



CREaTE

Canterbury Research and Theses Environment

Canterbury Christ Church University's repository of research outputs

<http://create.canterbury.ac.uk>

Please cite this publication as follows:

Lockwood, P. (2017) Exploring variation and trends in adherence to national occupational standards for reporting radiographers. *Journal of Social Science & Allied Health Professions*, 1 (1). pp. 20-27. ISSN 2397-2696.

Link to official URL (if available):

[http://nebula.wsimg.com/5e0c89494740609c80d0bd840d8eda78?
AccessKeyId=E65A9B0FDB304EB160F6&disposition=0&alloworigin=1](http://nebula.wsimg.com/5e0c89494740609c80d0bd840d8eda78?AccessKeyId=E65A9B0FDB304EB160F6&disposition=0&alloworigin=1)

This version is made available in accordance with publishers' policies. All material made available by CReaTE is protected by intellectual property law, including copyright law. Any use made of the contents should comply with the relevant law.

Contact: create.library@canterbury.ac.uk



Exploring variation and trends in adherence to national occupational standards for reporting radiographers

P. Lockwood

Allied Health Department, Canterbury Christ Church University, Medway Campus, Rowan Williams Building, 30 Pembroke Court, Chatham Maritime, ME4 4UF, UK

Keywords:

Radiographer reporting; advanced practice; national standard; scope of practice; guidelines and policy

Abstract

Purpose: The primary aim of this study was to observe variations and trends in the implementation and conformity to guidelines and standards in the advanced practice role of radiographer reporting within United Kingdom (UK) National Health Service (NHS) trusts.

Method: A questionnaire using a 5-point Likert categorical response scale, and free text open questions was applied. The engagement process used on-line survey was sent out between July and August 2015 to NHS reporting radiographers. The inclusion criteria covered a cross section of imaging modalities including plain film, computed tomography (CT), magnetic resonance imaging (MRI), nuclear medicine (NM), fluoroscopy, and mammography.

Results: A total of 261 radiographers completed and returned the survey. Commenting on a selection of questions based on four key themes of scope of practice (a clearly defined job description (74.3%; $n=168/226$). Education and training support (55%; $n=125/227$ had no mentor allocated), resources and equipment (48%; $n=102/212$ did not have access to dedicated equipment); and outcome measures of performance (36%; $n=77/216$ regularly audited their workload).

Conclusion: The results of the data collected, identified specific trends in the sample group on defined scope of practice, and the level of organisational support. It was implicitly implied from the varied responses on equipment and resources provided to fulfil the role, that best practice guidance on resources used to fulfil the role should have a clearly defined area in future frameworks and policy to support safe working practices. The variances of responses suggest adherence to recommended best principles in reporting were not consistent within this sample group; and acknowledged factors on the parity of support, equipment, scheduled sessions, audit mechanisms and cross-cover of service provision.

Introduction

The United Kingdom (UK) National Health Service (NHS) is under considerable pressure to deliver the NHS Five Year Forward¹ whilst developing and employing new models of care based on local Sustainability and Transformation Plans that are responsive to the challenges of the changing healthcare sector and local population demands. However, there is a requirement to maintain standards in healthcare which is paramount to progress the quality of services to patients when establishing new service models and health profession roles.

The Royal College of Radiologists (RCR) review of acute and primary care NHS radiology services²⁻³ proposed that healthcare organisations have a responsibility to provide an adequate quality of service through the establishment of guidelines to maintain standards in practice. In radiography, it is the duty of governing and professional bodies such as the Department of Health,⁴⁻⁷ and the Society and College of Radiographers (SCoR)⁸⁻⁹ to develop, appraise and embed these frameworks into clinical practice.

Advanced practice radiographer reporting has been established for over twenty years within the NHS allied health professions, and is just one of many developments in service delivery improvement projects¹⁰ that in recent years have improved patient management and treatment pathways. However, there is evidence in contemporary literature of a wide variation in interpretation and implementation of the role within the NHS.¹¹⁻¹⁹ The SCoR are currently progressing a voluntary accreditation and registration scheme of advanced practice radiographers,²⁰ which builds upon the existing Department of Health (DoH)⁴ four tier skills mix system, to standardise and regulate the introduction of advanced practice roles.

Research on reporting radiographers' practice has previously focused on factors of inter and intra-observer variability and performance, cost effectiveness and clinical impact.¹¹⁻¹⁹ The aim of this study was to explore variation and trends in adherence to national occupational standards^{8-9, 20-26} for reporting radiographers.

