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Preliminary clinical evaluation in cross-sectional imaging: A qualitative exploration of current international radiography practice

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ABSTRACT

Introduction: Implementation and practice compliance of preliminary clinical evaluation (PCE) vary across national and international settings. The reason for these variations remains unclear, especially in relation to cross-sectional imaging. This study therefore explored PCE education and practice experiences of a multinational cohort of cross-sectional imaging radiographers with the aim of identifying effective training and implementation strategies, challenges, and opportunities for improvement.
Methods: A phenomenological qualitative design was used, with purposive sampling to recruit a multinational cohort of cross-sectional imaging radiographers enrolled in a UK-based postgraduate medical imaging programme. Semi-structured, in-depth interviews were conducted via Microsoft Teams between December 2024 and February 2025. Data were analysed using Braun and Clarkes' reflexive thematic analysis approach, facilitated by NVivo™ (v.20.0).
Results: Twelve radiographers from seven different countries participated in the study. The clinical experience of participants ranged (2–8 years), with most working in public or both public and private hospitals (8/12, 67 %) and (5/12, 42 %) had multinational clinical experience. All participants had PCE as a core component of their undergraduate training, but post-qualification practice expectations vary. Four overarching themes were developed: (1) education and skill refinement, (2) drivers for practice, (3) barriers to practice, and (4) opportunities for practice.
Conclusion: The findings reveal inconsistencies in PCE education, including variable module content and teaching depth, which affect clinical preparedness and confidence. Additionally, systemic barriers and communication lapses hinder PCE integration, while engagement is driven by its perceived value for others, support for clinical decision-making and presence of PCE-specific practice frameworks.
Implications for practice: Standardisation of PCE education and training, establishment of clear practice frameworks and addressing communication gaps can enhance the integration of PCE into routine clinical workflows.

Introduction

Cross-sectional imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI) play a fundamental role in diagnostic medicine, significantly influencing treatment pathways and patient outcomes.[1] Timely and accurate interpretation of the acquired images - whether through formal reporting or preliminary clinical evaluation (PCE)[2] is critical for effective clinical decision-making. Healthcare professionals, including doctors, physiotherapists, nurse practitioners and radiographers contribute to image interpretation.[3] PCE is an established practice in the United Kingdom (UK) and Australia[4,5] while it is at its developmental stages in jurisdictions such as Fiji, Singapore, South Africa, and New Zealand.[6–9]

PCE refers to brief, structured comments by radiographers on medical images, intended to communicate significant radiological findings to referrers in a clear and unambiguous manner[3,10–13]

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with the aim to support ongoing patient care. PCE practice has primarily focused on projectional radiography however, recent evidence[14–18] indicates its expansion into cross-sectional imaging, especially, CT and MRI. Given the diagnostic value of cross-sectional imaging, integrating PCE as a routine into the radiographer's clinical role in these modalities is vital.

Updated PCE guidance from the UK's Society and College of Radiographers (SCoR) notes that CT scans do not often receive immediate formal reporting, which can compromise patient safety[4]. This places PCE as an important 'safety net' in time-sensitive clinical circumstances, providing reliable information for urgent decision-making and facilitating intervention. In response, the SCoR advocates for the training of radiographers in cross-sectional imaging to recognise and escalate clinically urgent findings.[4] Similarly, in Australia, radiographers are expected to identify and communicate significant findings promptly.[5] These recommendations may remain aspirational unless actively supported and enforced by adequate regulatory frameworks.

Despite these efforts, limited progress in PCE implementation has been made according to a 2023 UK survey.[19] The survey suggested minimal change in PCE practice, although it noted increased use of abnormality flagging systems over the red dot method.[19] Comparable challenges have been reported among newly qualified Namibian radiographers with concerns about assessment standards and the realities of practice.[20] These findings are echoed in recent international scoping reviews, which identified widespread barriers to PCE practice including governance, and enforcement.[14,19]

To date, no primary study has explored PCE education, training, and practice from a transnational perspective with a focus on cross-sectional imaging. With increasing transnational mobility of the clinical radiography workforce,[21] it is imperative to understand cross-sectional PCE training and implementation strategies across different healthcare systems. Such insights could inform the development of internationally relevant education and training models to support the attainment of comparable PCE competencies regardless of where radiographers are trained or practice.

This study therefore explored PCE education and practice experiences of a multinational cohort of cross-sectional imaging radiographers with the aim of identifying effective training and implementation strategies, common challenges, and opportunities for improvement.

