

Radiographer abnormality detection schemes in the trauma environment – An assessment of current practice

Introduction

Radiographer abnormality detection schemes (RADS) were first introduced in the United Kingdom (UK) in the 1980's with the introduction of 'red dot' schemes to assist emergency department (ED) doctors in the correct interpretation of radiographic images¹. Prior to this, radiographers were precluded from expressing an opinion on a radiograph, largely as a result of medical, and later radiological, intervention^{2,3}. However, following publication of the first reported use of red dot, RADS became widely adopted. Indeed, the role extension survey undertaken by Paterson in 1995 identified that over half of UK radiology departments had a 'red dot' scheme in place⁴. In 2004, when Price and Le Masurier completed the last national survey of extended roles, this number had increased to 81% of Hospital Trusts⁵ demonstrating that the radiography profession had truly embraced this role development.

Although 'red dot' remains the most widely used radiographer abnormality detection system, the College of Radiographers (CoR) has stated that its aspiration is for all radiographers to be able to make an initial interpretation on a trauma radiograph by 2010⁶. Such development of the radiographers' role is also supported by the regulatory body, the Health Professions Council⁷, and the Quality Assurance Agency⁸, the organisation responsible for setting academic benchmarks. Importantly, the CoR's aspirational statement does not indicate that all radiographers should be able to provide definitive image reports. Instead, it appears to promote radiographer role development into the middle ground between 'red dot' and definitive reporting by encouraging the introduction radiographer comments, or preliminary opinion. In this way, the radiographer can take a more proactive role in the diagnostic process by indicating verbally, or in writing, the nature of the abnormality identified rather than just highlighting the radiograph^{9, 10, 11}. Little published literature has examined whether this role extension has been embraced by the profession in the same way as 'red dot' and radiographer reporting¹¹. Further, it is unclear whether the CoR aspiration for all radiographers to be able to provide an initial

interpretation on radiographic images is likely to be realised in the projected time frame. This article establishes the current position of UK practice with respect to the transition from 'red dot' or other RADS to radiographer commenting and provides insight into specific areas for development if the profession is to achieve the CoR aspiration.

Method

Following a critical review of the literature, a cross-sectional survey was undertaken using a postal questionnaire as the data collection tool. This approach permitted the collection of data at a specific point in time¹², facilitated the optimization of the study breadth¹³.

The questionnaire was designed to elicit factual information relating to the type of emergency department and radiography service provided; details of RADS operated including any education and audit to support radiographer participation; and the mandatory/voluntary nature of the system adopted.

A pilot study was undertaken to ensure the accuracy, appropriateness and relevance of the questionnaire. As clinical leadership for radiography within the trauma environment is not within the domain of a single clinical role in the UK, the pilot process included both advanced practitioners and superintendent radiographers. The questionnaire was updated following feedback from the pilot study and in February 2007, was distributed to every hospital in the UK (including Northern Ireland, Channel Islands and the Isle of Man) that had both a trauma (ED or minor injury) and radiography service, with a return date within 4 weeks of receipt. A total of 456 sites were identified from the British Association of Emergency Medicine (BAEM) online directory¹⁴, comprising 59.2% ED (n=270/456) and 40.8% minor injuries units (MIU) (n=186/456). Data analysis was undertaken using SPSS version 14.0 (SPSS Inc., Chicago, IL) and STATA version 9.0 (Stata Corporation, College Station, TX).

Results

A total of 306 (n=306/456; 74%) responses were received within the specified response time frame. Approximately 2/3^d responses were from hospitals with

an ED (n=203/306; 66.3%) and 1/3rd from hospitals with a MIU (n=103/306; 33.7%). A greater proportion of responses were received from hospitals that had an ED rather than a MIU ($z=1.99$; $p=0.047$).

Service Provision

The majority of ED departments (n=199/203; 98.0%) operated a 24 hour patient service. In contrast, the majority of MIU departments (n=77/103; 74.8%) offered a restricted hours patient service. The operational hours of the ED / MIU and radiography service were compared to establish compatibility (see table 1).