Method

A literature search was undertaken to review previous research and standards of advanced practice using PubMed Central, OVID, CINAHL, ScienceDirect, and professional body documents (SCoR,^{8-9,20-23} RCR,^{3,24-29} DoH,^{4-7,30} Health and Care Professions Council³¹⁻³² (HCPC), and Skills for Health).³³ The SCoR advanced practice frameworks detailed a range of practice duties for reporting radiographers to be considered against, which fit broadly into four areas. These are a defined scope of practice, governance and audit of work, professional registration (code of conduct, ethics, and accountability), and education (training and continuing professional development (CPD)). These four pillars of advanced practice are reflected in other national policies and guidance for reporting radiographers that set out the basic threshold standards to adhere to (Table 1).

It was deemed that the participants in the survey were already registered with mandatory professional bodies such as the HCPC in order to practice, so assessing this area would provide no meaningful data. This category was replaced with resources and equipment which was a critical area noted in previous research on observer performance in advanced roles.^{28-29,34-36} This prompted an adaption of the four categories into: (1) scope of practice, (2) education and training (organisational support), (3) resources and equipment (working conditions), and (4) measure of performance (governance and audit) as the main questions in the survey.

An online questionnaire using a 5-point Likert scale of ordinal response levels (never, rarely, sometimes, often, all the time) based on the four categories, was employed to obtain data on current practice. The advantage of a web-based survey allowed results to be collected from a wide geographical area, in a short time frame, in a cost-effective and efficient way.

Using a sample size calculator for the target population was problematic, as a current register of reporting radiographers does not exist. Instead, the sampling frame consisted of a population list of qualified postgraduate reporting radiographers ($n=427$) from this higher education institute (HEI) and contacts at reporting special interest groups (SIGs) and consultant radiographer groups provided by the SCoR. An acknowledgement of the sample bias included missing elements (an incomplete register

of all practising UK reporting radiographers); foreign elements (reporters trained at other HEI's) and duplicate entries (former students who are associates of SIGs).

Ethics and governance approval were agreed by the Faculty of Health and Wellbeing Research Ethics Committee to contact potential participants. The initial contact included information on the study, consent to participate (with the right to withdraw at any point), confidentiality of response, and information on the dissemination of results. To increase potential responses, the initial contact also asked participants if they would like to contribute to the survey response rate via snowball sampling through their local network of reporting radiographer colleagues and peers.

Steps taken to mitigate potential response bias from contributing an effect on the results included a broad cross-section of responders (no restriction on gender or age, geographical location was centred on UK NHS providers, and multiple imaging modalities) in the sample group (with no control group bias). Strategies to further reduce response bias included neutral, negative and positive format questions for responder consistency, with forced choice questions that require rating scales. The use of self-administration of the questionnaire additionally helped to reduce social desirability bias. The inclusion criteria covered a cross section of imaging modalities, including X-Ray (computed radiography and digital radiography), computed tomography (CT), magnetic resonance imaging (MRI), nuclear medicine (NM), fluoroscopy, and mammography. A decision was made not to include ultrasound within the sample frame due to the current UK government position on the title of sonographer not being legally protected. Thus, sonographers are not required to register with a professional body for regulation or have a legal requirement to act in accordance with a national standard or benchmark guidelines, as a radiographer does. This implication makes them exempt from adhering to and comparison against the same advanced practice requirements as reporting radiographers, although it was noted that radiographers could and do hold this title and role.

A pilot questionnaire was tested on a small sample of reporting radiographers ($n=5$) to review the readability, terminology, and accessibility of the electronic survey. Pilot feedback allowed minor revision to include open questions with free text responses to capture additional information from the participants.

The on-line survey was sent out between July and August 2015, to English and Welsh NHS trusts, Scottish Health Boards, and Northern Irish Health and Social Care services. The SCoR provided additional support, information and participation links to the survey on their news website and Synergy journal³⁷. The survey was hosted on-line through Qualtrics³⁸ software, analysis of the Likert scale data to identify specific trends used Excel software³⁹ for coding of responses, and Social Science Statistics⁴⁰ on-line calculator for Chi-Square test for variations in categorical response.

Results

The number of respondents that completed the survey within the given timescale was 261 (61% $n=261/427$). A proportion of the returned surveys did not complete all questions, which was reflected in the sample size of answers. The geographical spread of response data was small with only 18% of participants providing their location as England (12%), Wales (4%), and Scotland (2%), leaving the remainder practising within unspecified hospital locations in the UK. The categories of participant roles came from X-ray (73%), CT (8%), MRI (5%), and mammography (14%), with no returned surveys stating NM or Fluoroscopy practice.