Method

Study design, population and setting

A qualitative study design underpinned by a phenomenological approach[22] was employed to explore participants' perspectives and experiences of PCE education and practice, culminating in a shared essence of the phenomenon across multiple narratives.

Study participants included a diverse cohort of qualified cross-sectional imaging (MRI and CT) radiographers enrolled in a post-graduate medical imaging course at a UK university. The diversity (i.e., country of primary radiography education and practice, years of practice experience, variety of experience across countries and sectors) provided a broad range of experiences and perspectives on PCE practices, education, training, and implementation.

Sample size and sampling method

A purposive sampling technique[23] was employed to recruit potential participants from the student cohort for the study. This approach enabled the selection of participants with specific knowledge and professional engagement in PCE who could provide rich and relevant insights. Recruitment commenced following a 10-min presentation delivered via Microsoft Teams to the target population on 11th September 2024. Fourteen individuals who met the eligibility criteria and expressed interest by providing their email addresses were subsequently invited to schedule an interview at a convenient date and time. Of the fourteen that were invited, twelve consented and were interviewed. Of note, this sample size is considered adequate for qualitative inquiry, as current methodological guidance suggests that 6 to 10 participants are typically sufficient for interview-based studies to achieve data saturation.[24]

Interview protocol and data collection

The development of the interview guide was informed by a previous scoping review[14] published by the research team. To ensure contextual validity, the interview guide development received input from an experienced clinical academic in CT and MRI imaging, who has multinational clinical experience. The interview guide was subsequently reviewed by two senior researchers (TA and SD) with experience in qualitative research and radiography education. Their review ensured that the questions were fully open-ended, non-leading, and aligned with the study's aim, thereby reinforcing methodological rigour and consistency in data collection as suggested by Kowalski et al.[25]

The interview questions focused on key areas including PCE-related education, training, practice, guidelines, perceived challenges, and opportunities for enhancement.

All the interviews were conducted by the lead author via Microsoft Teams between 20th December 2024 and 27th February 2025. Each session lasted approximately 30 min and was both recorded and transcribed using the platform's built-in features. By the seventh interview, we observed no new patterns or insights emerging from the data, despite the diversity in participants' backgrounds, suggesting a level of saturation. This was identified through an iterative coding process of interviews conducted in December 2024. However, recognising that the concept of data saturation is not typically supported within reflexive thematic analysis (Braun & Clarke, 2019),[26] we proceeded with the remaining five interviews to ensure the inclusion of potentially divergent perspectives and to enhance the richness and consistency of the dataset.

Ethical Considerations

This work received institutional ethics approval and informed consent was obtained from all participants. To maintain privacy, interviews were conducted individually, and explicit consent was obtained to record each session.[27] To ensure confidentiality, all transcripts were pseudo-anonymised[28,29] by removing personally identifiable information and assigning participant codes (e.g., P1, P2, P3 ⋯ P12). All interview transcripts were securely stored on the lead author's institutional Microsoft OneDrive.

Rigour and trustworthiness

To enhance credibility and trustworthiness, both member checking[30] and peer debriefing[31] were undertaken. Participants were provided with the opportunity to review and verify the accuracy of their interview transcripts. Similarly, during the coding and theme development phases of the thematic analysis, peer debriefing was held at two separate meetings to support reflexivity in keeping with the Braun and Clarkes reflexive approach as discussed by Pearson and Colleagues.[32] This collaborative process allowed the research team to critically reflect on

the data analysis process to identify and address any potential discrepancies, biases, thereby strengthening transparency and reliability of the findings.

Data preparation and analysis

Data cleaning was carried out to correct grammar and spelling errors before being uploaded to NVivo™ (v.20.0) for analysis. NVivo aided the organisation of data and supported the maintenance of a transparent audit trail throughout the analysis process.

Data analysis followed Braun and Clarkes' six-step reflexive thematic analysis approach[33] (Fig. 1).

An inductive coding strategy was employed to identify and extract significant information regarding the study's aim from the transcripts.[34] This was done by tagging and naming selections of text within each transcript in the computer-based NVivo software.[35] This coding approach allowed the data to be interpreted directly from participants' expressions (data-driven rather than theory-driven), thereby supporting credible and authentic analysis.[34]

Through an iterative process of review and refinement of the initial themes, final themes were developed for reporting.

