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Systematic Review

Towards defining the competencies and leadership attributes for radiographer-led management in clinical practice: A scoping review

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ABSTRACT

Introduction: Radiographer-led management is multifaceted and requires the optimal balance of clinical, administrative, technical, and people management duties. These duties demand a broad range of managerial and leadership competencies. However, the exploration of how to effectively apply these competencies and attributes in the context of clinical Radiography practice for senior leadership is limited. This review aims to identify and synthesise findings from existing literature on competencies, and leadership attributes essential for radiographer-led management.

Methods: A literature search via EBSCOhost (MEDLINE, CINAHL, SCOPUS, Academic Search Ultimate) and key Radiography journals for relevant articles was conducted (August 2023 to January 2025). Eligible studies were screened and documented using the PRISMA-ScR framework. Data were extracted and thematically analysed using NVivo™ (v14) to identify key themes. Narrative synthesis was used to present the core competencies and leadership attributes relevant to Radiographer-led management.

Results: The initial search identified 1905 articles. Following various levels of screening, twenty-five documents were included, comprising studies (n = 23) and policy documents (n = 2), primarily from the UK and Australia. Team collaboration and communication skills were the major competencies highlighted. Furthermore, leadership attributes, including interprofessional skills and visionary thinking, emerged as crucial for radiographer-led management. These findings centre on the need for collaboration, interdisciplinary teamwork, strategic vision, resilience, professional development and role clarity.

Conclusion: This review identified competencies and leadership attributes relevant to radiography-led management. It highlighted challenges, including resource constraints and role ambiguity, while recommending evidence-based leadership training and role alignment to support radiography managers and leaders in delivering efficient services.

Implications for practice: Actionable guidance is required for developing tailored training and clarity of radiographer-led management roles to drive innovation that improves team performance in the delivery of better services.

Introduction

The clinical Radiography workforce has significantly evolved in terms of professional outlook, roles and responsibilities.[1] Historically, radiographers have been trained through certificate and diploma programmes, with an example being the Diploma Award of the College of Radiographers (DCR) in the United Kingdom (UK).[2] Radiography training also evolved and was transitioned to a graduate profession, requiring practitioners to obtain a university degree for their qualification.[3] This evolution led to the emergence of new roles, with the clinical radiography workforce assuming responsibilities and positions previously reserved for other professions in the domains of leadership and management within the clinical environment and beyond.[4]

Radiographers in leadership and management positions within clinical environments hold diverse titles and responsibilities, reflecting differences in healthcare structures and professional hierarchies internationally.[5] Typical titles include "Chief

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Radiographer", "Divisional Lead", "Department Manager", and others, with specific roles varying by region and organisation.[6] In the UK, roles like "Radiology Professional Lead" and "Radiotherapy Manager" illustrate these differences. A radiotherapy manager typically manages clinical radiotherapy services, focusing on equipment procurement and service delivery management. Similarly, a radiology professional lead oversees imaging departments, including staff and organisational relationships.[7] In many imaging and radiotherapy departments, leadership is often shared or split between professions, such as clinical leads, who are radiologists or oncologists and service leads, who may be radiographers or other healthcare professionals. This parallel structure adds complexity to defining radiographer-led leadership roles within the clinical environment.[8,9] With the quickly evolving pace of technology and the increasingly complex management structures and role extensions across both therapy and diagnostic imaging departments, there is a need for clarity in role definitions in terms of competencies and attributes to support efficient service delivery through the lens of radiographer-led management.[10–12]

Leadership attributes, such as inspiring and motivating teams, foster a positive work environment,[13] while competencies encompass measurable skills and knowledge required for tasks, including technical and interprofessional expertise.[6,14,15] Despite the recognised importance of leadership attributes and managerial competencies, assessing and measuring these concepts remain challenging in clinical Radiography practice.[10,16,17] This is due to a lack of consensus on definitions and evaluation methods, with the terms often used interchangeably.[16–20] Existing guidelines, including the Health and Care Professions Council (HCPC) Standards of Proficiency[3] and the Education and Career Framework (ECF) for the Radiography Workforce,[21] highlight that leadership is critical to professional practice at all levels. While acknowledging that these examples reflect regulatory and professional guidance specific to the UK context, they lack explicit clarity and only broadly outline competencies and leadership attributes needed for core radiography roles.[3,21] This highlights the need for a nuanced approach to address these challenges and provide support to defining the critical competencies and leadership attributes required for Radiographer-led management.

While other healthcare professions, including nursing,[22] medicine,[23] and clinical informatics,[24] have benefited from comprehensive competency frameworks to define senior leadership and management roles and responsibilities, radiography-led management remains underexplored. The existing competency frameworks in this area, including the Framework for Professional Leadership in Clinical Imaging and Radiotherapy and Oncology Services,[25] remain outdated, and the much newer guidance, the ECF for the Radiography workforce,[21] primarily focuses on core and technical radiography domains and does not adequately address leadership needs.

This scoping review focuses on this underexplored yet critical area by synthesising existing literature to identify crucial competencies and leadership attributes vital for effective radiographer-led management within the clinical area. It aims to fill this gap by addressing the overarching research question:

What core competencies and leadership attributes have been identified in previous studies as crucial for radiographer-led management roles?

This question will guide the review in critically analysing studies in radiography management to understand best practices and gaps for further development.

Methods

Research methodology and procedures

This review follows the methodological framework propounded by Arksey and O'Malley,[26] incorporating recent guidelines from the Joanna Briggs Institute and Collaboration (JBIC)[27] to map existing literature and examine competencies and leadership attributes for radiographer-led management globally. Unlike systematic reviews, which focus on narrowly defined questions and overlook broader or grey literature,[28,29] a scoping review was considered more appropriate for this study. The review employed six stages: (1) identifying the research question, (2) identifying relevant studies, (3) study selection, (4) charting the data, (5) summarising and reporting the results, and (6) consultation. These stages provided a systematic structure to map the breadth of literature, ensuring transparency and reproducibility, aligning with the research objectives. This adhered to the PRISMA Extension for Scoping Reviews (PRISMA-ScR) guidelines.[30]

Search strategy

A systematic search strategy is developed with the support of a research librarian to ensure comprehensive coverage of relevant literature.[31] The literature search was conducted from August 2023 to September 2024 and was updated in January 2025 to ensure thorough, up-to-date data collection. No publication date restrictions were applied during the search process. This approach was chosen to include all relevant studies regardless of publication year, as the literature on radiographer-led management and leadership remains limited and may span a wide time frame. Databases were searched via EBSCOhost (MEDLINE, CINAHL, SCOPUS, Academic Search Ultimate) and supplemented with a search across Google Scholar and the four key Radiography journal websites, including *Radiography (UK), Journal of Medical Radiation Sciences (Australia), Radiologic Technology (USA) and Journal of Medical Imaging and Radiation Sciences (Canada)* for all published relevant articles. In Google Scholar, documents were screened on relevance and as relevance declines, screening was limited accordingly. Non-peer-reviewed articles such as white papers and grey literature were obtained through additional searches to ensure comprehensive coverage of both academic and practical insights. Citations within articles were screened by title for relevance to avoid omitting other relevant and eligible studies.[32]

The search strategy employed a combination of keywords, Medical Subject Headings (MeSH) terms, truncation techniques, and Boolean operators (AND/OR) to ensure a comprehensive and precise retrieval.[33] Variations of search terms included "Radiography Manager," "Radiology Division Lead," "Radiology Unit Lead," "Radiography-led Management," "Leadership," "Competencies," and "Attributes/Traits" were systematically used as keywords. However, the reliance on predefined keywords may have excluded studies that used alternative terminologies for similar concepts. This was mitigated by screening reference lists for additional studies. Full search terms and database-specific strategies are detailed in Table 1.

Inclusion and exclusion criteria

Articles published in languages other than English were excluded, as the review team included only native or fluent

Table 1
Full search terms and database-specific strategies.