Table 1: Radiography service provision related to operational hours of ED/MIU

Trauma Department operational hours	Trauma Radiography Service Provision		
	24 hours shifts	24 hour on call	Restricted hours
ED (24-hour)	60	134	3
ED (restricted hours)	-	1	3
MIU (24-hour)	1	9	16
MIU (restricted hours)	1	4	70

Where the ED/MIU department operated a 24 hour patient service, the majority of radiography departments (n=204/223; 91.5%) also offered a 24 hour service although at a large number of sites this was through a radiographer 'on call' system (n=143/223; 64.1%). Similarly, where the ED/MIU service operated over restricted hours (n=73/79; 92.4%). Radiography service provision was not specified by 4 respondents (n=4/306; 1.3%)

Information regarding the type of imaging system operated for trauma radiography was provided by 305 respondents (n=305/306; 99.7%). The majority of imaging departments operated a filmless digital radiography system (n=190/305; 62.3%) with a further 55 sites (n=55/305; 18.0%) having digital imaging systems but were printing images for ED review. Only 60 trauma radiography departments (n=60/305; 19.7%) were operating with conventional film and processing facilities.

Radiographer role in trauma image review

The large majority of respondents (n=284/306; 92.8%) indicated that a RADS was in operation. Of these, 221 sites (n=221/284; 77.8%) operated a 'red dot' scheme; 7 sites (n=7/284; 2.5 %) operated a radiographer 'comment' system; and a further 54 sites (n=54/284; 19.0 %) operated both a red dot and comment scheme. Two sites (n=2/284; 0.7%) indicated that a RADS other than 'red dot' or radiographer commenting was operated although further information was not supplied. A greater number of RADS operated in hospitals with an ED compared to those with an MIU (see table 2).

Table 2: Radiographer abnormality detection schemes operated.

Type of Trauma Department	RADS operated	
	'Red Dot' Number (%)	Radiographer 'Commenting' Number (%)
ED	188 (92.6)	42 (20.7)
MIU	87 (83.5)	19 (18.5)

Further exploration of the 275 sites operating a 'red dot' scheme (including those that concurrently operated a radiographer commenting system) identified 21 different methods of signalling a radiographic abnormality to the referring trauma clinician. These included in order of popularity; the phrase '*red dot*' annotated on the CR image (n=83/275; 30.2%); a '*red dot*' sticker affixed to the radiograph (n=71/275; 25.8%); and an asterisk (*) annotated on the CR image (n=43/275; 15.6%). Other methods included a variety of different coloured stickers, packets and other CR image annotations.

Of the 61 sites providing a written comment on the radiographs (including those sites also operating a 'red' dot' system), 8 different methods of communicating radiographer findings were identified. These included the use of a radiographer comment proforma (n=24/61; 41.4%); space for radiographers to communicate findings on the imaging request card (n=12/61; 20.7%); and verbal communication (n=7/61; 12.1%). Other methods identified

were a note on the PACS system or the Radiology Information system (RIS); a hand written post-it note; and a stamp on the request card. Where only a radiographer comment system was operated (7 sites), a radiographer comment proforma was most commonly used (n=5/7; 71.4 %).

RADS: mandatory of voluntary

Respondents were asked whether participation in the RADS ('red dot' or 'comment') was mandatory or voluntary. Seventy-one sites indicated that participation was mandatory (n=71/284; 25%) whereas 210 indicated it was a voluntary system (n=210/284; 73.9%). One site indicated that the RADS was considered voluntary for AfC Band 5 radiographers and mandatory for staff graded Band 6 and above. The nature of the service was not specified by 3 respondents (n=3/284; 1.1%).

RADS education

All sites operating a RADS were asked to describe the education provided for staff prior to participating in the scheme and as part of ongoing continuing professional development (CPD) to support continued radiographer participation (see table 3). This information was then cross-tabulated with the voluntary/mandatory status of the RADS.

