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Radiographers' individual perspectives on sonography - A survey of European Federation of Radiographer Societies (EFRS)

M.R.V. Pedersen [a, b, c, *], B. Kraus [a, d], R. Santos [a, e, f], G. Harrison [a, g]

[a] European Federation of Radiographer Societies, Churchilllaan 11, 3527 GV, Utrecht, the Netherlands
[b] University Hospital Southern Denmark, Department of Radiology, Vejle, Beriderbakken 4, 7100, Vejle, Denmark
[c] University of Southern Denmark, Department of Regional Health, Campusvej 55, Odense, Denmark
[d] Department of Health Sciences, Radiological Technology, University of Applied Sciences FH Campus Wien, Favoritenstrasse 226, A-1100, Vienna, Austria
[e] Polytechnic Institute of Coimbra, Coimbra Health School, Department of Clinical Physiology, Rua 5 de Outubro - SM Bispo, Apartado 7006, 3046-854, Coimbra, Portugal
[f] Laboratory for Applied Health Research (LabinSaúde), Rua 5 de Outubro - SM Bispo, Apartado 7006, 3046-854, Coimbra, Portugal
[g] Society and College of Radiographers, 207 Providence Square Mill Street, London, SE1 2EW, UK

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ABSTRACT

Introduction: Radiographers can elect to work within many different modalities, one being ultrasound. Within Europe there are differing opinions about how much of a role radiographers should take in relation to the ultrasound examination, particularly report writing. This paper provides findings exploring the radiographer's views on working within sonography.
Methods: In 2019 an electronic survey was disseminated to radiographer members by European Federation of Radiographer Societies (EFRS) national radiographer societies, following a pilot study. A mix of closed questions, free text, and scale responses aimed to investigate radiographers' practice, legal responsibilities, report writing, educational level and experiences of support and mentoring.
Results: Of 561 radiographers participating, most (92%) reported performing ultrasound scans. Challenges with legislation, medical protectionism and lack of high-quality education restricted other radiographers. On average, the respondents have practiced ultrasound for 13.5 years. A total of 60% had postgraduate education and carried out a wide range of examinations. A full interpretative report, including advice on further investigations is performed by 52%, whilst 22% provide a checklist or descriptive report. Over 55% of radiographers took legal responsibility for the examination and the majority had clear protocols, good mentoring and support in the workplace. Peer review of their work was less common.
Conclusion: The result shows that in 21 (n = 25) countries radiographers perform ultrasound, however not without challenges. Educational levels range from no formal education or short courses to an MSc in ultrasound. Report writing practice differs across the EFRS countries responding to the survey, as does peer review to enhance skills and clinical practice.
Implications for practice: National Radiographer societies could review findings to support campaigning for a change in legislation and improvements to educational offerings in ultrasound.

Introduction

Radiographers perform ultrasound examinations in a number of European countries. They are recognised as an important part of the workforce, particularly as demands on ultrasound and other imaging services increase.[1] Ultrasound is predominantly performed by radiologists in Europe, however, due to the shortage of radiologists, providing a qualified ultrasound workforce may become a future challenge in Europe.[2–11] Radiographers educated and trained as sonographers can help overcome this challenge in the future.

Who should be performing ultrasound examinations? Questions have been raised about who should provide the written

* Corresponding author. European Federation of Radiographer Societies, Churchilllaan 11, 3527 GV, Utrecht, the Netherlands.
E-mail addresses: Malene.Roland.Vils.Pedersen@rsyd.dk, malene12@mail.tele.dk (M.R.V. Pedersen).

