

## Radiographer abnormality flagging systems in the UK – A preliminary updated assessment of practice

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### ARTICLE INFO

#### Article history:

Received 11 October 2022

Received in revised form

28 November 2022

Accepted 30 November 2022

Available online 16 December 2022

#### Keywords:

RADS

Red dot

Commenting

Preliminary clinical evaluation

### ABSTRACT

**Introduction:** Radiographer abnormality flagging systems have been in use in the UK for over 30 years, with the guidance of the Society and College of Radiographers indicated that the preliminary clinical evaluation (PCE), or comment, be the preferred system of choice. This study aimed to provide an updated assessment of current practice based upon a previous 2008 study.

**Methods:** A cross-sectional online survey was disseminated via Twitter and aimed at departmental and reporting leads. It requested information on the types of flagging and reporting systems operated, scope of the systems employed, required education of participants, and the role of audit.

**Results:** Responses were received from 31 Trusts within the UK. Red dot systems were employed in 90% (n = 28) of sites, with 26% (n = 8) undertaking PCE. Skeletal radiographs were most commonly reviewed (90%; n = 28) followed by chest (58%; n = 18) and abdomen (32%; n = 10). Only 13% (n = 4) sites indicated if the image was normal but 71% (n = 22) allowed the radiographer to indicate if they were unsure. There was marked variation in the educational requirements and use of audit.

**Conclusion:** Compared to 2008 there appears to be quite minimal change in practices in the UK. There does appear to be some increase in the use of flagging systems generally and a higher proportion of PCE systems in comparison to red dot but the use of education and audit does not necessarily show much development in the past 15 years.

**Implications for practice:** Significant conclusions cannot be drawn due to limited sample size, however, it may support further study and consideration in relation to implementation and potentially standardisation of abnormality detection systems may be justified.

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### Introduction

The Society and College of Radiographers (SCoR)<sup>1,2</sup> has, for some time, envisaged that a preliminary clinical or image evaluation (PCE/PIE) abnormality flagging system, otherwise known as the ‘comment’, should replace the red dot flagging system within radiology and emergency departments (ED). The difference between the two systems is that the PCE system permits the radiographer to immediately provide a brief comment describing any abnormality that may be present, rather than just highlighting there may be an abnormality present and thus reducing the

ambiguity and lack of specificity which may be seen with red dot<sup>3–5</sup> prior to a formal clinical report.

The SCoR<sup>2</sup> has also considered commenting to be within the scope of practice of graduate radiographers and outlined expectations on higher education institutions (HEIs) to ensure graduates have the necessary skills to undertake commenting post-qualification which can then be developed further. Whilst it has been embedded in the pre-registration curriculum since at least 2009,<sup>6</sup> it is uncertain to what extent those commenting skills are then being utilised in practice.

Despite this vision being around since at least 2006, the fact commenting is now heavily integrated into undergraduate radiographer education,<sup>6</sup> and that PCE is the subject of numerous research studies,<sup>3–5,7–12</sup> both in the UK and Australia (where interest is rapidly growing); the use of PCE still appears somewhat regional and not universally employed in the UK. A national audit in 2007<sup>4</sup> identified only 2.5% of Trusts used PCE as the preferred

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method of image review by radiographers. Additionally, neither the SCoR<sup>2</sup> or Health and Care Professions Council (HCPC)<sup>13</sup> have updated their guidance on expectations of the graduate radiographer's role in terms of image interpretation since 2013.

This evaluation project aimed to provide an updated perspective on the previous study undertaken by Snaith and Hardy in 2008<sup>4</sup> and provide a contemporary overview of the use of PCE within NHS radiology and minor injury departments in the UK. Whilst the concept of PCE is over 15 years old, its implementation into wider practice in the UK and internationally appears limited. It is envisaged that by providing further insight into the use of the PCE in the UK, it will help to understand the breadth of the scheme since this has not been widely investigated in the literature since 2008.<sup>4</sup>

**Methods**

Ethical approval was granted by the University of Leeds School of Medicine Research and Ethics Committee on 28th October 2021 (ref. MREC 21-006)

