

## A national survey of radiographer and assistant practitioner's experiences of incidents, investigation processes and safety culture



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### ABSTRACT

**Introduction:** To date, no surveys have been conducted to engage with UK radiographers and assistant practitioners (AP) to explore their experience of safety culture within Radiology departments in the UK. The aim of the project is to assess qualified radiographer's and AP's perceptions and experiences of safety culture in clinical practice.

**Methods:** Online survey consisting of 26 questions was conducted with diagnostic radiographers and APs working in radiology departments within the UK over an 8-week period. The survey was distributed through social media platforms facebook, Linked In and Twitter (now called X). Thematic analysis was conducted using an iterative process.

**Results:** Thematic Analysis revealed 3 key themes of type of incidents, contributing factors and impact of incident and 8 subthemes. There was no statistically significant correlation between job role and incident involvement. There was a moderate negative correlation between years of experience and incident involvement that was statistically significant. Responses emphasizes the requirement for better management of incidents and the effective dissemination of lessons learner in an accessible manner.

**Conclusion:** Radiographers are competent and confident with reporting incidents but there are inconsistencies in effective dissemination of feedback. Suggestions to improve safety culture include involving radiographers within investigation processes and ensuring radiographers are involved in re-writing policies/systems of work.

**Implications for practice:** The key areas for improvement include feedback following incidents, dissemination of learning and strategies to positively impact safety culture to a more honest and open culture.

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### Introduction

Research has shown that around 45 million diagnostic tests within Radiology are undertaken safely and effectively in the United Kingdom each year.<sup>1</sup> Out of these, most tests and treatments are delivered safely and without harm although errors and near misses are uncommon in diagnostic imaging, radiotherapy and nuclear medicine. These incidents range in nature and are inclusive of but not limited to patient identification errors,

unintended exposure to ionising radiation, administrative and procedural errors, and human factors.<sup>2,3</sup> In some instances, these incidents have the potential to cause harm and inhibit the reasonable expectation for patients to receive healthcare service intended for them, which is safe, effective and protected from avoidable harm. As such there is a professional expectation that all incidents are investigated at local level and reported appropriately.<sup>4</sup>

In England (United Kingdom), 652,246 incidents were reported to the National Reporting and Learning System (NRLS) from April–June 2022; a predominantly voluntary service with less than 4 % reported as causing higher degrees of harm.<sup>5</sup> 72 % of incidents were from the acute care setting although the categorisation is broad to account for multiple care environments and multiple

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health care professions. Incidents within radiography are reported to the Care Quality Commission (CQC) if they reach the relative pre-determined thresholds. The most recent CQC/IR(ME)R report (2022/2023)<sup>6</sup> indicated 727 notifications. Of these notifications, 52 % ( $n = 380$ ) were from diagnostic radiography of which a quarter were attributable to patient identification errors. Of these, computed tomography (CT) received 62 % of notifications and due to inherent higher radiation doses in this modality, respective incidents are more likely to meet reporting threshold. Although magnetic resonance Imaging (MRI) and ultrasound (US) incidents do not involve ionising radiation, the Medicines and Healthcare Products Regulatory Agency (MHRA) stipulates that reportable incidents must be inclusive of; device failure (adverse incident) which may result in, direct harm to the patient or users, defective medicines and side effect with a medicine (adverse drug reaction). Regardless of this guidance, reporting of incidents nationally by health workers is voluntary and this might reflect the under-reporting of incidents in the UK, which correlates to published findings in other countries. As such the true number and extent of MRI/US related incidents is not clear with some quarters contending projectile effect and patient burns (due to Radiofrequency pulse) are responsible for majority of MRI safety incidents.<sup>7</sup>

The evidence base on patient safety is clear that a “systems approach” rather than a “person approach” is required to analyse incidents since all protocols and systems of work are “flawed” according to the Swiss Cheese model.<sup>8</sup> The model advocates for continual review and adaptation to foster patient safety in healthcare. Additionally, the National Health Service (NHS) patient safety strategy (2019)<sup>9</sup> also asserts that leaders are responsible for building and fostering an open culture which ensures that staff feel safe to report incidents and near misses and that learning is disseminated effectively across teams. More recently, under the NHS Standard Contract, the patient safety incident reporting framework (PSIRF) is a prescribed requirement for services provided.<sup>9</sup> However, the framework’s supporting guidance outlines the limitations of root cause analysis (RCA) as an investigation strategy, due to its linear nature and satisfaction which inherently identifies only root causes instead of identifying all contributory factors. Instead, the Systems Engineering Initiative for Patient Safety (SEIPS), a systems-based framework, is recommended which encourages all incidents to be analysed. It is premised that SEIPS’ ensures a thorough consideration of all aspects that may need review or amendment to prevent the incident from reoccurring. Although across healthcare profession, the importance of a ‘no blame’ culture to foster a safer workplace and higher quality care for patients is well documented; research suggests in Radiography, it may not be well established or invariably applied<sup>10,11</sup> To date, no study of this nature have been conducted to engage with UK radiographers and assistant practitioners (AP) to explore their experience of safety culture within Radiology departments in the UK. The aim of the project is to assess qualified radiographer’s and AP’s perceptions and experiences of safety culture in clinical practice.