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ultrasound report and whether this should be the radiographer performing the examination, the radiologist or other professionals.[12] Ultrasound is a hands-on investigation, with the written report being the primary communication method and an essential part of the investigation, which is inseparable from sonographic imaging.[13] In the United Kingdom (UK) the expectation is that the healthcare professionals performing the examination writes the report, due to dynamic nature of the examination, safety, and best practice.[13,14] Besides having the responsibility of writing the examination report, there are other factors affecting radiographers in ultrasound such as educational level, salary, access to new equipment, and psychological support.[15] The educational level and training for non-medical ultrasound is variable across Europe.[16,17] This is also recognised by the European Society of Radiology (ESR).[14] In the United States of America integration of ultrasound education for medical professionals was also found to be extremely inconsistent[18] varying from "ad hoc" or "on the job" learning to formal postgraduate qualifications.[17] Cultural differences between hospital or country will often determine the preferred educational approach preferred. Still, radiographers writing individual ultrasound reports are highly skilled.[17] Hofmann and Vikestad (2013) investigated how radiographers perform in upper abdominal examinations compared to radiologists and found kappa agreement of 0.9.[8] Studies have also found radiographer reporting comparable to radiologists in ultrasound and other modalities.[19–21] The knowledge of radiographers' perspectives, views, experiences and challenges in ultrasound is limited in current literature.

In 2019 the European Federation of Radiographer Society (EFRS) convened an Ultrasound Surveys Working Group to investigate radiographer involvement in ultrasound across Europe and surrounding countries. Some findings have already been reported from a survey of national societies and advanced practice aspects from this current survey.[17] Ultrasound was one of nine areas of advanced practice identified by the EFRS in their 2011 guidance document on radiographer role development.[22] This survey investigates views, experiences and challenges relating to clinical support and mentoring, legal responsibilities, report writing, education level, type of ultrasound examinations performed by radiographers across European Federation of Radiographer Societies (EFRS) countries.

Methods

In 2019 an online survey (SurveyMonkey™) was developed by EFRS Ultrasound Survey Working Group as a part of a wider study. This paper focuses on the online survey investigating individual radiographers' current ultrasound practice.

The survey was sent to 38 national societies with membership of the EFRS to disseminate to radiographers within their own country. Five national societies opted out of disseminating further surveys, on completion of the first survey.[17] The survey questions concerned sonography education, workforce issues, report writing, and legal responsibility. There were a mix of closed questions, free text, and scale responses. All text and questions were in English. A small pilot study of 12 participants was carried out in five European countries, to determine the completion time, examine the quality of the survey response, and assess potential issues with language. Subtle wording changes were made in response to the pilot study findings for a few questions. The survey was open for six weeks. Social media platforms were also used to disseminate the survey, namely Facebook, Twitter and LinkedIn.

In general, professional body surveys do not need ethics approval.[23] A short statement was published at the beginning of the online survey, describing that anonymous data from the study would be made public and data complied with the EU General Data Protection Regulation (GDPR). Participants had to accept the statement before proceeding with the survey. On completion the results were downloaded to an excel spreadsheet. Quantitative analyses were based on descriptive statistical results and displayed as charts and tables.

Results

A total of 561 individual responses were received from radiographers, covering 25 countries (Fig. 1). It was possible for individuals to omit questions; consequently the response rate varies between questions. The mean age was 33.5 years and the majority of respondents identified as female (80%). Most respondents (>80%) were from the United Kingdom (n = 285), Ireland (n = 113) or Spain (n = 54) and predominantly worked in large or medium sized public hospitals. A total of 40.8% (n = 142/348) spend ≥31 h per week performing ultrasound (mean 26.5 h; range <7 to >48 h) (Fig. 2). On average, the respondents have practised ultrasound for 13.5 years.

Why do radiographers not undertake ultrasound?

Overall, a total of 92% (n = 514) reported that radiographers perform ultrasound scans in their country of origin, 7% (n = 39) did not, and 1% (n = 6) did not know; (2 non-respondents). The 39 respondents not performing ultrasound scans were from Spain (n = 9), Belgium (n = 5), Bosnia and Herzegovina (n = 5), Switzerland (n = 4), Lithuania (n = 2) Croatia (n = 2), Ireland (n = 2), Czech Republic (n = 1), Germany (n = 1), Italy (n = 1), Norway (n = 1), Poland (n = 1), Slovenia (n = 1) and four with unknown county of origin. Respondents gave several reasons why radiographers are not able to perform ultrasound in their country, if responding no. These included lack of support from radiologists or other medical colleagues, no training programme available, and lack of legislation enabling the development. Comments related to the lack of support included "… *probably also a certain amount of protectionism by the radiologists*" [respondent 192, Switzerland] and cultural issues in the workplaces: "… *almost all the radiographers … think that the radiologist will never give us the possibility of performing this kind of exams. I think that the radiologist is not the problem. … to convince the radiographers that this could be a whole new possibility to extend our professional role*" [respondent 281, Italy].