Database	Search Terms	Boolean Operators	Truncation	MeSH Terms Included
EBSCOhost (MEDLINE, CINAHL, SCOPUS, Academic Search Ultimate)	Radiology division OR Radiology personnel OR Radiography-led management* AND Leadership styles OR Leadership styles OR Leadership qualities OR Management styles OR Leadership behaviours* AND Competence OR Competency OR Competencies OR Knowledge OR Confidence OR Skill*	AND/OR	Radiology-led management* Behaviours* Skill*	Yes, where applicable. e.g. "Leadership" [MeSH}, "Radiography manager" [MeSH] "Professional Competence" [MeSH]
Google Scholar	Radiology division OR Radiology personnel OR Radiography-led management AND Leadership styles OR Leadership styles OR Leadership qualities OR Management styles OR Leadership behaviours* AND Competence OR Competency OR Competencies OR Knowledge OR Confidence OR Skill*	AND/OR	Radiology-led management* Behaviours* Skill*	Not applicable (Google Scholar does not use MeSH Terms. The developed search terms were used independently.
Key Radiography Journals	Radiology division OR Radiology personnel OR Radiography-led management AND Leadership styles OR Leadership styles OR Leadership qualities OR Management styles OR Leadership behaviours* AND Competence OR Competency OR Competencies OR Knowledge OR Confidence OR Skill*	AND/OR	Behaviours*	Depending on the journal's indexing system

speakers of this language.[34] This ensured consistency in interpretation and analysis. The predefined inclusion and exclusion criteria (Table 2) ensured the selection of studies most relevant to this review's research question.

Study/source of evidence selection

The inclusion criteria were developed following the Population, Concept, and Context (PCC) framework, ensuring the selection of studies aligned with the review's objectives.[35,36] This framework helped structure the review's scope to focus on managers and leaders within Radiography services (Table 3).

This process adheres to the methodology described in the JBI System for the Unified Management, Assessment, and Review of Information (SUMARI) for evidence synthesis and management.[28,37] All studies that met the predefined eligibility criteria were further assessed for full-text content alignment, and those that were ambiguous were excluded. The article screening and selection process is summarised to provide a clear and systematic representation of the study selection process.[37]

Data charting/extraction

Key data extracted included author(s), year of publication, study design, participant characteristics (e.g., sample size and demographics), and findings related to competencies and leadership attributes in radiography-led management. Data extraction was independently conducted, and discrepancies were resolved

Table 2
Inclusion and exclusion criteria.

Inclusion Criteria	Exclusion Criteria	Justification
Articles focusing on core competencies and leadership attributes across radiographer-led management and/or leadership roles.	Studies unrelated to core competencies and leadership attributes across radiographer-led management and/or leadership roles.	This criterion ensures the review addresses the core competencies and leadership attributes relevant to radiographer-led management and leadership roles. Excluding studies unrelated to the topic
Research articles, reviews, or empirical studies exploring competencies and leadership attributes for roles such as radiography manager/leader, radiotherapy lead, superintendent, or modality lead, covering both diagnostic and therapeutic radiography practice.	Studies focus solely on general management and leadership competencies unrelated to diagnostic or therapeutic radiography.	Including studies on diagnostic and therapeutic roles ensures a comprehensive understanding of core competencies and leadership attributes, while excluding irrelevant studies maintains focus on radiography-specific management and leadership.
Publications in peer-reviewed journals, conference proceedings, dissertations, and conceptual papers are included if they address key themes or research questions.	Non-academic sources include opinion pieces, non-peer-reviewed editorials, or news articles that do not address key themes or research questions.	Peer-reviewed publications provide reliable information through rigorous evaluation, while conference proceedings and dissertations broaden the scope with rigour. Excluding non-academic sources maintains scholarly integrity.
Studies conducted in any geographical location, including low-, middle- and high-income countries, or in any healthcare setting, such as hospitals, clinics, or community-based facilities, were included.	Studies are published in languages other than English unless an English translation is available.	Including studies from diverse geographical locations and healthcare settings enhances generalisability, while excluding non-English studies ensures reviewers' accessibility.
Studies with clear methodologies and conceptual or reflective insights. Include older studies to contribute unique insights or foundational knowledge not addressed in recent research.	Duplicate publications or studies with overlapping data from the same research project are excluded.	Clear methodological descriptions and reflective studies ensure transparency, reproducibility, and rigour. Excluding duplicates avoids redundancy and bias while including all relevant literature, regardless of age, ensuring each study makes a distinct and valid contribution.

Table 3
PCC framework for study inclusion.

Component	Description
Population	Radiography leaders and managers
Concept	Competence and leadership attributes
Context	Radiography-led management, Radiography, Medical imaging, Radiologic technology

through discussion with the research team. Although a formal critical appraisal was not conducted, given the scoping nature of the review,[26,27,34] the methodological rigour of the studies was considered to ensure that the included studies were relevant and reliable for addressing the review question.[38] Studies with notable limitations or biases were flagged, and their impact on the overall findings was discussed. Data from the included studies were organised using Microsoft Excel 2023 for Mac and Mendeley (v.2.1) for reference management and citation tracking.

Data analysis and synthesis

A parallel results convergent data synthesis approach was employed for the analysis of the extracted data.[39] The extracted data was exported from an Microsoft theExcel to Nvivo™ (v14) for independent management and analysis. A word search of frequently used terms across all studies was conducted using Nvivo™ to identify key patterns and emerging trends. Fig. 1 visually emphasises the most frequently mentioned competencies and leadership attributes, offering insights into skills and attributes essential for radiography-led roles. Each included article was critically read and coded using open hierarchy coding to refine concepts and generate themes. The synthesised results were then integrated into summary outcomes using inductive narrative analysis, providing rich insights into the findings and uncovering overarching themes. This iterative process ensured the data was effectively managed, analysed, and linked to the study objectives.[40,41]

Results

Study selection

A total of 1905 records were identified. After removing duplicates and non-academic sources, 257 underwent screening, with 192 excluded for irrelevance. The full-text creation of 66 reports led to the exclusion of 39 articles due to inaccessibility and 5 articles for not meeting the criteria. An additional 17 records were identified, with 12 excluded. The final selection included 23 articles and two policy documents (see Fig. 2). The included studies covered various global regions, with the United Kingdom (UK) being the most represented (n = 13, 52 %). This was followed by Australia (n = 4, 16 %) and South Africa (n = 2, 8 %). Additionally, New Zealand, Zimbabwe , Norway , Malta , and the United States (USA) each contributed a single (n=1, 4%) study. Finally, one article was from a multi-national European study (n = 1, 4 %), where specific countries were not identified.

Competencies and leadership attributes essential for radiography management are primarily reported in studies from the UK (52 %), reflecting a strong national and/or professional interest in radiography leadership. Australia (16 %) and South Africa (8 %) also contributed valuable insights, while the smaller contributions from New Zealand, Zimbabwe, Norway, Malta, USA, and a multi-national European study each (4 %) reinforce the topic's global significance. The geographical distribution of the included articles and the contributions to the various identified themes are presented in Table 4.

Study characteristics

Publication trends over the past two decades reveal an increasing focus on radiography-led management, with significant peaks in 2022 (n = 6) and 2016 (n = 3), which comprises qualitative (n = 7) and quantitative (n = 2) research. The UK (n = 4)

Figure 1. Word cloud of the frequently mentioned competencies and leadership attributes across the included articles.