Scope of practice

Concerning the current professional body guidelines and national standards requirement for advanced practice radiographers to work within an agreed and defined scope of practice. The majority of respondents (74%; $n=168/226$; $X^2 = 107.07$; $p < 0.05$) reported having a scheme of work defined

within their job description. Which detailed a protocol of examinations covered, referral pathways accepted, with local variations and mode of reporting described. Details of how this was reflected in practice revealed a large majority of radiographers (79%; $n=174/220$) always had scheduled and planned reporting sessions. Impacting factors indicated in the data showed that only 30% ($n=65/216$) of radiographers disclosed that their departments had an adequate staffing capacity to provide a routine reporting service. Further, likely factors demonstrating a potential disruption to fulfil their advanced practice role included a third of respondents (33%; $n=72/219$) stating that they were occasionally taken out of reporting sessions to cover other general radiography, cross-sectional imaging, and screening roles.

The types of reporting sessions described by the respondents were defined into three distinct classifications. Hot reporting (26%; $n=56/213$), cold reporting of backlog examinations (36%; $n=78/215$) and undefined reporting sessions. With half of the radiographers (54%; $n=116/215$) not required to cover for a duty/day radiologist for queries related to reports while reporting. Consideration of interruption to workflow from this activity can be a potential risk to concentration and accuracy of the task. It was noted the majority of participants (75%; $n=164/218$) stated they did not have a set or defined target for the number of reports per session within their scheme of work. Free text responses reflected the variety of reporting output per session/modality that was documented in the responses.

- | | |
|---|----------------|
| <i>"Minimum of 40 reports per 3 hour session for plain film, regardless of referral pathway"</i> | Respondent 26 |
| <i>"Approximately 60-70 plain film reports per morning or afternoon session"</i> | Respondent 58 |
| <i>"A minimum of 80 cases reported in a 4 hour session"</i> | Respondent 81 |
| <i>"100 per session, which equates to 3.5 hour session for plain film"</i> | Respondent 103 |
| <i>"50 A&E appendicular reports per 3 hour session"</i> | Respondent 112 |
| <i>"60 examinations (CXR & AXR would count as 1 examination) per session which is 3.75 hrs"</i> | Respondent 119 |
| <i>"I expect to do at the very least, 100 reports in a day, allowing for interruptions, phone calls and queries from A&E"</i> | Respondent 132 |
| <i>"6 CT head reports per 3 hour session"</i> | Respondent 147 |
| <i>"12 Outpatient CT head reports per morning session"</i> | Respondent 168 |
| <i>"20 CT head reports per 7.5 hours session"</i> | |

	Respondent 172
<i>"12 CT colograms per 4 hour session"</i>	
	Respondent 177
<i>"150 Mammograms per 4 hour session"</i>	
	Respondent 189
<i>"75 Mammos per 3 hour session"</i>	
	Respondent 193
<i>"Around 80 chest examinations in a 4 hour reporting session"</i>	
	Respondent 198
<i>"30 chest reports in a 3 hour session"</i>	
	Respondent 201
<i>"12 MRI's in a 4 hour session"</i>	
	Respondent 207

The amount and length of rest breaks were an additional influence in considering the amount of possible reports completed per session. A range of data was recorded on this subject, with some radiographers having between 10-15 minutes per reporting session, to others on an ad-hoc basis. It was also acknowledged a substantial group (45%; n=96/213) had no agreed rest periods during their reporting sessions.

<i>"There are no agreed breaks, rest breaks are down to the individual, as long as the number of exams are covered per session"</i>	Respondent 37
<i>"We have none agreed, but we are allowed to make a drink"</i>	Respondent 93
<i>"Effectively, I am self-supervising therefore I take breaks when I think fit, I am not subject to criticism with regard to work output"</i>	Respondent 168
<i>"We have no set breaks for morning/afternoon sessions, just a ½ hour lunch"</i>	Respondent 210

A trend was noted in the continuity of service and cross-cover of reporting provision during annual leave, which some respondents (29%; n=64/221) stated employers never pre-arranged or planned cover. Conversely, 34% (n=75/221) of radiographers were allowed to participate in additional out-of-hours sessions to reduce reporting backlogs after periods of leave to support the service.

Resources and Equipment

On equipment, resources, and working conditions, a high number of radiographers (88%; $n=187/212$) indicated they had access to appropriate Picture Archiving and Communication Systems (PACS) reporting monitors. Despite this, not all radiographers (40%; $n=84/211$) had a dedicated office to report in, with a quarter (25%; $n=51/204$) reporting in open plan or shared spaces. Almost half (48%; $n=102/212$) did not have a dedicated chair, desk, telephone or IT equipment during reporting. However, a large number (69%; $n=146/212$) of the respondents had access to and used speech recognition software.