Another respondent commented "… *it is possible to train radiologist, so I don't know why it shouldn't be possible*" [respondent 195, Switzerland] for radiographers to perform ultrasound.

Some radiographers have short, focused courses available, however not always leading to clinical competence. Of the 31 respondents to this section, 28 (90%) reported that they did not perform ultrasound but would like to if given the opportunity. One stated that "… *we have lack of radiographers … so, we primarily need them for medical imaging, X-ray, CT and MRI*" [respondent 184, UK].

Education

Of radiographers practising ultrasound, 292 (60%) have a postgraduate educational qualification at level 7 of the European Qualification Framework (EQF) (certificate, diploma, or Master's degree) in ultrasound. A further 74 were educated in ultrasound as part of a postgraduate radiography programme (level 7), and 51 completed radiography undergraduate programmes (level 6; Bachelor's degree) containing elements of ultrasound. A total of 29 undertook a short or focused ultrasound course, 12 had an EQF level 6 ultrasound qualification, and 26 had no formal course

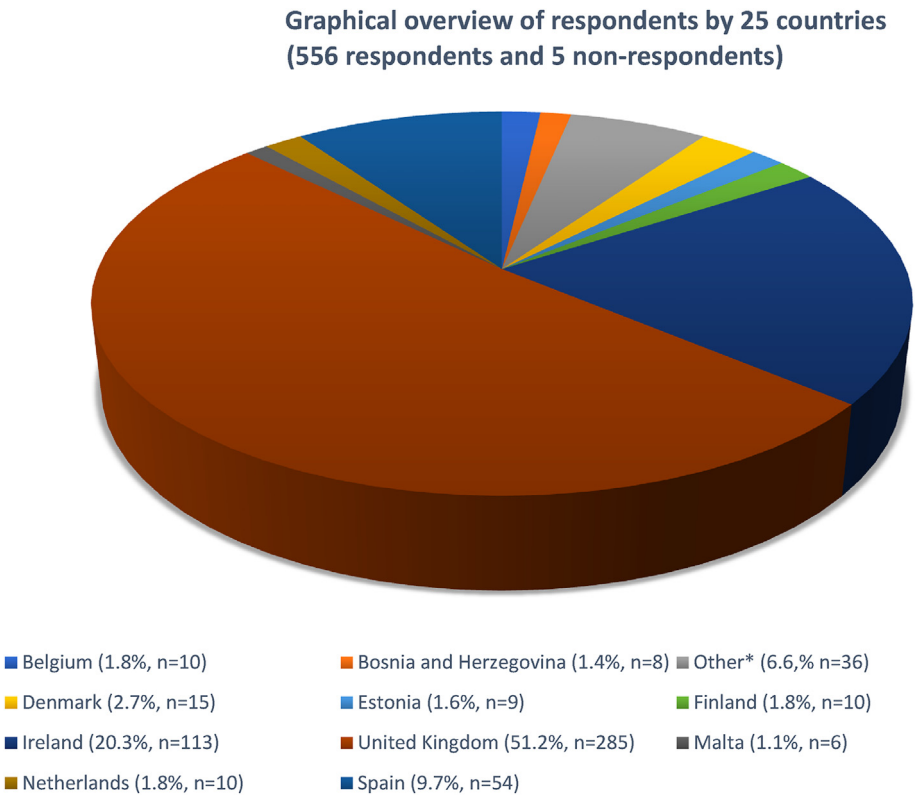

Figure 1. Graphical overview of respondents by 25 countries (556 respondents and 5 non-respondents). * *Cyprys (n=1), Czech Republic (n=1), France (n=1), Germany (n=1), Jersey (n=1), Poland (n=1), Croatia (n=2), Norway (n=2), Slovenia (n=2), Sweden (n=3), Lithuania (n=3), Austria (n=4), Portugal (n=4), Switzerland (n=5), Italy (n=5)

