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**Title:**

Advanced and Extended Scope Practice of Diagnostic Radiographers: The Scottish Perspective.

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## **Abstract**

### **Purpose**

Against a UK wide backdrop of increasing radiology service demand, resource constraints and changing population demographics, there is limited information available regarding the shape of the diagnostic radiographic workforce in Scotland. In particular, the impact of changing roles, skill mix and a shortage of consultant radiologists is not clearly understood, although the anecdotal perspective suggests the situation in parts of Scotland does not reflect that of England. A current viewpoint was therefore indicated.

### **Method**

A questionnaire survey was administered to lead radiographer managers across all Health Boards in Scotland and this was supplemented with a series of telephone interviews.

### **Results**

The implementation of skill mix initiatives and particularly advanced or extended scope practice was found to be geographically variable with limited evidence of change in some areas, despite service demands. Lack of effective funding and backfill for training was found to be a major barrier to change, although it was also acknowledged that opposition from some professional groups could be a major factor.

### **Conclusion**

Although there is some optimism and evidence of accelerating change, development of the radiographic workforce in Scotland does not in general compare favourably to the findings of Price et al in 2007. The reasons are multi-factorial including fiscal, professional and geographical elements.

**Key words:** extended scope; advanced practice; skill mix; role development; role extension

## **Introduction**

Health care imperatives in Scotland generally align with the rest of the UK in terms of demographic change and the challenges of cost achieving effectiveness. Nevertheless, health policy in Scotland is fully devolved from the rest of the UK which means the evolution of practice diagnostic radiography cannot be assumed to mirror that of England.

The development of radiographic practice and roles has historically been a consistent feature of the profession, with examples and documented commentary appearing at least 50 years ago<sup>1,2</sup>. The primary drivers for this are technological development and changing patterns of health care delivery. Development, or extension to roles has accelerated in the last two decades, encouraged by a range of factors including significant change to the health economy, variations in the workforce profile and professional aspiration<sup>3,4,5</sup>. The most prominent developments could be said to be the evolution of radiographer reporting of diagnostic images and the promotion of the '4 tier' career structure by the Society and College of Radiographers, subsequently adopted by the UK Department of Health<sup>6,7,8</sup>. The latter initiative introduced and supported inherent notions of role extension and skill mix, through proposing new practitioner definitions; in particular those of advanced and consultant practitioner<sup>8</sup>. Despite the clear evidence of potential service enhancement<sup>9,10,11,12</sup>, such change, considered contentious in some areas, has led to a patchy and often incoherent process of

implementation across the UK, based as often on professional preference or opposition, than service need or an evidence base<sup>5,13,14,15,16,17</sup>.

The health landscape in Scotland differs from that of England and Wales in a number of fundamental ways. The Scottish government has control of health and social care imperatives in Scotland, including health policy, workforce development and the allocation of resources<sup>18,19,20</sup>. These vary from the rest of the UK, manifested largely through a less commercialised, more traditional professional environment with a consequent implication for service development<sup>20</sup>. A UK wide perspective cannot reliably provide information of strategic value to those who have a stake in the delivery of diagnostic imaging services in Scotland. This is particularly relevant due to the unique geographical features, with a high proportion of remote and rural areas.

The literature identifies a range of research and survey material relating to development of radiographer roles across the UK, there is nothing that specifically focuses on the current Scottish situation. Where data exists, it is often dated or unpublished however the indications are that the development and implementation of radiographer advanced practice in Scotland falls significantly behind England. Fourteen years ago, McKenzie et al, exploring radiographer performed barium enemas, reported low rates of participation in Scotland<sup>21</sup>, whilst in 2002, Price et al<sup>22</sup> again identified comparatively low participation rates in an examination of 'the extent and scope of changes to radiography practice'. More recently Price et al<sup>13</sup> and Snaith and Hardy<sup>23</sup> again identified lower participation rates in Scotland, indeed Snaith and Hardy identified seven (out of twelve) Health Boards in Scotland in which radiographers undertook reporting of diagnostic images, compared with ten (out of ten) English regions.

An initial scoping exercise was undertaken to develop a relevant Scottish evidence base, inform service development and provide a useful comparator with other health systems.

### **Aims**

- To profile advanced or extended scope practice in diagnostic radiography across Scotland whilst identifying the views and perspectives of stakeholders.
- To identify strategic and demographic features that do, or will influence the development of radiographer roles in the delivery of imaging services.
- Establish the features or barriers that impact on the development of radiographer roles in terms of professional or employment elements.

### **Method**

An exploratory study was carried out in order to quantify the extent and nature of radiography practice. To explore this from two perspectives, job specific questionnaires were developed and distributed to lead radiographers and strategic service managers in imaging departments within each Health Board. In this report, the data from lead radiographers only has been considered. A lead radiographer is defined as a 'superintendent' or manager with operational responsibility for a service. There were two main phases; a quantitative questionnaire survey and qualitative semi-structured telephone interviews.