## Methods

Ethical approval was granted by the University of Bradford Humanities, social and health sciences Research Ethics panel committee (EC reference: EC27084, approved 18/08/2022) for a multiphase project with parallel national online surveys for qualified radiographer and APs, and student radiographers and trainee APs to collect information on experiences of incidents, the investigation processes and dissemination of learning across organisations. Respondents were also asked to participate in interviews which will be informed by the survey results. The overall

aim of the multiphase project is to enhance understanding of safety culture within radiography and suggest strategies for improving education within this area. This manuscript only presents the results from the survey for registered radiographers and APs.

## Survey

An online survey was conducted with diagnostic radiographers and APs working in radiology departments within the UK. The survey was developed by a team of academic and clinical radiographers based in the North of England and performed through JISC Online Surveys (Bristol, UK). The questionnaire consisted of 26 questions with a mix of close-ended response and free text to explore demographic information, experience of incidents and investigation, education around safety culture and experience/feelings of overall safety culture. A pilot survey was launched with 6 clinical and academic radiographers to ensure validity and robustness of the survey questions. Amendments were made following feedback to ensure clarity of wording and remove extreme/neutral bias and double-barrelled questions.

Additionally, radiographers and APs were provided opportunity to add any additional comments and provide their email if they chose to volunteer in the second interview phase of the study. A summary table of the types of questions within the survey is provided as appendix 1. Non-probability sampling was used through convenience sampling and voluntary sampling but also snowball sampling occurred as individuals shared the survey after completion.

Informed consent was obtained from participants and a statement on Page 1 of the questionnaire outlined that completion of the questionnaire implied consent to participation and publication of findings. Project lead details were also provided if respondents wished to withdraw.

The online survey was open from 21st October 2022 to 16th December 2022 and was advertised through social media platforms Facebook, Twitter and Linked In. Reminders to complete the survey were also updated on social media platforms. Survey results were exported into Microsoft Excel (Microsoft corporation, USA) for analysis.

## Inclusion/exclusion criteria

All radiographer roles were permitted to complete the survey providing respondents were fully qualified radiographers or APs. These included academic, clinical and management roles.

## Quantitative analysis

For statistical analysis, a chi square test was used to assess for any correlation between incident involvement and job role and a point-biserial correlation test to analyse if years of experience influenced the likelihood of incident involvement.

## Qualitative analysis

Analysis of open text answers was conducted using an iterative, inductive process that followed Braun and Clarke’s (2006)<sup>12</sup> 6-phase framework of thematic analysis. Three researchers (XX, XX and XX) independently read, interpreted and organised all data, deducing codes into themes. The advantage of this method is the interpretivist approach to focus upon people’s perspectives and experiences and ensuring reflexivity whilst undertaking the analysis. Another researcher (XX), who had not undertaken the analysis, acted as a moderator to guide reflection of the team’s

coding process, and facilitate discussion and agreement of themes and subthemes.

**Results**

*Quantitative results*

*Demographic data*

A total of 133 responses were received within the 8 week timeline and 131 responses were analysed following a review for eligibility, with most based in England (90.83 %), particularly Yorkshire and the Humber (25.95 %), South West (17.56 %), and North West (15.27 %). Respondents by region are presented in Fig. 1.

*Job role.* Senior Radiographers comprised the largest job role group ( $n = 49$ ), followed by Radiographers ( $n = 24$ ), Team Leaders ( $n = 19$ ), Advanced practitioners ( $n = 18$ ), Assistant Practitioner ( $n = 2$ ) and other job roles ( $n = 19$ ). Distribution by job role is presented in Fig. 2.

*Incidents.* The type of incident varied, as demonstrated in Fig. 3 which outlines the number of incidents within each category. Incident involvement was reported by 76.5 % of respondents, with radiation incidents involving patients being the most common (41.58 %), followed by patient safety incidents (23.76 %) and near misses (9.90 %). A Chi-square test of independence revealed no significant association ( $\chi^2 = 0.592, p = 0.988$ ) between job role and incident involvement, and logistic regression confirmed that job role did not significantly predict incident involvement (pseudo  $R^2 = 0.007$ , all  $p > 0.91$ ). These findings indicate that, within this sample, incident involvement was relatively evenly distributed across roles.

There was a moderate negative correlation between years of experience and incident involvement which was statistically significant. A Point-Biserial correlation test demonstrated a statistically significant  $p$ -value of  $<0.01$  with  $r \sim -0.42$ . This suggests experience may reduce likelihood of involvement in incidents but not eliminate it.