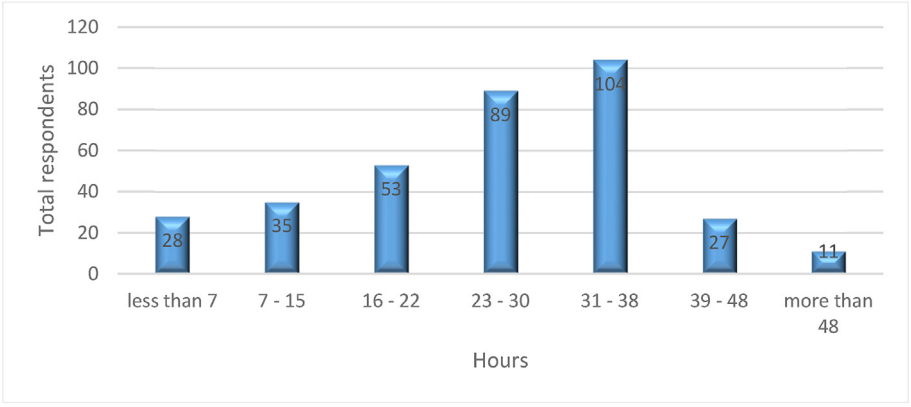

Figure 2. The figure shows number of hours practising ultrasound in an average week (n = 347).

qualification. Multiple responses were permitted; therefore, percentages could not be provided (see Table 1).

Report writing

Radiographers undertaking ultrasound examinations confirmed that they work independently. Most of the radiographers produce reports, but the level of independent report writing varies. A full interpretative report including advice on further investigation is performed by 52% (n = 181), 20.4% (n = 71) provide a full interpretative report without advice on further investigation, and 22.1% (n = 77) provide a checklist or descriptive report or only reports normal findings (Fig. 4 and Table 2). The remainder produces a

Table 1
Age of respondents.

Age (years)	Number of respondents
20–24	11 (3.1%)
25–29	34 (9.5%)
30–34	54 (15.1%)
35–39	59 (16.5%)
40–44	60 (16.8%)
45–49	46 (12.9)
50–54	47 (13.2%)
55–59	31 (8.7%)
60–64	13 (3.6%)
65+	2 (0.6%)

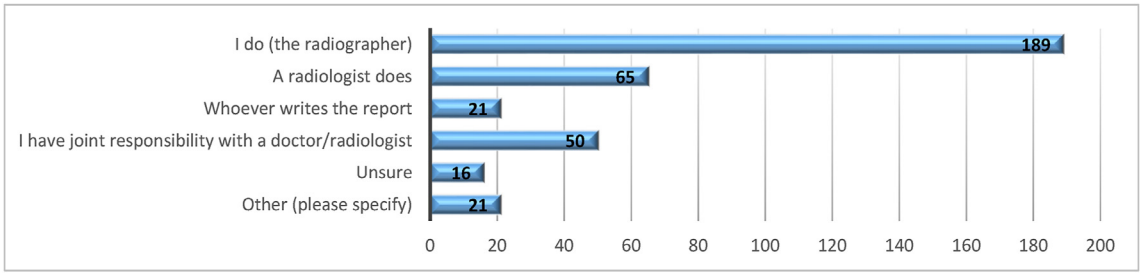

Figure 3. Legal responsibility for the ultrasound examination (n = 347).