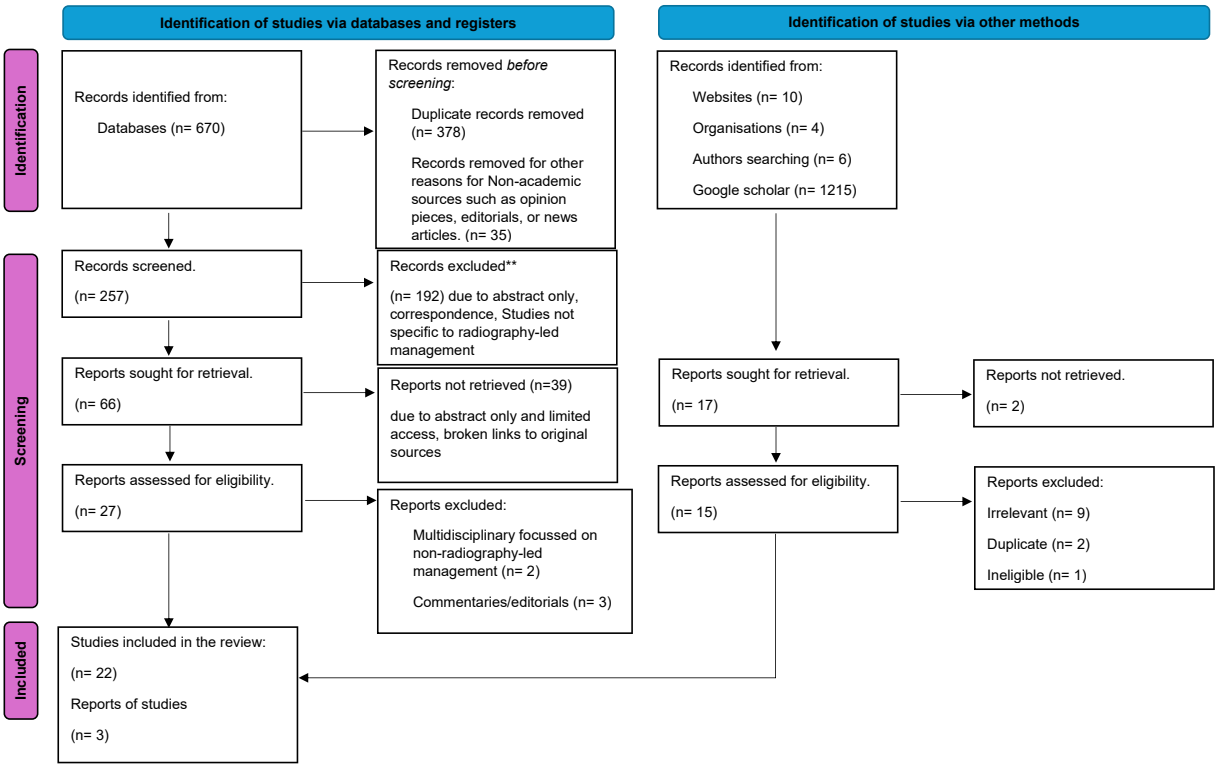

Figure 2. PRISMA flow chart.

contributed the most studies during these peak years, followed by South Africa (n = 2), Australia (n = 1), USA (n = 1), and multi-nation European (n = 1). This trend may reflect the increasing focus on competencies and leadership attributes in clinical Radiography practice. Moreover, advancements in healthcare policies during these periods suggest a link between practice and research output to address evolving challenges in radiography-led management. The annual publication trends are shown in Fig. 3.

Communication skills (n = 7) and team collaboration (n = 7) emerged as the most frequently discussed competency, followed by education and training (n = 6) and problem-solving/critical thinking (n = 6) (see Fig. 4). Moderately frequent competencies include technical expertise (n = 5), research and evidence-based practice (=5), and adaptability/change management (n = 5). Lastly, emotional intelligence (EI) (n = 4) and quality and safety management (n = 4) were the least frequently identified. The absolute frequencies of the competencies discussed across the included studies are presented in Fig. 4.

The most frequently cited leadership attributes identified include visionary thinking (n = 9) and interprofessional skills (n = 9) then followed by mentorship and coaching (n = 8). Decision-making (n = 5) and strategic planning/direction (n = 5) are moderately cited. Less commonly discussed attributes but still relevant are resilience and adaptability (n = 4), ethical leadership (n = 4), Transformational leadership (n = 4), and EI (n = 4). The distribution of these attributes is illustrated in Fig. 5.

Core competencies and leadership attributes were identified during the initial coding process, and then the development of key themes was guided by their relevance to the study's aims and findings. Themes were derived through an iterative process of connecting and consolidating concepts, prioritising those deemed most significant for further discussion. This process resulted in four overarching themes: Emotional intelligence (EI), collaboration and interdisciplinary teamwork, strategic vision and resilience, professional development and role clarity.

Discussion

Over the past two decades, research into the competencies and leadership attributes essential for radiographer-led management has been dominated by studies from the UK, Australia, and South Africa, reflecting the existence of advanced professional standards within the healthcare management structures for inclusive and multidisciplinary leadership. This review identified vital competencies, including team collaboration, communication, education and training, problem-solving/critical thinking, technical expertise, and research/evidence-based practice[42–47] as crucial for radiographer-led management within the clinical environment. Visionary thinking, interprofessional skills, mentorship and coaching, decision-making, EI, resilience, mentorship and strategic planning also emerged as core leadership attributes[48–54] necessary for effective Radiography-led management. While this body of literature offers valuable insights, its focus on well-established healthcare settings highlights potential geographic and contextual bias.[55] Notably, publication peaks were identified in 2022 and 2016, reflecting the evolving healthcare policies and growing research interest.

Competencies and leadership attributes

Team collaboration and communications are pivotal in collaboration and effective patient engagement.[46,51,56,57] These competencies are particularly relevant in clinical practice, where radiographers often navigate interaction between diverse teams, such as radiologists and other healthcare professionals. This also implies that these competencies are applicable across regions, but it fails to consider the differences in healthcare systems worldwide. Thus limiting the generalisability of these findings. Technical expertise emerged as critical, particularly in advanced and consultant radiography roles where operational proficiency is vital.[43,48,53,58] While this aligns with the role-specific demands of

Table 4
Charted and synthesised data.

Study ID	Title	Author and Year	Study type	Country	Aim	Study designs and methods	Sample size	Core competencies	Leadership attributes	Key findings and conclusions	Emerging themes and sub-themes
S1	Examining the relationship between emotional intelligence, leadership attributes, and workplace experience of Australian chief radiographers	Abu Awad et al., 2020	Primary research	Australia	To investigate the relationship between emotional intelligence (EI) scores and leadership attributes among Australian chief radiographers.	Cross-sectional survey design	22 chief radiographers	• Emotional intelligence (EI) • Better staff engagement and performance • Improved patient and customer satisfaction.	• Communication skills • Collaboration • Vision-setting • Fostering a positive work environment.	Chief radiographers from larger hospitals scored lower on the TEIQue-SF sociability factor than those from smaller hospitals. Chief radiographers with less than 10 years of experience scored higher on the LSAT 'Developing Capability' dimensions than those with more experience. Increasing years of experience as a chief radiographer was associated with a reduction across some emotional intelligence and LSAT factors. The findings suggest the need for increased support to senior for senior professional leadership and job performance.	Themes: • Relationship between emotional intelligence and leadership attributes among chief radiographers. • Impact of hospital size and years of experience on emotional intelligence and leadership behaviours. • Implications for supporting senior leaders in the radiography profession to enhance leadership and job performance.
S2	Radiographer managers and service development: a Delphi study to determine an MRI service portfolio for year 2020	Castillo et al., 2015	Primary research	Malta	To develop a comprehensive MRI service portfolio for 2020, aligning continuing professional development (CPD) for radiographers with the anticipated needs of MRI services.	Delphi method	15 stakeholder experts and leaders in MRI services.	• Technical Expertise • Research Skills • Education and Training • Quality and Safety Management • Interprofessional Collaboration • Patient Accessibility	• Visionary Thinking • Decision-Making Skills • Communication Skills • Advocacy • Change Management practices. • Team Building	The study highlighted significant issues related to research and education, quality and safety in MRI, and the need for updated MRI referral guidelines. It concluded that a systematic approach to forecasting an MRI service portfolio is essential for addressing local healthcare needs and avoiding subjectivity in service development.	Themes: • Staff and Public Education • Need for ongoing research to inform service development. • Current Procedures • Future Services and Technology • Legislation, Quality, and Safety considerations
S3	Training and development for radiographers' extended roles	Miller et al., 2011	Primary research	United Kingdom	To examine the training and development of diagnostic radiographers in extended roles and explore hospital recruitment policies for accredited and non-accredited training.	A mixed-methods approach, including a postal questionnaire survey and telephone interviews with selected managers.	Not specified	• Training quality • Consistency • Skill development • Assessment and validation • Recruitment policies	• Vision for standardisation • Influence on policy • Commitment to patient safety • With accrediting bodies • Responsiveness to training needs	• Over 80 % of survey respondents supported the development of external standards as benchmarks for training. • Most respondents believed there was a role for a validating/ professional body to endorse training for extended role activities. • Managers expressed concerns about the availability and nature of training for existing and newly recruited staff. • The study identified a need for national standards to provide	Themes: • Need for external standards • Role of accrediting bodies • Recruitment challenges • Quality assurance concerns • Variability in training