Results

The study sample consisted of twelve cross-sectional imaging radiographers from seven different countries (Table 1). The majority (11/12, 92 %) completed their undergraduate training at public universities, where they had all received PCE education, although the module titles varied across institutions. Participants clinical experiences ranged between 2 and 8 years, with expertise in either CT alone or both CT and MRI. Less than half (5/12, 42 %) worked clinically in more than one country (Table 1).

Themes and subthemes

Four overarching themes and corresponding subthemes were developed from the thematic analysis (Fig. 2).

Theme 1: education, training and PCE skill refinement

This theme pertains to participants' pre- and post-qualification PCE training. Participants' perspectives were influenced by the nature of the PCE module, particularly the scope and depth of teaching. A recurrent theme, however, was the mandatory inclusion of PCE training within undergraduate radiography curricula as shown in Table 1.

Subtheme 1.1: satisfaction with PCE training at undergraduate level

Participants expressed varied perspectives regarding their undergraduate training. While the majority described their training as comprehensive, encompassing multiple imaging modalities and a range of pathologies, some indicated limited exposure to PCE. Accordingly, most participants felt adequately prepared for clinical practice, whereas a minority expressed contrary view, including limited scope, depth of the module content and insufficient teaching time. Thus, highlighting the need for standardised and structured curriculum to ensure comparable competency across training institutions.

> *P2 "My … education did not sufficiently prepare me for practical applications of identifying abnormalities." We had a brief lecture on identifying pathologies in brain CT scans, including acute haemorrhages and infarcts, but we didn't cover MRI pathologies" (Ghana, CT/MRI radiographer).*

> *P5 "My training in image interpretation at the undergraduate level was comprehensive and included both CT, MRI, and projectional radiography." (Kenya, CT/MRI Radiographer).*

Subtheme 1.2: structured on-the-job training and mentorship

Participants engaged various media in improving their PCE skills post-qualification. This includes in-house professional development strategies such as probationary appraisals. Furthermore, peer observation and mentorship were also identified as valuable methods used for enhancing PCE skills. This underscores the significance of informal but a well-coordinated education in enhancing PCE capabilities.

> *P3"So as part of the appraisal, some of it has to do with image interpretation, right? So ideally you'd assess 50 imaging reports as part of the appraisal, and you do it alongside radiologists." (Ghana, CT/MRI Radiographer)*

> *P12 " … clinical rotations, along with mentorship from senior radiographers, helped me differentiate normal anatomy from pathological anatomy." (Pakistan, CT/MRI Radiographer)*

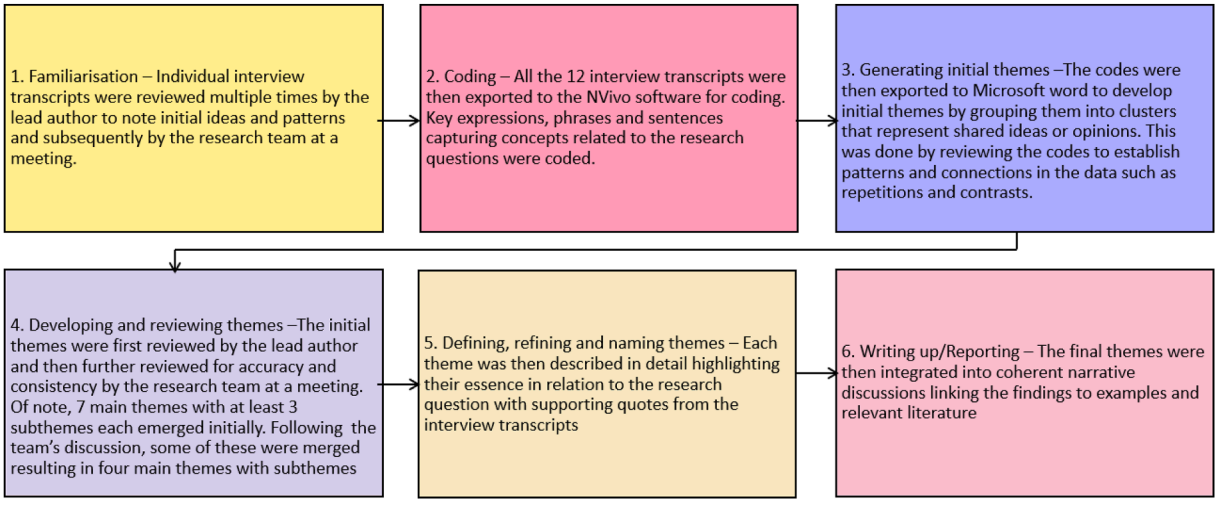

Figure 1. Thematic analysis process following the six steps proposed by Braun and Clarke.[33]

Table 1
Participants demographics-primary radiography education, clinical experience and area of expertise.