A cross-sectional online survey was utilised based upon the previous study by Snaith and Hardy in 2008.<sup>4</sup> The template of this survey was kindly provided by the previous authors who were also invited to take part in the study. The previous study was done in paper form by post, however, due to implications of the COVID-19 pandemic, financial cost, and the further advent of technology in the last 15 years, it was decided to undertake the survey using the Jisc Online surveys© platform. In common with the previous survey<sup>4</sup> the questionnaire consisted of a combination of multiple choice and open-ended free text responses requesting factual, and not opinion-based information on the flagging and reporting services within the Trust. Questions were focused on areas including the types of flagging and reporting systems operated, scope of the systems employed, required education of participants, and the role of audit.

The previous survey<sup>4</sup> was targeted directly to all hospitals in the UK with an ED or minor injury service, a list of which was accessed via the British Association of Emergency Medicine (BAEM) online directory which is no longer accessible. According to the Kings Fund, in 2019, there were 223 NHS Trusts in the UK, though it was not possible to identify all ED and minor injury units in the UK. Therefore, considering the developing role of social media in health research,<sup>14,15</sup> the online survey was posted via Twitter for a six-week period between January and February 2022.

The survey was designed to obtain an overview of flagging systems within NHS Trusts so was aimed towards radiology service managers, superintendent radiographers, or other staff overseeing reporting services within Trusts offering ED and minor injury services. To avoid duplication and try and ensure responses from appropriate persons only NHS Trust and job role, under predetermined criteria, were requested in the survey. Otherwise, no identifiable, and no personal data, was requested. Implied consent was obtained through the inclusion of a detailed participant information sheet prior to commencing the study. Participants were able to withdraw from the study up to two weeks from the closure date, after which time hospital/Trust data was removed. Only the authors had access to responses. Descriptive statistical analysis was performed using Microsoft Excel.

**Results**

The study returned 31 responses, 30 from England and 1 from Scotland. Most responses were from those who manage radiographer abnormality systems within the department e.g., consultant

radiographer (n = 17, 54.8%), followed by superintendent radiographer (n = 8, 25.8%), then department manager (n = 3, 9.7%) and radiology services manager (n = 3, 9.7%).

*Service provision*

All sites have a 24-h Emergency Department (ED). Only 2 sites (6.5%) operate a 24 h “hot” reporting service, 16 sites (51.6%) offer a restricted hours service and 13 sites (41.9%) do not have a “hot” reporting service. Most Trusts (n = 28/31, 90%) operate a Red Dot system, eight Trusts (26%) operate a PCE flagging system, with five these Trusts (16%) having a hybrid of both systems and only one Trust (3%) does not operate any type of abnormality flagging system. The PCE system is only in use at Trusts that have no hot reporting service (n = 4/8, 50%) or a restricted hours hot reporting service (n = 4/8, 50%) (Table 1).

*Scope of practice*

A range of anatomical areas were indicated as being included within the scope of practice of both red dot and PCE systems, with both indicating that the appendicular and axial skeleton were most common, followed by chest, and then abdomen being least common (Chart 1). Radiographers only indicate normal appearances at one site (3%) using the red dot system and three sites (10%) using the PCE system (Chart 2).

The commonest chest abnormalities flagged using the red dot system were traumatic abnormalities, such as pneumothorax (n = 12/28, 43%) and fractures (n = 6/28, 21%). Those using the PCE system had a wider remit with three sites being permitted to comment on anything abnormal (n = 3/8, 38%), describing pneumothoraces was next most common (n = 2/8, 25%) (Chart 3).

The commonest abdominal abnormalities flagged using the red dot system was anything abnormal (n = 4/28, 14%) followed by foreign body (n = 3/28, 11%). Both these abnormalities were seen with equal frequency with those using the PCE system (n = 1/8, 12.5%) (Chart 4).

*Education*

Only two sites (6%) reported that they require a minimum period of clinical experience before participation is permitted in the red dot system. None of the sites that have a PCE system require a minimum period of clinical experience.

Beyond registration, radiographers are required to maintain ongoing CPD education at 19 (68%) sites for red dot systems and four (50%) sites for PCE. No ongoing education was required at nine (32%) sites for red dot and five (63%) sites for PCE. Further breakdown is shown in Chart 5.

