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Radiographer Education and Learning in Artificial Intelligence (REAL-AI): A survey of radiographers, radiologists, and students' knowledge of and attitude to education on AI

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A B S T R A C T

Introduction: In Autumn 2023, amendments to the Health and Care Professions Councils (HCPC) Standards of Proficiency for Radiographers were introduced requiring clinicians to demonstrate awareness of the principles of AI and deep learning technology, and its application to practice' (HCPC 2023; standard 12.25). With the rapid deployment of AI in departments, staff must be prepared to implement and utilise AI. AI readiness is crucial for adoption, with education as a key factor in overcoming fear and resistance. This survey aimed to assess the current understanding of AI among students and qualified staff in clinical practice.

Methods: A survey targeting radiographers (diagnostic and therapeutic), radiologists and students was conducted to gather demographic data and assess awareness of AI in clinical practice. Hosted online via JISC, the survey included both closed and open-ended questions and was launched in March 2023 at the European Congress of Radiology (ECR).

Results: A total of 136 responses were collected from participants across 25 countries and 5 continents. The majority were diagnostic radiographers 56.6 %, followed by students 27.2 %, dual-qualified 3.7 % and radiologists 2.9 %. Of the respondents, 30.1 % of respondents indicated that their highest level of qualification was a Bachelor's degree, 29.4 % stated that they are currently using AI in their role, whilst 27 % were unsure. Only 10.3 % had received formal AI training.

Conclusion: This study reveals significant gaps in training and understanding of AI among medical imaging staff. These findings will guide further research into AI education for medical imaging professionals.

Implications for practice: This paper lays foundations for future qualitative studies on the provision of AI education for medical imaging professionals, helping to prepare the workforce for the evolving role of AI in medical imaging.

Introduction

As Artificial Intelligence (AI) becomes more commonplace in all sectors, media and academic sources have reported resistance to and fear of the anticipated impact on job security and opportunities.[1–4] This perceived resistance and apprehension has been noted across almost all sectors. Research investigating the phenomenon has highlighted a lack of understanding as a barrier to successful implementation.[1,5–8] The increasing integration of AI into healthcare, particularly in medical imaging, has prompted amendments to the Standards of Proficiency for Radiographers and Radiotherapists by the Health and Care Professions Councils (HCPC).[9] The updated standards require clinicians to demonstrate competence and confidence in utilising AI and related technologies within their roles. These changes reflect the growing necessity for AI readiness, so healthcare staff can effectively implement and leverage AI technologies. It has been reported that the perceptions radiology staff have of AI will influence its adoption.[2] Huisman et al. (2021) noted an inverse correlation between AI knowledge and fear of replacement. If AI readiness is the precursor to successful

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adoption, education then emerges as a pivotal tool in addressing barriers to technological advancement. To understand how imaging staff perceive and adopt AI, this study has been grounded in the Technology Acceptance Model (TAM), which highlights how perceived usefulness and ease of use influence technology adoption. In this context, TAM provided a framework to assess how current levels of understanding of AI influence readiness for adoption and the likelihood of successful implementation. Alongside TAM, Adult Learning Theory (ALT) shaped the design of the educational interventions, emphasising the need for practical, engaging, and relevant learning experiences for adult learners, such as qualified imaging staff. Together, these frameworks guided the development of the study, ensuring that the assessment of AI knowledge and subsequent interventions were both theoretically grounded and responsive to the needs of the target audience.

A 2021 study[6] of diagnostic and therapeutic radiographers noted that staff indicated they had to educate themselves on AI due to a lack of training available, a finding echoed in a 2022 survey of radiology residents in the USA.[10] A 2024 scoping review[11] reinforced this notable lack of validated AI educational offerings tailored for medical imaging professionals. Despite official recommendations[12] and an increasing demand for integrating AI into existing curricula,[13,14] the availability of comprehensive AI education remains limited. The REAL-AI project,[15] funded by a College of Radiographers Industry Partnership Scheme (CoRIPS) grant [229 AI], aims to investigate this through, 1) determining current understanding of AI amongst the medical imaging community; 2) ascertaining current and planned educational offerings from higher education institutes (HEIs); 3) curating, delivering and evaluating educational interventions. This paper presents the findings of a study which addresses the first aim through a survey of clinical staff and students.

Methods

An original survey instrument was co-designed by a team of radiographers with combined experience of 30+ years, healthcare research academics, and human-computer systems professors. A mixed methods approach was employed targeting medical imaging professionals, working clinically or otherwise, including radiography students, academics and industry workers.