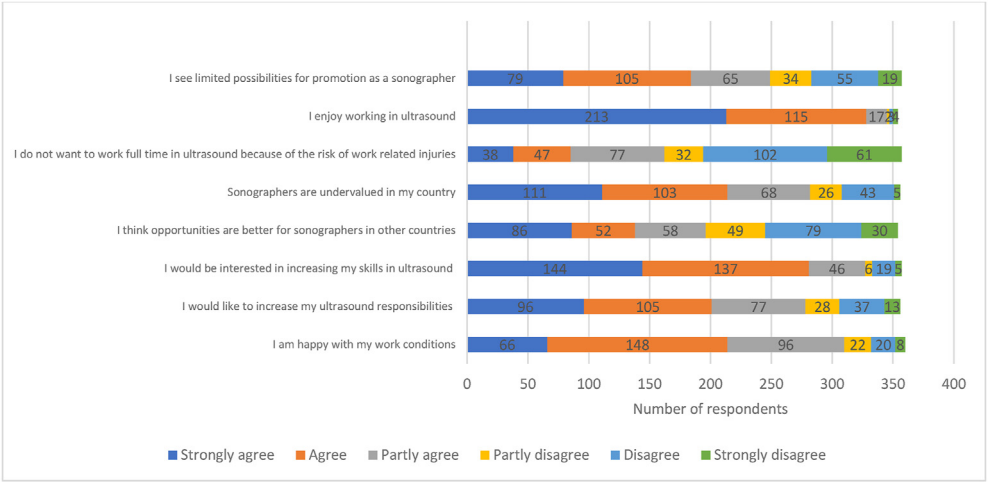

Figure 4. Perspectives of the radiographer's future working with ultrasound.

Table 2
The level of ultrasound report writing performed by radiographers.

	No report (n = 12)	Descriptive (n = 45)	Checklist (n = 29)	Only if normal (n = 3)	Sometimes (n = 7)	Full interpretative report (provides meaning to the ultrasound findings) (n = 71)	Full interpretative report and provide advice on further investigations/management, where relevant (n = 181)
Austria					1	1	
Belgium						1	1
Boznia and Herzegovina			1				
Denmark	2	3					5
Estonia		2				1	1
Finland		3		1			
France							1
Ireland	2	19	24		4	22	18
Italy	1	1					
Malta						3	1
Netherlands		3					1
Norway						1	
Portugal	1					1	
Spain	5	4	3			1	1
Sweden			1				2
UK	1	10	0	2	2	40	150

variety of reports, such as "*I provide some further information but only as suggestions*" [respondent 2, UK] and "*I write a preliminary report … and the radiologist signs off on it*" [respondent 268, Ireland] and "*this goes through to the radiologist alongside the images and the radiologist provides the final report*" [respondent 342, Ireland]. Contradictory findings were seen amongst respondents within countries who stated that they did not report the scan, as other respondents from the same country reported providing a full report, indicating variation within a county, region or hospital setting (Table 2).

Legal responsibility

Of 341 answering the question about who takes legal responsibility for the ultrasound examination 55.4% (n = 189) of the respondents reported that the individual radiographer has the legal

responsibility for the ultrasound examination, and 19% (n = 64) stated that the radiologist takes legal responsibility. Disturbingly 4.7% (n = 16) were unsure, respondents were from Denmark (1), Finland (1), Ireland (6), Italy (1), Sweden (1) and the UK (5). Mixed responses were found across all respondent countries that had more than one response. Countries where no respondents reported radiographers taking sole responsibility for the examination were Finland, France, Netherlands and Sweden. Other health care professionals take responsibility in a smaller number of centres, including cardiologists, general practitioners, the hospital through vicarious liability by the employer (Fig. 3).

Most of the respondents have indemnity insurance (n = 250, 72%), but 15.6% (n = 54) had no cover, and 12.4% (n = 43) did not know if they were covered. There were 255 comments related to who provides the indemnity insurance, most referred to their national society or their employer, with only four reporting to have independent private insurance.

Clinical practice

Radiographers perform ultrasound in many specialities, primarily abdominal, gynaecology, superficial structures, vascular and obstetrics (Fig. 5). Respondents strongly agreed that they experienced good support, mentoring opportunities, clear protocols, and guidelines, but 30.6% (n = 110) did not think there were good opportunities for peer review in the workplace setting (Fig. 6). Comments suggest that in some departments there is opportunity for support and mentoring, but when short staffed this opportunity decreases. A statement confirms "*All good intentions but too many patients to have enough time for proper supervision and mentoring*" [respondent 248, Denmark]. Another respondent stated that it takes so much time supporting and mentoring different health care professionals that the time is very limited for their own personal development and education. This is supported by another statement that highlights "*there is simply not enough time*" [respondent 265, Ireland] (see Fig. 7).

