

**Has the skills mix promise been broken? A scoping review of the deployment of the support and assistant workforce within diagnostic imaging in the UK**

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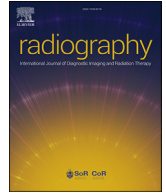
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## Systematic review

# Has the skills mix promise been broken? A scoping review of the deployment of the support and assistant workforce within diagnostic imaging in the UK



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## ABSTRACT

**Introduction:** In the UK the development of skill mix in radiography at the end of the 20th century formalised the assistant practitioner role, separating it from the support worker function. The key aim was to increase imaging capacity whilst enabling opportunities for career progression within both the support and radiography workforce. There has been limited examination of these support and assistive roles and this review aims to explore the current evidence.

**Methods:** This scoping review used a systematic search strategy and interrogated MEDLINE, CINAHL, Scopus and Google Scholar. Primary research articles published in the English-language referring to studies conducted in the UK on assistant or support roles in radiography were sought. The sourced data was uploaded to a web-based review platform for screening.

**Results:** The literature search identified only 11 articles which met the search criteria, of which only one referred to the support worker role. Adopting a primarily qualitative approach the quality of the articles varied. Thematic analysis was undertaken using *a priori* themes role purpose, outcomes, aspirations and capacity building.

**Conclusion:** There is limited research evidence of capacity generation with most presenting individual perspectives. Job satisfaction and career aspirations within the support and assistive workforce are evident but there is still confusion over scope of practice and supervision.

**Implications for practice:** The support and assistive workforce are a key part of the diagnostic imaging workforce but limited research evidence examining these roles has been published. Further research exploring the impact of skill mix changes across all levels and imaging professions is required.

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## Introduction

Over twenty years has passed since the launch of the pioneering four-tier radiography skills mix strategy<sup>1</sup> in the United Kingdom (UK). Subsequent education and career frameworks for the profession have been published to support the development of practice and practitioners.<sup>2,3</sup> The latest career framework expands on the original four tiers to describe six levels of practice<sup>4</sup> and now includes support worker (SW) as an entry to the imaging workforce

with a pathway to the assistant practitioner (AP) role.<sup>5</sup> Furthermore, the enhanced level has been added to complement the advanced and consultant practitioner roles, recognising that some will progress whilst others will embrace their expanded role as a career pinnacle.<sup>6</sup>

The premise of skills mix has been endorsed within the imaging professions,<sup>7</sup> yet the radiography profession is experiencing an ongoing workforce supply challenge. The UK vacancy rate has risen to 13%,<sup>8</sup> and to meet demands approximately one-quarter of UK registered radiographers are now from overseas.<sup>9</sup> Recent increases in pre-registration training are enabling approximately 3% growth in the profession, but this is failing to meet the ever-burgeoning demand.<sup>8</sup>

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The aim of the skills mix strategy was to “broaden the profile” of the imaging workforce through flexible career pathways,<sup>1,2(p9)</sup> using the support and assistive workforce effectively and enabling their potential to increase capacity and release registered staff. However, it is unclear whether the anticipated additional 5000+ support and assistive roles proposed in 2020<sup>10</sup> have been realised. Or, indeed whether insufficient growth in staff numbers or a reticence to change practice is contributing to the current capacity and workforce challenges.

This scoping review informs a larger study which aims to identify the barriers and enablers to effective deployment and utilisation of the imaging support workforce.<sup>11</sup> It is based on a wider review exploring support and assistive roles in allied health professions (AHPs).<sup>12</sup> This article explores the current evidence for these roles within a UK diagnostic imaging context. It also seeks to explore the research literature in comparison with the published data regarding enhanced, advanced and consultant roles in the radiography profession.

**Methods**

This study builds upon the results from a previously published scoping review examining the deployment and utilisation of the SW and AP role across the AHPs.<sup>12</sup> The initial search was conducted in June 2023 with eligibility criteria of peer reviewed articles reporting on primary research with no limits on date of publication. The population, exposure, outcome (PEO) framework was used to develop the search strategy with search terms combined with Boolean operations to generate search strings for MEDLINE, CINAHL complete and Scopus. The resultant 2071 articles were limited through screening to 39 peer reviewed research publications which were included in the previous AHP wide review.<sup>12</sup> The screening process resulted in 10 publications related to the UK diagnostic imaging setting which were selected for inclusion in this review.