#### *Phase 1:*

A questionnaire was administered to lead radiographers throughout Scotland. Following consultation, elements of the questionnaire were designed with regard to the work of Price et al<sup>13</sup> whose 2007 UK wide scope of practice study, provided useful background and the potential to identify comparative situations. The

questionnaires were distributed by post. The questionnaire was also available in electronic form via a link for participants. Although electronic methods of data collection are now a common method of data collection, difficulties were reported by participants within NHS hospitals in accessing the link due to health Board 'fire walls'. The questionnaire was piloted with a number of lead radiographers in England.

#### *Sample and questionnaire distribution*

It was important that the sample represented practice throughout Scotland in both urban (U) and remote and rural (RR) imaging departments. Consequently, the questionnaires were sent to lead radiographers within every imaging facility across Scotland between July and November 2014. The sample, included NHS acute and community hospitals (approx n=100) and private hospitals (approx n=10). Initially minor injury units were included, but subsequently removed as it was discovered through communication with the relevant units that for all bar one, imaging was mainly provided by an adjacent primary site. The sample included childrens hospitals and specialist imaging sites, eg. breast imaging.

Reminders with an additional copy of the questionnaire attached were sent at approximately three and six weeks after the first mailing, and these were followed up by reminder letters after a further three to six weeks. In addition verbal reminders of the study were given at national committee meetings in order to encourage participation. Each questionnaire had a coded reference with unique identifier known only to the research assistant.

#### *Phase 2:*

Stage 1 participants were invited, via a check box on the questionnaire, to take part in a semi-structured telephone interview to explore in more detail, responses to the questionnaire, and eight participants (3 Urban and 5 Remote and Rural) took part. An interview schedule was developed based on the general topics highlighted in the questionnaire and time included to enable development of the respondents' own views.

Telephone interviews were selected in order to accommodate the wide geographical spread of subjects. Interview arrangements were aligned with the convenience of participants and with consent, were audio recorded. The interview schedule explored key issues identified from the questionnaire responses<sup>24,25</sup>.

Prior to interview, participants were sent information sheets and consent forms, and given the opportunity to ask any questions which were related to the study. Confidentiality and anonymity were assured. A transcript of the interview was provided to participants in order to confirm accuracy of the content prior to analysis.

#### *Ethical implications*

It was identified that in respect of a study of this type, NHS REC opinion was not required for research involving NHS staff, however as this was a multi-centred study, R&D approval was required from each site taking part. Approval was obtained through the Scottish Network of Clinical Effectiveness Managers. Additionally, the study was approved by the Robert Gordon University Research and Enterprise Services, Ethics Subcommittee.

#### **Data analysis**

Phase 1: The nature of the data collected meant that quantitative analysis would be descriptive and presented in tabular or chart based form. Due to the low response rate, advice was sought from a statistician who confirmed that Fisher's

Exact Test could be used to compare the presence of advanced practice in urban with remote and rural hospitals. The questionnaire data were managed and analysed using SPSS® v21.

The questionnaires included some focussed open ended questions in order to enable participants to provide additional depth or context to their responses. These were categorised thematically and used to support the wider analysis.

Phase 2: The recorded interviews were transcribed verbatim by the research assistant. The subsequent transcription contained personal details and these were removed to ensure confidentiality and anonymity. The data analysis was based on the fivefold process recommended by Pope et al<sup>26</sup>; 1)familiarisation; 2)identifying a thematic framework; 3)indexing; 4)charting and mapping; and 5)interpretation. Quotations from participants have been included below to provide evidence of the statements made and to enable the participants' 'voice' to be heard.

## **Results**

Data is presented from the questionnaire responses and from the telephone interviews.

A total of 111 questionnaires were distributed to lead radiographers in hospitals throughout Scotland. Questionnaires were returned from a total of 42 hospitals, with only one respondent using the electronic version. Forty of the questionnaires (21 urban hospitals and 19 rural hospitals) were completed and two were not, providing a disappointing, though usable response rate of 36 % (n=40/111). Twelve of the fourteen Health Board areas were represented in the responses.

An additional 10 hospitals deferred their responses to a main site which rotated staff to their imaging department and it cannot be confirmed whether professional practice within the smaller hospitals replicated the larger site. Not all respondents answered every question therefore the denominator varies.

## **Practice areas**

The breakdown of radiographers and assistant practitioners along with staff gradings and working profiles are given in Table 1. Key points from this data are that the majority of assistant practitioners are in part time posts; 6.5% of practitioner posts are graded in band 7; 17% of advanced practitioner posts are in band 6.

### *Radiographer roles*

Respondents were asked to describe the activities in which their radiographers were involved. A total of 226 radiographers carried out abnormality highlighting system, ie. red dot system, with 24 participating in an abnormality commenting system. Nine radiographers were described as carrying out hot reporting of Accident and Emergency images, and 21 carried out cold reporting. Other roles carried out by radiographers are shown In Table 2.