										a performance benchmark for radiographers in extended roles.	
S4	How do consultant radiographers contribute to imaging service delivery and leadership?	Snaith et al., 2019	Primary research	United Kingdom	The study's primary aim was to understand the roles of consultant radiographers and how they contribute to imaging leadership and management.	Activity diaries analysis over a 7-day period.	6 consultant radiographers	• Clinical expertise • Management skills • Educational skills • Research and audit	• Visibility and Knowledge • Collaboration and Connections • Flexibility • The ability to impact practices and policies within the imaging service and the broader healthcare system.	• Consultant radiographers engage in various activities that reflect their complex roles. • There is a significant volume of administrative tasks impact their ability to deliver clinical care. • The consultants' influence extends beyond their local departments to the broader health system and profession. • The study highlighted the importance of both clinical and strategic leadership roles. Conclusions: • Consultant radiographers fulfil the leadership expectations of their roles and significantly contribute to service delivery and capacity generation. • The impact of these roles is multifaceted and cannot be underestimated.	Themes and Subthemes: 1)Multitasking and broad caseloads. • Variability in weekly activities (clinical vs. managerial). 2)Administrative Burden: • High volume of paperwork and correspondence. • Challenges in delivering care due to administrative responsibilities. 3)Leadership Impact: • Strategic and clinical leadership at various levels (clinical, organisational, system, and national). • The necessity for diverse leadership styles
S5	Leadership, clinician managers and a thing called "hybridity"	Fulop 2012	Primary research	Australia	Explore the concept of "hybridity" in leadership roles of clinician managers in healthcare	Qualitative methods involving interviews with clinician managers	7 clinician managers were interviewed.	• Collaborative in decision-making skills • Adaptability and flexibility in complex healthcare environments • Strategic thinking and problem-solving abilities • Commitment to continuous learning and professional development	• Ability to navigate the intersection of clinical practice and management • Strong communication and relationship-building skills • Emotional intelligence and empathy towards team members • Ethical decision-making and	Identified challenges and dynamics of leadership roles for clinician managers, emphasising the importance of understanding hybridity in healthcare leadership	Themes: • Collaboration in decision-making • Leadership in healthcare settings

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Table 4 (*continued*)

Study ID	Title	Author and Year	Study type	Country	Aim	Study designs and methods	Sample size	Core competencies	Leadership attributes	Key findings and conclusions	Emerging themes and sub-themes
									integrity in leadership roles		
S6	Establishing advanced practice for medical imaging in New Zealand	Yielder et al., 2014	Primary research	New Zealand	To develop profiles and criteria for advanced practice roles in medical imaging in New Zealand	Cross-sectional survey methods	58 participants	• Advanced Clinical Knowledge • Effective Communication Skills • Decision-making and Prioritisation	• Leading and implementing best practices. • Encouraging the introduction of new practices. • Fostering a culture of continuous professional development	The study found significant barriers to advanced practice roles, including a lack of radiologist support and financial limitations, but also identified strengths, such as workplace enthusiasm and eagerness for role development. The study concluded that sustainable separate advanced scopes of practice for different specialities might be unlikely due to the small population of MRTs in New Zealand.	Themes: • Support for Advanced practice roles • Barriers to implementation • Departmental Strengths and limitations • Need for Formal Education and Training • Variation in Agreement on Skills Criteria • Integration of Multidisciplinary
S7	Leadership and the everyday practice of consultant radiographers in the UK: transformational ideals and the generation of self-efficacy	Booth et al., 2017	Primary research	United Kingdom	To investigate the leadership experiences of consultant radiographers and how they assess their leadership effectiveness	Qualitative thematic analysis of interviews	6 Consultant Radiographers	• Role modelling and inspiration • Support and guidance • Problem-solving and process optimisation • Self-evaluation and goal orientation • Self-efficacy and trust building	• Transformational leadership • Self-assessment • Decision-making	Participants described their leadership practices aligning with transformational leadership principles, such as exerting positive influence and inspiring collective action. In real professional environments, participants sometimes found direct managerial approaches more effective than transformational leadership. Participants evaluated their success as leaders based on institutional goals and personal achievements that surprised them or garnered colleagues' trust.	Themes: • Balancing leadership styles • Self-efficacy • Impact of practical constraints • Evaluation of success
S8	A literature review exploring the perceived impact, challenges and barriers of advanced and consultant practice in therapeutic radiography	Caulfield 2021	Systematic review	United Kingdom	To explore the perceived impact, challenges, and barriers of advanced and consultant radiographer roles on staff, patients, and healthcare.	A systematic literature review with qualitative thematic analysis.	11 articles (independent sample sizes not specified)	• Team/ professional leadership • Practice and service development Education and training • Research and development	• Clinical leadership Strategic direction within clinical areas of expertise • Implementation of clinical governance • Expansion and development of practice • Delivery of improved outcomes for patients	Most advanced and consultant radiographers felt unprepared for their roles, with varied and often misunderstood education requirements. Advanced and consultant radiographers reported high job satisfaction, believing their roles benefitted patients and their careers. Advanced and consultant roles improved patient care by streamlining pathways and increasing satisfaction while providing time and cost savings for healthcare. Implementation obstacles were primarily due to a lack of understanding and support from colleagues.	Themes: • Education • Quality of Working Life • Patient Care • Benefit to Healthcare • Implementation Obstacles • Challenges related to understanding and support from colleagues.
S9	Reflections on the role of consultant radiographers in the UK: the perceived impact on practice and	Henwood et al., 2016	Primary research	United Kingdom	To assess the perceived impact of consultant radiographers on practice and	Longitudinal case study with phenomenological interviews.	8 consultant radiographers and 6 completed the study.	• Clinical Skills • Leadership Skills • People management	• Visionary Thinking • Coaching and Mentoring	All participants reported that their roles benefited service delivery and patient care. They identified obstacles such as increased workload, time	Themes: • Perceived Impact on Practice

	factors that support and hinder the role				identify factors supporting or hindering their roles.			• Strategic planning • Decision-making • Communication Skills • Self-Belief and Confidence	• Adaptability • Resilience	pressures, and occasional resistance from colleagues. Support mechanisms included strong professional networks and institutional backing. Recommendations were made to enhance support for these roles.	• Developing new services • Factors that Support or Hinder Consultant Practice • Lack of support • Organisational structures • Time and workload
S10*	Advanced practice roles amongst therapeutic radiographers/radiation therapists: a European survey	Oliveira et al., 2022	Primary research	Multi-national European	To assess advanced practice (AP) roles among Therapeutic Radiographers/ Radiation Therapists (TR/ RTTs) and identify educational gaps across Europe.	Cross-sectional survey methods	189 participants	• Clinical Expertise • Patient Care Management • Multimodal Imaging • Quality Assurance • Risk Management • Technical Proficiency • Research and Evidence-Based Practice • Communication Skills • Interdisciplinary collaboration	• Strategic Thinking • Influencing Skills • Decision-Making • Team Leadership • Change Management • Mentorship • Conflict Resolution • Emotional Intelligence • Visionary Leadership • Advocacy for Professional Development	Demographics: Most respondents were female (72 %), and TR/RTTs working in advanced practice roles were significantly represented. Geographical Representation: Respondents came from 21 European countries, with the UK, Portugal, and Ireland being the most represented.Professional Roles: The most prominent group self-reported as TR/ RTTs working in advanced practice roles, followed by advanced practitioners (APs). Survey Engagement: The study utilised convenience sampling and various dissemination strategies to ensure a diverse response. ConclusionsThe study concludes that there is a need for further development of advanced practice roles among TR/RTTs in Europe, highlighting the importance of tailored education and training to meet the evolving demands of the healthcare landscape.	Themes: • Professional Development • Role clarity • Collaboration
S11	Reflections on the role of consultant radiographers in the UK: what is a consultant radiographer?	Booth et al., 2016	Primary research	United Kingdom	To explore the nature and scope of consultant radiographer roles in the UK	Longitudinal case study with thematic analysis of interviews	6 Consultant Radiographers	• Clinical expertise • Situational Awareness • Boundary Spanning	• Transformational Leadership • Interpersonal Skills • Mentorship • Strategic Orientation	The study found significant variation in consultant roles, primarily driven by local clinical needs and individual skills. The clinical aspect dominated, while research was the least supported domain. There was a lack of clarity around the role, with concerns about remuneration and limitations hindering further development.	Themes and Subthemes: • Variation in role definitions • Dominance of clinical duties • Underemphasis on research, • Need for clearer role frameworks.
S12	Embedding consultant radiographer roles within radiology departments: a framework for success	Nightingale et al., 2018	Primary research	United Kingdom	To develop and evaluate an outcomes framework to support the transition of trainee consultant radiographers into their roles, ensuring clarity in the expectations and competencies required for consultant practice.	Longitudinal qualitative design, incorporating individual interviews, focus groups, and group interviews over five years.	5 trainee consultant radiographers.	• Expert clinical practice • Professional leadership and consultancy • Service development • Research and evaluation • Education and professional development	• Confidence in leadership roles • Ability to facilitate staff development • Skills in driving clinical audit and service evaluation	Participants initially felt comfortable with their clinical skills but expressed anxiety regarding leadership capabilities. Over time, participants reported increased confidence in their leadership roles and the integration of framework objectives into their daily practices. The framework effectively guided participants and prevented them from viewing objectives as mere bureaucratic tasks.	Themes: • Professional Development • Leadership and Confidence • Engagement in leadership roles and responsibilities • Framework Utilisation • Collaboration and Engagement