Measure of performance

It is stated throughout DoH,³⁰ SCoR,²⁰ HCPC³², and RCR^{24,27} standards on advanced practice that clinical governance, auditing, recording of discrepancies and attending of multidisciplinary team meetings (MDTMs) are all held as established benchmarks for quality assurance for reporting radiographers. Data obtained under the performance measure category reflected only 36% ($n=77/216$) of the questioned reporters indicated that they regularly audited their workload. Possible impeding factors included 33% ($n=74/221$) of participants were not accommodated protected time for auditing within their shift. Although 87% ($n=227/261$) of radiographers had a requirement to attend MDTMs, of which 53% ($n=84/158$) were not allocated time to prepare materials (images/reports) for discussion or feeding back of information. Further responses conveyed concerns that several radiographers (26%; $n=58/219$) were not given time for any clinical governance responsibilities connected to their practice. When asked if they were consulted when their department adjusted imaging protocols for the modality they reported, which would directly affect the image quality of their practice, 34% ($n=72/211$) reported they were. Furthermore, 68% ($n=142/209$) did state they received annual employee appraisals to review their ongoing performance.

Education and training

All clinical advanced practice positions require participants to engage in CPD linked to the career framework of the SCoR,²⁰ HCPC,³² and DoH.³⁰ When reviewing mandatory CPD as a requirement of the HCPC registration,³² 29% ($n=65/221$) of respondents stated they were not allocated any protected time for CPD activities. However, 37% ($n=78/211$) reported having departmental support to access external CPD events. One of the deciding elements in study day attendance was who funded the CPD, with 44% ($n=93/210$) having available departmental training funds for CPD. Yet some respondents (30%; $n=62/208$) were routinely required to provide a business case first before a decision was made to allow access to training funds.

On questioning whether respondents were given internal departmental support (radiologist mentor) post-training and in daily clinical practice, as recommended by the SCoR.⁸ Just over half (55%; $n=125/227$; $\chi^2 = 4.6$; $p < 0.308$) of the survey participants responded as not being provided with any mentor support in their advanced practice role. However 78% ($n=180/231$) of respondents agreed, this would provide a safe and supportive working practice.

The training and educational activity questions were not restricted to just the practitioners CPD, as many advanced practice standards require the role to include knowledge exchange activities with other professional groups. Included in the scope of practice of many reporting radiographers' duties is a requirement to teach training medical practitioners and emergency nursing professionals in image interpretation. Unfortunately, some respondents (31%; $n=68/216$) who were required to perform this task were not allocated time during shifts for this activity and were expected to carry out this duty outside of their paid rostered duties.

Discussion

The returned surveys allowed a comparison of the responses to the professional guidelines, although due to a small sample size it was not always possible to perform Chi Square calculation of independence. Review of the first category on the scope of practice found the questionnaires obtained data that reflected a broad variation on having a defined and explicit scope of practice. The data appeared to contrast at times to many standards, including professional body requirements⁸ and the responsibilities detailed specifically under the Agenda for Change and Knowledge and Skills Frameworks,³⁰ and the Service of Diagnosis of Illness (Section 3(1) and Section 5(1)(b) of the NHS Act 1977⁴¹. The response data inferred that not all radiographers were consistently allocated weekly reporting sessions. The RCR²⁴ specify that any reporting practice involves direct clinical care and should have routinely scheduled reporting sessions to support adequate service delivery, including cross-cover provision or the requirement to provide additional 'out of hours' reporting sessions to resolve reporting backlogs.²⁴

The results obtained on the category of resources, equipment, and working conditions, demonstrated not all radiographers had parity of access to suitable PACS display screens of recommended standards on spatial resolution and contrast as detailed in best practice guidance.²⁸ The environment to report within should adhere to best practice guidelines⁴² such as an adequate workplace, IT resources, lighting,²⁹ heating, air quality, and reduction of extraneous sound. This environmental recommendation not only would provide an appropriate confidential setting, but could increase concentration and reduce the risk of errors in reporting. There is evidence for the potential for errors to occur through eye strain,³⁴ which conceivably may affect those radiographers not allocated rest breaks during long reporting sessions. It is worth noting that by law, the Working Time Regulations,⁴² which applies the European Working Time Directive⁴³ (Article 10 and 11) requires an adequate uninterrupted rest period between shifts, to provide a period of rest away from the glare of a computer monitor.