Participant code	Country of primary radiography education	Type of institution	PCE embedded in curriculum?	Title of PCE unit
P1	Nigeria	Public University	Yes	Image interpretation
P2	Ghana	Public University	Yes	Imaging pathology and pattern recognition
P3	Ghana	Public University	Yes	Imaging pathology and pattern recognition
P4	Rwanda	Public University	Yes	Image interpretation
P5	Kenya	Public University	Yes	Reporting
P6	Nigeria	Public University	Yes	Image appreciation
P7	Ghana	Public University	Yes	Imaging pathology and pattern recognition
P8	UK	Public University	Yes	Image interpretation
P9	Ghana	Public University	Yes	Imaging pathology and pattern recognition
P10	India	Public University	Yes	Imaging pathology
P11	Pakistan	Private University	No	None
P12	Pakistan	Public University	Yes	Imaging interpretation

Participants code	**Clinical expertise**	**Years of experience**	**Countries worked in**	**Sector**	**PCE required in practice?**
P1	CT and MRI	5	Nigeria and UK	Public	Not sure
P2	CT and MRI	3	Ghana	Private	No
P3	CT and MRI	5	Ghana and UK	Public and private	No
P4	CT	2	Rwanda	Public	Yes
P5	CT and MRI	3	Kenya and UK	Public	Yes
P6	CT	3	Nigeria	Public and private	Yes
P7	CT	4	Ghana	Private	No
P8	CT	6	UK and New Zealand	Public and private	Yes
P9	CT	2	Ghana	Public	No
P10	CT	2	India	Private	No
P11	CT and MRI	2	Pakistan	Public	Yes
P12	CT and MRI	8	Pakistan and UK	Pubic	Yes