As an addition to the earlier data the search was repeated in May 2024 to identify any more contemporary literature. As this second search was limited to imaging the population search terms were restricted and then used alongside the other original search strings (Table 1). The decision was made to retain the original internationally accepted radiographic professional terms to ensure that any papers describing UK practice published elsewhere could be identified. The Google Scholar search utilised simpler strings which each generated three pages of results and all results were included. All resultant datasets were uploaded for screening to Covidence (covidence.org), a web-based literature review tool. As both the previous and current review are focussed on the deployment and utilisation of the support workforce those studies exploring only training and education were excluded. Other excluded studies were predominantly those focussed on registered radiographer roles and support staff in other settings.

Independent scrutiny of the articles at screening and full text review stages was conducted by two members of the research team (Fig. 1). Consensus discussion took place for publications identified as conflicts, referring to disagreement in categorisation, within the

Covidence system. The studies that met the inclusion criteria were downloaded for review and analysis of their characteristics including role and modality, where stated. Additional thematic analysis was conducted using a priori determined themes informed by the prior scoping review<sup>12</sup> exploring role purpose, outcomes, aspirations and capacity building. Although not specifically required of scoping reviews, all included studies were reviewed against the Quality Assessment with Diverse Studies (QuADS) criteria.<sup>13</sup> The QuADS score is calculated from the sum of 13 individual criteria reflecting the reporting of the theoretical underpinning, research design, sampling, analysis, and limitations, with a maximum score of 39.

**Results**

Arising predominantly from England, the 11 articles (Table 2) primarily focussed on the lived experiences of assistant practitioners and the perceptions of their managers, and as such limited data from practice has been provided. Only one study explicitly includes support workers, referred to as ‘imaging assistants’.<sup>21</sup>

The quality of the articles varied, although none were excluded on the basis of the QuADS score. The lowest score<sup>16</sup> was influenced by the journal style with no clear methods section. The other reasons for loss of marks across the dataset was absence of detail regarding stakeholder involvement in the study design, poor justification for the research approach and analytical method, limited description of the sampling strategy and no (or minimal) discussion of the strengths and limitations of the research.

**Discussion**

Only eleven peer-reviewed papers were identified relating to the support and assistive workforce in diagnostic imaging. This is the converse of the higher levels of radiographic practice where multiple systematic literature reviews conducted over the same timeframe have identified a much larger number of publications including Thom (n = 21),<sup>25</sup> Hardy et al. (n = 148),<sup>26</sup> Spacey et al. (n = 17, limited to breast diagnosis)<sup>27</sup> and Lockwood et al. (n = 241 papers, limited to radiographic reporting).<sup>28</sup> This illustrates the disparity in research conducted across the levels of practice. The higher levels being perhaps driven by the radiographers to evidence their own capability to perform tasks now shared with radiologists.<sup>26,29</sup> The lack of emphasis on support and assistive publications suggests there is no obvious advocate for evaluation of the support workforce.

Although there are some parallels with the wider AHP support workforce<sup>12</sup> there are some unique perspectives within the imaging focussed papers, partly driven by the strategic approach to the development of this workforce as part of the overarching radiography profession in the UK. Themes were identified across the literature, with further parallels to the wider profession, including opportunities within different modalities, their scope of practice, job satisfaction and aspirations, acceptance in practice, and evidence of capacity generation and impact.