*Mandatory/voluntary*

Mandatory participation was only required at eight sites (29%) with red dot systems and only two of these sites (25%) undertake

**Table 1**  
Abnormality flagging system usage relative to hot report service availability.

“hot” reporting service availability	PCE System		Red Dot System	
	No	Yes	No	Yes
No	9	4	2	11
Yes - restricted hours	12	4	1	15
Yes - 24 h	2	0	0	2
<b>Total</b>	<b>23</b>	<b>8</b>	<b>3</b>	<b>28</b>

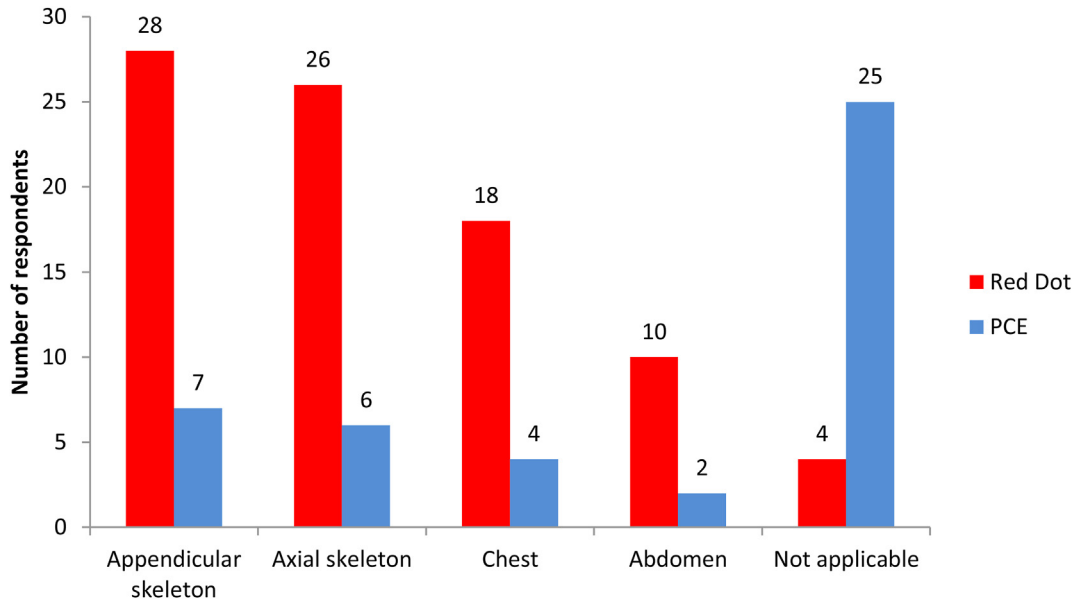


Chart 1. Which anatomical areas are included in your abnormality flagging system?