The response to the third category on measures of performance allowed comparison of the 21% that regularly audited their work against the SCoR⁸ and RCR²⁴ quality improvement and governance frameworks that require periodic audit and/or peer-review for quality and error review. The RCR² also advise that regular evaluation of the nature and number of examinations be audited. Acknowledging the workload achievable during a reporting session is variable, not just by ability, but by environmental interruptions²⁴ and equipment resources. The RCR²⁴ suggest a normal 'hot-reporting' session is likely due to its nature to be repeatedly interrupted, thus be less productive and produce lower reports per session (but provide a valuable service). Whereas, an uninterrupted 'cold reporting' session would achieve higher productivity of reports. Other factors that potentially impede productivity per session include the modality being reported by the radiographers. With each imaging technique having a different level of complexity and volume of data per examination, which can be time-consuming and complicated to retain a level of quality against punctuality of reporting. The RCR use the Gishen Ready Reckoner²⁶ to provide indicative modality based estimates of the amount of reports per hour of uninterrupted time, which is comparable to the amounts identified within this survey. Collective learning from audit discrepancies, error, and MDT meetings is advocated to improve patient safety,^{25,27} which the data suggested only 68% of respondents attend these meetings. Accompanying data revealed only 53% had allocated time to feedforward or back images/reports, as opposed to the RCR²⁷ and SCoR²⁵ recommendation of time be assigned to the preparation of materials for discussion and feedback of inquiries to improve service delivery.

The fourth category of education and training indicated mixed organisational support that did not consistently conform to SCoR^{8,25} and RCR²⁴ principles of CPD education and training activities, regular reviews and appraisal of advanced practice roles. The RCR and SCoR Team Working document⁷ underlines the guiding values and beliefs that the establishment of appropriate supervision could

provide a safe, efficient and practical service with safeguarding precautions, which is an important governance issue⁷⁻⁸ that clinical imaging managers are collectively responsible for establishing and maintaining. The SCoR and RCR⁸ advise that working in isolation without support is recognised as poor practice and potentially unsafe.

It is important to consider the impact of the outcomes of this small scale research which may be minor in practical terms (formal assessment and causal expectations), but studies in this area are important to help guide discussion on future practices. The provable effects of these results beyond academia will mostly be demonstrated in the contribution of this and similar papers in this area within the growing evidence base of implementation of advanced practice standards. The role of research in this area is to engage with professional bodies who are committed to improving future practice and advanced role guidelines through continued re-evaluation of the drivers and barriers to safe and competent practice.

Limitations

The constraints of this data suggest further research with a larger sample group to observe if the scale of variability is affected by factors of geographic location (urban vs. rural), size and type of hospital (district general or speciality), and experience of the reporter. Additionally, it would be of interest to know what, if any, the effect of increased support (mandatory auditing, mentorship, protected time for CPD) had on reporting. What a standardised approach would bring to the productivity of reports and the impact of future best practice guidelines to clinical reporting practice. At present with no published register of radiographers in advanced practice reporting roles, the population to sample is unknown and difficult to access, this factor will reduce the generalisability of these results to the population.

Conclusion

A sample group of reporting radiographers working in advanced practice roles were engaged through on-line survey methods to produce data on how professional body best practice policies and guidelines are currently being implemented in clinical practice. The results of the data collected, identified specific trends in the sample group on defined scope of practice, and the level of organisational support. It was implied from the varied responses on equipment and resources provided to perform the role, that best practice guidance on resources should be considered in future frameworks and policy to support safe working practices.

The diverse responses to the survey suggest adherence to recommended best principles in reporting were not consistent within this sample group. The main trends noted from the survey data centred upon on parity of support, equipment, scheduled sessions, audit mechanisms and cross-cover of service provision.

Acknowledgements

The author would like to thank all the radiographers that participated in the study.

Funding

There were no financial conflicts of interest.