*Incident reporting, investigation and learning*

Most respondents 91 % ( $n = 92$ ) reported incidents using the organisations' online systems. Of the 101 reported incidents, almost half, 47.52 % ( $n = 48$ ) were investigated formally, and only

37.5 % ( $n = 18$ ) of those involved attended the investigation meeting. Just 70.8 % ( $n = 34$ ) were informed of the investigation outcome.

Of the investigated incidents, only 77 % ( $n = 37$ ) of respondents shared and disseminated learning from investigations to the wider teams via email/staff bulletins (35.4 %), staff meetings (29.2 %), and a smaller proportion reported other methods (12.5 %).

When asked whether additional actions could have prevented the incident from recurring, most respondents (82.1 %) said no, while 17.9 % suggested improvements.

*Familiarity with safety culture concepts*

115 radiographers and AP's (86.5 %) were familiar with the concept of human factors, while awareness of other safety culture concepts was lower: 'open culture' (53.4 %), Swiss Cheese Model (SCM) and systems approach (both 40.6 %), and causative factors (33.8 %). Only 12 % had ever heard of the term 'second victim'. Additionally, just 29.3 % reported being taught these concepts during undergraduate studies, indicating a significant educational gap.

*Qualitative results*

Thematic analysis of free-text responses conducted using Braun and Clarke's six-phase framework revealed 3 key themes and 8 subthemes (see Table 1), identified. These themes were interpreted in relation to the survey findings, providing deeper insight into participants' perspectives and complementing the quantitative results. A Visual representation of the themes and subthemes is shown in Fig. 4.

*Theme 1*

Respondents frequently outlined ID incidents as a subtheme which emphasises the complexity around the ID process and the different factors that can result in misidentification, including patient paternalism.

The subtheme of justification linked to systems checks not being performed or complexity within them resulting in examinations being performed at the wrong time:-

*"Patient had a scan too early, was missed at vetting and scanning stages." REF101347497 (Senior radiographer with 11-15 years' experience, works in CT)*

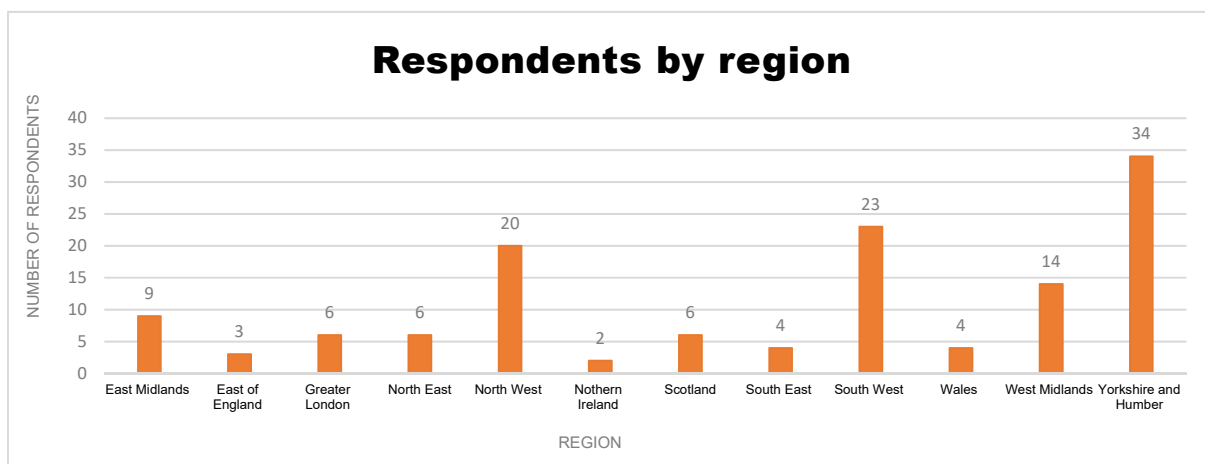


Figure 1. Respondents by region.