**Table 1**  
Population, exposure, outcome (PEO) framework and search terms.

PEO framework	Database	Search terms
Population: Radiography	MEDLINE, CINAHL, Scopus, Google Scholar	“Radiographer”
Exposure: Assistant Practitioner, Support worker	MEDLINE, CINAHL, Scopus Google Scholar	“Support OR Assistant” “Support worker” “assistant practitioner”
Outcome: Impact, deployment, role	MEDLINE, CINAHL, Scopus Google Scholar	“Professional role” –

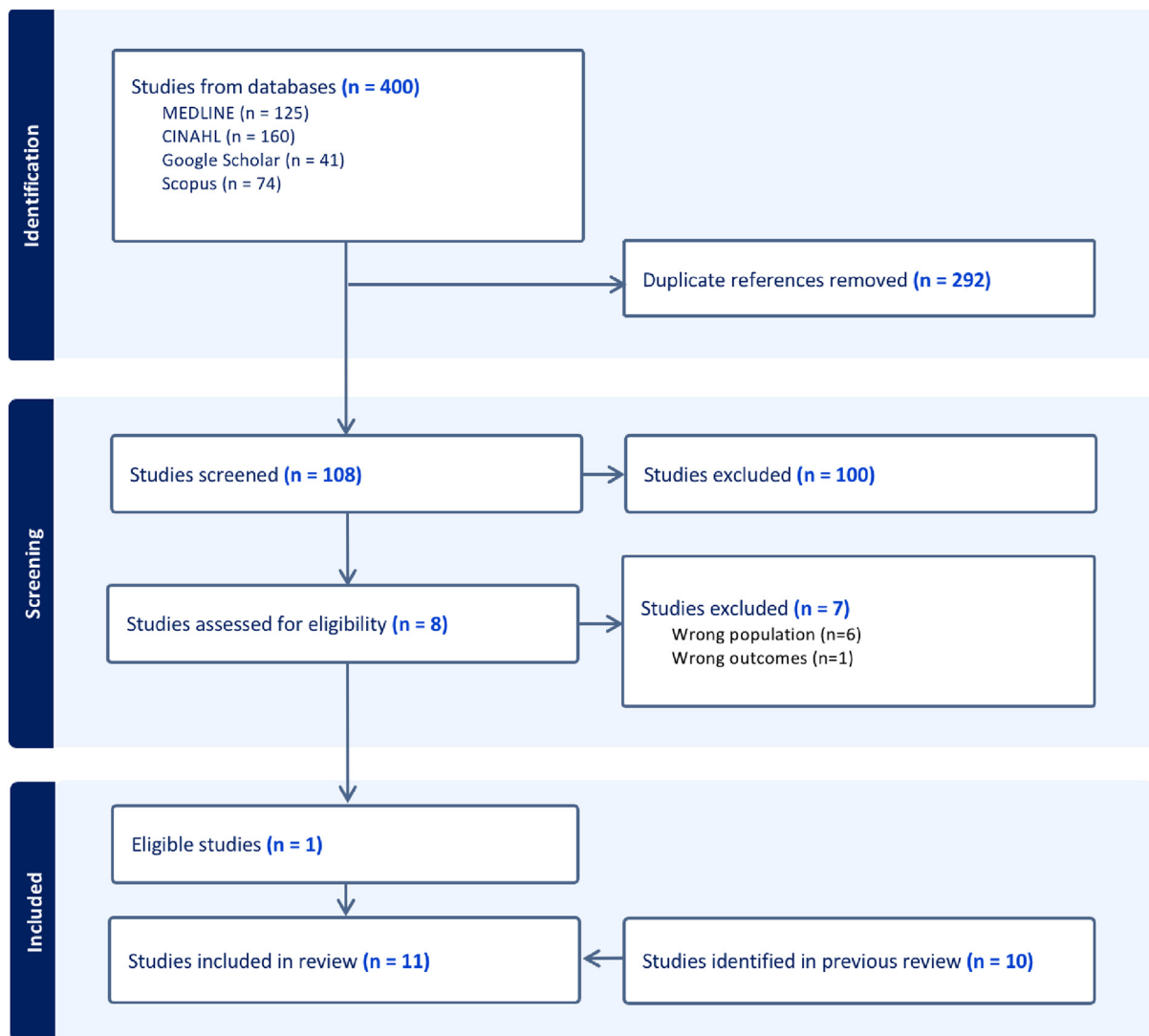


Figure 1. PRISMA flow chart combining the new search with the imaging data from Ety et al.<sup>12</sup>