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Table 4 (*continued*)

Study ID	Title	Author and Year	Study type	Country	Aim	Study designs and methods	Sample size	Core competencies	Leadership attributes	Key findings and conclusions	Emerging themes and sub-themes
S13	A UK-wide analysis of trait emotional intelligence within the radiography profession	Mackay et al., 2013	Primary research	United Kingdom	To profile the radiography profession's Trait Emotional Intelligence (EI), explore differences between subgroups, compare the profession with a normative group, and investigate the relationship between EI and the profession's leaders.	Cross-sectional online survey methods	1997 radiographers across all levels	• Emotional intelligence • Communication Skills • Teamwork and Collaboration • Problem-Solving • Critical Thinking	• Clinical leadership • Emotional intelligence and leadership • Influence on team • Development of future leaders • Benchmarking and research	The study concluded that Trait EI is an essential attribute within radiography, with notable differences among subgroups. It highlighted the need for further research to understand the implications of these differences and the relationship between emotional intelligence and effective leadership, especially in advanced practice roles.	Theme and subthemes: • Variation in Emotional Intelligence Across Specialties • Correlation Between Leadership and Higher EI • Benchmarking EI in Radiography • Importance of Sociability and Interpersonal Skills • Potential for Targeted EI Training • Impact of Experience on EI • Need for Future Research on EI Development
S14	Education and career framework for the radiography workforce (4th edition)	The Society and College of Radiographers 2022	Professional guidance document	United Kingdom	To provide a structured career development framework for radiographers, outlining education, competencies, and leadership expectations at various levels of practice.	Delphi study methods	115 participants	• Leadership and service management • Education and training • Research and development • Clinical expertise	• Compassionate leadership • Resilience and adaptability • Ethical leadership • Strategic vision • Effective communication • Accountability and responsibility	The radiography workforce must continue evolving to meet future healthcare needs, mainly through education, leadership, and technology integration. • It is essential that radiographers at all levels, from support workers to consultant practitioners, be adaptive and knowledgeable in patient-centred care, technological advancements, and leadership. • Continuing Professional Development (CPD) is critical in ensuring the workforce remains future-facing and can contribute to service transformation.	Themes: • Patient-Centric Care Technology and Innovation • Professional Development • Leadership at All Levels
S15	Advanced and extended scope practice of diagnostic radiographers in Scotland: exploring strategic imaging service imperatives	Henderson et al., 2017	Primary research	United Kingdom	To investigate the perspectives of strategic service managers on implementing advanced and extended-scope practices among diagnostic radiographers in Scotland.	A mixed-methods approach	14 strategic service managers	• Change Management • Strategic Thinking • Advocacy and Negotiation Skills • Team Building and Collaboration • Commitment to Professional Development	• Visionary Leadership • Effective Communication • Emotional Intelligence • Cultural Competence	The key findings highlight the critical role of radiography managers in leading imaging services and aligning them with broader healthcare goals, particularly in implementing advanced practice roles. Managers must address financial, logistical, and cultural barriers while promoting collaboration among healthcare professionals. Training and development are essential for staff to take on advanced roles, and optimism can be leveraged to inspire innovation and manage change effectively. Adequate resources, including staffing and equipment, are crucial for delivering high-quality services, and all improvements must focus on	Themes and Subthemes: • Barriers to Change • Financial constraints • Logistical challenges • Political influences • Cultural attitudes within the radiological community • Opportunities for Development • Initiatives for role expansion • Importance of strategic vision and teamwork • Implementation Challenges • Variability in local developments

									enhancing patient outcomes and satisfaction.	
S16	Conceptualisation of the characteristics of advanced practitioners in the medical radiation professions	Smith et al., 2015	Theoretical article	Australia	To develop a conceptual model defining the characteristics of advanced practitioners in the medical radiation professions, incorporating experiences from various countries and professions.	Literature review and conceptual model approach.	Not specified	• Communication • Collaboration • Professionalism • Clinical expertise • Scholarship and teaching • Evidence-based practice • Clinical leadership	• Strategic Vision • Advocacy • Influence in Decision-Making • Mentorship	The study emphasises the importance of foundation characteristics in advanced practice roles. It highlights the need for advanced practitioners to possess clinical expertise, engage in scholarship and teaching, and apply evidence-based practice. The model suggests that advanced practitioners should be clinical leaders who can influence decision-making and advocate for patients. Conclusions The proposed conceptual model is robust yet adaptable, defining generic characteristics of advanced practitioners across various clinical specialities. The evolution of advanced practice roles must focus on the needs of patients and local communities.	Themes: • Professional Maturity • Challenging Professional Boundaries • Pioneering Innovations
S17	From the clinical to the managerial domain: the lived experience of role transition from radiographer to radiology manager in south-east Queensland	Thompson et al., 2016	Primary research	Australia	To explore the lived experiences of radiographers transitioning from clinical roles to managerial positions, focusing on the challenges and identity shifts encountered during this process.	Descriptive phenomenological approach	6 radiology managers	• Leadership and management skills • Communication • Strategic planning • Resource management	• Adaptability • Emotional intelligence • Decision-making • Conflict resolution	All participants had a strong drive to succeed during their role transition. The importance of comprehensive orientation and mentorship was highlighted. Training and support were deemed essential, particularly in people management and communication. Access to networking opportunities was crucial. Clear expectations from higher management were necessary to reduce role ambiguity. The study concluded that role transition can be fraught with uncertainty, but having support mechanisms in place before, during, and after the transition can significantly ease the process. Participants expressed that the level of support they received did not meet their needs, indicating a gap in organisational planning and support for new managers.	Themes: • Drive to Succeed • Need for Support • Role clarity • Networking Opportunities • Communication Skills Subthemes: • Lack of preparation for management roles. • Absence of performance objectives and guidance. • Need for formal transition processes and orientation.
S18	Moving domains: radiographers as managers in NHS	Forbes and Prime 2000	Primary research	United Kingdom	To explore the transition of radiographers into managerial roles within the National Health Service (NHS), examining the challenges and adaptations involved in this role change.	Qualitative comparative study	25 radiographer managers	• Operational Management • Strategic Planning • Professionalism • Conflict Resolution	• Resilience • Adaptability • Decision-Making • Balancing Clinical and Managerial Responsibilities	Radiographer managers are developing hybrid roles that combine clinical expertise with management responsibilities. There is a tension in transitioning from professional to managerial roles, characterised by: Role conflict, an emergent management style, a lack of management development and training, the transition is challenging, requiring new	Themes: • Development of hybrid management roles. • Professionalism • Management Style • Role Conflict • Role Change

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Table 4 (*continued*)