### *Diagnostic ultrasound*

For the purposes of this study sonographers are defined as radiographers who hold a postgraduate qualification in ultrasound. Respondents were asked to indicate the areas in which sonographers provide a service. These are described in Table 3 and their reporting procedures in Table 4. Sonographers are seen to predominantly report independently of radiologists although there are instances of double checking and a significant number of check box type reporting procedures.

Ultrasound was widely described as an accepted and established area of advanced practice for radiographers. *'Ultrasound only, that's been recognised', (21,RR), with funding available 'for ultrasound University based courses and work place training (20,U).*

#### *Onward referral*

Fourteen sites stated that their sonographers had the autonomy to refer patients for further imaging after their initial scan and this was mainly following abdominal ultrasound. Six sites stated that radiographers could refer patients and all were for DEXA scanning following skeletal trauma.

#### *Reporting by radiographers*

Information was gained from respondents in relation to radiographers with a formal postgraduate qualification, indicating which areas of reporting they carried out, whether they produced written reports independent of radiologists and the percentage of reporting workload they carry out. These are indicated in Table 5 and 6 respectively. There is a wide scope of practice underway, however it is notable that in some more 'specialist' areas there are only single instances, eg. barium swallow, CT brain and stroke, chest. With one exception, all have been implemented since 2000.

During the interviews, reasons were given for radiographers taking on reporting. One lead radiographer described

*'after a radiography review (radiographers) suggested reporting as there was no radiologist on site ..... we wanted a piece of paper to say we were doing it legitimately' (47,RR).*

Another described; *'in the beginning it was a fight as there was a lot of resistance, but finally the radiographer was able to do the course with rigorous controls put in place that are still adhered to, despite being in place for a number of years' (103,U).*

#### *Evidence of Service improvement*

Firm evidence of service improvement was seldom described but for example; *'our bone age waiting times were sometimes 2-3 months, now it is done in 2-3 days' (20,U)* was given. Comments were mainly anecdotal; *'anything that speeds up treatment and diagnosis must improve the quality of care' (47,RR)* and *'carrying out IV injections makes the throughput faster, less hanging around for the patient as you wait for a radiologist' (108,U).*

Other interviewees were more forthright *'without advanced practice the service would not have been able to cope, we just wouldn't have been able to deliver a service at all' (103,U); 'developing the skills of radiographers absolutely gives you more capacity, we are very cost effective and as long as they [radiographers] have proper training and adequate support for the role it gives patients access to a service and diagnosis, and the care they require' (57,RR).*

Advanced practice was described as *'increasing job satisfaction and staff morale' (21,R)* of radiographers in an imaging department. One lead radiographer stated *'thoroughly enjoying being able to report and having the confidence to report, broadens the outlook and increases your standing in the hospital (47,RR).* Another added, *'I do feel they respect me when they come and ask me and we look at films together' (27,RR).* It was acknowledged advanced practice *'had sharpened our practice because taking the responsibility [for the image] inevitably makes sure you are looking at things properly' (27,RR).* It was also

suggested that advanced practice is not for everyone *'not all radiographers want to take on the added responsibility'* (57,RR), but the *'presence of advanced practice does aid retention of staff if there are training and role development opportunities'* (57,RR).

#### *Other roles*

Six sites described radiographers taking on roles which were previously carried out by other professional groups such as nurses and doctors. These included a fracture liaison service; palatograms and urodynamics; US guided neck FNAs and stereotactic breast biopsies; ultrasound examinations of the breast; breast care previously provided by nurses.

#### *Professional liaison*

Sites were asked which professional groups had supported or obstructed extended and advanced roles and these are described in Table 7. It can be seen that whilst radiologists are most likely to obstruct the development of radiographer roles, particularly into advanced practice, they are also more likely than not to support such developments. Resistance from radiologists was described; *'part of the argument against it was if they give reporting duties it would take some of the work away from radiologists and negate the argument for having another radiologist to support the service'* (21,R).

Advanced practitioners see their role differently; *'reporting radiographers are really there as a support for radiologists aren't they?'* (47,RR). One added *'there is a financial issue here. Reporting radiographers are much cheaper than radiologists and if they can do the basic reporting it frees up the radiologist to take on more advanced techniques such as those in interventional radiology'* (47,RR).

Another suggested *'a bit of professional protectionism goes on as we extend our roles into things normally done by radiologists and is still in some areas resisted'* (57,RR). *'I think it is more difficult for radiographers to extend their role possibly because doctors, Consultant surgeons/physicians possibly have a different relationship with nursing staff rather than the consultant radiologists have with radiographers who many see as more technicians rather than clinicians'* (57,RR). It was acknowledged that times and thoughts may be changing; *'there seems to be more willingness for recognition that radiographers could possibly contribute to an increase in service delivery'* (27,R).