The instrument, detailed in Appendix A, had three sections; 1) Demographics; 2) Current AI awareness; and 3) AI Education. It consisted of 17 main questions, mainly check-box style, with some open-ended sub-questions for detailed responses. The survey was hosted online via JISC Online Surveys, and piloted 20 laypersons, medical imaging staff, and students to ensure validity. Minor wording adjustments were made post-pilot. A QR code and a short URL were created for ease pf access, linking directly to the survey's introduction page, which included a participant information sheet (PIS) and an AI definition from the Oxford English Dictionary. The PIS explained the study's voluntary and anonymous nature, data usage the right to withdraw. Participants consented via a screening question; those who declined were directed to a closing page.

Section one gathered demographic data and included a screening question to ensure only imaging professionals or trainees participated. Participants not fitting this criterion were routed to the closing page. Demographic data was later used to explore correlations with dependent variables collected in the survey.

Measuring AI awareness

Participants were first asked about any formal AI training, with affirmative responses leading to a free-text box for details. A series of 15 statements about AI in medical imaging followed, with 12 accurate and 3 inaccurate statements. Participants indicated belief in the accuracy of a statement by checking a box; selecting neither option indicated disbelief. Responses were scored, with one point awarded for each correct identification of accurate statements, yielding a total awareness score (0–12). This score, representing AI awareness, was analysed for correlations with demographic variables.

Education on AI

Section 3 explored participant's opinions on current and future AI education in medical imaging. Questions focused on whether respondents use AI, how they were trained, their understanding of AI decision-making, and what additional support or training they need to work confidently with AI. The section also inquired about role development opportunities with AI to gauge attitudes toward career trajectory changes Finally, some questions on role development opportunities with AI were posed, to gain insight into the attitudes of respondents to potential changes to their career trajectory.

The research questions for this phase of the study were:

1. *What exact knowledge, type of training and mode of delivery imaging staff would like to enhance their AI knowledge?*
2. *What AI education is currently available in European HEIs at both undergraduate and postgraduate level?*

Recruitment and dissemination

The survey was launched online using JISC during the European Congress of Radiology (ECR 2023) via the European Federation of Radiographer Societies (EFRS) Research Hub. ECR, the largest European radiology conference, provided a diverse range of imaging professionals for recruitment. Attendees accessed the survey by scanning a QR code, facilitating easy participation. The online format also enabled widespread sharing through social media by the Congress, attendees and the study team. Snowball sampling was employed, with ECR 2023 serving as the initial dissemination point within the medical imaging community.

Ethical considerations

Participation was voluntary, with informed consent obtained using an embedded PIS and digital consent form. Data were collected and stored anonymously on the JISC platform adhering to General Data Protection Regulation (GDPR) 2018 standards. Anonymity was ensured using the platform's ‘anonymise responses’ feature, which removes identifiable information such as IP addresses. The survey followed the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) guidelines.[16] Ethical approval was granted by [redacted] before the survey launch.

Data analysis

Data were exported directly from the JISC survey platform into SPSS version 29, where checking and cleaning was performed. A range of descriptive and inferential tests were performed, including independent t-tests, one-way ANOVA, and Tukey HSD. This group comparison approach was favoured over correlation analysis methods due to the relatively small sample size of 136.

Results

Demographic breakdown

A total of 136 responses were received from across the globe. 59.6 % *(n = 81)* of responses were from participants residing in the United Kingdom. Participants in the 'Other' category were from Nigeria (*n* = *4*), India (*n* = *3*), Australia (*n* = *2*), Canada (*n* = *2*), Egypt (*n* = *1*) Ghana (*n* = *1*), Iran (*n* = 1), Singapore (*n* = 1), Sri Lanka (*n* = *1*), and the USA (*n* = *1*). Most student participants (27.2 % of whole sample) indicated they were completing their studies in the UK *(n = 27)*, with others studying in Ireland *(n = 5)*, Belgium *(n = 2)*, Nigeria *(n = 2)* and India *(n = 1)*. For a full geographic breakdown, see Table 1. 68 % of respondents were female *(n = 93)*, 29 % male *(n = 39)* and 3 % other *(n = 4)*. 56.6 % *(n = 77)* of the sample were aged 35 years or under. See Fig. 1 for full age breakdown. 56.6 % of the sample were diagnostic radiographers *(n = 77)*, 27.2 % were students on either diagnostic or therapeutic radiography degree courses *(n = 37)*. Therapeutic radiographers accounted for 10 % of the total participants *(n = 13)* and 3.7 % indicated they were dual-qualified *(n = 5)*. Four radiologists responded, accounting for 2.9 % of the cohort.