The level of preceptorships differs greatly from "*close supervision for a year with additional assistance given as required*" [respondent 190, UK] and "*three staged preceptorships*" [respondent 305, UK] and "*two weeks to a month*" [respondent 310, UK] ending with very limited or no support. One commented that "*newly qualified needs peer support and supervision for at least one year*" [respondent 35, Ireland].

Discussion

This survey of radiographers found several reasons why radiographers were unable to be involved with ultrasound. Particularly lack of support from the medical professionals and limited/no specific education and training programme available. Similar conclusions were drawn from the study of EFRS national radiographer society representatives, which highlighted resistance from medical professionals, lack of adequate training and lack of legal frameworks as key barriers,[17] although none of the studies have explored the different funding arrangements for imaging examinations across Europe. A recent paper also found lack of support to be a barrier affecting radiographers and recognised that radiologists can be protectionist or reluctant to delegate roles to radiographers in ultrasound.[24] Henwood et al. (2016) also identified barriers and variation in support from radiologist to radiographers.[25] A strategy to overcome this barrier is joint audit to provide safe practice and demonstrate sonographer skills at a local level. It is possible that this perspective is changing, as most respondents agreed or strongly agreed that support and mentoring was available to them. Further consideration of who provides this mentoring and support was not elicited, so it could be other sonographers supporting colleagues. Whilst some departments have good support and quality monitoring, there is still room for improvement, for example image peer review. Peer review of radiographer reporting has been reported to be more common in some parts compared to other parts of a country.[26] Again, the current survey did not explore who undertakes peer review, however some published studies used solely sonographers,[27,28] whereas the Royal College of Radiologists[29] have developed an audit template whereby sonographers and non-radiologist reports are audited by radiologist. To develop and improve teamworking and shared learning, it would be prudent to audit all ultrasound practitioners using the same method to engage every member of the team in making improvements to patient care and outcomes. A recent publication from the ESR states that radiologists should be integral in developing the medical ultrasound curriculum,[15] this highlights that support from radiologists is very important for other medical staff performing ultrasound. This team-working approach should be encouraged across Europe to extend the scope of practice for radiographers.

Many radiographers working in ultrasound do so for three to five days per week, although 18.1% (63/348) worked less than 15 h per week. It may be difficult to obtain technical and diagnostic skills with limited exposure to ultrasound, particular for those new to the

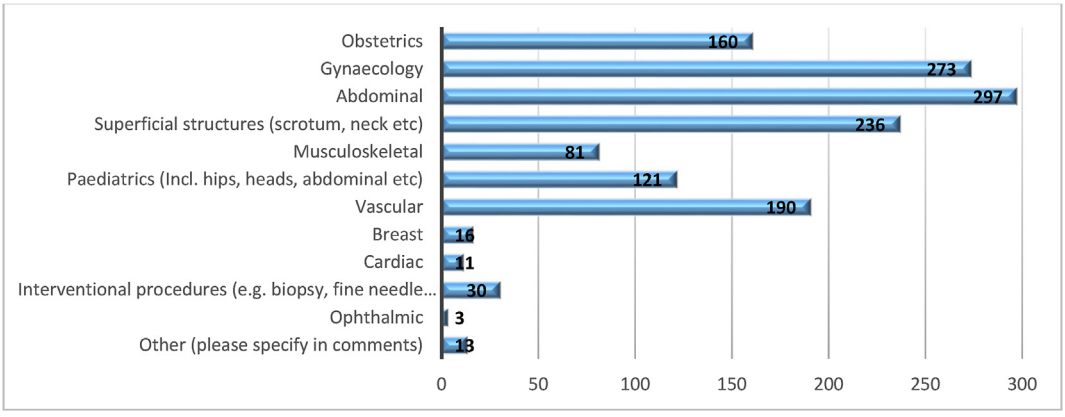

Figure 5. The different clinical areas radiographers are involved (n = 344).