Lead radiographers were asked if having a radiographer in an advanced practitioner role made a difference to other staff. Benefits were indicated *'especially in rural hospitals where there was little budget or opportunity for training'* (21,R). *'Advanced practitioner 'mentorship' for the rest of the staff was especially beneficial for newly qualified radiographers'*. (47RR).

*'As I was a trained reporting radiographer I was able to do a red dot course right here. If I report on another radiographer's film, I may not be able to report it because it is not a good lateral or AP; a training opportunity exists to improve the quality of imaging within the department'* (47,RR).

It was stated that radiographers made a difference to service delivery *'clinicians here can make a definitive diagnosis without waiting for a radiologist report; our GP run hospital relies heavily on me giving a report'* (47,RR).

#### **Four Tier Workforce**

The titles given below are as defined in the Society and College of Radiographers (UK) 4 Tier Career Framework<sup>8</sup>.



#### *Assistant practitioners.*

Responses indicated 40% (n=16/40) of sites employed assistant practitioners. The main reasons given for not employing assistant practitioners were; i) the department was not busy enough to support such a grade and ii) it was a single handed department. In all 16 departments they were employed at Band 4. The tasks they carried out were i) supporting breast imaging, including carrying out mammography (n=14, implemented 2004-2008); ii) performing plain film imaging (n=12, implemented from 2007 to 2012); iii) supporting fluoroscopy (n=3, implemented from 2010); iv) supporting CT scanning (n=2); and v) supporting ultrasound (n=2).

#### *Practitioners*

As was expected, the greatest proportion of radiographers are employed at practitioner level. Their numbers, bandings and duties carried out are described in Table 8. The predominance of red dot provision is to be expected and it would appear that notwithstanding seven sites that provide commenting, only four have future plans to implement.

#### *Advanced practitioners*

Twenty five respondents described having radiographers titled advanced practitioner employed at band 6-8b and these are described in Table 9. When asked if these radiographers held a postgraduate qualification one site said radiographers with this title were lead CT radiographers and another did not know if they had a postgraduate qualification.

When a comparison was undertaken between the presence of diagnostic radiographer advanced practice in urban and remote and rural departments using the Fischer exact test, no significant difference was identified (P= 0.761).

Notably, the data show that less than a third of skeletal reporting is non-A&E and also there is a wide variation in the grading of the radiographers. This was supported by the lead radiographers *'Some are carrying out advanced practice, but not being recognised or remunerated for it'* (20,U). A reporting radiographer stated, *'I am a very busy reporting radiographer, I am paid at a Band 6, it is really disheartening. This has been challenged, but still not resolved'* (47,RR).

This variation in gradings has been attributed to two causes: *'There has been a big problem with Agenda for Change. It was supposed to look at the individual roles and reward people for the work they do not what their job title is or, Affluent boards can afford to set their bandings high to attract and retain good staff while Boards who are strapped for cash under-band to keep their costs low'* (57,RR).

On the other hand they also reported *'despite training radiographers to carry out advanced roles – these are not currently used, as advanced practice is not written in their job description so they are not banded to carry out the duties, so we can't use their abilities'* (57,RR).

#### *Consultant Radiographer*

Two respondents described having a Consultant radiographer; one in the field of trauma imaging and another in ultrasound. A breast imaging centre stated they had a radiographer *'carrying out the duties'* of a consultant, but not titled consultant. These radiographers were employed at bandings 8b and 8c. A further two stated that to employ at this level was a strategic objective for the future and that the posts would be in the area of trauma imaging.

## **Education and training**

Only 21% (n=8) of respondents stated they had a training budget specifically for radiographers. No respondents had employed a radiographer within the past five years who possessed a postgraduate qualification in an advanced practice area that had been unable to use their skills. Interestingly however, two sites did identify that they had trained radiographers to a postgraduate level and then were unable to use their skills. This was mainly due to issues of mentoring and supervision, and resistance from radiologists. It was not only the lack of a training budget for radiographers that was problematic; 'there is never enough money for backfill' (57,RR). This comment was echoed on a number of occasions; 'limited budget and no backfill' (21,RR).

### *Access to education and training*

Respondents were asked to describe how radiographers accessed post qualifying training to support extended or advanced practice and these are described in Table 10. Additional methods were also given and these included the use of professional journals and professional update courses. In addition to formal education through the higher education sector, it can be seen that the predominant sources of training are e based or in-house.

### *Barriers to education and training*

The barriers to radiographers taking part in post qualifying training (Table 11) appear to be a mixed bag. Although budget, backfill and pay protection issues are the most significant, there is a fairly even spread in the other categories. Notably however are difficulties associated with lack of interest, lack of support from radiologists and intriguingly, mismatch with the service model. Interview responses noted the significance of rural or community location of the sites, mixed support for radiographers for certain areas of advanced practice and low staff morale. Three hospitals described withdrawing extended/advanced practice after it had been implemented. This was due to prioritisation of radiologist training needs; fall in demand for relevant examinations and replacing a reporting radiographer at retirement with a radiologist.