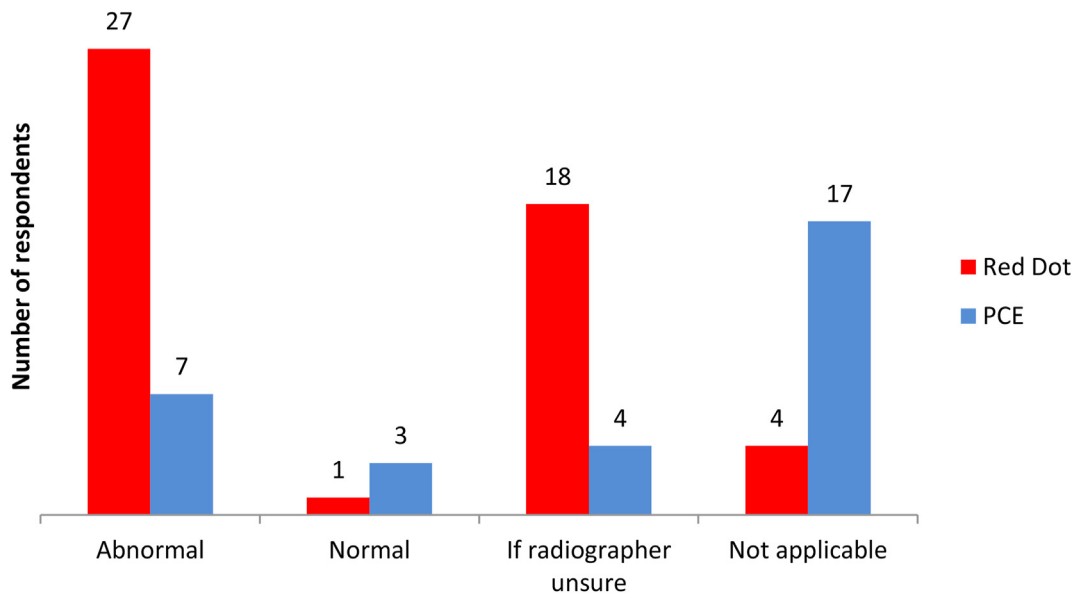


Chart 2. In relation to your abnormality flagging system(s), which context do radiographers identify images?.

audits of practice. Mandatory participation was only required at two sites (25%) with PCE systems and only one of these undertakes an audit of practice. Three of the six sites (50%) where participation was voluntary also undertook audit of practice.

*Audit of practice*

Participants were asked if they had a regular audit process for assessing accuracy. Only eight sites (29%) with red dot systems, and four sites (50%) with PCE systems indicated that they undertake regular audits of practice.

The free text comments section regarding audit design and regularity provides insight into the diverse methods

departments use to assess radiographers' participation. When asked about their audit process participants indicated that the reporting radiographers play a central role in undertaking the audits and assessing radiographers' comments and providing feedback.

*“Not formally but reporting radiographers feedback to individuals”  
 “... to be completed by the MSK and chest reporting radiographer team”*

The comments also highlighted that the interval at which audits are undertaken are seen with wide variance;

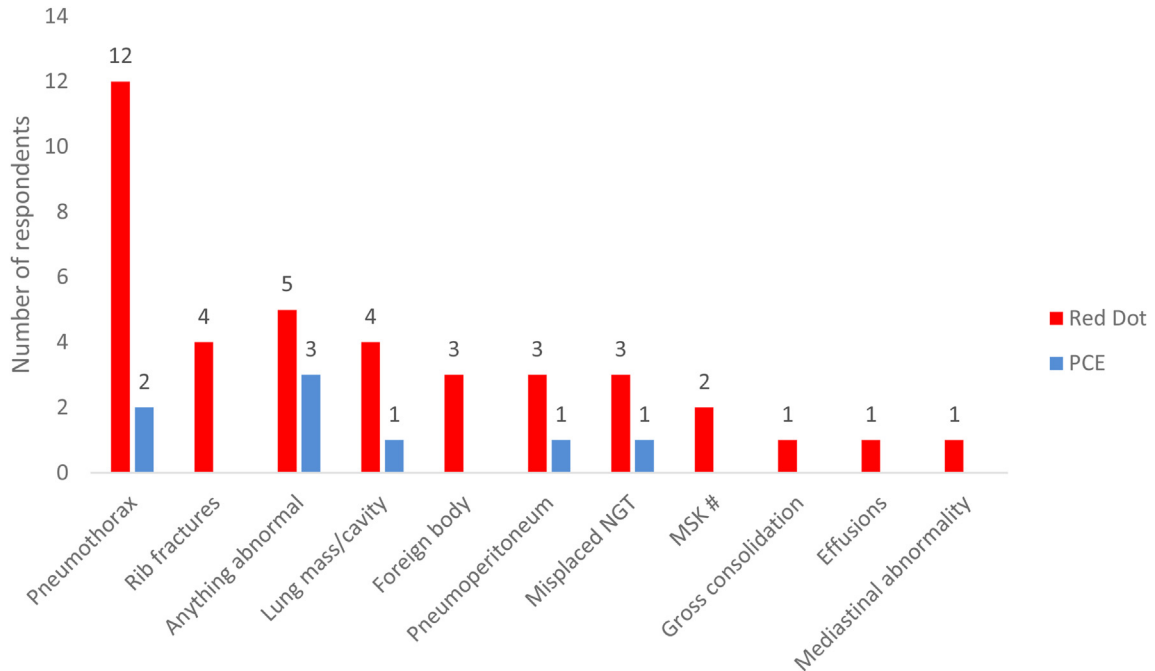


Chart 3. Chest abnormalities that are flagged in each system.