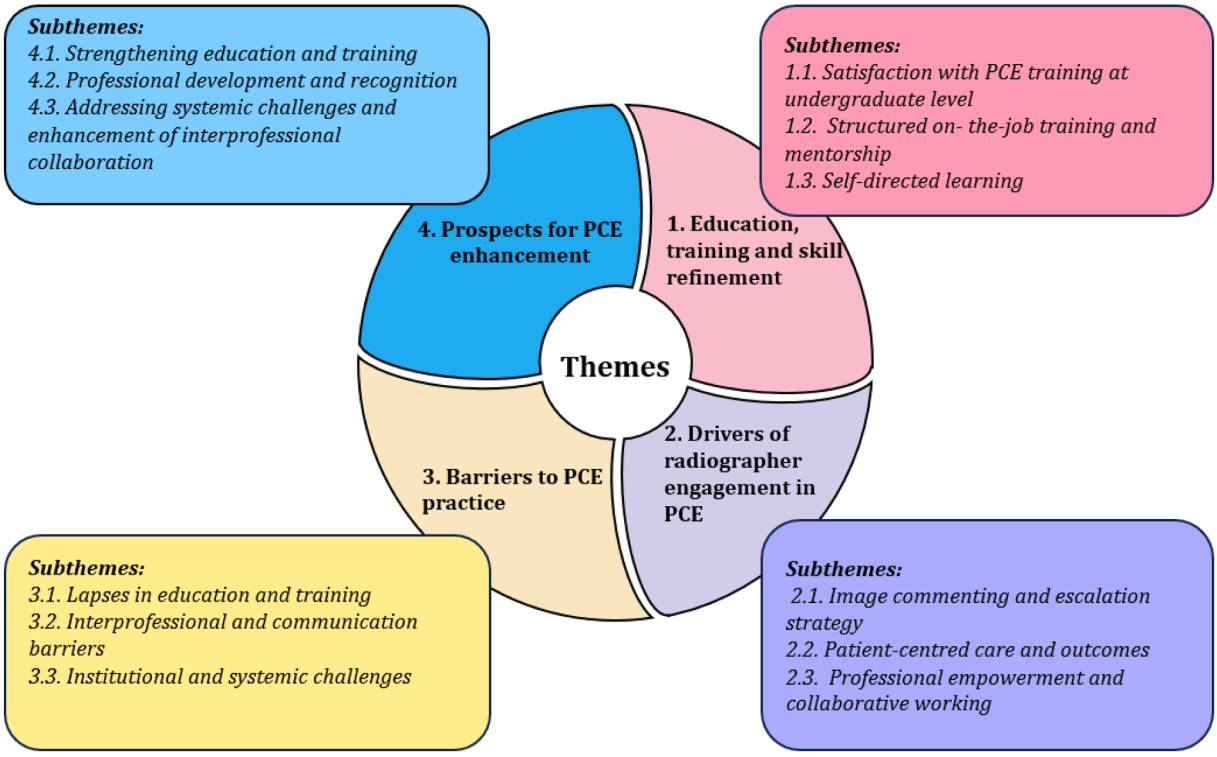

Figure 2. Themes and subthemes.

Subtheme 1.3: self-directed learning

Some participants rely on academic and professional resources, such as radiology textbooks, journal articles, radiology websites to deepen their understanding of pathologies. Additionally, engaging in workshops, webinars, and with image interpretation experts via social media (e.g., LinkedIn) has helped in their continuous professional learning. These findings reveal the variety of sources that support radiographer professional development in PCE.

P8 "I stay updated using resources like Wikipedia, workshops, and webinars." (UK, CT/MRI Radiographer).

P9 "I have completed a 1-year course covering … CT, and MRI image interpretation, which helps to keep my knowledge up to

date. I also follow image interpretation professionals on LinkedIn and read online to gain insights into image interpretation" (Ghana, CT Radiographer).

Theme 2: drivers of radiographer engagement in PCE

All participants demonstrated strong motivation to engage in PCE, driven by factors such as its value to others, professional expectation, impact on career development and the presence of practice frameworks or guidelines. One notable benefit is the ability to make effective decisions regarding imaging protocols, which they believe is enhanced by their proficiency in PCE.

Subtheme 2.1: image commenting and escalation strategy

The responses revealed differences in PCE protocols and practices across participants. While some participants operate within coordinated frameworks, others lacked formal practice guidelines despite being required to provide PCE. Working closely with radiologists when interpreting images, especially in urgent situations seemed common across participants. This highlight inconsistencies in PCE deployment strategies emphasising the need for standardised guidelines to clearly define the scope and format of PCE performance for consistent practice.

P2 "I mainly followed established departmental protocols to communicate urgent findings to radiologists." (Ghana experience, CT/MRI Radiographer).

P4 " … we are expected to provide PCE, there is however currently no formal guidelines for PCE practice in Rwanda." (CT Radiographer).

Subtheme 2.2: patient-centred care and outcomes

Collectively, participants underscored the critical role of PCE in enhancing patient care as a major driver of their engagement. Participants asserted that PCE influences clinical decision making and tailoring of imaging protocols to answer clinical questions effectively. Additionally, participants noted PCE's lifesaving role by allowing the escalation of urgent findings. In effect, PCE shapes radiographers' actions towards each imaging examination.

P9 "I strongly believe PCE is very important in enhancing patient care and radiographers' satisfaction." (Ghana, CT radiographer).

P10 "It is very important in providing timely interventions for patients. Because radiographers are often the first to see the medical images and can identify critical findings and be able to make informed decisions." (India, CT Radiographer).

Subtheme 2.3: professional empowerment and collaborative working

The participants stressed the importance of strong PCE skills in securing competitive CT and MRI jobs. Ability to pass on PCE knowledge to their colleagues and students is of high importance to participants. Participants also noted the critical role of PCE in interprofessional collaboration, allowing them to engage in professional discussions with radiologists and other clinicians.

P1 "PCE training has been crucial in securing my current role, where CT and MRI positions are highly competitive and require strong image interpretation skills." (Nigeria, CT/MRI)

P3 " … with this ability, you are able to brainstorm and discuss imaging pathologies with the radiologists and also helps in supporting student and newly qualified radiographers." (Ghana, CT/MRI Radiographer).

Theme 3: barriers to PCE practice

This theme pertains to the perceived barriers to PCE integration and practice. These barriers include resource-constraints, gaps in education, training and professionalism related issues. These barriers affect active participation in PCE by participants in their clinical practice.

Subtheme 3.1: lapses in education and training

Participants reported significant difference in the PCE skill set among radiographers. This was attributed to the variations in training emphasis, adequency and practices between sectors. From the data it is worth noting that even participants who emanated from the same country reported variations in their primary image interpretation education.