Table 1
Participants' country of residence.

	Number of respondents (*n*)	Percentage of respondents (%)
United Kingdom	81	59.6
Other	17	12.5
Ireland	14	10.3
Malta	6	4.4
Portugal	5	3.7
Belgium	2	1.5
Hungary	2	1.5
Norway	2	1.5
Cyprus	1	0.7
Denmark	1	0.7
Greece	1	0.7
Italy	1	0.7
Slovenia	1	0.7
Spain	1	0.7
Switzerland	1	0.7

33.8 % *(n = 46)* of respondents had <1 year of experience post-qualification, 30.9 % had 1-11-years' *(n = 42)*, and 35.3 % *(n = 48)* had >11 years in the field (See Fig. 2 for a full breakdown). There was representation from imaging professionals across all major modalities (Table 2).

Formal AI training

10.3 % of respondents *(n = 14)* indicated they had completed some training on AI. Full details are available in Appendix B.

Participants currently working with AI

27.2 % *(n = 37)* of participants stated they were unsure if they were using AI in their current role. 29.4 % *(n = 40)* indicated they were using AI, examples given included for noise reduction in CT, post-processing in nuclear medicine and CAD4COVID software in plain film chest imaging. Only 50 % of those currently using AI *(n = 20)* had received training on its operation, ranging from "*vendor training onsite*", "*Applications training (did not state that it was AI, just how to use it)*" and "*As the MRI lead, I was given brief, limited information regarding the AI during apps training*." Furthermore, 50 % *(n = 20)* of those currently using AI also reported no understanding of how it functions. Some suggested that more support in the form of in-depth or intensive training would be required to allow them to work confidently with the technology. Full details are available in Appendix B.

AI champions

Only 7.4 % *(n = 10)* were aware of an AI champion or equivalent role in their workplace, but many indicated support for such a role, citing it would "*… assist in the introduction of AI and support staff in this role development and support the change process*" and "*… would be useful to understand its (AI) role to allow me to effectively use it in the future*". Conversely, some stated that there is no need for such a role, "*there are far more 'necessary' roles which are required at the moment and AI needs to be considered a low priority as such I can't say we need such a role right now*" and that "*I don't think so, AI cannot replace the work of humans*". 41.9 % *(n = 57)* indicated that the role of an AI champion would be of interest in their future career.

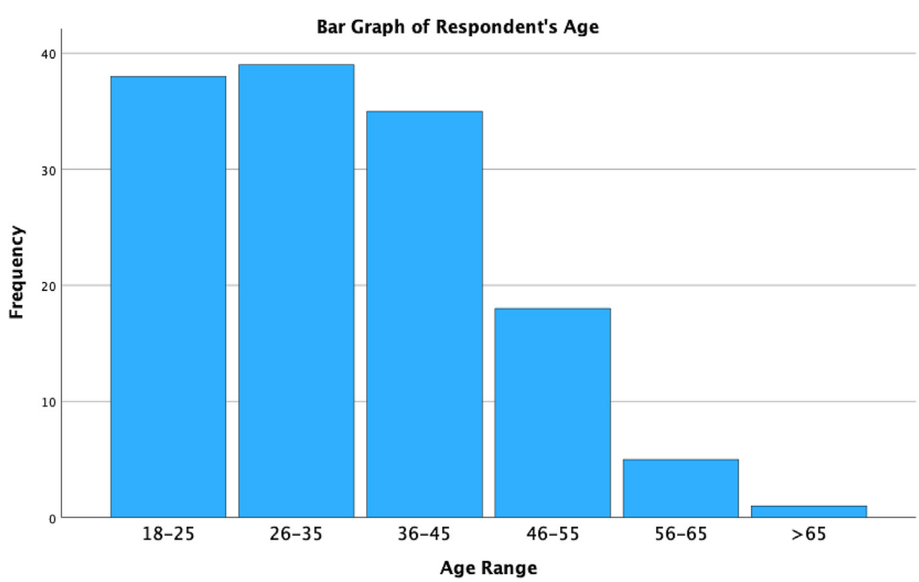

Figure 1. Age range of respondents.