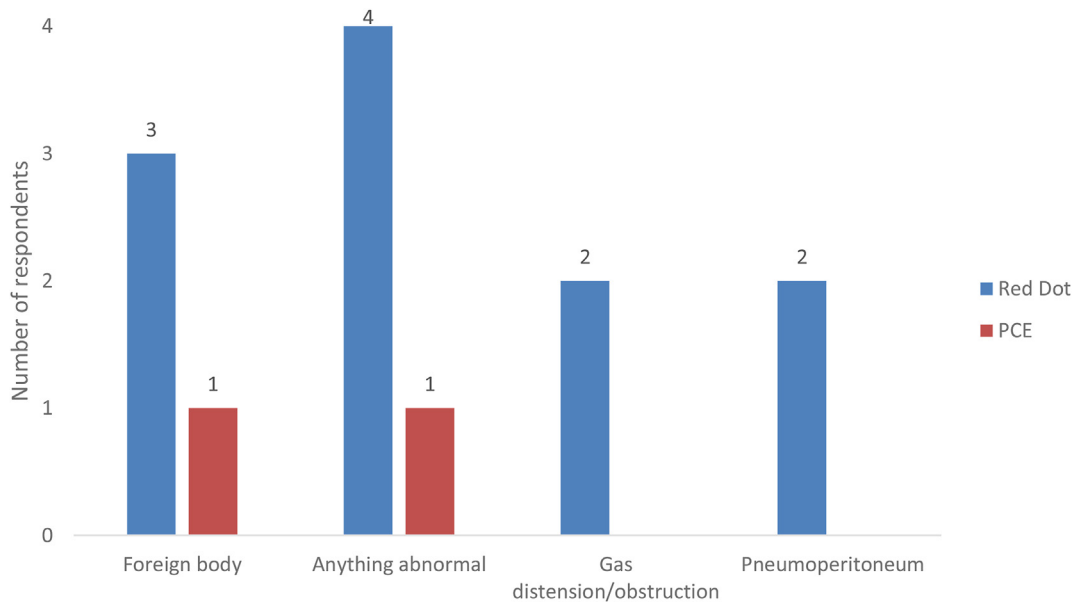


Chart 4. Abdominal abnormalities that are flagged in each system.

“Monthly” “Every 2 months” “Quarterly clinical audit” “Ongoing audit” “Annually”