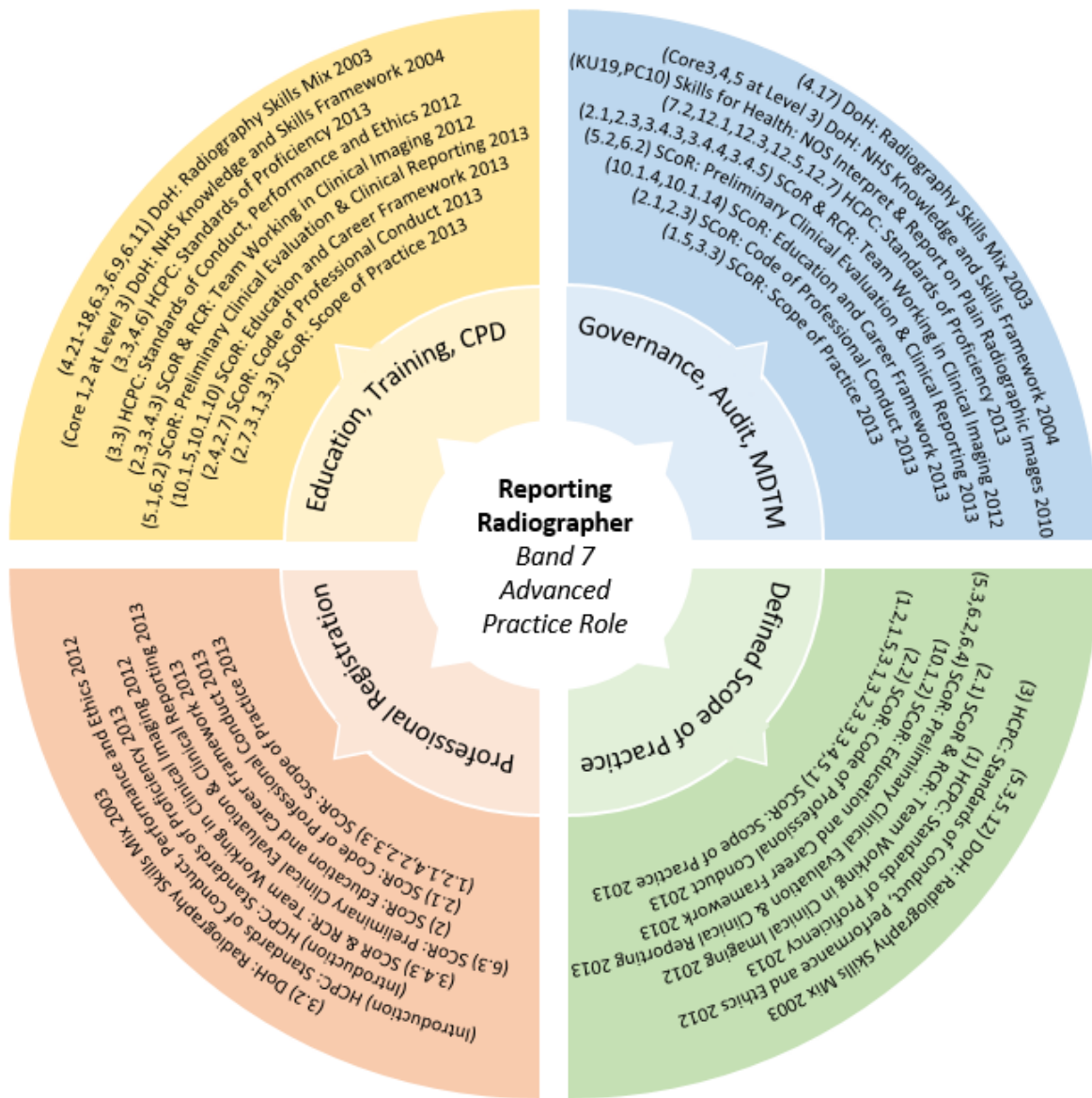


Table 1. Advanced Practice basic threshold standards.

References

1. NHS England. *Five Year Forward View*. Available from: <https://www.england.nhs.uk/wp-content/uploads/2014/10/5yfv-web.pdf> [Accessed 20 Jan 2017].