P2 " … include the absence of formal guidelines, limited training in image interpretation …." (Ghana, CT/MRI Radiographer).

P3 "While both public and private sectors in the country have competent radiographers, there is considerable variability in skills and understanding due to differences in training emphasis and practice" (Ghana, CT/MRI Radiographer).

Subtheme 3.2: interprofessional and communication barriers

Most participants noted interprofessional communication gaps as major constraint to PCE practice. These, they asserted impede the escalation of PCE findings. Additionally, pressure due to low manpower and high workload were highlighted as limitation to PCE performance at some institutions. Further, role conflicts have been highlighted as a potential barrier.

P3 " …, we could flag pathologies, but we don't have a channel of communication with the referring doctor." (Ghana experience, CT/MRI Radiographer).

P6 "Radiographers often face pressure that hampers their ability to take the time necessary to evaluate and comment on images after scans." (Nigeria, CT Radiographer).

Subtheme 3.3: institutional and systemic challenges

Participants expressed concerns about the lack of PCE guidelines or regulatory framework. This according to participants complicates practice standardisation and may discourage participation and negatively affect PCE implementation as guidelines provide for the scope and strategy for practice implementation. Furthermore, the lack of guidelines could also cause potential role clashes between radiographers and radiologists.

P5. "The lack of guidelines, and stronger foundation in early training creates roadblocks in practice." (Kenya, CT/ MRI Radiographer).

P6 "I think main problem is the gap in the implementation of strict guidelines for PCE practice in Nigeria." (CT Radiographer).

Theme 4: prospects for PCE enhancement

Opportunities for enhancing PCE training and practice in cross-sectional imaging were highlighted. Key benefits of PCE implementation were noted while also advocating for the adoption of practice guidelines and regulations.

Subtheme 4.1: strengthening education and training

Participants saw a unique opportunity to streamline and standardise PCE training and education scope, aligning with international frameworks. There was greater emphasis on training to recognise life-threatening findings.

P2 "Developing training programs for radiographers focused on PCE …, particularly in relation to identifying emergencies like haemorrhages, is essential." (Ghana, CT/MRI Radiographer).

P11 "I think there is a need for standardisation in education, training, and protocols." (Pakistan, CT/MRI Radiographer).

Subtheme 4.2: professional development and recognition

Participants view PCE as a prospect for professional development and improved patient care. Accordingly, participant advocated the integration of PCE into the clinical career progression strategy or framework for radiographers. This, participants opined should enable radiographers to be well informed to influence examination protocols.

P6 "I believe that improved support could enhance patient care and radiographers' professional development in image interpretation." (Nigeria, CT Radiographer).

P8 "PCE should be a competency requirement for specialisation, ensuring radiographers know what to identify before performing scans independently."(UK, CT Radiographer).

Subtheme 4.3: addressing systemic challenges and enhancement of interprofessional collaboration

Participants suggested that addressing resource constraints, providing support systems for radiographers, and strengthening interprofessional collaborations can enhance the effective execution of PCE. The responses also underscored the need for effective communication, developing standard operative procedures (SOPs) while maintaining confidentiality.

P4 "It is very necessary to establish protocols and guidelines that would empower radiographers to communicate their PCE findings effectively while maintaining patient confidentiality." (Rwanda, CT Radiographer).

P10 "I think that there should be collaboration between radiographers and radiologists to quickly report critical findings." (India, CT Radiographer).

Discussion

This study explored the perspectives and experiences of a multinational cohort of radiographers regarding PCE in cross-sectional imaging. Participants reported varied experiences with PCE training, although their approaches to practice appeared similar. The thematic analysis revealed key areas of focus, including PCE education and training, motivations for engaging in PCE, and the challenges and opportunities for enhancing PCE training and practice.

Theme 1: education, training and skill enhancement

Education and training are critical to the development of image interpretation skills, pre- and post-graduation.[36] These elements determine not only the content but also the methods of teaching necessary to equip radiographers with the competencies required for clinical practice.[20] Structured learning, typically led by instructors, and self-directed learning through e-learning platforms, academic journals, textbooks, and social media, were identified by participants as key resources for learning image interpretation.

Participants in this study expressed varied experiences with their image interpretation training, which influenced their perceived preparedness for clinical practice. Variations in the breadth and depth of pathologies covered and imaging modalities was a commonly reported experience. Such variations in perspectives were anticipated, given the participants' diverse backgrounds and the potentially differing stages of their respective radiography programme development.