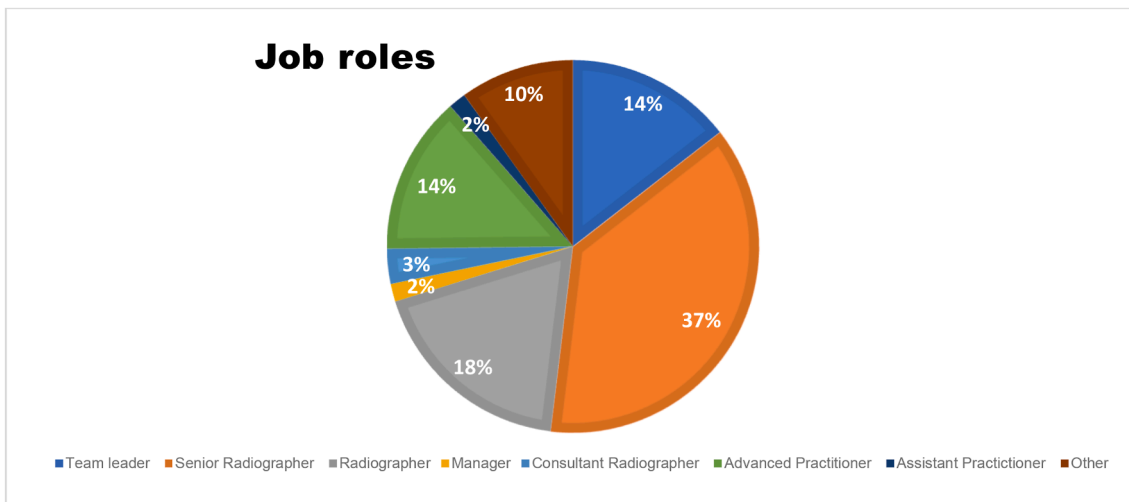


Figure 2. Respondents job roles.

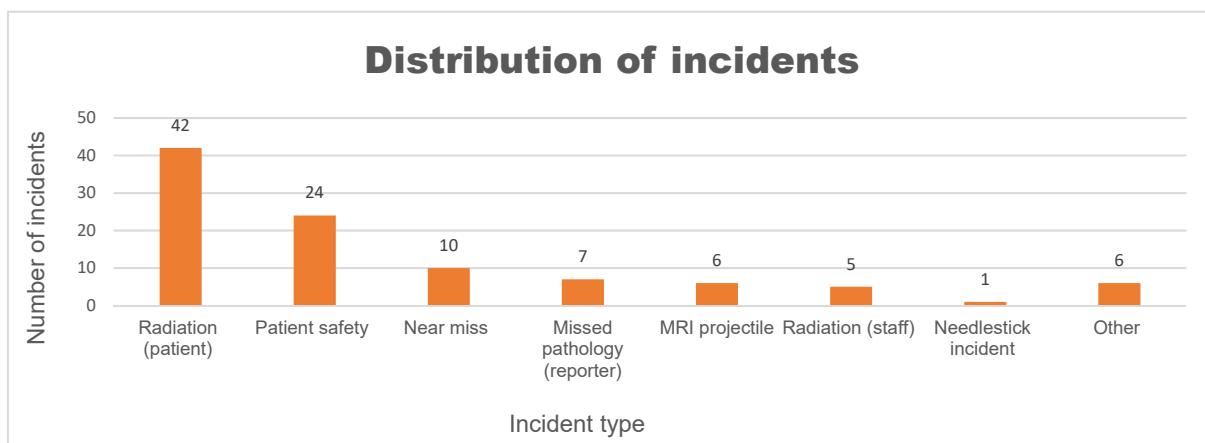


Figure 3. Distribution of incidents.

Although only 6 incidents were classed as MRI projectile incidents, MRI safety was a subtheme, and due to other types of incidents that can occur within this modality, including Radio-frequency burns and screening issues.

**Theme 2**

There were many contributing factors outlined within responses that led to incidents occurring, categorised into sub-themes of resource factors, patient factors, human factors and poor safety culture. Resource factors were evidenced through examples of technology that was not working correctly -either from ineffective set up or faults.

Insights from respondents outlined workarounds that were created but were not always successful.

Patient factors contributed in different ways – from deteriorating health to challenging patient situations that brought complexity. Contributory human factors were often represented as stress, tiredness, and trying to adapt normal practice when in challenging or stressful situations.

*“.. had a paediatric patient for an emergency examination. Had them positioned held by a comforter and carer, patient distressed rapidly moved to press button before they moved as comforter*

*and carer of little use and failed to select correct detector so exposure happened and the equipment permitted exposure of patient without an active receptor in place.” REF101038752 (radiographer, less than 1 years' experience, conventional radiography)*

Respondents outlined detailed recollections of the many factors that were influential in each incident.

The quantitative data suggests a good safety culture in terms of high proportion of reporting, however insight from the qualitative data highlights improvements can be made in investigation and feedback stages. The poor safety culture subtheme ranged from poor safety practices to language which was indicative of a blame culture.