### *Departmental CPD activities*

Sites were asked to describe the CPD activities available for staff in their departments (Table 12). It is interesting to note the role of staff meetings in providing staff development along with study day participation and in-house delivery. Also high scorers are practice audits and use of the e Learning for Health Care provision. The use of journal clubs and participation in research showed the least uptake. Fifteen sites included assistant practitioners in their CPD sessions.

## **Service delivery**

### *Provision of image reporting*

Eight respondents (21%) stated that they contracted with an external company to provide reporting of certain categories of imaging. These included plain film imaging (n=5); MRI (n=1); general CT (n=1) and head CT (n=1).

### *Unreported images*

Four sites stated they had images unreported that should have received a report within a clinically appropriate timeframe. These included OPTs, operative cholangiograms, and some conventional images. Respondents were asked if they were aware of areas of referral where it was formally acknowledged and agreed that certain images could be left unreported. Five respondents stated this was the case including dental images (n=3); orthopaedic images with orthopaedic surgeons interpreting follow up images (although radiology did provide the report

at first attendance (n=1); plain film imaging (n=1) and intra-operative imaging interpreted by an attending consultant (n=1).

#### *Waiting times*

Waiting times for examinations and return of reports was explored. The patients' wait from referral to examination (Table 13) indicates that the majority of examinations are undertaken within two weeks of referral, whether from GP or clinic. It is notable however that waits for ultrasound, CT and MRI examinations are significantly longer in a number of sites with some waits of up to nine weeks.

The wait from examination to report (Table 14) identifies a high number of sites in which the time taken for report return to referrer is in excess of a week, with some reports taking up to nine weeks.

#### **The future.**

There seems an optimistic feel about the future of extended and advanced practice in Scotland. In general *'we just have to keep on knocking on doors and hopefully we will have someone with advanced skills in this department in the near future'* (123,RR). The National Delivery Plan<sup>27</sup> was described *'as focussing the mind'* (21,R) and has the potential to *'providing funding'* (123,RR) for training radiographers in reporting images, but a reservation was voiced *'we can't all of a sudden introduce this without the planning behind it. I would reckon it takes 3-4 years for a radiographer to be fully trained in reporting'* (20,U).

It was suggested that newly qualified radiographers see their future differently *'Radiography staff are changing... they are not content to stay in the same job... they want to expand their knowledge and skills in the profession and see what else they can do with their knowledge'* (47,RR).

Lead radiographers from remote hospitals described problems with IT across Health Boards which is hindering a joined up imaging service; *'we have separate referral systems and although we are all PACS, we don't see their referral proforma or their reports'* (47,RR).

#### **Discussion**

This survey is the first to be carried out throughout Scotland to explore the practices of diagnostic radiographers. The results present a diverse and sometimes contradictory picture of practice across the sample and some of the messages delivered probably align with common assumption. The picture is one of variable activity and variable recognition for that activity. There are pockets of quite specialised practice underway, although a number of these appear to be on a very limited scale. The general sense is one of inconsistent implementation geographically, despite a fairly consistent message in health policy and national resource terms. In addition no significant difference was demonstrated in the introduction of advanced practice between urban and remote and rural imaging sites.

#### *Practice*

The general development of radiographer roles shows predictable patterns with high levels of participation in areas such as IV injection or audit. Image abnormality flagging is another widespread practice, however the implementation of initial image commenting is not as wide spread as might have been expected, given the potential benefits and the lack of 'technical' controversy<sup>30</sup>.

In conventional imaging there is evident development of radiographer roles in reporting where it is seen that reporting of skeletal imaging occurs in a wide range of settings. It is notable however that a considerable majority of this reporting is A&E, with non-A&E forming less than 33% of the whole.

An additional feature of this is the variation of AfC bandings demonstrated for reporting radiographers. Of particular interest is the significant number of reporting radiographers banded at AfC level 6, despite the fact that reporting is defined as an advanced practice by the professional body. This may reflect the fiscal pressures in the environment, however it may also create a disincentive for those who may otherwise wish to develop such roles.

### *Barriers*

The barriers to evolving radiographer roles are multi-faceted. It is apparent that fiscal pressures restrict developments in a number of ways including frequently, a complete lack of training budget for radiographers. In addition, there are acknowledged issues associated with access to postgraduate training, many of which are related to geography. This is despite the availability of e learning post graduate courses with no requirement for attendance. It cannot however be ignored that one of the major barriers is the lack of support, or indeed direct opposition to change from other professionals, most notably the radiology profession. Professional resistance to change or protectionism, is apparent across a range of healthcare disciplines where workforce change is being advocated. However in radiography it appears that as one interviewee suggested, the relationship between radiographers and radiologists may be different. There may be historical reasons for this, though technically there is no rationale for a group of professionals to claim rights over the practice of another.