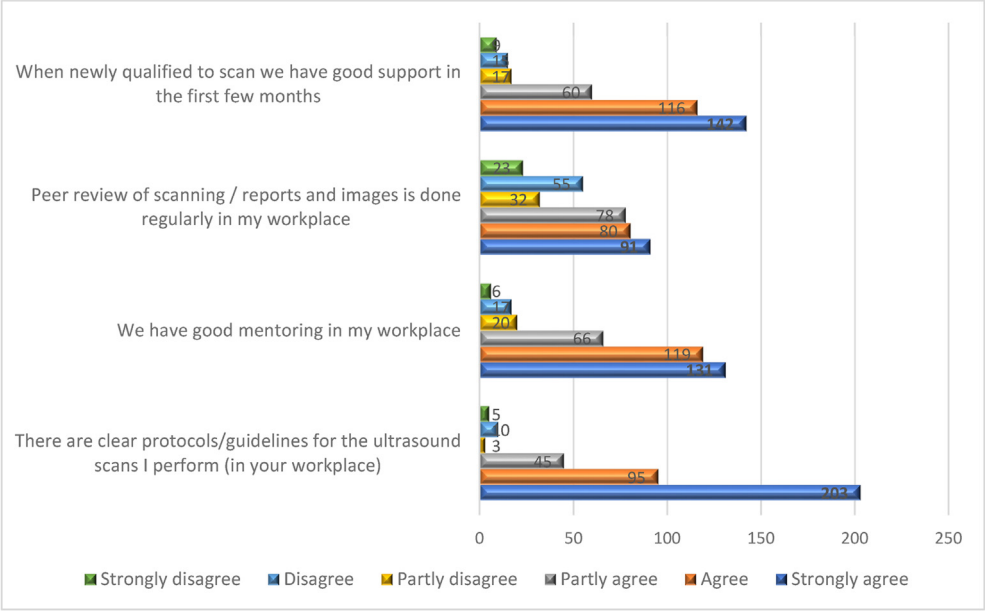

Figure 6. The responses relating to clinical practice for radiographers in ultrasound (n = 361).

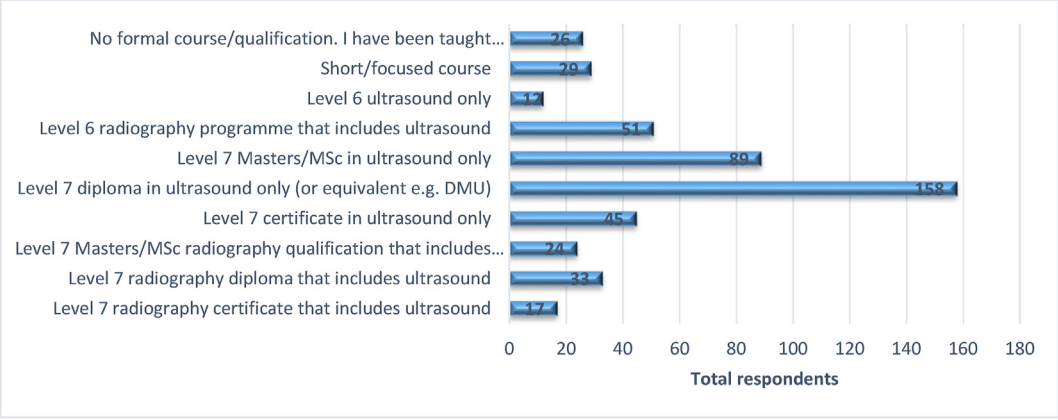

Figure 7. The level of education for those countries where radiographers do perform ultrasound examinations.

modality. The majority of radiographers working in ultrasound across the EFRS countries are female, which is in keeping with findings from other publications.[30,31] The educational level varies from postgraduate to no formal qualification in ultrasound. It is important to keep in mind that ultrasound technique and interpretation are skills that are developed and acquired slowly over time. These skills require practice and cannot be learned during a one-day course. Findings from this survey reflected those from the EFRS national society representatives, which highlighted that the majority of radiographers practising ultrasound had undertaken postgraduate studies or focused courses.[17] Several studies have compared sonographers and radiologists' interpretation and report writing. Results indicate comparability and similar accuracy between sonographers' and radiologists'.[8,9,11,32] Leslie et al. (2000)[9] investigated radiographers who had undertaken postgraduate ultrasound training, Bates et al. (1994)[32] had a range of postgraduate experience and included a student. The other studies made no mention of the education level of the sonographers.[8,11]