2. The Royal College of Radiologists. *College review of radiology services, Fourth edition*. Available from: <https://www.rcr.ac.uk/publication/college-review-radiology-services-fourth-edition> [Accessed 27 May 2016].
3. The Royal College of General Practitioners, The Society and College of Radiographers, The Royal College of Radiologists. *Quality imaging services for primary care: a good practice guide*. Available from: <http://www.rcgp.org.uk/news/~media/Files/CfC/RCGP-Quality-imaging-services-for-Primary-Care.ashx> [Accessed 27 May 2016].
4. Department of Health. *Radiography skills mix: a report on the four-tier service delivery model*. Available from: http://webarchive.nationalarchives.gov.uk/20130107105354/http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsPolicyAndGuidance/PublicationsPolicyAndGuidanceArticle/fs/en?CONTENT_ID=4007123&chk=J/aahA [Accessed 27 May 2016].
5. The Stationary Office. *The Health and Social Care Act 2012*. Available from: <http://www.legislation.gov.uk/ukpga/2012/7/contents/enacted> [Accessed 27 May 2016].
6. Department of Health. *White Paper: Trust, Assurance and Safety: the regulation of health professionals in the 21st Century*. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228847/7013.pdf [Accessed 27 May 2016].
7. Department of Health. *Equity and excellence: Liberating the NHS*. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/213823/dh_11779_4.pdf [Accessed 27 May 2016].
8. The Royal College of Radiologists and the Society and College of Radiographers. *Team working in clinical imaging*. Available from: [https://www.rcr.ac.uk/sites/default/files/publication/BFCR\(12\)9_Team.pdf](https://www.rcr.ac.uk/sites/default/files/publication/BFCR(12)9_Team.pdf) [Accessed 27 May 2016].
9. The Society and College of Radiographers. *Preliminary Clinical Evaluation and Clinical Reporting by Radiographers: Policy and Practice Guidance*. Available from: <http://www.sor.org/learning/document-library/preliminary-clinical-evaluation-and-clinical-reporting-radiographers-policy-and-practice-guidance> [Accessed 27 May 2016].
10. NHS England. *AHPs into Action: Using Allied Health Professions to transform health, care and wellbeing*. Available from: <https://www.england.nhs.uk/wp-content/uploads/2017/01/ahp-action-transform-hlth.pdf> [Accessed 28 Jan 2017].
11. Kelly J, Piper K, Nightingale J. Factors influencing the development and implementation of advanced and consultant radiographer practice—A review of the literature. *Radiography*. 2008;14:e71-78. Available from: <http://www.sciencedirect.com/science/article/pii/S1078817408001090> [Accessed 25 May 2016].
12. Hardy M, Spencer N, Snaith B. Radiographer emergency department hot reporting: An assessment of service quality and feasibility. *Radiography*. 2008;14.4:301-305. Available from: <http://www.sciencedirect.com/science/article/pii/S1078817407000958> [Accessed 27 May 2016].
13. Forsyth LJ, Robertson E. Radiologist perceptions of radiographer role development in Scotland. *Radiography*. 2007;13.1:51-55. Available from: <http://www.sciencedirect.com/science/article/pii/S1078817405001495> [Accessed 27 May 2016].

14. Ford P. The role of the consultant radiographer—Experience of appointees. *Radiography*. 2010;16.3:189-197. Available from: <http://www.sciencedirect.com/science/article/pii/S1078817410000374> [Accessed 29 May 2016].
15. Blakeley C, Hogg P, Heywood J. Effectiveness of UK radiographer image reading. *Radiologic technology*. 2008;79.3:221-226. Available from: <http://www.radiologictechnology.org/content/79/3/221.short> [Accessed 25 May 2016].
16. Snaith B, Hardy M. The perceived impact of an emergency department immediate reporting service: An exploratory survey. *Radiography*. 2013;19.2:92-96. Available from: <http://www.sciencedirect.com/science/article/pii/S1078817413000138> [Accessed 23 May 2016].
17. Brealey S, King D, Warnock N. An assessment of different healthcare professionals' attitudes towards radiographers' reporting A&E films. *Radiography*. 2002;8.1:27-34. Available from: <http://www.sciencedirect.com/science/article/pii/S1078817401903530> [Accessed 25 May 2016].
18. Snaith B, Hardy M, Lewis EF. Radiographer reporting in the UK: A longitudinal analysis. *Radiography*. 2015;21.2:119-123. Available from: <https://search.informit.com.au/documentSummary;dn=552902823948723;res=IELHEA> [Accessed 25 May 2016].
19. Hardy M, Smith T, Snaith B. Radiographer reporting of trauma images: United Kingdom experience and the implications for evolving international practice. *Radiographer: The Official Journal of the Australian Institute of Radiography*. 2008;55.1:16.
20. Society and College of Radiographers. *Education and Career Framework for the Radiography Workforce*. Available from: <http://www.sor.org/learning/document-library/code-professional-conduct> [Accessed 13 Oct 2015].
21. Society and College of Radiographers. *Code of Professional Conduct*. Available from: <http://www.sor.org/learning/document-library/code-professional-conduct> [Accessed 13 Oct 2015].
22. Society and College of Radiographers. *Scope of Practice*. Available from: <http://www.sor.org/learning/document-library/code-professional-conduct> [Accessed 13 Oct 2015].
23. The College of Radiographers. *Medical Image Interpretation by Radiographers Definitive Guidance*. Available from: http://www.sor.org/system/files/document-library/public/sor_Definitive_Guidance_May_2010.pdf [Accessed 27 May 2016].
24. The Royal College of Radiologists. *A guide to job planning in clinical radiology*. Available from: [https://www.rcr.ac.uk/sites/default/files/BFCR\(13\)9_job_plans.pdf](https://www.rcr.ac.uk/sites/default/files/BFCR(13)9_job_plans.pdf) [Accessed 27 May 2016].
25. The College of Radiographers. *Medical Image Interpretation and Clinical Reporting by Non-Radiologists: The Role of the Radiographer*. 2006.
26. The Royal College of Radiologists. *Clinical radiology workload: guidance on radiologists' reporting figures*; Available from: <https://www.rcr.ac.uk/publication/clinical-radiology-workload-guidance-radiologists%E2%80%99-reporting-figures> [Accessed 27 May 2016].
27. The Royal College of Radiologists. *Standards for radiology Discrepancy Meetings*. Available from: [https://www.rcr.ac.uk/sites/default/files/publication/BFCR\(14\)11_LDMs.pdf](https://www.rcr.ac.uk/sites/default/files/publication/BFCR(14)11_LDMs.pdf) [Accessed 27 May 2016].