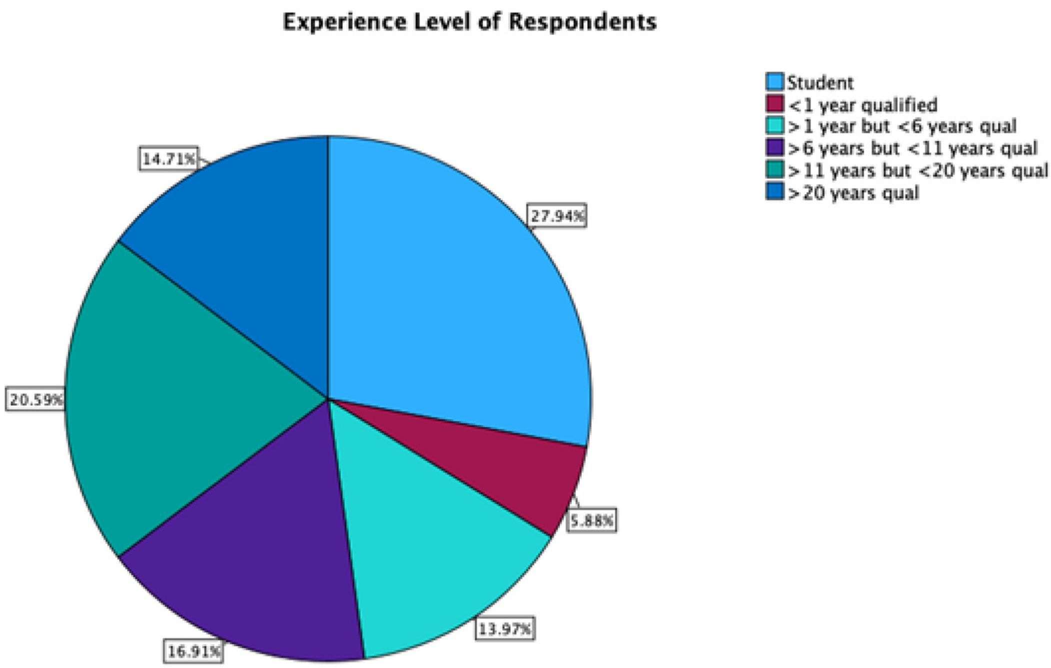

Figure 2. Experience level of respondents.

Table 2
Current role of respondents.

Current Role	Number of respondents (*n*)	Percentage of respondents (%)
General radiography	57	18.4
CT	31	10
MRI	29	9.4
Student	28	9
Research	26	8.4
Radiotherapy & oncology	19	6.1
Clinical educator	16	5.2
Mammography	14	4.5
Academic	14	4.5
Management	13	4.2
Quality assurance/improvement	12	3.9
Professional body	9	2.9
Ultrasound	8	2.6
Reporting	8	2.6
Nuclear medicine	8	2.6
Interventional radiography	7	2.3
Other	5	1.6
DEXA/DXA	4	1.3
Industry partner	2	0.6

Current AI awareness

Table 3 outlines the statements provided to participants. Those with an asterisk (*) are statements which are incorrect.

Level of knowledge required & preferred method of delivery

50.7 % of respondents *($n = 69$)* believed AI education should be delivered at undergraduate level. 11 % *($n = 15$)* were unsure. Table 4 shows a breakdown of participants opinions on the most appropriate method of delivery of AI education for undergraduate level. 76.8 % *($n = 53$)* favoured a mix of theory and practical learning, whilst the least popular was purely theoretical learning at 7.2 % *($n = 5$)*. Participants indicated a preference for online delivery of short courses and CPD for postgraduate education (Table 5).

Desired topics

Practical applications of AI, AI terminology and key concepts were the topics rated most desirable. Computer science & programming was the only selection with less than 50 % support from participants. One respondent selected the option that they fully trust the AI and feel they do not need any training to work alongside it. The responses are further detailed in Table 6.

AI superusers

72.8 % of respondents *($n = 99$)* indicated support 'AI Superusers' (see Table 7). In analysing the free-text responses to this question (see Appendix B), a notable proportion of respondents expressed potential positive outcomes that could stem from such a role, including enhanced efficiency and service level improvements to benefit staff and patients. There was also some uncertainty regarding the possibility of such roles and a lack of understanding of AI. One respondent stated they were *"unsure as I'm unsure what constitutes AI in day to day practice"*. Amongst the responses that were unsupportive of the introduction of superuser roles, there were suggestions that it could be something of benefit in the future.