Additionally, these differences may also reflect the varying emphases placed on radiography training across countries, informed by national educational policies and healthcare priorities. Historically, radiography education focused on developing technical skills,[37] especially image acquisition. This might contribute to a wrong perception of radiographers as mere "technicians," constraining their scope of training and professional identity. Consequently, critical areas such as image interpretation were often underemphasised as they were traditionally viewed as the domain of radiologists.

Given the evolving landscape of radiography practice, broader competencies beyond image production are required. Graduate attributes increasingly include broad clinical expertise, leadership, education, research, and service development.[38] These competencies are essential for delivering evidence-based, radiographer-led service transformation and fostering multidisciplinary collaboration. Accordingly, the UK's standards of proficiency for radiographers[39] require graduates to perform standard MRI and a wide range of CT procedures in addition to identifying and escalating clinically significant imaging findings. These core themes now reflect the UK's undergraduate radiography curricula, ensuring that graduates meet the expected competencies defined by the regulator.

Furthermore, the increasing transnational mobility of radiographers,[21] as evident in this study, where several participants had worked in multiple countries, underscores the need for globally relevant training. Training therefore needs to align with international standards, which are often based on a combination of education, clinical experience, and ongoing professional development.[40] This is particularly necessary in countries where PCE practice is still emerging to ensure that the skills acquired are relevant and meet contemporary clinical demands.

Theme 2: drivers for PCE practice

In this study, participants' motivations for engaging in PCE were multifaceted but consistent across contexts. Key drivers identified included the presence of well-defined practice frameworks, PCE's contribution to patient care, radiographer empowerment and interdisciplinary collaboration.

Participants saw practice frameworks as essential for ensuring that radiographers operate within their defined scope of practice. In the context of PCE, these guidelines clarify which images should be interpreted, how findings should be communicated, and to

who, potentially helping to mitigate role conflict and ethical or legal risk while optimising patient safety. Typically, practice frameworks are established by professions regulatory bodies, and they inform curriculum development and continuing professional development (CPD) by outlining the competencies required for safe and effective PCE.[41]

Radiographer empowerment emerged as another significant driver. Participants viewed PCE as a pathway to professional development and future role extension, such as clinical reporting. Participants also highlighted the importance of mentoring students and other colleagues in PCE. This reflects an awareness of their educational and supervisory responsibilities and willingness to empower others. Of note, radiography graduates are expected to be able to teach clinical skills including image interpretation, supervise and give feedback to students and less experienced colleagues.[42]

A central purpose of PCE is to provide timely, informal remarks to support patient care.[4,5] Participants' motivations affirmed this purpose noting that PCE practice helps prevent delays in diagnosis and treatment, especially when official radiology reports are not readily available. As the first to review medical images, radiographers play a critical role in early detection of significant pathologies.[43,44] Their input can also guide imaging protocol adjustments to ensure diagnostic accuracy.

Radiographer PCE is particularly important in areas where radiologists are not available or during out-of-hours periods. In such cases, radiographers' comments can influence clinical decisions and enhance patient safety.[43,44] This perspective supports a previous study[45] which found that PCE positively impacted radiographer decision-making process.

Theme 3: barriers to PCE practice and implementations

Participants identified several barriers to PCE integration into practice including gaps in education, absence of clear practice guidelines, and ineffective communication systems. Despite geographical diversity, challenges reported appear similar, although the degree to which these barriers impact varied by region, institution and in some instances by training. In contrast, previous research[46] reported anxiety and lack of confidence in writing radiological comments as barriers. This suggests the need for context-specific support systems but tailored in keeping with international standards.

Key educational gaps cited in this study included insufficient teaching and curricula limitations, which echoed previous research[3,20] findings such as inconsistencies in radiography curricula as a constraint to role expansion.

Moreover, the lack of standardised curricula across institutions and countries could also contribute to uneven skill development. For instance, the response in this study shows marked disparities in participants' image interpretation training experiences even among those from the same country. Thus, highlighting the need for more equitable access to CPD and the standardisation of image interpretation in core radiography training programmes.

Absence of a formal practice framework was also seen as a significant impediment to PCE practice as it creates uncertainty about professional boundaries, particularly in settings where radiographer PCE is not formally recognised. Without clear guidelines, radiographers may hesitate to engage in PCE due to fear of legal repercussions and role conflicts especially in multidisciplinary teams where responsibilities for image interpretation may overlap. Inconsistent expectations from referring clinicians may arise which could further complicate the situation, potentially undermining the radiographer's confidence and authority.