### *Education*

The prevalent sources of training are in-house, study day and university provided options and it is significant that e learning programmes are also commonly in use. The features of these may suggest that individuals' value structured provision in which the delivery mode and objectives are clear. In the case of university based education, it may be assumed that postgraduate award bearing courses play a part. The provision of transferable qualifications is important in advanced practice roles and these are not attainable through other means. Reported strategies to support professional development are variable. The relatively low incidence of research activity is notable, though the opportunities to initiate and pursue meaningful research are inevitably limited by opportunity in many locations. Journal clubs also appear to be less popular which raises the question of whether this may be an indication of the perceived relevance to clinical practice.

### *Service delivery*

The study shows there are a number of significant features influencing the performance of service delivery. A notable element is that of waiting times for both examinations and reports where it is seen that there are waits of up to nine weeks for some examinations, failing to comply with the Scottish Government's standard of six weeks for Barium studies, CT and MRI scans<sup>18</sup>. For report turnaround, the picture is perhaps even more disturbing. Considered in the wider sense, it is evident that in many cases, waiting times for examinations are excessive and the return of reports compromises the diagnostic value of many examinations.

These data indicate apparent anomalies in service delivery that could be related to resourcing or workforce deployment which leads back to the issue of staffing and skill mix. In 2014 the Royal College of Radiologists<sup>28</sup> identified a shortage of

radiologists in England and the same situation is evident in Scotland<sup>29</sup>. In the resulting position paper they describe a means for developing a new service model which acknowledges that *'reporting of some images by radiographers is already an established part of service in most UK radiology departments'*. Read in conjunction with the CoR/RCR 'team working' document of 2012<sup>16</sup>, this should be seen as encouraging to both radiographers and radiologists as to what can be achieved if both work together to improve service delivery. Notably, at the College of Radiographers Managers Conference in 2015 Peter Cavanagh, a radiologist, stated that radiographers should be reporting on all plain film images (reported in Synergy magazine, June 2015).

## **Conclusion**

This report forms a part of a wider investigation and provides an overview of data and experiences in Scotland. An attempt has been made to access the full spectrum of practice across the Country, however it is acknowledged that there are limitations related to the response rate and some aspects of how data was returned. Nevertheless, the quantitative and qualitative elements together provide a valid and illuminating profile of activity, perspectives and practices across Scotland.

The primary messages from this work are:

Implementation of extended or advanced roles in Scotland is variable and compared with Price et al's UK wide Scope of Radiographic Practice<sup>13</sup>, Scotland continues to lag significantly behind most of England.

The predominant extended role is conventional image reporting. In the context of practice in England<sup>13</sup> and data collected in this study, it can be asserted that the potential for radiographers to develop into more specialist roles remains to a significant extent untapped.

Barriers to development are often fiscal or workforce related, however access to appropriate training is also an issue, both geographically and in terms of suitable courses. The evidence suggests also that despite the findings of Forsyth and Robertson<sup>15</sup>, the radiological community is ambivalent in its support of radiographers, in cases exerting undue influence over the deployment of radiographers.

Nevertheless, change is occurring and there is evident optimism for the future amongst many respondents, though the rate of change will be linked to changing attitudes and the changing clinical environment.

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Role title/level		AfC banding							
		3	4	5	6	7	8a	8b	8c
Assistant practitioner (Cert HE level)	P/T	1	14						
	F/T		12						
Assistant Practitioner (Dip HE level)	P/T								
	F/T		2						
Practitioner/ Radiographer	P/T			25	133	12	1		
	F/T			39	103	9	1	1	
Advanced Practitioner	P/T				5	18	1		
	F/T				6	28	6		
Consultant Practitioner	P/T								
	F/T							1	

Table 1 : Radiographers and assistant practitioners; numbers and pay gradings as described by respondents (n= 40)



<b>Roles</b>	<b>No. of radiographers</b>	<b>Date of implementation</b>
Departmental audit	159	1990-2011
Part of advanced trauma life support/ resus team	2	No information
Perform intravenous injection cannulation	152	1995-2010
Supplementary prescribing	1	2010
Contracted research roles greater the 0.2 wte	0	
Contracted clinical education role above 0.2 wte:		
Undergraduate students	74	1995-2010
Post-graduates	18	1997-2000
Assistant practitioners	32	2005-2009
CPD for radiology dept staff	67	2000-2010
CPD for radiology SPRs	9	2000-2010
Others: including medical students, nurses.	24	1990-2010
Radiographer led* IVU	11	
Reporting IVU's	0	2006
Radiographer led* CT scans	5	Pre 2002
Reporting CT scans	2	Pre 2002
Radiographer led* MRI	0	