Comparison of mean AI awareness in different groups

Gender and mean AI awareness. When examining gender differences in AI awareness scores, the mean score in male participants ($M = 8.92$, $SD = 2.47$) was statistically significantly higher than that of female participants ($M = 7.95$, SD 2.95), $t(123) = 1.747$, $p = 0.042$.

Age and mean AI awareness. Mean scores by age were calculated then analysed using a one-way ANOVA (see Table 7). No statistically significant differences were noted ($p > 0.05$).

Table 3
Statements on AI in clinical imaging and representative figures.

Q10 Statements on AI	% of Respondents who provided a correctanswer	% Unsure
The AED in standard x-ray equipment is a form of AI. *	22.1	48.5
X-ray equipment with an auto-positioning function to move the tube and/or detector is powered by AI. *	21.4	38.2
AI algorithms can 'triage' a large volume of imaging examinations and prioritise those which need to be attended to more urgently.	75	24.3
AI can reduce CT and MRI scan times in a number of ways, one of which is by reconstructing data from shorter scans whilst maintaining diagnostic accuracy.	77.9	19.9
AI is being used to predict the likelihood of developing certain illnesses in later life.	71.3	26.5
AI algorithms can predict optimal positioning to spare organs at risk during certain radiotherapy treatments.	67.6	30.1
Referral vetting and protocol selection are tasks AI can complete.	45.6	48.5
AI can detect fractures on images of the appendicular skeleton.	72.8	26.5
AI can be used to organise patient lists and clinician's schedules.	69.9	28.
Quantitative data can be extracted from medical images to predict treatment toxicity and patient outcomes.	58.1	36.8
Automated breathing instructions given to patients during CT/MRI scans are a function of AI. *	16.9	48.5
Algorithms have been developed to detect a range of pathologies, including tuberculosis and Covid-19, on chest x-rays.	75	22.8
Quality assurance processes in radiotherapy can be managed by AI.	49.3	46.3
The need for implanted fiducials in prostate cancer patients has been reduced by developments in AI localisation.	32.4	61.8
Algorithms can perform multi-modal image registration using geometric, statistical and physical properties to precisely match features of a patient's various scans.	70.6	27.9

Table 4
Respondent's preferred methods of delivery for undergraduate AI education.

Method of Delivery	Number of respondents (n)	% of respondents[a]
Mix of theory & practical learning	53	76.8
Aspects of AI incorporated throughout existing modules	48	69.6
Clinical demonstrations	44	63.8
Standalone AI module	31	44.9
Online webinars	29	42
Standalone module with reference to existing topics	14	20.3
All practical i.e. developing and testing an algorithm	13	18.8
Asynchronous learning materials	12	17.4
Optional classes	11	15.9
Purely theoretical i.e. lectures/seminars	5	7.2
Other	2	2.9

[a] Multiple selections were permitted.

Table 5
Preferred methods of delivery for postgraduate AI education.

Method of Delivery	Number of respondents (n)	% of respondents[a]
Online short courses/CPD	26	50
In-person short courses CPD	21	40.4
Diploma	10	19.2
Master's level	12	23.1
Aspects incorporated throughout existing PG offerings	19	36.5
Clinical demonstrations	23	44.2

[a] Multiple selections were permitted.

Table 6
Preferred topics and areas for AI education.

Topics & Areas	Number of respondents (n)	Percentage of respondents (%)
Practical applications of AI	117	86
AI terminology	113	83.1
Key concepts	111	81.6
Ethics of AI	100	73.5
Making AI work for you	99	72.8
QA for AI	93	68.4
Patient-centredness & AI	92	67.6
Role development & AI	88	64.7
Future applications of AI	86	63.2
Evaluating the performance of AI	80	58.8
Explainable AI	78	57.4
AI standards	78	57.4
AI development	73	53.7
Computer science & programming	47	34.6
Other	2	1.5
None, I trust the AI to work alongside me clinically if it has been regulated & approved. I don't need any further training in it.	1	0.7

Level of experience and mean AI awareness. Differences were also noted in mean scores grouped by level of experience (see Table 8). With students combined into one group for simplicity, a one-way ANOVA was used to investigate the significance of the differences found. The test demonstrated statistical significance in mean scores between participants of different levels of experience ($F = 2.335$, $p = 0.046$). Post-Hoc Tukey HSD tests were then conducted to assess individual difference between groups, but the test was unable to identify which specific pairwise comparisons are driving the significant effect identified using the one-way ANOVA.