### Opportunities

In one of the earliest papers Ford highlighted that the manager participants in his study were unclear on the utility of developing support staff to take on some radiographic tasks, but they recognised the opportunities associated with such a change.<sup>15</sup> Although Ford's 2004 qualitative study<sup>15</sup> used the 'support worker' terminology, the participant questions and responses blur the boundary between the accepted tasks of support and assistive roles. As such, his outcomes represent both levels of practice, perhaps influenced by the age of the research with his manuscript submitted in 2003, coinciding with the publication of the national Skills Mix report.<sup>1</sup> In addition, much of his data collection was performed in 2001/2, therefore demonstrating the potential limited relevance of the role titles to contemporary practice. The initial expectation was that 'helpers' (historical terminology) would be trained to "take a limited range of basic x-ray images".<sup>30p60</sup> Although, it is reassuring to see that these early expectations of career progression for support workers were subsequently realised in later papers with individuals' recruitment into the trainee AP role through internal selection.<sup>22</sup>

Although there are no limits on the area of practice of AP and SW roles, the literature predominantly places them within X-ray

(projectional radiography) and/or breast imaging (mammography).<sup>18,20,22,24</sup> Interestingly, these two imaging areas were foci of the initial skills mix pilot<sup>1</sup> and correspond with the most common developments in radiographer roles.<sup>31</sup> The lower number of APs in cross-sectional imaging<sup>20,22</sup> is also replicated in relation to radiographer role development, with CT and MRI reporting being less widespread.<sup>32,33</sup> However, it is unclear whether these two outcomes are linked and related to the complexity of technology and images, or just coincidence.

### Scope of practice

At the time of their publication there was evidence across several papers of challenge to the accepted role of APs. Some of the papers refer to confusion around utilisation, scope and supervision requirements.<sup>13,20,23</sup> There was also debate around medicines management and the dispensing of oral contrast.<sup>20</sup>

Over time there is evidence of scope 'creep', with the boundaries of practice expanding either through individual's growing experience or deliberate development.<sup>17</sup> These changes have been acknowledged nationally with updated guidance on delegation to, and supervision of, the support workforce.<sup>34</sup> Zelenyanski et al.

**Table 2**  
Overview of the included studies.

First author	Date	Method(s)	Level of practice	Modality	Participants	Study location	QuADS score/39
Bennion <sup>14</sup>	2011	Focus groups and interviews	Assistant practitioner	X-ray	Radiology service managers	England–North West	27
Ford <sup>15</sup>	2004	Survey and focus group	Support worker	Not specific	Radiology service managers	England - South	26
Leach <sup>16</sup>	2009	Survey and interviews	Assistant practitioner	Not specific	Assistant practitioners and managers <sup>b</sup>	England -South Central	8
Palmer <sup>17</sup>	2018	Survey	Assistant practitioner	Not specific	Assistant practitioners	UK wide	29
Price <sup>18</sup>	2007	Survey	Assistant practitioner <sup>a</sup>	Not specific	Radiology service managers	UK wide	21
Price <sup>19</sup>	2015	Interviews	Assistant practitioners	Not specific	Radiology service managers	Scotland	18
Snaith <sup>20</sup>	2018	Survey	Assistant practitioner	X-ray	Assistant practitioners	UK wide	24
Spacey <sup>21</sup>	2024	Interviews	Assistant practitioner Support worker	X-ray MRI	Assistant practitioners and support workers <sup>a</sup>	UK wide	35
Stewart-Lord <sup>22</sup>	2011	Survey	Assistant practitioner	Not specific	Assistant practitioners	England	22
Stewart-Lord <sup>23</sup>	2014	Interviews	Assistant practitioner	Not specific	Assistant practitioners	England	27
Zelenyanski <sup>24</sup>	2022	Service evaluation	Assistant practitioner <sup>a</sup>	Breast	N/A	England – South West	25

Notes:

<sup>a</sup> Also included all radiographer levels of practice.

