



Guest editorial

Artificial Intelligence and the Radiographer/Radiological Technologist Profession: A joint statement of the International Society of Radiographers and Radiological Technologists and the European Federation of Radiographer Societies



Radiographers and radiological technologists are the interface between imaging technology and patients. As medical imaging and radiotherapy experts, radiographers and radiological technologists are professionally accountable for patients' physical and psychological wellbeing, immediately prior to, during and following imaging investigations or therapy procedures. Radiographers and radiological technologists take an active role in justification and optimisation of medical imaging and radiotherapeutic procedures, and have a critical position and vital role in the radiation safety of patients, carers and relatives in accordance with the "As Low As Reasonably Practicable (ALARP)" principle and relevant legislation.¹

Recent developments have seen increasing integration of complex machine learning algorithms and artificially intelligent systems (AI) within medical safety, equipment operation, image review and treatment planning processes.^{2–4} Adoption of AI in medical imaging and radiation therapy requires radiographers and radiological technologists to adapt their imaging and treatment practices to ensure new technology is being implemented, used and regulated appropriately, based on high quality research evidence, maximising benefits to their patients.^{5–8} Changes in practice must be underpinned by appropriate education and training, both for the existing workforce and also curriculum development for the future workforce at European Qualifications Framework (EQF) Levels 6 (Bachelors) and 7 (Masters).

1. Use of Artificial Intelligence in Radiography

- 1.1 AI should only be implemented into clinical practice once this has been validated and proven to be beneficial to patients by robust research evidence.
- 1.2 Radiographers/radiological technologists should take advantage of AI as a clinical decision support tool for the appropriate justification of examinations, including vetting. There is also an opportunity to increase the role for radiographers to communicate relative benefit/risk discussions of radiation dose to patients on the justification of examinations which requires active supervision and input from expert practitioners.⁹
- 1.3 AI should release radiographers and radiological technologists from non-critical roles to reinforce the focus of our professional role based on the patient, as caregivers with imaging and therapy expertise.¹⁰
- 1.4 AI has the potential to further optimise imaging and radiotherapy workflows, including streamlined appointments

and scheduling, prioritisation of examinations and shortening examination times.^{11,12} It is critical that radiographers and radiological technologists ensure that care is based on the patient, is prioritised and that potential biases within AI are minimised/eliminated, ensuring equitable healthcare for all.^{13–16} Radiographers and radiological technologists are also responsible for themselves and colleagues, ensuring that appropriate outcome measures are used and throughput efficiency is not at the detriment to staff or patient wellbeing and quality of care.

- 1.5 With AI, radiographers and radiological technologists can potentially perform greater dose reduction and optimisation in all modalities involving ionising radiation which is especially important in higher dose examinations such as CT and nuclear medicine.^{17,18} AI may also have a role in automated quality assurance and may offer indications for the repeat of an examination in the event of an equivocal or poor quality image. It is essential that clear protocols are developed to support implementation of new systems, and where possible quality standards are developed jointly by professionals within imaging and radiotherapy services to support consistent implementation of proven technologies to high standards.
- 1.6 AI should maximise the role of the radiographer in improving patient pathways and outcomes through AI supported image interpretation to enable radiographers and radiological technologists to provide immediate results to patients. Immediate results would facilitate triage of patients for additional imaging examinations or signpost to other specialities, for example emergency referrals for traumatic pathology on primary care imaging, CT chest for lung nodules identified on chest radiographs and interpretation/reporting of ultrasound examinations.^{19–23}
- 1.7 Radiographers/radiological technologists working in radiation therapy should take advantage of AI technology in order to improve planning, deliver consistently high quality and personalised planning processes for patients and radiation therapy treatment, including organ(s) at risk identification, tumour segmentation, image matching and dose stratification.

It is essential that radiographers and radiological technologists:

- 1.8 Ensure that all research involving AI systems is conducted in an ethical way, communicating with patients on how their data may be used to develop and test AI.

- 1.9 Are involved in the piloting and research of algorithms prior to clinical implementation.
 - 1.10 Understand how algorithms arrive at decisions and probability errors within these decisions to enable effective communication of findings to patients.
 - 1.11 Maintain and develop core skills and competencies to act as a sense check to AI-supported clinical decisions (for example scan planning in CT, image interpretation triage).
 - 1.12 Ensure that radiography educational programmes are regularly reviewed to support development of the appropriate skills within the profession.
 - 1.13 Demonstrate essential leadership to support, test and deliver safe systems of work and safely implement into practice.
2. Radiographers and Radiologic Technologists Role in Optimising the Use of Artificial Intelligence
- Radiographers and radiological technologists:
- 2.1 Embrace, adopt and adapt technology, ensuring that practice is evidence based and based on the patient.
 - 2.2 Are clinical decision makers, and should use AI as a support tool, an adjunct to, not a replacement for, clinical judgement and professionally accountable decision making.
 - 2.3 Should work with industry and other healthcare professionals to ensure AI solutions are developed to solve current and future medical imaging problems.
 - 2.4 Develop a broad understanding of how algorithms work prior to implementation in clinical practice, to be aware of the limitations of technology. For example, differences between the population where the algorithm was developed and deployed, awareness of possible biases within algorithms and intended scope of algorithm in clinical practice.¹⁶
 - 2.5 Ensure that algorithms are used to improve patient experience as well as working conditions for radiographers, recognising the need for multiple outcome measures when determining departmental effectiveness and an awareness of the role that increased imaging volumes may have on patient experience.²⁴
 - 2.6 Collaborate with the multidisciplinary team, industry and the wider radiographic community that will be involved in designing, developing and validating AI for use in clinical practice.
 - 2.7 Maintain awareness of and lobbying for adaptation to legislation in each country to maximise the benefit of AI to patients and radiographers/radiological technologists.
 - 2.8 Work at national and international levels with policy makers to ensure that investment in AI research focuses across the scope of practice within imaging and radiotherapy services
 - 2.9 Ensure investment in development of the existing and future workforce through funded professional development

Conclusion

It is of critical importance that radiographers and radiological technologists, as medical imaging and radiotherapy experts, must play an active role in the planning, development, implementation, use and validation of AI applications in medical imaging and radiation therapy, reinforcing the need for the technology to be targeted to the most pressing clinical problems. The optimal integration of AI into medical safety, clinical imaging and radiation therapy can only be achieved through appropriate education of the current and future workforce¹⁰ and the active engagement of radiographers and radiologic technologists in AI advancements going forwards.

Acknowledgements

A joint working group was established by the European Federation of Radiographer Societies (EFRS) and the International Society of Radiographers and Radiological Technologists (ISRRT) in May 2019 to explore the impact that artificial intelligence may have on the radiography profession. The working was co-chaired by Dr Nick Woznitza (ERFS) and Hakon Hjemly (ISRRT) with contributions from Prof Marryann Hardy (EFRS), Lars Henriksen (ISRRT), Dr Sundaran Kada (EFRS), Prof Naoki Kodama (ISRRT), Dr John Stowe (EFRS) and Dr Yudthaphon Vichianin (ISRRT), supported by Dr Jonathan McNulty (EFRS President) and Donna Newman (ISRRT President).

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