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ASMIRT

Position Paper

Artificial Intelligence in Medical Imaging and Radiation Therapy

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Australian Society of Medical Imaging and Radiation Therapy
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There are a number of protected titles for medical radiation practice. They include:

Medical Radiation Practitioner (MRP)

Diagnostic Radiographer (DR)

Medical Imaging Technologist (MIT)

Radiographer

Nuclear Medicine Scientist (NMS)

Nuclear Medicine Technologist (NMT)

Radiation Therapist (RT).

For the purposes of our documentation we use the broad descriptor Medical Radiation Practitioner (MRP) recognising that it covers a range of areas of practice.

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The Australian Society of Medical Imaging and Radiation Therapy (ASMIRT)

The ASMIRT is the peak body representing medical radiation practitioners (MRPs) in Australia. Our aims are to promote, encourage, cultivate, and maintain the highest principles of practice and proficiency in medical radiation science, always mindful that the welfare of the patient should be at the centre of everything we do.

Artificial Intelligence (AI) within Medical Imaging and Radiation Therapy

Artificial intelligence within medical imaging and radiation therapy is not considered an emerging technology, but a reality in contemporary Australian healthcare. As AI tools are implemented within clinical settings, MRPs have a role in advocating for safe, justified use of the technology.

The Medical Radiation Practice Board of Australia (MRPBA) professional capabilities statement for medical radiation science practice, established in 2020, was designed to be forward-thinking and inclusive of future technologies [1]. These capabilities provide a solid foundation that encompass current and medium-term effects of AI and machine learning on our profession. In the age of AI, timeframes from proof-of-concept software to systems ready for use in the clinical setting, can evolve quicker than once thought. When engaging with new technologies, registered practitioners must consider how these capabilities can reasonably apply to clinical circumstances and ensure their actions align with safe professional practice.

In 2022, the MRPBA additionally published the Statement on Artificial Intelligence in medical radiation practice [2]. The statement provided a brief comment on the need for MRPs to be more educated and active in the safe rollout of AI tools in a clinical setting.

Artificial intelligence is not a substitute for human expertise and judgment, instead, serving as a supplementary tool to enhance and assist MRPs[3,4]. Artificial intelligence requires careful development, validation, implementation, and evaluation to ensure its safety, reliability, explainability and transparency meets practice and ethical standards [5,6]. Fostering collaboration is key among researchers, clinicians, vendors, regulators, and patients to facilitate seamless integration, and widespread acceptance of AI in clinical practice. The following statements amalgamate the priorities of both radiation therapists and medical imaging professionals as standards that should be considered during the roll out of AI tools in clinical practice.

Justification

AI systems should be justified in the context of the proposed environment, i.e. the product proposed should aim to solve or improve a current workflow or healthcare matter that is specific to the practice.

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Example:

- an algorithm developed for and tested on adults should not be used in a paediatric setting without proper justification and validation.

The proposed AI system should demonstrate a clear benefit to healthcare outcomes from either a staff or patient perspective.

The proposed AI system should demonstrate a clear benefit to healthcare outcomes, in enhancing the quality, effectiveness, timeliness, and personalization of practice across all disciplines.

Examples:

- an automated stroke detection tool that does not communicate with the local PACS infrastructure may pose less of a benefit than one that does.
- AI-based contouring may facilitate efficiencies in the radiation therapy treatment planning process that lead to reduced wait times for patients.
- AI based feedback on assessment of mammography image quality may lead to higher levels of consistency in tissue visualisation.

Evidence-based

Artificial intelligence systems should be evidence-based and demonstrated to perform safely in a clinical environment similar to the proposed setting.

If the AI system is only tested within a company's data set without clinical evidence to support intended concept, the vendor should declare it as such.

Examples:

- a brain haemorrhage detection system that has published evidence demonstrating efficacy in a similar hospital setting, including commentary on potential pitfalls, would be more beneficial than a system with no evidence attached.
- AI-based systems for radiation therapy plan generation that are based and validated on internationally recognised consensus guidelines.

Transparency

While maintaining commercial confidence, AI developers should disclose their testing populations, including how the system would perform on specific demographics based on the local clinical setting.

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Example:

- an algorithm tested on a homogenous population group within a certain age range or habitus may not perform as advertised in a tertiary hospital setting servicing a wide population group.

Artificial intelligence manufacturers must declare how data is handled and how local data retention standards are met, to ensure appropriate privacy and data protection.

Example:

- local patient data is uploaded to a cloud-based server and data is stored for future use by the vendor for further model training

Accountability

Artificial intelligence systems should undergo an auditing phase during initial installation to ensure results are comparable to the proposed outcomes.

- If possible, a 90-day trial should be undertaken to allow clinical sites to audit and feedback on AI systems.
- AI manufacturers should provide assistance if failures or anomalies are noted during an audit period.

Quality Assurance

Medical radiation practitioners should consider the ongoing quality assurance requirements of the AI technology employed in their clinical setting and develop mechanisms to check that it remains fit for purpose given the potential for clinical caseloads and techniques to change over time. This should be discussed collaboratively with the broader multidisciplinary team to identify responsibility of roles and tasks.

Education

Education plays a pivotal role in preparing our workforce for the intersection of AI with medical imaging and radiation therapy. Accreditation standards mandate that education providers and their programs equip graduates with the necessary capabilities to support continuous learning and evolving practice. This includes proficiencies in information gathering and analysis, data science, health informatics, inter-professional collaboration, and evidence-based practice. Education providers are tasked with the continual update of their curricula to incorporate an understanding of the clinical applications of AI, ensuring that graduates are well-versed in the role of AI in contemporary practice.

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Conclusion

By fostering AI competence, MRPs will be well-positioned to lead the development and deployment of AI in their respective fields. Our involvement is critical, as it is our responsibility to inform and educate patients about the role of AI in their healthcare, ensuring respect for individual preferences and the maintenance of safety and privacy in AI applications.

As AI systems can learn, improve, and operate autonomously, it is imperative for practitioners to exercise oversight and, when necessary, direct the application of AI in their practice and policies. The Australian Society of Medical Imaging and radiation Therapy reinforces its ongoing commitment to working across the medical radiation sciences, to evaluate and inform the evolving AI practice standards and governance, with patient safety as the top priority.

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