<sup>b</sup> Also includes other professions.

describes their experiences within a single breast screening centre of deploying paired APs without direct radiographer supervision,<sup>24</sup> potentially in response to the challenge posed by Professor Sir Mike Richards in his review of the English screening programmes.<sup>35</sup> The authors recognised that this practice was pushing the boundaries of the traditional scope but undertook their evaluation to underpin the development of the role. However, for other roles the scope of practice remains uncertain, for example Harris et al. in their exploration of radiographer CT competencies found that the respondents were unable to clearly identify what would be expected of an AP in that setting.<sup>36</sup>

### Job satisfaction

In the initial report on the skills mix pilot schemes there was an expectation of, and some limited evidence for, increased job satisfaction from the changes in the radiographic workforce.<sup>1</sup> This has been borne out in a number of the studies with mammography APs describing the autonomy of working without direct supervision, yet retaining remote supervision capability, increasing their confidence and creating an enjoyable experience.<sup>24</sup> Although not attributable directly to imaging APs, Leach and Wilton found that they loved their job,<sup>16</sup> a finding also acknowledged by Snaith et al.<sup>20</sup> Milner and Akhtar examined job satisfaction amongst radiographers and APs in a single centre, reporting staff were happy in their roles, however as they did not break down the results by role type it is unclear whether this is true of both groups.

### Career aspiration

It was always envisaged that skills mix within the imaging setting would enable individuals in the support workforce (SW and AP) to build a career in radiography.<sup>1,37</sup> Indeed, Stewart-Lord et al. felt that the future of the AP role was at risk without career progression,<sup>23</sup> and many of the AP participants within the studies had aspirations to become a radiographer.<sup>13,20</sup> However those in MRI and breast specialities considered that they would have to ‘leave’ their chosen speciality and move to X-ray to continue their training to be a registered radiographer.<sup>20</sup> Some alternative approaches to career development are being explored, with Leach and Wilton identifying support for uplifting the AP band to recognise the role responsibility<sup>16</sup> and band 5 (equivalent to radiographer entry

grade) AP posts being implemented.<sup>20</sup> However, career development is not necessarily universal, as Spacey et al. uncovered tensions amongst the support workforce who described significant patient contact yet felt neglected in terms of training and support in their context within end of life care.<sup>21</sup> They acknowledged that APs and SWs did not receive the same level of training as radiographers who had clear expectations of their role because of regulatory standards.<sup>38</sup>

### Acceptance in practice

The earlier publications alluded to some reluctance of radiographers to accept the AP role, perceiving them as ‘taking on their role’ rather than enabling role development and additional capacity.<sup>22</sup> This was particularly evident within cross-sectional imaging.<sup>20</sup> Some radiographers were concerned that they would be left to deal with the ‘heavy work’,<sup>14(p293)</sup> perhaps mirroring the expectations of radiologists who are expected to take on the more complex reporting as radiographers take on some of their tasks.<sup>29</sup>

There were reports of APs covering other duties to provide flexibility,<sup>20</sup> although Bennion found that there was reluctance by some APs to undertake tasks associated with their previous support worker role.<sup>14</sup> This may be linked to their feeling greater affinity with the radiographer rather than support functions. Anecdotally there are benefits to patient experience, but this was solely from the perspective of mentors to trainee APs.<sup>39</sup>

### Creating capacity

Anecdotal evidence of capacity generation is presented by the majority of the papers. Referred to as a ‘logical solution’ to workforce shortages,<sup>24(p979)</sup> skills mix has been embraced but to varying degrees. Enabling radiographers to take on advanced training was considered the rationale behind the introduction of the AP role,<sup>19</sup> a finding echoed by Leach and Wilton.<sup>16</sup> This is borne out by Price et al.<sup>19</sup> who found that in one site the AP role had been implemented to release a radiographer into the CT workforce. This represents greater capacity generation, but perhaps not career or role progression for radiographers.