**Theme 3**

A key insight was the impact of the incident such as poor patient outcomes, missed diagnoses, delayed treatment and deteriorating patients:-

Although no individual referred to the impact on themselves, some of the experiences outlined were serious in nature and could have emotionally affected individuals. The quantitative data

**Table 1**  
Themes, subthemes and examples of codes that informed themes.

Number of theme	Theme	Subtheme	Key quotations	Suggestion for further action
1	Type of incident	Identification	"Pt was ID [identified] correctly as wrong patient ID information on request with another patient's clinical information. Patient did not challenge or question examination when discussed immediately prior to scan as patient believed Dr had decided examination was necessary." REF101041571 ( <b>Senior radiographer, 20 years' experience, CT</b> )	Usually, vetting is completed in spare moments between scanning patients or on night shifts. Ideally a Radiographer should be able to step away from dept to a quiet room in order to complete vetting. This would help with concentration and potentially reduce errors ( <b>REF 101039553 senior radiographer, 6–10 yrs experience, CT</b> ) Hand wand detector. (MRI) ( <b>REF 101470412 (quality and patient safety manager – 16–20 years experience, MRI)</b> )
		Examination	"Clinical history not checked, x-ray wasn't required." REF 101037272 ( <b>Senior radiographer, between 1-5 years' experience, conventional x-ray</b> )	
		MRI safety	"Pt had been screened asked if anything in pocket which he denied. On being positioned, lighter flew out of pocket, narrowly missing staff & pt." REF101181026 ( <b>Team leader, 11–15 years' experience, works in MRI</b> )	
		Justification	"Patient had a scan too early, was missed at vetting and scanning stages." REF101347497 ( <b>Senior radiographer with 11-15 years' experience, works in CT</b> )	
2	Contributing factors	Contributing resource factors	"Pre programmed exposure was wrong on the machine. I changed it for the first exposure of a difficult child, forgot for the second exposure." REF 101333731 ( <b>senior radiographer, 11–15 years' experience, conventional radiography</b> )	Better staffing levels, staff empowered to say no when patients turn up late for appointment so pressure reduced to scan at arrival when working out of hours. ( <b>REF 102562337 – advanced practitioner, over 20 years exp, cross sectional CT and MR worker, incident in MRI</b> ) By attending seminars online or face to face – e-learning is good but boring ( <b>REF 101040176 – team leader, 11–15 years experience, MRI incident</b> ) "It should be lead from the top.. band 7s should practice gold standard in safety, in my experience it is not always encourage us to datix [web based system for incidents reporting] near misses.." REF101185386 ( <b>radiographer, 11–15 years' experience, CT and MRI</b> )
		Contributing patient factors	"Abusive patient, damaging equipment and self." REF 101192966 ( <b>Senior radiographer, 11–15 years' experience, conventional radiography</b> )	
		Contributing human factors	"A very busy department, had a paediatric patient for an emergency examination. Had them positioned held by a comforter and carer, patient distressed rapidly moved to press button before they moved as comforter and carer of little use and failed to select correct detector so exposure happened and the equipment permitted exposure of patient without an active receptor in place." REF101038752 ( <b>radiographer, less than 1 years' experience, conventional radiography</b> )	
		Poor safety culture	"the equipment in the room (wall stand) was faulty and not well documented or taken out of use. I went into the room to cover over lunch, did a PA [posterior anterior] chest on an elderly women using the wall stand and the detector fell out, landing on and fracturing the woman's great toe." REF 101808201 ( <b>senior radiographer, 11–15 years' experience, conventional radiography</b> )	
3	Impact of incident		"Pt brought to CT from ED [emergency department]. PT became unwell as having seizures, then went into arrest. ED Rd and arrest team arguing over who would lead arrest and no one taking control. Pt not successfully resuscitated." REF 102437356 ( <b>radiographer, over 20 years' experience, cross sectional</b> )	"Having been through a major safety incident a number of years ago, I was disappointed with how senior management/line manager of person responsible dealt with it. Lack of communication and cover up" REF101037513 ( <b>Senior radiographer, 11–15 years' experience, CT</b> )

revealed that only 12 % of respondents had heard of the term 'second victim'.

*Summary of qualitative findings*

Responses emphasised the requirement for better management of incidents and the effective dissemination of lessons learned in an accessible manner. Staff highlighted the importance of feedback, noting that most currently are updated only by email, whilst

21 % (n = 10) reported not receiving feedback at all. Comments disclosed the impact of stress on individuals and departments, indicating that understating contributory factors would be valuable. Calls for stronger leadership and clearer guidance on safety culture were common, alongside concerns relating to process issues; predominantly at referral stages, and frustration concerning the non-implementation of proposed changes. Respondents requested more training and support, particularly MRI safety and challenges in training staff outside the MRI team.



Figure 4. Visual representation of themes and subthemes.

Notwithstanding these concerns, several comments reflected positive experiences with open safety culture and incident investigations.

**Discussion**

*Type of incident (identification, justification, MRI safety and examination)*

Identification errors dominated the incident details provided. This theme highlighted wrong patient details being provided, incorrect paper referrals being scanned onto patient details and wrong patient initially referred. The most common incident in diagnostic radiography within the UK is when the wrong patient receives an examination and CQC describes this as due to “inadequate checks about the patient’s identity by both referrer and operator” as common causes.<sup>6</sup> Our study results demonstrate multiple incidences of this nature but outlines a 3-point ID check is complicated by many factors. Distractions, complex patients and working in stressful cases (e.g skeletal surveys) were all identified as contributing to the ID check not being performed in the recommended manner.