Table 3: Radiographer education to support participation in RADS

Level of RADS education provided	Mandatory RADS participation		Voluntary RADS participation	
	'red dot' No (%)	'comment' No (%)	'red dot' No (%)	'comment' No (%)
Prior to participation	57 (82.6)	13 (100)	116 (57.1)	25 (42.3)
Ongoing education	47 (68.1)	13 (100)	107 (52.7)	26 (44.1)
No education provided	7 (10.1)	-	55 (27.1)	14 (23.7)

Sites were asked whether they employed plain film reporting radiographers to assess whether this influenced the implementation of radiographer 'comment' schemes. Where 'red dot' only is undertaken, 57.0% of sites (n=126/221) have reporting radiographers. In contrast, 63.9% (n=39/61) of sites where radiographer commenting has been implemented employed reporting

radiographers. This difference in the proportion of sites employing reporting radiographers was not statistically significant ($z=0.971$, $p=0.331$).

Audit

All sites operating a RADS were asked whether regular audit of practice was undertaken. Six sites ($n=6/284$; 2.1%) did not respond to this question. Of the remaining 278 sites, only 87 audited the RADS ($n=87/278$; 31.3%). Cross tabulation of audit with mandatory/voluntary status of service was undertaken (see table 4).

Table 4: RADS audit

Audit undertaken	Mandatory RADS participation No (%)	Voluntary RADS participation No (%)
Yes	33 (47.8)	54 (25.8)
No	36 (52.2)	155 (74.2)

Seventy seven sites ($n=77/87$; 88.5%) that audited the RADS provided information regarding the regularity of the audit process. The majority of sites operated an ongoing/monthly audit of the RADS ($n=25/77$; 32.5%) or annual audit of service ($n=21/77$; 27.3%). However, various audit time frames were reported including six-monthly audit ($n=4/77$; 5.2%); audit review every 2/3 years ($n=11/77$; 14.3%); and ad hoc audit ($n=9/77$; 11.7%). A number of sites ($n=7/77$; 9.1%) indicated that practice audit was undertaken on an individual basis although this was not a formal expectation of RADS participation or employment.

Technological issues

Respondents were invited to comment on important issues related to RADS not directly included within the questionnaire. While the majority of respondents did not expand on any issues, a small number of respondents indicated that the implementation of PACS had limited the functionality of the RADS due to incompatibility of new technology with standard RADS practice or the perception that monitor quality was hindering the radiographers' ability to detect abnormalities.

Geography

In order to determine any geographic trends in the implementation of RADS, analysis of responses was grouped by country (see table 5).

Table 4: RADS practice across UK

RADS across UK	'Red Dot'	Radiographer Commenting
England	210 sites (n=210/237; 88.6%)	54 sites (n=54/237; 22.8%)
Wales	23 sites (n=23/25; 92.0%)	3 sites (n=3/25; 12%)
Scotland	29 sites (n=29/30; 96.7%)	3 sites (n=3/30; 10%)
Northern Ireland	10 sites (n=10/10; 100%)	0 sites (n=0/10; 0%)

Discussion

The results of this study support earlier research and confirms the continued widespread contribution of radiographers to the trauma diagnostic process through the use of RADS ^{4,5}.

The inclusion criteria for this study were all hospitals in the UK with both trauma and radiography services. This study differed from others studies in this field ^{4,5,15} as it actively sought feedback from small hospitals with MIU facilities and did not presume similar radiographic practices across all sites of a single hospital Trust. This additional information has demonstrated that RADS ('red dot' and commenting) are more likely to be used in hospitals with ED's rather than MIU's. Reasons for this apparent association may be the greater number of staff and education opportunities in larger trauma centres. However, this does have service implications when one considers the primary purpose of RADS, which are to assist the clinician managing the patient by highlighting, or describing, abnormal image appearances ^{1, 9,10,11,16}. ED's usually have a high level of medical expertise available and within the department and access to radiologists and reporting radiographers to review images that are causing concern. In contrast, MIU's are often staffed by nurse practitioners with limited medical support and who have recognised the valuable input radiographers make to the diagnostic process ¹⁵. Consequently, the value of RADS is perhaps greater in the smaller centres where

radiographers may make a greater contribution to patient management as a result of the collaborative nature of small site working and the implementation of RADS at these sites should be encouraged.