It is interesting that further articles published under the guise of enhanced and advanced practice also include reference to APs as part of the workforce. Spacey et al.<sup>27</sup> identified that a proportion of

mammographers' routine work was being carried out by APs. In an article focussed on team-working within a single centre, Woznitza et al. include a single sentence stating that in 2012–13 an AP undertook "22.4% of the plain imaging workload" across general practitioner and outpatient X-rays.<sup>40(p261)</sup> Unfortunately no other data was provided. This illustrates the lack of robust evidence of cost effectiveness; Leach and Wilton in their evaluation of the AP role found that participants viewed the role as cost effective but justified this only on the basis of the lower salary costs.<sup>16</sup>

Stewart-Lord in 2011 commented that at that time the radiography vacancy rate had fallen and that this would likely reduce the drive to implement AP roles.<sup>22</sup> Regrettably things have changed with Palmer et al., in 2018 describing how APs were 'propping up' services affected by radiographer vacancies.<sup>17</sup>

### Limitations

The intention of the review was to focus on the UK support workforce; however the majority of papers were England-centric with limited inclusion of data related to the other home countries. Although this limits the generalisability of the data it should be recognised that the same radiography career framework is in place across the UK and therefore increases the relevance of the findings.<sup>4</sup>

The majority of papers originated from a single journal with its origins in the UK, this may be expected given the population under question and this journal is the official publication of the UK profession. Most of the papers provided little quantitative evidence of the impact of the developments in the support and assistive workforce with many only providing individual perspectives, there was also no detailed evaluation of the support worker role. Rather than an acknowledgment of the quality of the reviewed research these limitations recognise the absence, or low volume of evaluation of the impact of these staff groups.

### Conclusion

This scoping review highlights the limited evidence of the role of APs in generating capacity. The aspirations of the skills mix strategy appear not to have come to fruition, and perhaps the promise of staff expansion through this route has been broken. It is unclear whether the slow progress in role development at the support and assistant level is inhibiting the progression of radiographers into the enhanced, advanced or consultant roles, or whether this development is continuing, thereby exacerbating the workforce crisis in the practitioner (entry-level) tier.

There is some evidence of job satisfaction and aspirations to develop further amongst the support workforce, but ongoing confusion over the limitations of the roles persist. The limited publications and data provided within them is insufficient to build an evidence base and represents a missed opportunity to add to the body of knowledge of such roles. Evaluation of the true impact of the skill mix changes is required to determine whether the developments proposed in the 1990s have been borne out, particularly in the context of the current workforce and capacity crisis affecting diagnostic imaging. Importantly, this review found the research quality and quantity to be limited and further evaluation is required to examine the cost effectiveness of skills mix changes within radiography and radiology. Any studies should also seek to establish the perspectives of service users, a group omitted from all work so far.

### Conflict of interest statement

None.