Other issues with pre-examination checks were clearly evidenced within results, such as previous imaging which may negate current referrals and wrong laterality. The Society of Radiographers (SoR) created the PAUSED process in 2019<sup>13</sup> and represented this through visual poster design. Although this policy is clear relating to the checks which should be completed prior to imaging, anecdotal evidence suggests the poster representation of these is lengthy. Ideally it should be easy for radiographers to utilise these, with the current incident rates suggesting radiographers are not reviewing the posters prior to every examination. Evidence demonstrates that lengthy systems of work that are inefficient often lead to ‘workarounds’ being developed under pressure.<sup>11</sup>

Simplified, accessible and universally accepted systems have been proposed by Danaher et al.<sup>14</sup> which showed excellent staff compliance; however, these do not cover the full extent of necessary pre-examination checks and are not endorsed by the SoR. If this remains the most common incident within radiography and the current PAUSED policy is not preventing these errors, then, it would be prudent that a review of the current systems of work is required to significantly improve practice.

*MRI*

MRI incidents were prominent within the qualitative data but there was no statistical evidence that incidents were more prevalent in any modality. MRI is often seen as the ‘safe’ modality within Radiography, but this project highlights the potential for harm to both patients and staff, including patient deterioration, projectiles, Radiofrequency burns and staff safety incidents. Respondents to our survey reiterated the importance of MRI safety understanding for staff working outside of MRI and that safety questionnaires should be completed by referrers to identify MRI contraindications earlier. Reporting of incidents within MRI is voluntary and Nugent<sup>7</sup> advised that having accurate incident statistics “is critical for safety analysis”. Departments should encourage incident reporting locally but also voluntary reporting to the MHRA for widespread dissemination of learning.

*Contributing factors (resource, human, patient) and safety culture*

Within resource factors, there were subthemes of equipment/resources from within and outside the radiography department. They included equipment failures, absence of patient monitoring, lack of escorts/staff, COVID amended practices and poor safety practices. Human factors were evidenced across answers, with

tiredness, stress, lack of staffing and ineffective human–technology interaction.

Human factors ergonomics includes the way in which humans interact with technology and is a key component of understanding patient safety.<sup>15</sup> Radiographers must be competent with innovative technology but also adaptable with its inefficiencies. Unique to the profession, the technology advancement can mean substantial 'leaps' in knowledge are required when new equipment is installed. Consequently, staff are expected to develop competence quickly and be proficient with technology optimisation, considering both radiation dose and image quality. Despite advancements, technology errors can still contribute to incidents. Anecdotally, industry is focused upon improving efficiency however the authors believe more focus should be made towards patient safety and radiographer interaction with technology, considering useability. This drive is likely linked to the effort to meet national priorities of improving cancer pathways.<sup>5</sup>

Radiography relies upon other departments to 'prepare' their patients effectively for different examinations. This ranges from removing metalwork to prevent artefacts, inserting a particular gauge cannula to ensure optimal contrast media opacification or to just maintain the stability/care of a patient. Unfortunately, if these preparations are not performed, it can result in patients being at risk once they arrive within the department. Wallin et al.<sup>10</sup> found a key issue in that activities outside of radiology departments can cause harm and this was evident within our results. Patients who had previously had seizures were left unattended and key patient information was not communicated. Consequently, to improve safety and minimise risk within radiology departments, a wider review of communication with other departments is required.

Patient factors which contributed to incidents included patient deterioration, direct patient harm, abusive/challenging patients and contrast reactions. Distractions were evident through patients cooperating with incorrect laterality, aggressive patients and complex patient needs. Distractions can result in a reduced ability to think critically and instead resort to an 'autopilot' mode.<sup>16</sup> In terms of incorrect laterality, there is an element of paternalism evident, as patients believe radiographers will do the right thing. Education around this effect can emphasise the importance of checking laterality.

#### *Safety culture and impact of the incident*

Examples of the incident's impact included missed pathologies, later diagnoses, delayed patient treatment, repeat imaging and direct patient harm (such as seizures and arrest) and staff harm. The theme of safety culture was identified through practices which did not represent an effective safety culture. Aspects of blame culture were present in both language and tone, and this can negatively affect both the motivation to report incidents and engagement with the investigation. This was supported by the quantitative data that 40.6 % of respondents were familiar with key patient safety concepts and only 29 % received formal education on the topic.

