoption of AI in healthcare at a critical juncture, where clinicians are asking for expert advice on how best to evaluate the adoption of the technology. In Qure.ai's work to date, it is clear that they have gathered detailed insights into the effectiveness of AI in healthcare settings, and together we will be able to assess effective use cases in European clinical environments.

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IT Integration



The Executive and IT teams need to consider the digital infrastructure that must be implemented – hardware and software requirements, costs, data sharing, and privacy needs.

AI can be integrated via on-premises or on-cloud solutions, depending on conditions.



Dr. Matthew Evison

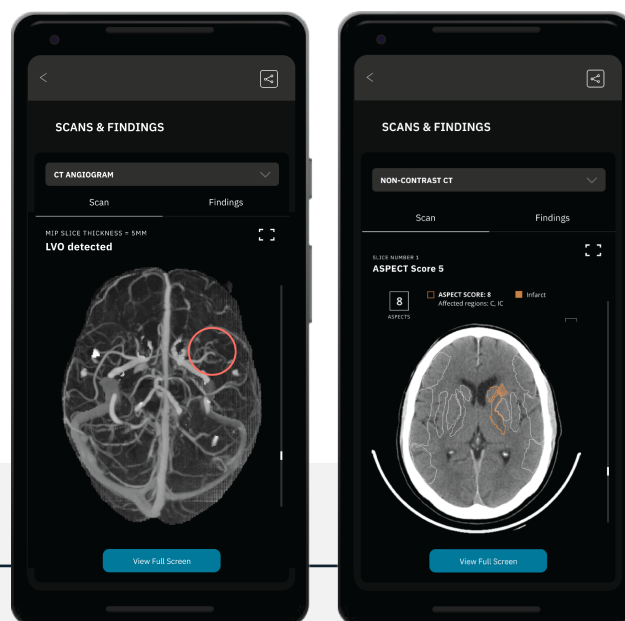
Consultant Chest Physician,
Manchester University
NHS Foundation Trust

We have formed a partnership between Qure.ai, AstraZeneca, and Greater Manchester Cancer Alliance to deploy an AI platform to address the backlog issue and improve reporting speed at a regional scale. This platform can help prioritise X-rays symptomatic of lung cancer and accelerate the straight-to-CT pathway. Moreover, it enables us to add features of automated reporting and referrals to enhance patient safety netting.

5

Troubleshooting for Client Success

Collaboration is critical for success. Hence, identifying an AI solution provider who will have a dedicated support team for every deployment and project is crucial. This level of support will ensure efficient delivery as well as smooth troubleshooting and act as a key partner for any specific deployment's lifetime.



Good to Know

The Client Success (CS) team is constantly in touch with the partner site to ensure that IT integration and data management are executed professionally. The CS representative acts as the conduit between the site and solutions teams and as the single point of contact for discussions or escalations. In addition, they travel to deployment sites, give presentations, and clarify any doubts or questions the site committees or other administrative agencies may have.



Samantha Davey, SD

Head of Programme Delivery,
Medica Group Plc.

Working with Qure.ai and implementing the algorithm has been fantastic. The tool is helping us improve the turnaround time and do it more safely. The algorithm has reported findings that reporters might not have seen. It has been helpful to make them take a second look and reconcile the report using AI. The team's expertise and flexibility in integrating the solution into our bespoke systems are commendable.

6

Periodic Reviews

The site where AI is deployed might also have internal mechanisms and periodic reviews with the users to ensure that the AI is being used in a well-defined manner. Any issues that might arise are discussed and communicated with the client success team of the AI solution provider.

The AI solution provider must establish appropriate governance models with the site to ensure patient safety and a best-in-class user experience.

Example

The site governing body might include stakeholders from various departments to review the usage of AI periodically. This review helps improve access to care for patients and enhances the efficiency of health systems by saving time and money, even in remote and challenging areas of the world.

7

Evidence Generation

Besides commercial deployment, AI offers the opportunity to publish learnings or new evidence discovery. First, an accepted IRB (Institutional Review Board) approved route is taken, where a concept note/protocol is shared with the site Principal Investigator (PI). After getting the required approvals on the interesting use case, a prospective or retrospective study is done. Finally, results are analysed and published in reputed journals and conferences to share learnings with peers.

Example

There are many examples where Qure.ai demonstrated the utility of AI in radiology. For example, one of the publications showed that it could detect mislabelled and missed findings. In another study, Qure.ai demonstrated that heart failure with preserved ejection fraction could be detected with the help of AI on chest X-rays.

Conclusion

AI is the future of healthcare, and Qure.ai is a pioneer in the “AI in radiology” space. It is often touted that AI will make the lives of radiologists easy by reducing the burden of mundane, repetitive, low-value work. Qure.ai has robust mechanisms, demonstrated by its acceptance in 70+ countries across the globe. High-impact academic publications add to the robustness reviewed by experts.

AI is relevant for:

- **LMICs** (Low Middle-Income Countries) grappling with infectious diseases like TB.
- Use of **Computer-aided Detection (CAD)** for auto-reporting.
- The developed world in incidental and early identification of cancers on X-rays.

This helps in both earlier diagnosis and better prognosis for patients.



How can we help you?

We have collaborated with multiple public and private healthcare systems. For example, nearly 25+ NHS Trusts in the UK currently use our AI solutions. In addition, we have built rigorous research associations with world-class academic institutes like the Erasmus MC, Massachusetts General Hospital, and others. We would be happy to share our experiences and learnings with you.

We use extensive clinical evidence to build deep learning and AI-based solutions that reshape early disease detection metrics in oncology, neurology, radiology, and more at **1000+** sites across **70+** countries, impacting **5 million** lives annually.

About our authors

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Professor Pickuth is the Head of the Department of Radiology and former longstanding Medical Director at the CaritasKlinikum, Saarbrücken, Germany. He is the founding Director of the Digital Innovation and Strategy Hub (DISH), responsible for driving digital transformation across all radiological, clinical, operational, and corporate environments. He also established the International Department of Artificial Intelligence in Medicine and Imaging (id:ai:mi). Professor Pickuth is the Lead for the Faculty of Medical Leadership and Management in Europe. As a digital leader with an impressive track record of driving successful technology and business transformation programmes, Professor Pickuth advises on digital transformation, including information governance, in many countries. He has authored several textbooks, including 'Clinical Radiology' and 'Healthcare Executives – The Essentials for Excellence in Leadership and Management'. Professor Pickuth was awarded numerous visiting and honorary professorships at distinguished European universities. His work has also been independently recognised with Honorary Doctorates epitomising the significance and lasting impact of his accomplishments.

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Dr. Ohlmann-Knafo is the Deputy Head of the Department of Radiology at the CaritasKlinikum, Saarbrücken, Germany. She is an extremely experienced radiologist and internationally renowned specialist in the field of Artificial Intelligence. Dr. Ohlmann-Knafo champions radiology IT and clinical workflow improvements, along with transforming ways of working by embedding digital technologies into radiological processes. She shares knowledge, supports development, facilitates effective implementation, and addresses professional issues.

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Dr. Agrawal is a physician with over a decade of healthcare experience in clinical medicine, digital health & oncology research. He has worked in patient care, clinical research, pharma consulting, and global health in corporate, government, academic, and non-profit settings across the globe. Dr. Agrawal completed his Master of Public Health degree from Boston University and trained in Global Health Informatics at MIT, followed by a User-Centered Design in Health Innovations Fellowship from Harvard Medical School. He is passionate about access to medicine and good quality healthcare for all through impactful innovations.