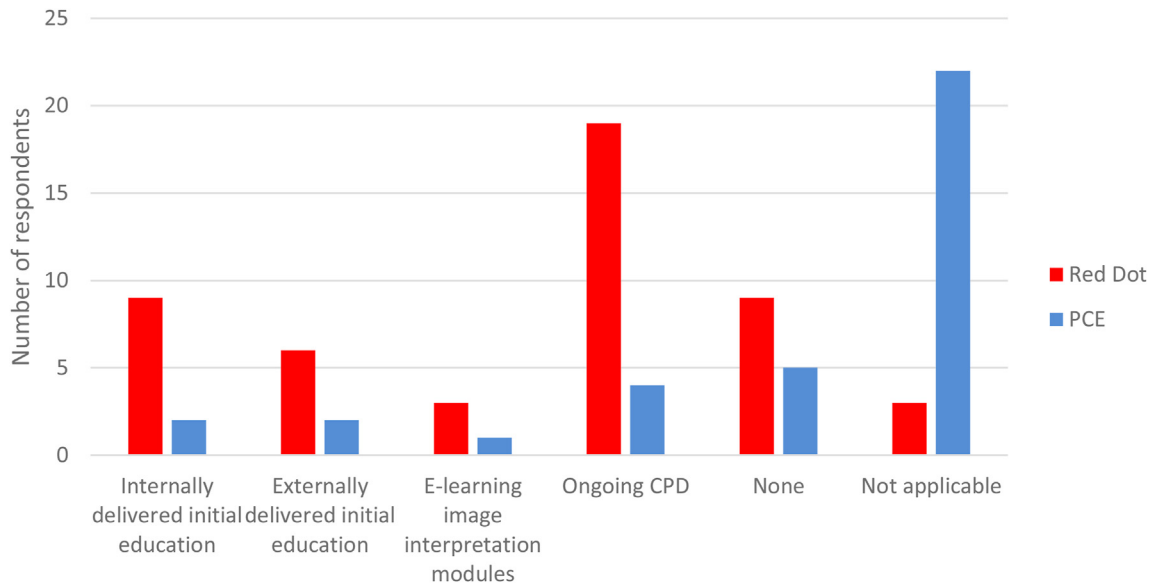
**Discussion**

The aim of this survey was to provide an updated overview of the use of radiographer abnormality flagging systems in the UK, however, given the relatively low number of responses these results only provide an insight into practice in comparison to the survey in 2008.<sup>4</sup>

The current study only received responses from hospitals, rather than minor injury units, and all offered a 24-h ED service, however only a small proportion operate a 24 h “hot” reporting service (6.5%,

n = 2) and 51.6% (n = 16) a restricted service. With the remaining 41.9% (n = 13) not offering a “hot” reporting service at all, this appears to indicate that radiographer abnormality flagging systems do have valid role with ED departments to assist clinicians.

97% (n = 30) of respondents, compared to 92.8% in 2008, operate some form of flagging system and 27% (n = 8) operated a PCE system (or hybrid) in comparison to 21.5% in 2007.<sup>4</sup> Those sites who only operate PCEs has increased also from 2.5% to 9.7% (n = 3). Since the previous study, the SCoR published guidance on clinical reporting and PCE which provided clearer guidance and expectations on the role of PCE<sup>2</sup> and it certainly appears that the use of PCE has grown in use in the past 15 years. Despite this guidance and the



**Chart 5.** Education, beyond registration, radiographers are required to undertake to participate in the flagging systems.

SCoR’s vision for PCE to replace red dot, many HEIs including PCE as part of their curriculum<sup>6,16</sup> and the growing body of evidence<sup>3–5,7–12</sup> on PCE, 90% of sites still operate a red dot system (or hybrid approach) so this is still by far the most popular form of flagging, though this is less than the 96.8% in 2008 so there has been a change in emphasis.

The scope of practice undertaken by such systems was not evaluated by Hardy and Snaith,<sup>4</sup> however, our study identifies that for both red dot and PCE, evaluation of skeletal trauma is more common than the chest and abdomen X-ray. Historically red dot and clinical reporting systems were predominantly based around skeletal trauma, with evaluation of the chest X-ray and other modalities being relatively more recent developments. This is reflected in the education at pre-registration level being aimed more clearly at skeletal trauma than other areas.<sup>16,17</sup> Confidence in being able to undertake PCE has previously been demonstrated to be a barrier to implementation of such practices.<sup>5</sup> The complexity of chest X-ray interpretation, in comparison to skeletal trauma, may be contributory to the relative lack of participation.

It is interesting to note that only 13% (n = 4) of sites directly indicate whether the image is normal, but a much larger proportion (71%, n = 22) identify if the radiographer is uncertain of findings. One of the noted limitations of the red dot systems was the ambiguity of the system if an abnormality was not flagged<sup>3–5</sup> and the PCE was designed to help reduce this, however, only 3 of the 8 respondents (37.5%) indicate where the radiographer is unsure. Another barrier to implementation of PCE has been perceived to be a fear of getting it wrong<sup>5</sup> so it might be suggested as a requisite of such systems that to both help support radiographers’ confidence but also to aid clinicians that the opportunity to provide and ‘uncertain’ response be included. Only 1 site out of 28 (3.4%) using the red dot system would indicate that the image is normal and a large proportion (64.2%, n = 18) did indicate uncertainty by the radiographer, which might be seen as being more preferable than not red dotting an image if they were uncertain.