It is important that staff 'want' to report but also that they are involved within the investigation and feedback stages, recognising their valuable insight. Those working with the technology and environments directly will be able to proactively recognise 'holes' within protocols/systems of work and consequently suggest solutions. Workarounds are often found to have been used in incidents however radiographers being able to suggest workarounds proactively could enable them to incident-proof systems.<sup>8</sup>

The NHS Patient safety strategy<sup>9</sup> outlines some of these concepts and summarises a good patient safety culture which

Radiology leaders can use and implement. Leaders have a responsibility to build and continuously nurture an open culture so that staff feel safe to raise concerns as this ultimately enhances patient outcomes.<sup>17</sup>

#### *Implications for practice*

*Patient safety education.* There remains a gap in radiography education around human factors and a systems approach to incident investigations. Less than half of radiographers surveyed had heard of the SCM and less than half were familiar with the systems approach. Therefore, further efforts are needed in terms of radiography education to ensure these topics are embedded consistently.

Although many Radiographer degree and apprenticeship programmes include these aspects as core learning there is a requirement to provide this education to qualified radiographers who have not been in education for some time. These more experienced radiographers are likely to be within senior/leadership roles and therefore have significant impact upon the departmental culture. Elearning modules could be particularly beneficial to ensure patient safety is embedded within leadership. Even if newly qualified radiographers have been taught these concepts, it is harder to question those more experienced when there are discrepancies within safety culture and the processes of reporting incidents. Previous literature has identified having 'confidence to question' as a key factor within near misses, preventing incidents<sup>11</sup> however this is likely linked to experience of radiographers and confidence gained through authorisation training. However, education could provide case study examples to provide students with training around these challenging scenarios.

*Feedback from incidents.* Our results demonstrated that most Radiographers are not involved within incident investigations and a small proportion did not receive any feedback (21 %). Without feedback, there is little incentive to report future incidents and can cause staff to disengage from safety procedures altogether. This is one aspect of lack of efficacy within the incident investigation process that has been questioned by the evidence base.<sup>18</sup> This also demonstrates a lack of compliance with disseminating feedback from radiation incidents related to (IR(me)R) (2024)<sup>4</sup> which is a key standard reviewed by the CQC in inspections.<sup>6</sup>

No changes were implemented in 73 % of incidents, which is surprising considering incidents bring latent errors into focus for system changes to be actioned and prevent recurrence. 18 % of staff expressed that they felt further actions could have been taken, indicating radiographers could suggest appropriate actions to mitigate or prevent recurrence of incidents, if actively involved within the investigation.

*Limitations.* Limitations include respondents were from England, so findings may not reflect experiences across the UK. The survey targeted individual radiographers/APs, meaning multiple responses could come from the same organisation. Advertising via social media may have excluded those less active online, unintentionally biasing the sample. Surveys offer limited depth and rely on recall, which may be inaccurate for older incidents. Small sample size and subgroup counts reduced statistical power, affecting chi-square and logistic regression reliability. Incident involvement was estimated proportionally across roles due to incomplete data, introducing bias. These factors limit generalizability; future research should use larger, balanced samples for robust analysis.

*Conclusion.* The aim of this project was to ascertain radiographers and APs' personal experience of incidents, the investigation

process and the learning that was disseminated. This will allow a greater understanding of safety culture in Radiography within the UK. Survey results suggest that Radiographers are competent and confident with reporting incidents but there are inconsistencies in effective dissemination of feedback and learning. Suggestions to improve safety culture would be to involve radiographers within the investigation processes and ensure radiographers are a key component of re-writing policies and influencing systems of work. The patient safety strategy<sup>9</sup> is not consistently being applied across the UK yet however has great potential to help leaders nurture an effective patient safety culture and SEIPs is an effective tool to ensure systems approach is used when analysing incidents.

**Ethics approval and consent to participate**

Ethical approval for this study was granted by the University of Bradford Health Studies ethics committee (EC reference: EC27084, approved 18/08/2022). Informed consent was obtained from participants; a statement on Page 1 of the questionnaire outlined that completion of the questionnaire implied consent to participation and publication of findings.

**Availability of data**

Data required for this study may be made available by the author(s) upon reasonable request.

**Author contributions**

HA: Conceptualisation, methodology, thematic analysis, writing original draft preparation, reviewing and editing.

BC: methodology, thematic analysis, writing original draft, reviewing and editing.

EM: methodology, thematic analysis, reviewing and editing.

EB: Visualisation, reviewing and editing.

KK: Reviewing and editing.

KV: Reviewing and editing.

**Declaration of generative AI and AI-assisted technologies in the manuscript preparation process**

During the preparation of this work the authors used CoPilot in order to perform statistical analysis on the quantitative data. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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**Conflict of interest statement**

None.

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Not applicable.

**Appendix 1. Privacy information and summary table of survey questions**

*Privacy information*

This survey will gather information about the experiences of radiographers and assistant practitioners with regards to all types of incidents. The aim of the project is to better understand safety culture within Radiography.

By completing this survey you are consenting for your information to be used for research purposes, including possible publication. The only personal information which this survey will collect is the organisation at which you work. If you complete the survey but wish to withdraw your responses you can do so by emailing the author and quoting your response reference number. The authors contact email is [h.k.adamson@bradford.ac.uk](mailto:h.k.adamson@bradford.ac.uk).