One factor which will influence the contribution of radiographers to the trauma image review process is the rapid technological evolution that is occurring with radiographers and other health professionals increasingly reviewing soft copy images on a computer monitor rather than on radiographic film (hard copy)^{17,18}. The results of this study suggest that the introduction of computerised filmless systems has reduced the use of the traditional 'red dot' sticker to highlight abnormal images and has in turn created uncertainty among the radiographic profession as to how best adapt traditional RADS in the light of new technology¹⁹. The great variety of methods identified in the study to highlight abnormal images suggests that the introduction of CR and PACS has exacerbated this inconsistency and more work is required to determine best practice for radiographers to effectively communicate radiographic findings to trauma care staff.

Despite the long term and widespread use of RADS in the UK, participation is still considered to be voluntary in the majority (73.9%) of hospitals. As a result, it appears that the issues pertaining to the consistency and level of reliance ED/MIU staff may place on RADS as raised by Dimond persist^{20,21}. Hampshire also identified confusion surrounding the voluntary nature of RADS with respect to employment and job descriptions²². A survey of radiographer vacancies in England and Wales in 2006 showed that where participation in the RADS was explicitly mentioned as part of the radiographer role in the vacancy job description, 61.5% of radiography managers identified participation to be voluntary. In contrast, participation in RADS was not mentioned in 58.1% vacancy job descriptions yet participation in RADS was considered mandatory of these and a fundamental part of the radiographer's role at 11.1% of sites. Consequently, work needs to be undertaken to alleviate confusion as to the voluntary/mandatory status of RADS at a local level in order that best practice standards can be achieved and the expectations of radiographers working in the trauma environment can be made explicit. However, acceptance and formalisation of RADS requires hospitals to

address issues of radiographer training, education and practice audit in order to ensure RADS service delivery is optimised.

This study demonstrated great variability in the provision of RADS education and the application of service audit both in centres where it is considered voluntary and where participation is an expectation of radiographer employment. The CoR state that image interpretation activity must be supported by continuous professional development (CPD) and regular audit of practice⁶. However, the limited progression in this area identified in this study echo the findings of Snaith²³. Although this earlier study surveyed only a limited number of hospital trusts with respect to the implementation of radiographer comment schemes, the results identified a significant lack of clinical governance arrangements to support such extension in scope of practice.

Published research illustrates that the ability of radiographers to accurately highlight radiographic abnormalities improves with education and training regardless of whether the context of the abnormality detection is 'red dot' participation, radiographer commenting or definitive reporting^{10,24,25,26}. However, in order for the CoR aspiration to become a reality, appropriate education and training to support RADS participation would need to be available on a large scale. Such education has already been introduced into radiography pre-registration programmes in the UK and it is now an expectation of pre-registration training⁸. However, with over 17000 radiographers currently employed in the UK, alternative education solutions will need to be sought if radiographer participation in RADS, and more importantly commenting systems, is to become an expectation of their role.

Conclusion

This study has provided an insight into current practice with respect to radiographer abnormality detection schemes and has demonstrated that radiographers are making a significant contribution to the decision making process for patients attending an ED or MIU. However, the findings of this study have raised a number of issues related to the perceived informal nature

of radiographer participation in RADS and the varied perception as to whether such participation is part of normal scope of practice.

It is clear from the results of this study that national guidance is required regarding the development and implementation of RADS, particularly with the rapid introduction of computerised filmless imaging environments. If participation in RADS is to be an expectation of the radiographers role within the next decade as hoped by the CoR, then professional leadership is required to define the scope of practice, educational requirements and governance arrangements to underpin such developments. More specifically as the radiography profession embraces hi-tech imaging solutions, the adoption of new technology must be seen as an aide to the development and utilisation of radiographer skills, rather than a hindrance.

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