Study ID	Title	Author and Year	Study type	Country	Aim	Study designs and methods	Sample size	Core competencies	Leadership attributes	Key findings and conclusions	Emerging themes and sub-themes
										skills and a shift in mindset from immediate clinical results to longer-term management outcomes.	
S19	Managers' experience of success criteria and barriers to implementing mobile radiography services in nursing homes in Norway: a qualitative study	Kjelle et al., 2018	Primary research	Norway	The study explored managers' experiences implementing mobile radiography services in nursing homes, identifying success criteria and barriers.	A semi-structured interview	11 managers	The text does not explicitly list core competencies and leadership attributes. Still, it discusses the importance of collaboration, management skills, and navigating financial and procedural challenges for effective leadership in this context.	The text does not explicitly list core competencies and leadership attributes. Still, it discusses the importance of collaboration, management skills, and navigating financial and procedural challenges for effective leadership in this context.	The study identified five main categories: National health policy, regional and municipal policy, inter-organisational implementation projects, experienced outcomes, professional skills and personal characteristics. Key barriers included financial, procedural, and structural challenges related to the reimbursement system and lack of management across healthcare levels. The study concluded that financial, structural, and procedural barriers hinder mobile radiography services, while success depends on external funding and organisational support. Changes in healthcare management, economic systems, and information systems are necessary to enhance the adoption of new technologies and mobile services.	Themes and Subthemes: Barriers: • Financial constraints due to reimbursement systems • Structural issues in healthcare management • Procedural challenges with information system compatibility Facilitators: • Availability of external funding • Engaged and enthusiastic personnel • Strong inter-organizational collaboration
S20	The role of the consultant radiographer-experience of appointees	Ford 2010	Primary research	United Kingdom	The study aimed to explore the experiences of the first consultant radiographers appointed, focusing on their roles, challenges, and perceptions of success.	A mixed-methods approach	10 consultant radiographers	• Expert clinical practice • Leadership Practice and service development • Education and research	• Autonomy in clinical care • Leadership in improving patient pathways • Support for neglected patient groups	Consultant radiographers experienced a positive impact on patient care but faced challenges in balancing clinical responsibilities with leadership and educational roles. There was limited involvement in service redesign despite substantial success in patient care. Support from other clinicians was positive, but peer and management support were lacking. The roles were primarily driven by the shortage of radiologists and the need to meet healthcare targets.	Themes: • Consultancy and Role Creation • Leadership in specific clinical areas. • Challenges in Role Balance. • Impact on Patient Care • Improvements in patient care were evident. • There is a need for further research on the evolving roles and job satisfaction.
S21	Consultant radiographer: Guidance for the support of new and established roles (second edition)	The Society and college of Radiographers (SoR) 2022	Professional guidance document	United Kingdom	The guidance aims to facilitate the transition to consultant practice for radiographers, providing a framework for development and support.	The document outlines a framework and guidance. It includes an outcomes framework and competencies for Consultant Radiographers.	Not specified	• High-level clinical expertise • Engagement across multiple domains of practice • Research and audit capabilities • Leadership and change management skills	• Mentorship and coaching • Service representation • Development of workforce plans • Engagement in academic partnerships	• A structured framework is essential for the development of Consultant Radiographers. • Mentorship and peer support are critical for successful transitions. • Demonstrating impact through audits and research is	Themes: • Professional Development: Continuous learning and adaptation to new roles. Subtheme: • Importance of mentorship and peer support. Themes: • Impact Measurement: The necessity of

										vital for professional development. The conclusion highlights the importance of ongoing professional development and the need for clear pathways to consultant roles within radiography.	demonstrating the effectiveness of consultant roles. Subtheme: • Use of audits and research to showcase outcomes. Themes: • Leadership in Practice
S22	South African radiography leadership co-constructing radiation protection change ideas	Lewis et al., 2022	Primary research	South Africa	The study aimed to explore co-constructed change ideas to facilitate optimal radiation protection among radiography managers in South Africa.	Qualitative research approach using focus group interviews.	8 radiography managers	• Knowledge of Radiation Protection. • Instruction and Education • Effective Communication • Critical Thinking • Research Involvement	• Leadership in Collaboration • Advocacy for Education • Understanding and Empowerment • Vision and Strategic Thinking • Commitment to Safety Culture • Responsibility and Accountability	• Radiography managers correctly defined radiation protection but observed suboptimal practices among radiographers. • Suboptimal practices were attributed to factors such as the diminished stature of radiographers, the hidden curriculum in education, and individual attitudes toward radiation protection. • Suggested strategies for improvement included collaboration among stakeholders, enhanced education, research funding, and the development of standardised national policies. • Compliance and accountability in radiation protection practices were emphasised as personal choices that require organizational support.	Theme 1: Understanding of radiation protection and current practices Subthemes: • Correct understanding vs. poor application of radiation protection principles. • Influence of professional status and education on practices. Theme 2: Vision for an ideal radiation protection environment Subthemes: • Suggestions for systemic changes in radiation safety culture. • Importance of continuous education and research in optimizing practices.
S23	Factors leading to disruptive behaviours at central hospitals in Harare metropolitan province: radiography managers perspectives	Chinene et al., 2022	Primary research	Zimbabwe	To explore radiography managers' perspectives on the environmental and cultural factors leading to disruptive behaviours involving radiographers at central hospitals in the Harare Metropolitan Province.	Exploratory qualitative study employing in-depth interviews.	11 radiography managers.	• Understanding Power Dynamics • Creating a Supportive Work Environment • Effective Communication • Conflict Resolution • Implementation of Protocols	• Trustworthiness • Empathy • Fairness • Visionary Thinking • Decisiveness	• Environmental factors, particularly power hierarchies and work environments play a significant role in leading to disruptive behaviours among radiographers. • The lack of a formalised reporting framework contributes to	Theme 1: Power Hierarchy Subthemes: • Superiority • Professional Boundaries • Representation Theme 2: Work Environment Subthemes: • Trust in leadership • Equality • Burnout and fatigue • Remuneration

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Table 4 (*continued*)

Study ID	Title	Author and Year	Study type	Country	Aim	Study designs and methods	Sample size	Core competencies	Leadership attributes	Key findings and conclusions	Emerging themes and sub-themes
										underreporting such behaviours. • Managers indicated strong correlations between managerial practices and disruptive behaviours. • The study underscores the need for targeted policies to foster a healthy work environment and ensure safe patient care.	Theme 3: Reporting Framework Subthemes: • Lack of protocol • Reporting culture
S24	Exploring a model of clinical leadership grounded in radiography: Developing clinical radiography leaders	Dunn 2022	Doctoral dissertation	USA	The study aims to develop a model of clinical leadership that includes the specialised technical skills and leadership behaviours exhibited by clinical radiography leaders and to identify commonly practised clinical leadership behaviours and technical skills associated with these leaders.	A quantitative study that utilised a survey method for data collection.	432 clinical radiography leaders.	• Clinical Decision-Making Skills • Technical Expertise • Effective Communication • Collaboration • Interpersonal Understanding • Clinical Competency • Mentorship	• Transformational Leadership Qualities • Distributed Leadership • Adaptability • Lifelong Learning	• There is a defined correlation between technical skills and leadership behaviours in clinical radiography. • A more comprehensive understanding of clinical leadership can enhance educational curricula, allowing future clinical radiography leaders to develop. • It emphasises the need for standardised leadership competencies within radiography education to better prepare students for leadership roles.	Themes: • Collaborative Leadership • Technical Competency • Education and Training • Mentoring and Clinical Supervision
S25	Radiography managers' perceptions of skills required in public health institutes in Gauteng	Mopeli et al., 2024	Primary research	South Africa	To explore and describe the perceptions of radiography managers regarding management training and skills required in public health institutions	Exploratory qualitative study employing focus group discussions	23 Radiography managers	• Management skills development • Strategic planning • Human resources management • Financial management • Leadership training	• Coaching and mentoring • Visionary leadership • Adaptability in management • Effective communication	• Radiography managers face challenges in transitioning into management roles. • A lack of structured orientation and management support negatively impacts their effectiveness. • The need for postgraduate management	Themes: • Transitioning into radiography management is challenging. • Lack of management support for newly employed radiography managers. • Need for postgraduate

		training and coaching programs was emphasised. • Competency development in leadership and administration is crucial for improving service delivery.	management qualifications. • Coaching and mentoring for radiography managers. • Management competencies and skills for radiography managers.

Note. The table summarises the geographic distribution of studies on competencies and leadership essential for radiography management (S10*) The specific countries in the cross-European study are not specified.

leaders in radiography, the emphasis on technical expertise risks overshadowing the significance of broader managerial capabilities, such as strategic decision-making and conflict resolution. This highlights a potential bias toward traditional, task-specific competencies, which may inadequately address the dynamic nature of leadership in radiography. Education and training were also frequently discussed as pivotal for professional development and radiography role growth.[43–45,53,59,60] However, the findings lack depth regarding how training initiatives are tailored for clinical skills development. This reflects how inadequate the existing opportunities for continuous professional development (CPD) training equip radiography leaders.