Main role and mean AI awareness. Mean scores for each professional role were calculated. A one-way ANOVA identified significant statistical differences between these groupings ($F = 5.267$, $p = <0.001$). Post-hoc Tukey HSD testing was then performed to assess the significance of pairwise comparisons behind the overall statistical significance. The groups 'students' and 'qualified diagnostic radiographer' were statistically significantly different (mean difference $= -1.98$, $p = 0.007$, 95 % CI [0.38, 3.57]. See Table 9 (see Table 10).

Completed AI training and mean AI awareness. Mean AI awareness scores were calculated for both groups (see Table 10) (Yes: $M = 10.3$, $SD = 0.99$/No: $M = 7.9$, $SD = 2.96$). Differences were noted and an independent t-test identified statistical significance $t\ (3) = 126$, $p = 0.001$.

No statistically significant differences were identified between mean AI awareness scores and country of residence, current clinical AI use, and those with an AI champion in their workplace.

Discussion

The findings from this study provide valuable insights into the current awareness and perceptions of AI among medical

Table 7
Age range and mean AI awareness scores.

Age range	Mean AI awareness score	Number of respondents (n)	Percentage of respondents (%)	SD
18–25	7.44	36	26.5	3.21
26–35	8.25	36	26.7	2.93
36–45	8.19	32	23.5	2.86
46–55	8.72	18	13.2	2.37
56–65	9	5	6.6	2.24
>65	12	1	0.7	–

Table 8
Mean score by level of experience.

Level of experience	Mean AI awareness score	Number of respondents (*n*)	Percentage of respondents (%)	SD
Student	6.7	33	24.3	2.95
<1 year qualified	9.4	8	5.9	2.45
>1 year but <6 years qualified	8.6	17	12.5	2.92
>6 years but <11 years qualified	8.6	22	16.2	2.79
>11 years but <20 years qualified	8.4	28	20.6	2.99
>20 years qualified	8.7	20	14.7	2.49

Table 9
Mean AI awareness scores and professional role.

Professional role	Mean AI awareness score	Number of respondents (*n*)	Percentage of respondents (%)	SD
Diagnostic radiographer	8.8	75	55.2	2.59
Therapeutic radiographer	6.5	13	9.6	3.36
Dual-qualified (diagnostic & therapeutic)	10.3	4	2.9	1.26
Student (diagnostic or therapeutic radiography)	6.8	32	23.5	2.98
Radiologist	10.3	4	2.9	1.26

Table 10
Mean AI awareness scores and status of formal training on AI.

Completed any formal training or qualifications on AI?	Mean AI awareness score	Number of respondents (*n*)	Percentage of respondents (%)	SD
Yes	10.3	14	10.3	0.99
No	7.9	114	83.8	2.96

imaging professionals across various regions and demographics. Several key themes which warrant discussion emerge from the data.

Awareness and use of AI

To attempt to measure the concept of AI awareness is difficult, as there is no generally accepted definition or measurement standard.[17] Certainty is a factor cited as a key component in seminal publications on the topic[18] thus the use of a scaled response option is generally deemed to be sufficient. Recent published research has implemented this approach using Likert scale responses to questions. However, a few issues caused the study team to take a different approach in this instance. First is the potential for central tendency bias, whereby some respondents will display a propensity for avoiding extreme response options and instead cluster their responses in the middle categories.[19] Another potential flaw in Likert scale responses is that the resultant data is ordinal, with options ranked but with intervals between which cannot be presumed equal and therefore can violate statistical assumptions if used to calculate means and correlations.[20] Finally, the subjectivity of the anchors or wording of the scale options can cause issue with interpretability and generalisation of data.[21]