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### References

1. Department of Health. *Radiography skills mix: a report on the four-tier service delivery model*. 2003. Available at: <https://www.hee.nhs.uk/sites/default/files/documents/DRad%20support%20workforce%20-%20literature%20review.pdf>. [Accessed 3 June 2024].
2. College of Radiographers. *A strategy for the education and professional development of radiographers*. 2002. [https://www.sor.org/getmedia/34e61153-2ff2-4769-9061-61ccadfc2ee2/sor\\_strategy\\_education\\_professional.pdf\\_1](https://www.sor.org/getmedia/34e61153-2ff2-4769-9061-61ccadfc2ee2/sor_strategy_education_professional.pdf_1). [Accessed 5 June 2024].
3. Society of Radiographers. *A curriculum framework for radiography*. 2003. Available at: [https://www.sor.org/getmedia/4be6f496-f470-4746-8738-dd7e3a1623af/sor\\_a\\_curriculum\\_framework\\_radiography.pdf\\_1](https://www.sor.org/getmedia/4be6f496-f470-4746-8738-dd7e3a1623af/sor_a_curriculum_framework_radiography.pdf_1). [Accessed 5 June 2024].
4. College of Radiographers. *Education and career framework*. 2022. Available at: <https://www.sor.org/learning-advice/professional-body-guidance-and-publications/documents-and-publications/policy-guidance-document-library/education-and-career-framework-fourth>. [Accessed 3 June 2024].
5. Health Education England. *Developing career pathways for diagnostic imaging support worker roles: literature review and expert group survey*. 2022. Available at: <https://www.hee.nhs.uk/sites/default/files/documents/DRad%20support%20workforce%20-%20literature%20review.pdf>. [Accessed 3 June 2024].
6. Snaith B, Beardmore C. Enhanced practice: a strategy to resolve the inconsistencies in advance practice implementation. *Radiography* 2021;**27**:S3–4.
7. Royal College of Radiologists and Society and College of Radiographers. *Team working in clinical imaging*. 2012. Available at: [https://www.sor.org/getmedia/ccf6c30-4e78-42d8-bf67-5cb2ac094761/BFCR\(12\)9\\_Team.pdf\\_1](https://www.sor.org/getmedia/ccf6c30-4e78-42d8-bf67-5cb2ac094761/BFCR(12)9_Team.pdf_1). [Accessed 5 June 2024].
8. Society of Radiographers. *Evidence to the pay review body*. 2023. Available at: <https://www.sor.org/getmedia/9d7de675-eed7-4f30-bdfe-750d5f922c87/SoR-PRB-Submission-January-2023>. [Accessed 7 June 2024].
9. Health and Care Professions Council. *Registrant snapshot 3 march 24*. Available at: <https://www.hcpc-uk.org/resources/data/2024/registrant-snapshot-march-2024/>. [Accessed 26 May 2024].
10. Richards M. *Diagnostics: recovery and renewal*. 2020. Available at: <https://www.england.nhs.uk/wp-content/uploads/2020/11/diagnostics-recovery-and-renewal-independent-review-of-diagnostic-services-for-nhs-england-2.pdf>. [Accessed 3 June 2024].
11. National Institute for Health Research. *The determinants of the utilisation of the support and assistant workforce in diagnostic imaging: a multi-methods investigation*. Available at: <https://fundingawards.nihr.ac.uk/award/NIHR133813>. [Accessed 7 June 2024].
12. Etty S, Snaith B, Hinchcliffe D, Nightingale J. The deployment and utilization of the allied health professions support workforce: a scoping review. *J Multidiscip Healthc* 2024;**17**:2251–69.
13. Harrison R, Jones B, Gardner P, Lawton R. Quality assessment with diverse studies (QuADS): an appraisal tool for methodological and reporting quality in systematic reviews of mixed- or multi-method studies. *BMC Health Serv Res* 2021;**21**:144.
14. Bennion CM, Irvine F. Embedding the assistant practitioner role within the clinical department: a qualitative study. *Radiography* 2011;**17**:292–6.
15. Ford P. The role of support workers in the department of diagnostic imaging—service managers perspectives. *Radiography* 2004;**10**:259–67.
16. Leach C, Wilton E. Evaluation of assistant and associate practitioner roles across NHS South Central. *Br J Healthc Assistants* 2009;**3**:97–9.
17. Palmer D, Snaith B, Harris MA. Assistant Radiographer Practitioners: creating capacity or challenging professional boundaries? *Radiography* 2018;**24**:247–51.
18. Price RC, Le Masurier SB. Longitudinal changes in extended roles in radiography: a new perspective. *Radiography* 2007;**13**:18–29.
19. Price R, Miller L, Hicks B, Higgs A. The introduction, deployment and impact of assistant practitioners in diagnostic radiography in Scotland. *Radiography* 2015;**21**:141–5.
20. Snaith B, Harris MA, Palmer D. A UK survey exploring the Assistant Radiographer Practitioner role across diagnostic imaging: current practice, relationships and challenges to progression. *Br J Radiol* 2018;**91**:20180458.