Participants described difficulties in effectively sharing imaging findings with referring clinicians, particularly in settings where radiographers do not often have direct contact with the referrer as another impediment. These findings are consistent with previous research[19,47,48] which reported persistent communication barriers between radiographers and referrers. These issues partly point to broader systemic challenges within healthcare teams, where hierarchical structures may inhibit open dialogue and collaborative decision-making. Thus, developing clear communication protocols and standardised commenting formats could remove these impediments while encouraging participation.

Theme 4: prospects for PCE enhancement

Participants identified some key strategies to enhance PCE practice, focusing on strengthening training, addressing systemic challenges, and reinforcing policy frameworks. These suggestions reflect a forward-looking perspective on how PCE could be improved to support safe, effective, and timely care.

Despite education providers being obliged to equip radiographers with PCE competency, evidence highlights a disconnect between theory and practice.[20,49] Thus, a call for review to align academic content and clinical expectations. Further training, mentorship, and CPD opportunities were seen as essential for ensuring graduate preparedness, maintaining and advancing PCE competencies as previously reported.[19] Similarly, Del Gante et al.[7] and Tay and Wright[50] have demonstrated the positive impact of mentorship and in-house education on radiographer image interpretation performance and confidence. Embedding these opportunities into both academic training and practice would support a culture of lifelong learning and professional growth. Also, PCE-specific CPD could also be embedded into radiographer career development plans, job description and clinical audit programmes. Of note, this may require protected time, funding, and training workshop. These strategies not only would enhance PCE competence but also contribute to job satisfaction, morale, and accountability.

Participants recognised that clear, enforceable policy guidance is essential for defining the scope of practice, communication strategies, ensuring consistency, and promoting professional accountability in PCE practice. When properly enacted, such policies can create a sense of legitimacy and foster a more integrated, multidisciplinary approach to patient care. It is worth noting that the mere existence of frameworks is insufficient without proper implementation and enforcement, as evident in a previous UK study[19] which reported low compliance with PCE despite formal practice guidelines.

Limitations of the study

While this study offers valuable insights into PCE education and practice, certain limitations should be acknowledged. The participant group included individuals with varied clinical experiences, some of whom had worked across multiple countries. This diversity was a strength of the study, contributing to the richness and depth of the thematic findings. However, the geographical scope of the sample was limited to those enrolled in the course, as such, the perspectives of individuals from regions not represented remain unknown. This limitation might influence the transferability of the findings, particularly in contexts that differ significantly in radiography education and practice. Nonetheless, given the qualitative nature of the study, the emphasis was placed on depth of understanding rather than broad generalisability.

It is important to acknowledge the positionality[51] of the lead author, who is a cross-sectional imaging radiographer and an

alumnus of the postgraduate course from which the study participants were recruited. Although there were no personal relationships with participants, this shared background may have influenced data interpretation due to prior knowledge and professional familiarity.

Conclusion

As the first known primary study in the multinational cross-sectional imaging context, the findings offer valuable real-world insights into current PCE education and training, implementation, and associated challenges. Key findings include variations and lapses in education in relation to inadequacies in module content and teaching depth, suggesting inconsistencies in knowledge delivery. Additionally, systemic challenges, and communication lapses were identified as major barriers to PCE integration into clinical practice. These gaps impact preparedness and confidence in applying PCE skills in clinical practice; thus restricts its accessibility and influence. However, engagement in PCE is driven by its value to others, support for clinical decision-making, and the presence of practice frameworks.

Improving training and implementation strategies is therefore crucial to maximise PCE's benefits and encourage its wider adoption in clinical practice. The findings in this study could inform PCE training and practice reforms.

Generative AI use

Not applicable.

Ethics approval and consent to participate

The project received ethical approval from the Bournemouth university's Research Ethics panel (Ethics Approval ID: 59938). Participants information sheet was provided, and informed consent was obtained from each participant through a signed agreement form. Participants were informed of their right to withdraw from the study at any time without providing reasons.

Written informed consent was obtained for anonymised participant information to be published in this article.

Availability of data

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

Author contributions

MNKA: Conceptualisation, Methodology, Data collection, Analysis and Original Draft preparation.

TNA/SD: Conceptualisation, Supervision, Reviewing and editing of the Original Draft.

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Conflict of interest statement

None.

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