The data indicate a moderate level of awareness and usage of AI among medical imaging professionals, with 29.4 % *(n = 40)* of respondents currently using AI in their roles. This suggests a growing integration of AI technologies within medical imaging practice. However, only 10.3 % *(n = 14)* had completed formal AI training, highlighting a significant gap in education and training, which could impede the effective and confident use of AI technologies. This speaks to a lack of training readily available to imaging staff.[11] The need for enhanced training is further underscored by the finding that half of the AI users do not fully understand how the technology functions. This lack of understanding has significant implications for clinical practice and patient care. Firstly, inadequate comprehension of AI systems may lead to misinterpretation of AI-generated results or overreliance on AI outputs without critical evaluation. This could potentially result in diagnostic errors or inappropriate treatment decisions, compromising patient safety and outcomes. Secondly, limited understanding of AI technology may hinder medical professionals' ability to identify and report potential biases or errors in AI algorithms. As per The Topol Review,[12] clinicians need to be aware of the limitations and potential biases inherent in AI systems to ensure their appropriate and ethical use. Without this knowledge, there is a risk of perpetuating or exacerbating existing healthcare disparities. Furthermore, a lack of understanding may impede effective communication with patients about the role do AI in their diagnosis or treatment. As healthcare becomes increasingly technology-driven, patients may have questions or concerns about the use of AI in their care. Medical imaging professionals need to be equipped with sufficient knowledge to address these concerns and maintain patient trust. These findings uphold the critical need for comprehensive AI training programmes in medical imaging. Such programs should not only focus on the technical aspects of AI but also on its ethical implications, limitations, and potential biases. As suggested by the Society of Radiographers (SoR) AI working group,[22] integrating AI education into existing medical imaging curricula and providing ongoing professional development opportunities could help bridge this knowledge gap and ensure the responsible and effective use of AI in clinical practice.

A significant percentage of participants incorrectly identified the three inaccurate statements in the awareness section as correct. While these elements were excluded from the calculation of awareness scores, this finding further highlights the need for AI education among imaging staff. The inaccurate statements referred to typical imaging equipment that does not utilise AI; however, 29.4 % ($n = 40$) of respondents failed to identify that the following statements were inaccurate: '*the AED in standard x-ray equipment is a form of AI*', 40.4 % ($n = 55$) thought '*x-ray equipment with an auto-positioning function to move the tube and/or detector is powered by AI*', and 34.6 % ($n = 47$) believed that '*automated breathing instructions given to patients during CT/MRI scans are a function of AI*'. These misconceptions underscore a fundamental gap in understanding what AI truly is and how it differs from other forms of automation or computerisation in medical imaging. This lack of clarity can have significant implications for clinical practice and the effective integration of AI technologies in healthcare settings.[23] Misidentifying standard automated functions as AI may lead to overestimation of AI's current capabilities and presence in imaging departments. This could result in unrealistic expectations of AI's role in diagnosis and decision-making processes.[22] Conversely, it may also lead to underestimation of the potential impact of true AI systems when they are implemented, potentially hindering their adoption or effective use. Furthermore, the inability to distinguish between AI and non-AI-technologies may impede medical imaging professionals' capacity to critically evaluate new AI tools and systems. Healthcare professionals need to understand the basics of AI to effectively assess its strengths, limitations, and potential biases.[12] Without this foundational knowledge, they may struggle to make informed decisions about incorporating AI into their practice or to provide meaningful input on AI implementation in their departments.

A lack of understanding about what constitutes AI could affect communication with patients and other healthcare professionals. Accurate information about the use of AI in patient care is crucial for informed consent and shared decision-making processes.[24] Misinterpreting standard automated functions as AI could lead to misinformation and potentially erode patient trust.

Perceptions of AI superusers and champions

The support for the introduction of AI superusers, with 72.8 % ($n = 99$) of respondents in favour, suggests that professionals recognise the potential benefits of having dedicated roles to manage and support AI integration. This aligns with the free-text responses, which highlighted anticipated improvements in efficiency and service levels. However, the sentiments of uncertainty and the lack of understanding about what such roles would entail point to the need for clearer definitions and expectations of these positions. Considerations for such roles by governing bodies in healthcare have been alluded to in key publications,[12,22] evidently these additions to the workforce could be timely and of benefit to the ongoing implementation of AI technologies.

Education and training preferences

The strong preference for AI education to be delivered at the undergraduate level (50.7 %, $n = 69$) and the favoured mixed-method approach combining theory and practical learning (76.8 %, $n = 53$) reflect a desire for comprehensive and integrated educational experiences. This preference suggests that foundational AI knowledge should be embedded early in professional training programmes, ensuring that future professionals are better prepared to engage with AI technologies from the outset of their careers. Further research exploring the provision of AI education in Higher Education Institutes (HEIs) is an ongoing element of this study. With the HCPC updated Standards of Proficiency and SoR AI recommendations[9,22] it is expected that curricula will be updated to reflect the necessity for staff to be capable of working competently alongside AI.