This survey is aimed at Radiographers, Assistant Practitioners and team leaders. If you are not one of these, please do not complete the survey. If you are a student radiographer please do NOT complete this survey as there is a separate survey that will be distributed for student Radiographers.

Question section	Overview of questions
Demographics	Current role in radiography, years post qualification, area/modality where currently work (most often if multi-modality),
Incident information	Have you ever been involved in an incident, how recent incident was, type of incident, modality where incident occurred, individual involvement in incident, was the incident reported through an electronic reporting system, details of the incident, any formal investigation performed, attendance at any investigation meeting, did individual receive outcome from incident, was learning shared with wider team, any changed made following the incident, any other changes individual felt could be made
Safety culture	Familiarity with safety culture concepts from evidence base, if individual wanted to change anything about safety culture in organisation what would it be, teaching of safety concepts in initial Radiography/AP education,
Participation in future research	Individuals were asked to provide their email address if they wanted to participate in future research on the topic
Free text question	Any other comments to add

**References**

1. NHS England and NHS Improvement. *Diagnostic imaging dataset annual statistical release* [Internet]. London: NHS England; 2025 [updated 2025 May; cited 2025 Jun 23]. Available from: <https://www.england.nhs.uk/statistics/wp-content/uploads/sites/2/2025/05/Statistical-Release-22nd-May-2025-1.pdf>.
2. Kasalak Ö, Yakar D, Dierckx RA, Kwee TC. Patient safety incidents in radiology: frequency and distribution of incident types. *Acta Radiol.* 2020 Jun;62(5): 653–666.
3. Mansouri M, Aran S, Shaqdan KW, Abujudeh HH. Rating and classification of incident reporting in radiology in a large academic medical center. *Curr Probl Diagn Radiol.* 2016 Jul;45(4):247–252.
4. UK Government. *Ionising radiation (medical exposure) (amendment) regulations*; 2024 [Internet]. Available from: <https://www.legislation.gov.uk/uksi/2024/896/made>.
5. NHS England. *National reporting and learning system (NRLS)* [Internet]; 2022. Available from: <https://www.england.nhs.uk/wp-content/uploads/2022/10/NAPSIR-commentary-Oct-22-FINAL-v4.pdf>.
6. Care Quality Commission. *CQC IRMER report*; 2023 [Internet]. Available from: <https://www.cqc.org.uk/publications/irmr-annual-report/2023-2024>.

7. Nugent B. *The need for mandatory reporting of UK MRI safety incidents and a universal template to harmonise reports*. RAD Magazine; 2022. Available from: <https://www.radmagazine.com/scientific-article/the-need-for-mandatory-reporting-of-uk-mri-safety-incidents-and-a-universal-template-to-harmonise-reports/>.
8. Reason J. Human error: models and management. *BMJ*. 2000 Mar 18;320(7237):768–770.
9. NHS England. *The NHS patient safety strategy*; 2019. Available from: <https://www.england.nhs.uk/patient-safety/the-nhs-patient-safety-strategy/>.
10. Wallin A, Gustafsson M, Carlsson AA, Lundén M. Radiographers' experiences of risks for patient safety incidents in the radiology department. *J Clin Nurs*. 2019;28:1125–1134. Available from: <https://onlinelibrary.wiley.com/doi/full/10.1111/jocn.14681>.
11. Adamson HK, Foster B, Clarke R, Scally A, Snaith B. A longitudinal evaluation of computed tomography radiation incidents within a multisite NHS trust. *J Patient Saf*. 2022;18(7):e1096–e1101. <https://doi.org/10.1097/PTS.0000000000001022>.
12. Maguire M, Delahunt B. Doing a thematic analysis: a practical, step-by-step guide for learning and teaching scholars. *AISHE-J*. 2017;9(3):3351, 14.
13. *Society of radiographers*. PAUSED; 2019. Available from: <https://www.sor.org/learning-advice/professional-body-guidance-and-publications/documents-and-publications/posters/have-you-paused-checked-diagnostic-imaging>.
14. Danaher LA, Howells J, Holmes P, Scally P. Is it possible to eliminate patient identification errors in medical imaging? *J Am Coll Radiol*. 2011;8:568–574.
15. Siewert B, Hochman MG. Improving safety through human factors engineering. *Radiographics*. 2015;35:1694–1705.
16. D'Esmond LK. Distracted practice and patient safety: the healthcare team experience. *Nurs Forum*. 2017 Jul;52(3):149–164. <https://doi.org/10.1111/nuf.12173>.
17. Murray M, Cope V. Leadership: patient safety depends on it. *Collegian*. 2021;28:604–609.
18. Sujan M. An organisation without a memory: a qualitative study of hospital staff perceptions on reporting and organisational learning for patient safety. *Reliab Eng Syst Saf*. 2015;144:45–52.