Table 2 : Roles undertaken by radiographers as described by respondents

*\*Radiographer led means radiographers complete that type of procedure within a given protocol without radiologist input during the examination.*

Obstetrics, Gynaecology and Abdominal		Other areas	
Early pregnancy	9	Small parts	16
Obstetrics	9	Vascular	15
Nuchal thickness	8	Musculoskeletal	5
Neonatal head	4	Cardiac	0
Gynaecology	20	Breast	2
Abdominal	20	Contrast examinations	0
Transrectal	0	Nerve blocks	0
		Other	3

Table 3 : Areas in which sonographers\* provide a service

\*In the context of this survey, sonographers are defined as radiographers who have a postgraduate qualification to perform ultrasound

Type of report procedure used	Type of ultrasound examination														
	Early pregnancy	Obstetrics	Nuchal thickness	Neonatal head	Gynaecology	Abdominal	Transrectal	Small parts	Vascular	Musculoskeletal	Cardiac	Breast	Contrast examinations	Nerve blocks	Other
Sonographer completed form or tick chart verified by another e.g. radiologist										1		1			
Sonographer completed form or tick chart verified by sonographer	2	3	2	1	1	1		1	1						
Sonographer generated free text report verified by another e.g. radiologist															
Sonographer generated free text report verified by the sonographer	5	4	4	2	16	17		13	13	4		1			2

Table 4 : Methods of sonographers reporting as reported by respondents (n=40).

Area of reporting	NO	N/A	YES	Approx date of implementation	How many radiographers?	Radiologist independent?
Appendicular skeleton radiographs	23		10	2003-2011	15	9
Axial skeleton radiographs	23		8	2003-2011	13	7
Chest radiographs	29		1	2011	1	1
Abdominal radiographs	29		1			
Breast imaging	21		3	2005-2009	5	2
IVU	24					
Paediatrics	26		2		5	1
Bone densitometry (DEXA)	21		2	2006	2	1
Barium meal	24	9				
Barium swallow			1			
Barium enema			6	1998-2009	7	
Venography	22					
Micturating cystography	24					
Proctography	22					
Any other plain radiography or fluoroscopy areas (please state)			2		6	2
CT Brain Trauma			1			
CT Brain Stroke			1			
CT other (please state)						
MRI IAMs						
MRI knee						
MRI spine (disc problems)						
MRI other (please state) e.g. Orbits check for pre MRI IOFB						

Table 5 : Number of departments where radiographers with a formal post graduate reporting qualification produce written reports independent of a radiologist\* ( n =40).

\*Radiologist independent means without radiologist confirmation of image content, but with radiologist to consult if necessary.

	<b>Procedural reporting</b>	<b>Yes</b>	<b>&lt;25%</b>	<b>26-50%</b>	<b>51-75%</b>	<b>&gt;75%</b>
a	Fluoroscopic GI procedures	4	1		1	1
b	GI procedures with CT					
c	US procedures	16	1	1	6	5
d	Adult MSK plain radiography reporting	6	4	2		
e	Adult chest plain radiography reporting	1	1			
f	Paediatric MSK plain radiography reporting	3	3			
g	Paediatric chest plain radiography reporting					
h	Abdominal plain radiography reporting					
i	CT reporting	1				
j	MRI reporting					
k	Other area of reporting	3	1			2

Table 6 : Procedures in which radiographers report images and the approximate percentage of workload they carry out.

	<b>Radiographer</b>	<b>Radiologist</b>	<b>Local Dept Manager</b>	<b>Health Board Manager</b>	<b>Other</b>
<b>Extended scope practice</b>					
Promoted	18	6	10	2	1
Obstructed	0	5	1	0	2
<b>Advanced practice</b>					
Promoted	18	14	11	0	3
Obstructed	1	8	0	1	3

Table 7 : Staff Groups who promoted and/ or obstructed extended and advanced practice for radiographers ( n=40)

<b>PRACTITIONERS as defined by the Society of Radiographers (UK) 4-tiered Career Framework.</b>					
Radiographers participating in the following radiographic practices	NO	YES	Number	AfC banding	If no, have plans to implement?
a) Red dot scheme		31	185	Band 5-8a	
b) Initial commenting	4	7	21	Band 5-8a	4
c) Routine rotation into CT	13	13	111	Band 5-8	No
d) Routine rotation into MRI	21	3	15	Band 6-7	No
e) Intravenous cannulation	14	13	88	Band 5-8	No
f) Fluoroscopic examinations such as ERCP's	16	9	62	Band 5-8a	No
g) Other : DEXA (no details provided)					

Table 8: Radiographers at Practitioner level were reported as carrying out these tasks.