Ethical leadership, transformational leadership, quality and safety management, although less commonly addressed, were identified as an area warranting further research to enhance service delivery and patient outcomes.[9,50,53,57] This gap suggests a concerning oversight, given the centrality of safety protocols and quality assurance in ensuring optimal patient outcomes. The included studies primarily focused on clinical or technical competencies, often neglecting the holistic demands of leadership roles.

Regarding leadership attributes identified, visionary thinking and interpersonal skills were consistently recognised as essential for aligning organisational objectives and guiding teams towards long-term goals.[9,43,45,46,48,49,61,62] Resilience and adaptability were noted for their significance in managing challenges and navigating change within a dynamic healthcare environment.[48,50,52,63] However, despite their importance, these leadership attributes receive less attention in the included studies, possibly due to a research focus on more traditional leadership skills. This imbalance underscores limitations in the existing literature. Without integrating these competencies into leadership training and practice, radiography managers/leaders may struggle to balance operational efficiency with patient safety.

Geographical distribution and annual publication trends

Geographically, the UK and Australia accounted for most studies, reflecting their advanced roles and established frameworks for radiography-led management.[48,50,52,54,63] The dominance of the UK and Australia raises concerns about research biases, as studies from regions with established professional frameworks may prioritise traditional, formal leadership structures. This focus risks overlooking informal leadership practices or region-specific challenges in underrepresented areas. However, limited contributions from regions such as Southern Africa, the USA, and other underrepresented areas expose a significant gap in geographic diversity.[43–46,57,60,64] The USA and Southern Africa have distinct healthcare systems, with one characterised by high-resource settings with advanced technologies[60] and the others often facing resource limitations and infrastructural challenges.[45,46,57] Both offer different perspectives that are underrepresented. Similarly, the lone study from Malta, Norway, and New Zealand and a cross-European study with unspecified countries further reflect a skew toward higher-resource settings.

This imbalance restricts the generalisability of current findings, as this creates a risk of developing competency frameworks that overlook the nuances of privately dominated, resource-limited, or hybrid systems found in underrepresented regions. Without sufficient representation from regions with varying socioeconomic and systemic conditions, the current evidence base may perpetuate a narrow understanding of radiography-led management. Thus, increasing studies in underrepresented regions could foster the development of a more holistic and adaptable competency framework, promoting leadership models capable of addressing challenges unique to low-resource and diverse healthcare systems.[65]

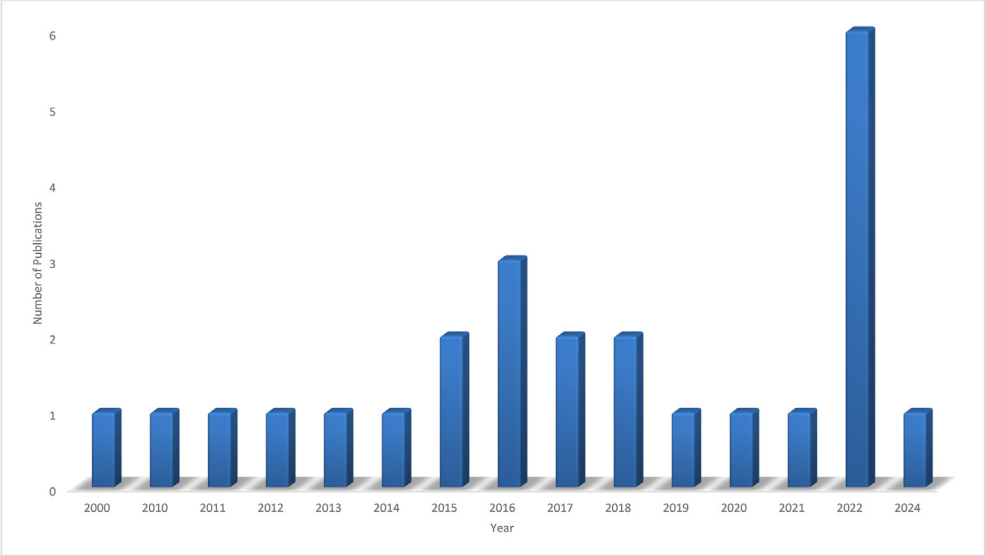
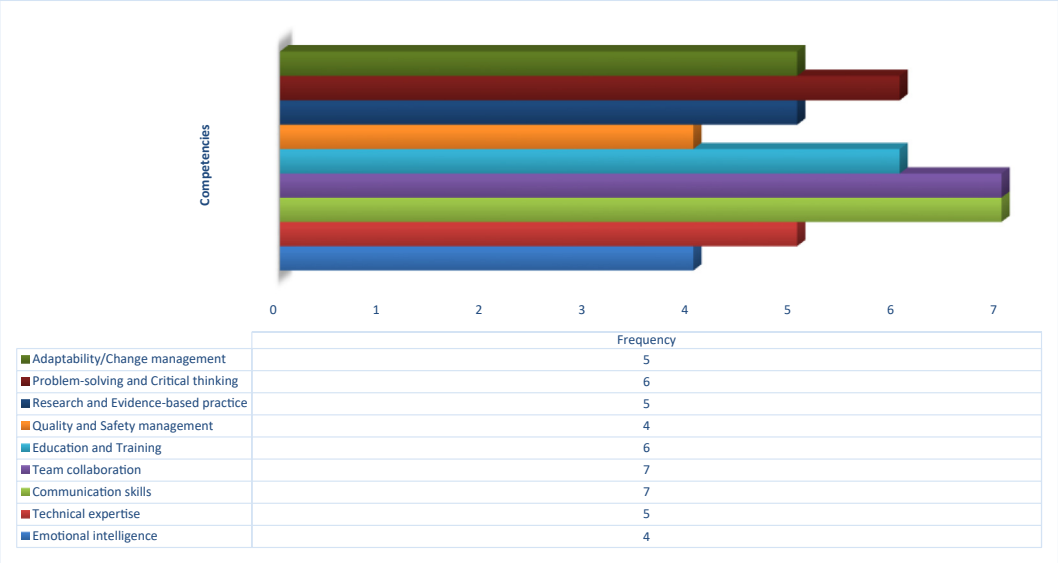


Figure 3. Number of publications per year.



	Frequency
Adaptability/Change management	5
Problem-solving and Critical thinking	6
Research and Evidence-based practice	5
Quality and Safety management	4
Education and Training	6
Team collaboration	7
Communication skills	7
Technical expertise	5
Emotional intelligence	4

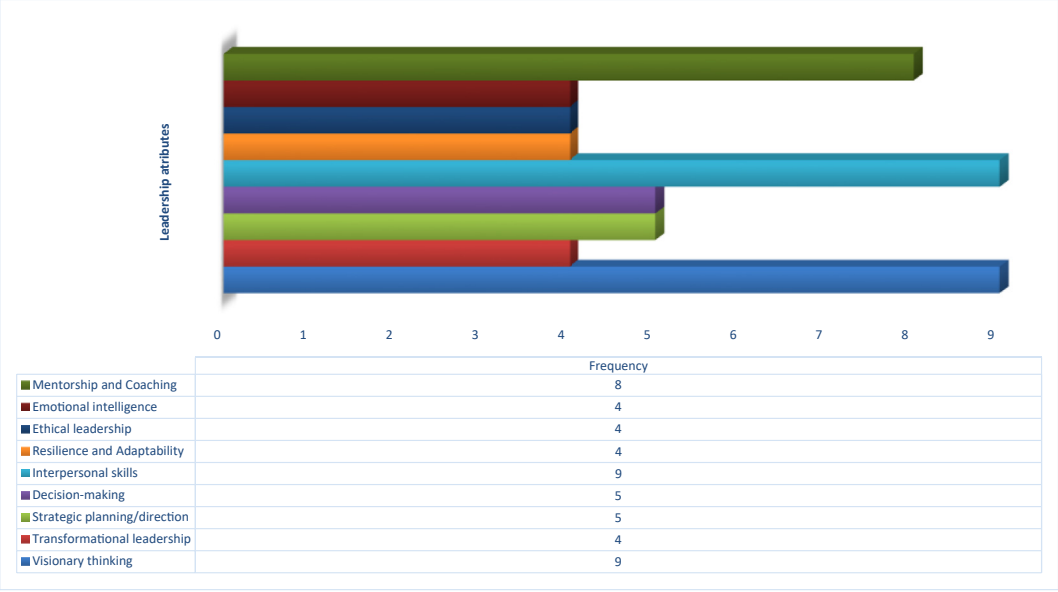
Figure 4. Frequency distribution of competencies identified across studies.