21. Spacey A, Heaslip V, Szczepura K. Understanding experiences of the radiography workforce delivering medical imaging as part of patients' end of life care: an exploratory qualitative interview study. *Radiography* 2024;**30**:132–40.
22. Stewart-Lord A, McLaren SM, Ballinger C. Assistant practitioners (APs) perceptions of their developing role and practice in radiography: results from a national survey. *Radiography* 2011;**17**:193–200.
23. Stewart-Lord A, Ballinger C, McLaren SM. Assistant Practitioners (APs) in radiography: an exploration of perceptions and experiences related to role development. *Radiography* 2014;**20**:137–42.
24. Zelenyanski C, Vertenten C, Spencer S, Hudson D, Currie R. Extending the scope of practice for experienced assistant practitioners in breast screening and the impact on service resilience. *Radiography* 2022;**28**:973–80.
25. Thom SE. Does advanced practice in radiography benefit the healthcare system? A literature review. *Radiography* 2018;**24**:84–9.
26. Hardy M, Johnson L, Sharples R, Boynes S, Irving D. Does radiography advanced practice improve patient outcomes and health service quality? A systematic review. *Br J Radiol* 2016;20151066.
27. Spacey A, Hipperson V, Gloster A, Mercer C. The role of the advanced clinical practitioner in breast diagnosis: a systematic review of the literature. *Radiography* 2021;**27**:654–62.
28. Lockwood P, Burton C, Woznitza N, Shaw T. Assessing the barriers and enablers to the implementation of the diagnostic radiographer musculoskeletal X-ray reporting service within the NHS in England: a systematic literature review. *BMC Health Serv Res* 2023;**23**:1270.
29. Culpan G, Culpan AM, Docherty P, Denton E. Radiographer reporting: a literature review to support cancer workforce planning in England. *Radiography* 2019;**25**:155–63.
30. Audit Commission. *Improving your image: how to manage radiology services more effectively*. 1995. Available at: <https://webarchive.nationalarchives.gov.uk/ukgwa/20150410163038/http://archive.audit-commission.gov.uk/auditcommission/aboutus/publications/pages/national-reports-and-studies-archive.aspx.html>. [Accessed 6 June 2024].
31. Woznitza N, Pittock L, Elliott J, Snaith B. Diagnostic radiographer advanced clinical practice in the United Kingdom – a national cross-sectional survey. *BJR Open* 2021;**3**:20210003.
32. Clarke R, Allen D, Arnold P, Snaith B. Implementing radiographic CT head reporting: the experiences of students and managers. *Radiography* 2014;**20**:117–20.
33. Estall H, Mitchell M. MRI reporting radiographers - a survey assessment of number and areas of practice within the United Kingdom. *Radiography* 2021;**27**:568–73.
34. Society of Radiographers. *The radiography support and assistant workforce: regulatory compliance, governance arrangements, supervision and delegation*. 2023. Available at: [https://www.sor.org/getmedia/57f75e2e-a9c6-4e0e-baa2-8add9b78e0c5/220823\\_The-Radiography-Support-and-Assistant-Workforce\\_D1-3](https://www.sor.org/getmedia/57f75e2e-a9c6-4e0e-baa2-8add9b78e0c5/220823_The-Radiography-Support-and-Assistant-Workforce_D1-3). [Accessed 6 June 2024].
35. Richards M. *Report of the independent review of adult screening programmes in England*. NHS England; 2019. <https://www.england.nhs.uk/wpcontent/uploads/2019/02/report-of-the-independent-review-of-adultscreening-programme-in-england.pdf>.
36. Harris M, Hardy M, Scally A. Developing CT workforce competencies: what knowledge and skills should we expect of an early career radiographer? *Radiography* 2024;**30**:1355–62.
37. Society of Radiographers. *Career progression framework: radiography support workforce*. 2003. Available at: [https://www.sor.org/getmedia/02df18f7-10e6-4316-832d-f41491700d10/sor\\_radiography\\_support\\_workforce.pdf\\_1](https://www.sor.org/getmedia/02df18f7-10e6-4316-832d-f41491700d10/sor_radiography_support_workforce.pdf_1). [Accessed 6 June 2024].
38. Health and Care Professions Council. *Standards of proficiency for radiographers*. 2023. Available at: <https://www.hcpc-uk.org/standards/standards-of-proficiency/radiographers/>. [Accessed 6 June 2024].
39. Colthart I, McBride M, Murray M. Mentoring assistant practitioners – the radiographer's perspective. *Radiography* 2010;**16**:223–9.
40. Woznitza N, Piper K, Rowe S, West C. Optimizing patient care in radiology through team-working: a case study from the United Kingdom. *Radiography* 2014;**20**:258–63.