<b>ADVANCED PRACTITIONERS as defined by the Society of Radiographers (UK) 4-tiered Career Framework</b>				
<b>Areas of advanced radiographic practice in which they work</b>	No	Yes	Number	AfC banding
a) Trauma imaging	5	7	32	6-8b
b) Gastro-intestinal imaging	7	6	9	7-8b
c) General diagnostic ultrasound	3	12	30	7-8a
d) CT	5	8	21	6-8b
e) MRI	8	3	4	6-7
f) Breast imaging	4	8	12	6-8a
g) Interventional procedures	5	4	2	7
h) Other: DEXA (no details provided)				
<b>Advanced practitioners reporting images in the following areas of practice</b>				
	No	Yes	Number	AfC banding
a) Reporting of appendicular skeletal images (A&E referred)	10	9	12	6-7
b) Reporting of axial skeletal images (A&E referred)	11	7	10	6-7
c) Reporting of chest images (A&E referred)	16	1	1	7
d) Reporting of abdominal images (A&E referred)	17			
e) Reporting of appendicular skeletal images (non A&E)	15	1	4	7
f) Reporting of axial skeletal images (non A&E)	15	2	4	7
g) Reporting of chest images (non A&E)	16	1	1	7
h) Reporting of abdominal images (non A&E)	17			
i) Reporting of CT images	14	1	1	7
j) Reporting of ultrasound images	5	15	23	7-8a
k) Reporting of fluoroscopy images	10	6	7	7-8a
l) Reporting of MRI images	14			
m) Reporting of breast images	14	2	4	7
n) Other : DEXA		1	2	7

Table 9 : Radiographers at Advanced Practitioner level were reported as carrying out the following tasks.

Method of education	Yes	No	Don't know
a) In house	23	5	3
b) University attendance	23	6	1
c) University e-learning	14	7	6
d) Independent education sector	4	12	6
e) College of Radiographers e-learning	18	5	5
f) NHS e learning for healthcare imaging modules	18	5	4
g) Independent e-learning	5	5	6

Table 10 : Sources of post qualification education to support advanced practice.

Barrier	Yes	No
a) Lack of supervisors or mentors	16	8
b) Lack of training budget	23	5
c) Problems with backfilling post	27	2
d) Access to courses	15	9
e) Non-relevant content	10	7
f) Lack of interest by radiographers	12	13
g) Lack of support from radiologists	16	7
h) Does not fit with radiology service model	16	3

Table 11 : Barriers to post-qualification education as described by responders (NB: Respondents were not limited to one statement).

Type of CPD activity	Yes	No
a) Staff meetings	34	6
b) Journal Clubs	7	24
c) Evidence based practice sessions to review department approaches	13	15
d) External study day attendance	34	4
e) External award based course attendance	17	10
f) Participation in multidisciplinary team meetings	19	12
g) Practice audits	30	6
h) In house teaching sessions	32	4
i) NHS e learning for health imaging modules	29	3
j) Participate in research leading to paper or presentation	9	15

Table 12 : Availability of CPD activities to radiographers in Departments (NB: Respondents were not limited to one statement).



	GP referral			Clinic referral		
	Plain radiography	General US	Barium Studies	General US	CT	MRI
Immediate/ same day	7	8	3	8	5	3
Walk in service	0	0	0	0	0	0
< 1 week	11	1	1	1	0	0
1-2 week	7	3	4	3	3	1
2-3 weeks	1	0	1	1	2	0
3-4 weeks	0	2	0	2	0	2
> 4 weeks	0	7 <sup>a</sup>	4 <sup>b</sup>	5 <sup>c</sup>	4 <sup>d</sup>	2 <sup>e</sup>
Other	1					

Table 13 : Approximate waiting time from referral to examination of non-emergency or cancer related cases (NB: Not all participants provided data).  
<sup>a</sup>Range 5-9 weeks; <sup>b</sup>Range 7-9 weeks; <sup>c</sup> Range 7-8 weeks; <sup>d</sup>Range 8-9 weeks; <sup>e</sup> Range 8-9 weeks

	GP referral			Clinic referral		
	Plain radiography	General US	Barium Studies	General US	CT	MRI
Immediate/ same day	3	1	1	1	0	0
Walk in service	0	2	1	2	0	0
< 1 week	8	7	4	8	3	1
1-2 week	8	2	2	2	3	1
2-3 weeks	3	1	1	1	4	3
3-4 weeks	1	0	0	0	0	0
> 4 weeks	2 <sup>a</sup>	2 <sup>b</sup>	2 <sup>c</sup>	2 <sup>d</sup>	1 <sup>e</sup>	1 <sup>f</sup>
Other	2	1	0	1	0	0

Table 14: Approximate waiting time for report return to referrers for non-emergency or cancer related referrals (NB: Not all participants provided data).  
<sup>a</sup> Range 7-9 weeks; <sup>b</sup> Range 4-8 weeks; <sup>c</sup> Range 6-8 weeks; <sup>d</sup> Range 4-8 weeks; <sup>e</sup> Range 7-8 weeks; <sup>f</sup>Range 8-9 weeks