28. The Royal College of Radiologists. *Picture archiving and communication systems (PACS) and guidelines on diagnostic display devices, second edition*. Available from: [https://www.rcr.ac.uk/sites/default/files/docs/radiology/pdf/BFCR\(12\)16_PACS_DDD.pdf](https://www.rcr.ac.uk/sites/default/files/docs/radiology/pdf/BFCR(12)16_PACS_DDD.pdf) [Accessed 27 May 2016].
29. The Royal College of Radiologists. *Ergonomics*. Available from: [https://www.rcr.ac.uk/sites/default/files/docs/radiology/pdf/BFCR\(12\)7_Ergonomics.pdf](https://www.rcr.ac.uk/sites/default/files/docs/radiology/pdf/BFCR(12)7_Ergonomics.pdf) [Accessed 27 May 2016].
30. Department of Health. *The NHS Knowledge and Skills Framework (NHS KSF) and the Development Review Process*. Available from: http://www.webarchive.org.uk/wayback/archive/20070626120000/http://www.dh.gov.uk/prod_consum_dh/DH_4090861b114.pdf [Accessed 13 Oct 2015].
31. Health and Care Professions Council. *Standards of Conduct, performance and ethics*. Available from: <http://www.hcpc-uk.org/assets/documents/10004EDFStandardsofconduct,performanceandethics.pdf> [accessed 29 Nov 2016].
32. Health and Care Professions Council. *Standards of Proficiency Radiographers*. Available from: http://www.hcpc-uk.org/assets/documents/10000DBDStandards_of_Proficiency_Radiographers.pdf [accessed 29 Nov 2016].
33. Skills for Health. National Occupational Standards: *Cl.B Interpret and report on plan radiographic images*. Available from: <https://tools.skillsforhealth.org.uk/competence/show/html/id/1193/> [Accessed 13 Oct 2015].
34. Robinson PJA. Radiology's Achilles' heel: error and variation in the interpretation of the Rontgen image. *The British Journal of Radiology*. 1997; 70: 1085-1098. Available from: <http://www.birpublications.org/doi/abs/10.1259/bjr.70.839.9536897> [Accessed 27 May 2016].
35. Brealey S, Scally AJ. Methodological approaches to evaluating the practice of radiographers' interpretation of images: A review. *Radiography*. 2008 Dec 31;14: e46-54. Available from: <http://www.sciencedirect.com/science/article/pii/S1078817408000023> [Accessed 27 May 2016].
36. Brealey S. Measuring the effects of image interpretation: an evaluative framework. *Clinical Radiology*. 56.5 (2001): 341-347. Available from: <http://www.sciencedirect.com/science/article/pii/S0009926001906786> [Accessed 25 May 2016].
37. The Society and College of Radiographers. *How can we get more reporting radiographers?* Available from: <http://www.sor.org/news/how-can-we-get-more-reporting-radiographers> [Accessed 27 May 2016].
38. Qualtrics. [computer program]. Qualtrics. 2015. Available from: <https://www.qualtrics.com> [Accessed 27 May 2016].
39. Microsoft Excel. [computer program]. Microsoft Office. Microsoft Corporation; Redmond VA, USA; 2016. Available from: <https://office.live.com/start/Excel.aspx> [Accessed 15 August 2016].
40. Statistical on-line calculators. [computer program]. The Social Science Statistics. 2016. Available from: <http://www.socscistatistics.com/tests/Default.aspx> [Accessed 15 August 2016].
41. Department of Health. *National Health Service Act 1977*. Available from: <http://www.legislation.gov.uk/ukpga/1977/49/contents> [Accessed 27 May 2016].

42. The Stationary Office. *The Working Time Regulations 1998*. ACAS; Available from: <http://www.legislation.gov.uk/uklj/1998/1833/contents/made> [Accessed 27 May 2016].

43. European Commission. *The European Working Time Directive (EWTD), Directive 93/104/EC*. Available from: <http://ec.europa.eu/social/BlobServlet?docId=2932&langId=en> [Accessed 27 May 2016].