The significant rise in publications in 2022 and 2016 implies a growing recognition of the importance of competencies and leadership attributes in radiography-led management.[44,45,48,50,52,54,57,60,63] These peaks may be related to heightened discussions around reforms,[10,66] and workforce restructuring global events such as the COVID-19 pandemic.[12] The surge in 2022 could indicate an increased focus on leadership crisis management and resilience during this period[4,45,57,60,67–69] The relatively steady and low number of publications before 2016 and after 2022 suggest that radiography-led management was not the primary research focus. This highlights a gap in historical data, particularly in how competencies evolved. The uneven nature of publication trends points to an inconsistent research focus on radiography-led management, which may reflect a disconnect in research contributions. Thus, further research is essential to broaden the scope beyond these dominant regions.

Themes obtained from the included studies

Theme 1: emotional intelligence (EI)

EI is essential for leadership success in radiography as it enhances and influences a leader's ability to manage team dynamics, foster positive collaboration, and make effective strategic decisions.[70,71] However, its practical application is hindered by unclear leadership expectations and insufficient role support, as highlighted in studies from the UK and Australia.[48,49] For example, in Australia, chief radiographers working in larger hospital settings with many years of experience had lower EI scores.[49] This highlights the need to understand how EI evolves in high-pressure environments. Additionally, while the educational and career framework[52] address these issues by emphasising leadership development and resilience, it lacks practical steps to address these emotional challenges which radiographer managers/leaders face.



	Frequency
Mentorship and Coaching	8
Emotional intelligence	4
Ethical leadership	4
Resilience and Adaptability	4
Interpersonal skills	9
Decision-making	5
Strategic planning/direction	5
Transformational leadership	4
Visionary thinking	9

Figure 5:. Frequency distribution of leadership attributes identified across studies.

To address this, healthcare organisations should implement targeted EI training tailored to the pressure of radiography management, and this includes simulations and scenario-based learning.[72] This exercise will help radiographer leaders reflect on their emotions and develop effective coping mechanisms to make balanced decisions. This approach aligns with findings from Nursing[73] and Medicine,[74] where tailored EI training improved team morale and stress management. Future research should explore how EI evolved in radiography leaders to manage emotional challenges in high-pressure healthcare environments.

Theme 2: collaboration and interdisciplinary teamwork

Collaboration and interdisciplinary work are fundamental aspects of effective healthcare delivery, particularly in radiography, where working across different healthcare teams, such as radiologists, nurses, and other specialists, is common.[75] However, the lack of clear leadership roles and support systems impedes these efforts, undermining their potential impact.[76,77] For instance, Kjelle and colleagues[64] identified financial and procedural barriers, along with the lack of cross-organisational leadership, as barriers to collaboration. While Oliviera and colleagues[44] highlighted that unclear role clarity hampers therapeutic radiographers' integration into teams, delaying decision-making and service improvements. Lewis et al.[45] further emphasised the importance of fostering collaboration among radiography leaders through co-constructed leadership strategies involving multiple stakeholders to improve decision-making and service outcomes.

To enhance collaboration, healthcare settings should promote opportunities for radiography leaders to engage in joint projects or decision-making alongside other healthcare professionals.[78] Additionally, regularly updating leadership frameworks and structured career pathways will provide transparency and set clear goals for aspiring leaders. These align with Rosen and colleagues,[79] emphasising the importance of well-defined roles within multidisciplinary teams for effective collaboration.

Theme 3: strategic vision and resilience

A clear strategic vision is essential for radiography leaders to effectively guide their departments and align clinical operations with broader organisational goals.[78] However, maintaining this vision requires significant resilience, as leaders must navigate various challenges, including resource constraints, role ambiguity, and operational pressures.[9,52,56] In Malta,[43] radiography leaders with strong strategic vision could anticipate and plan for future service needs, while in Zimbabwe[57] resilient leaders managed disruptive behaviours and maintained effective team dynamics. However, resource constraints frequently tested their resilience, diverting focus from long-term goals to immediate demands. Similarly, Nilsen and colleagues[80] found that nurse leaders, without a clear vision, struggled to prioritise patient care improvements due to staffing shortages and resource pressures, reinforcing the need for a balance between resilience and strategic planning. The Consultant Radiographer Guidance[54] sought to address these issues by promoting structured frameworks, mentorship, and workforce planning to strengthen leadership support. However, its practical impact remains unclear.

Leadership programmes should prioritise resilience training, equipping leaders with the tools to manage challenges such as staff shortages and budget constraints[81]. Furthermore, radiography leaders should be encouraged to develop long-term strategic plans that align departmental goals with broader organisational objectives,[82] ensuring they can effectively guide their teams through periods of change and innovation.

Theme 4: professional development and role clarity

In the UK, healthcare professionals, including radiographers, must continually develop their skills and knowledge to remain competent.[83] However, the absence of role clarity significantly undermines the impact of continuous professional development , leaving radiographers feeling unprepared for leadership responsabilities.[48] Dunn[60] and Mopeli and colleagues[46] emphasised that structure leadership training, postgraduate management training, and clear role definitions are crucial to support radiographers transitioning into leadership roles. This challenge extends across other healthcare professions, with similar findings reported in nursing.[84,85] Studies show that unclear job descriptions/roles and leadership expectations make it difficult for radiographer leaders to apply skills gained through CPD.[50,56,58]

Healthcare organisations need to align these CPD programmes with well-defined leadership roles.[86] Radiographers should be encouraged to undertake specialised leadership training, such as healthcare management or strategic planning, within the first six months of their managerial or leadership roles. This will ensure they have the skills needed to balance clinical expertise with managerial responsibilities. Furthermore, implementing clear job descriptions and expectations for radiographers transitioning into leadership roles will provide structure and guidance tailored to their professional development.

Limitations

Given the limited research on this topic, the findings predominantly stem from studies conducted in the UK and Australia. While there are some contributions from underrepresented regions, such as three studies from Southern Africa and alone studies from the USA, Malta, Norway and New Zealand, these are insufficient to fully capture the complexity of radiography leadership in diverse contexts, particularly in regions like Asia or resource-limited countries with hybrid healthcare systems. As a result, the findings may not fully capture the global experience of radiography leadership, particularly in areas with distinct healthcare settings.

Efforts were made to include grey literature by searching professional journals and Google Scholar. However, some unpublished or non-digitised resources might not have been captured, which may have limited the review's comprehensiveness. The PCC framework ensured alignment between the study's objectives and the selected literature. However, its reliance on predefined categories may have limited exploration of emerging themes beyond these areas.

Furthermore, the review's scope is further narrowed by limitations such as excluding non-English studies, the potential oversight of grey or unpublished literature, and access restrictions to certain materials. These constraints reduce the diversity of perspectives and highlight the need for more inclusive research to better capture the global landscape of radiographer-led management.

Conclusion

This scoping review provides comprehensive insights into the essential competencies and leadership attributes required for radiographer-led management. The findings highlight the critical role of EI, resilience, interdisciplinary collaboration, professional development and role clarity in strengthening radiography leadership and management.

The included studies reveal significant challenges for radiographer managers or in leadership roles, particularly in high-pressure healthcare environments. These challenges include resource constraints, role ambiguity, and interdisciplinary collaboration. Although the Framework for Professional Leadership in Clinical Imaging and Radiotherapy and Oncology Services by the College of Radiographers offers general guidance and support for managers and leaders, it does not provide an exhaustive or contemporary list of competencies and leadership attributes necessary to address these challenges. Consequently, radiography leaders may be hindered from fully realising their potential to drive innovation and improve healthcare outcomes.

Furthermore, the lack of sufficient research on radiography leadership and management makes it challenging to identify and define the competencies and attributes required for these roles. Future primary research should explore how competencies and leadership expectations are incorporated, particularly in job descriptions. These expectations should be aligned with the findings of this study and professional/regulatory standards. This will inform evidence-based recommendations for recruitment, training and practice to equip radiography leaders to excel in their roles and improve service delivery.

Conflict of interest statement

None.

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