In some countries it is recommended that the healthcare professional performing the examination also writes the report,[13,14,33] however the results of this survey suggest that many radiographers are not independently completing the final report. The variability in practice within and between countries is evident (Table 2). Even in the UK, where the report should be integral to the examination,[13,14,34] a small number of respondents (n = 15, 7.3%) are not always providing an interpretative report. When reviewing this data in more detail 1 respondent has a postgraduate (Pg) diploma in radiography at that included some ultrasound and clinical competency assessment, 2 had a Pg certificate in ultrasound, 10 had a Pg diploma and 1 had a MSc in ultrasound. The remaining respondent had undertaken a focused/short course of less than one week duration which did not lead to an award or competency. Ultrasound is a hands-on investigation and writing the report allows for a dynamic workflow focusing on patient safety. Visscher and Bax (2017) conclude that waiting lists may decrease when radiographers take responsibility for all aspects of the examination.[33] Radiographers should write the report, rather than provide a 'snap-shot' of the examination for a clinician to report, but to do so they need appropriate education and training followed by legislation and appropriate indemnity insurance.[34]

The findings of this survey reported mixed responses when asking whether professional indemnity insurance was in place for individual practitioners. In the UK many contracts of employment, including working within the NHS, include primary indemnity insurance, although secondary insurance can be purchased or included as part of professional body membership.[35] In some countries it is mandatory for radiographers to have professional indemnity insurance as part of the statutory regulation.[35,36] No respondents from seven countries (Austria, Estonia, Italy, Malta, Netherlands, Portugal and Sweden) reported having indemnity insurance, although numbers were low. Med responses were provided from other countries. Even in the UK and Ireland, where radiographers who are statutorily regulated must have indemnity insurance there were respondents without or unsure if they had indemnity insurance (n = 11, 8% UK and n = 32, 55% Ireland).

Some of the respondents highlighted that image peer review was not possible due to staff shortages. Image peer review is a critical and on-going process, which if neglected can lead to a decline in clinical standards and outcomes.[28] Imaging reports needs to be diagnostic and reliable to be of any value. The report need to be actionable,[37] as almost no medical treatment or surgery can occur without imaging. The report is often central to general decision making, care and treatment. Peer and self-audit are essential tools to ensure on-going development of skills.[28]

From the study findings and literature there are several recommendations that can be made to support radiographer development in ultrasound, these include supportive teamworking with medical colleagues to co-develop programmes of education, provide clear clinical protocols, develop report writing skills and standards to up-skill existing sonographers, monitor standards of education and clinical practice, pursue legislative reform to enable this service development and identify clear lines of responsibility. Exploring existing models of successful radiographer role extension into independent ultrasound would be an appropriate starting point. It should be recognised that all ultrasound practitioners, regardless of professional background can benefit from teamwork[38–40] to improve clinical outcomes and patient safety.

Limitations

It is a limitation that there may be language barriers and different interpretation of some questions, which may have affected the survey results. The survey was designed so that it was possible for the respondent to skip questions, and consequently not all questions were answered by each respondent. The results should be interpreted with some caution as there may be differences between European countries but also between hospitals within the same country.

Self-selection bias may impact the results, alongside the predominance of responses from three countries (United Kingdom, Ireland, and Spain).

Conclusion

In general, radiographers perceive sonography as an extension of their role with the addition of new responsibilities and skills. Previous literature supports that an essential component of completing an ultrasound examination is writing the report. Whilst many radiographers responding to this survey practise ultrasound, far fewer have the opportunity to write independent actionable reports. Although numbers were small, the majority of those who do not perform ultrasound would be interested to develop in this area.

Overall, radiographers have different career, support and educational opportunities to engage in ultrasound practice across Europe. A wide range of clinical ultrasound examinations are undertaken by radiographers, particularly general medical, gynaecology, obstetrics and vascular. The main educational level is postgraduate (EQF level 7), although some radiographers have limited or no formal education and training, which is a concern as ultrasound is such an operator dependent modality. Previous studies suggest that radiographers can provide a safe, effective ultrasound service, but this does require good underpinning education, mentoring, support and on-going audit and peer review of practice.

Conflict of interest statement

None.

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