As noted, abnormality flagging systems have primarily been utilised within the trauma and emergency setting and within the context of the chest X-ray, indication of a pneumothorax is most common pathology identified using the red dot. However, it is

interesting to note that, although in small numbers, the use of the PCE most commonly considers any abnormality demonstrated and is not restricted to trauma alone. Defining scope of practice within any aspect of health is of utmost importance to allow health professionals to be able to work safely and effectively. For tasks such as image interpretation, either flagging systems or clinical reporting, a clearly defined scope of practice and scheme of work outlining the activity is essential for both the referring clinician and individual undertaking the task, therefore, it must be made clear what aspects are and are not covered by the flagging system.<sup>1,2</sup>

Related to scope of practice is the education required by participants to undertake RADS within departments. Image interpretation training is now heavily incorporated within pre-registration programmes, however, there is marked variation in the breadth and level of education, nor is the writing of PCE education universal.<sup>16</sup> Only 3 of 8 (37.5%) of sites offering PCE offered some additional training, and 32.1% (n = 9) of sites offered initial education for red dot systems. Hardy and Snaith<sup>4</sup> found 90% provided initial education compared to a combined 53% (16/30) in the current study which suggests there is now perhaps more reliance on pre-registration education. Given the lack of specificity in the requirements of image interpretation pre-registration education by professional and statutory regulatory bodies (PSRBs),<sup>1,2,13,16</sup> and the extensive evidence base supporting the role of initial and on-going education<sup>8,12,17</sup> in improving confidence and accuracy, it may be considered highly desirable that some form of initial and on-going learning be a requisite of flagging systems.

The HCPC standards of proficiency<sup>13</sup> do indicate that diagnostic radiographers in the UK need to be able to differentiate normal and abnormal appearances, and be able to communicate them appropriately, yet there is no specific requirement to participate in RADS, despite the vision of the SCoR.<sup>1,2</sup> Mandatory participation was demonstrated in 30% (n = 9) of the sites, in comparison to 26.1% in 2008<sup>4</sup> which suggests there is minimal change in participation in the interim period. Despite the increased evidence base to support such practices, it appears some of the barriers to participation remain.<sup>5,7</sup>

Similar minimal change compared to the previous study is the role of audit in the governance of such systems. In 2008 there were 31.3% of sites who had some form of audit process of RADS systems,

the current study indicates this is 40% (n = 12) overall, and 29% and 50% for red dot and PCE respectively. Whilst other sites indicated there were informal mechanisms for feedback, it is apparent that in many instances practices are not being supported by mechanisms for quality assurance or to provide support to participants which might be considered essential as part of any effective clinical governance scheme.<sup>18</sup>

### Limitations

The aim of this study was to provide an updated overview of practices from Snaith and Hardy's 2008 survey.<sup>4</sup> Unfortunately, the low response rate and small sample size means any significant conclusions cannot be drawn and this study must be viewed as only indicative of any changes in practice in the interim. It is recognised that the recruitment strategy likely played a role in the small response rate. In addition, it may be considered that participants may represent departments who may be more proactive in the implementation and management of RADS systems and therefore potentially introducing bias into the results. The authors, therefore, identify that this current study is only a preliminary updated assessment on practice, one which may need to be undertaken on a much larger scale to provide a true reflection on current practice.

Additionally the term “hot reporting,” defined by the Care Quality Commission<sup>19</sup> as a report returned within an hour, was not defined in the questionnaire. This ambiguity may have led to participants not being able to respond appropriately to this part of the questionnaire.

### Conclusion

Within the confines of the study it might be considered that despite the vision of the SCoR there appears to be quite minimal change in RADS practices in the UK. There does appear to be some increase in the use of RADS generally, a higher proportion of PCE systems in comparison to red dot, and a growing scope of practice outside of skeletal trauma but, in contrast, many practices such as the use of education, audit, and mandatory participation do not necessarily show much development in the past 15 years. Despite the growing evidence base, the guidance offered governing the application of PCE is quite ambiguous and has not been update for over a decade. Whilst a wider scale study is required, the results of this preliminary study indicate the vision of the SCoR for the PCE to be considered standard practice for radiographers remains a long way off.

### Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

### Conflict of interest statement

None.

### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.radi.2022.11.014>.

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