Differences in AI awareness

Statistical analyses revealed significant differences in AI awareness based on gender, level of experience, and main professional role. Male participants had higher mean AI awareness scores than female participants, which could suggest potential gender disparities in access to or engagement with AI training and resources. Similarly, the significant differences in AI awareness based on professional role and experience indicate that targeted educational initiatives might be needed to address these gaps. For example, students and less-experiences professionals may benefit from introductory AI training, while more experienced professionals might need advanced, application specific training. Disparities in AI awareness and gender are well documented,[25,26] however more research is warranted to understand the factors at play and to ensure equity in AI training opportunities. While the post-hoc Tukey HSD test did not identify significant pairwise comparisons, we note that the mean scores suggest trends that may explain the significant overall effect observed in the ANOVA ($p = 0.046$). For instance, the student group ($M = 6.73$) and <1 year qualified group ($M = 9.38$). This indicates that although the pairwise differences were not statistically significant after correction, meaningful differences in the mean scores may still contribute to the overall significant effect.

Whilst not a surprising finding, the significant difference in AI awareness between those who had completed AI training and those who had not ($p = 0.001$), reinforces the importance of formal AI training programmes within professional development curricula.

Implications for practice and policy

The findings of this study have several implications for practice and policy. Firstly, there is a clear need for more structured and widespread AI training programmes tailored to the needs of medical imaging professionals. Institutions and professional bodies should consider developing standardised AI training curricula that can be integrated into both undergraduate and postgraduate education.

Secondly, the support for AI superusers and champions indicates that healthcare organisations should consider establishing these roles to facilitate AI integration and provide ongoing support to staff. Clear role definitions, career pathways, and support structures will be essential to the success of these initiatives.

Finally, addressing the identified disparities in AI awareness, particularly across gender and experience levels, will require targeted interventions to ensure equitable access to AI education and resources. This could include mentorship programmes, targeted workshops, and online courses designed to bridge these gaps.

Limitations

The authors acknowledge that the sample size ($n = 136$) is relatively small however it provides a snapshot of perceptions across different countries. Several methods were employed to maximise participation in the survey, including a short promotional article in the Society of Radiographers member magazine Synergy, promotion on multiple social media platforms, and at two of the most notable imaging conferences in Europe, namely the United Kingdom Imaging and Oncology conference (UKIO) and ECR. Response bias could have been a limitation in this study, depending on whether those with favourable opinions on AI or those who view it more negatively responded. The aim was to gather a general view from a range of staff and the authors hope that the qualitative element of this study provides more nuanced findings. The categorical nature of demographic variables limited the types of analyses that could be performed. Future studies might benefit from collecting continuous data for variables such as age and years of experience to allow for correlation analyses.

This study was conducted before the changes to the HCPC Standards of Proficiency in Autumn 2023. This is a rapidly changing area, and it may be that as the impetus to adhere to the amended standards would have changed the results of this study. As it is, it serves as a snapshot of the workforce at that time.

Summary of findings

- Gender Differences: Male participants had statistically higher AI awareness scores than females.
- Experience and Role: Significant effects on AI awareness were found when grouping by experience level and professional role.
- Impact of Formal Training: Those with formal AI training had significantly higher AI awareness.
  Non-Significant Factors: No significant differences in AI awareness were noted between age groups, country of residence, current AI use, or presence of AI champion in the workplace.
- AI Usage: <30 % of those surveyed are currently using AI in their clinical role.
- Training Gap: Only 10 % of respondents had completed formal AI training.
- Understanding of AI: <50 % of those currently working with AI claim to understand how it functions.
- Misconceptions: A significant number of respondents incorrectly attributed AI functionality to typical automated imaging equipment.
- Support for AI Roles: There is a high level of support in the community for specialised AI roles.
- Educational Preferences: A preference for AI education to be introduced at undergraduate level, with a combination of theory & practical learning.

Conclusion

This study highlights both the opportunities and challenges associated with the integration of AI in medical imaging. While there is growing recognition of the potential benefits of AI, significant gaps in training and understanding remain. Addressing these gaps through targeted education, the establishment of AI-specific roles, and policies to ensure equitable access to AI resources will be crucial in realising the full potential of AI in medical imaging. Future research should continue to monitor these trends and evaluate the effectiveness of interventions aimed at enhancing AI literacy and integration in healthcare settings.

Conflict of interest statement

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.radi.2024.10.010.

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