

Workplace factors facilitating the radiographers' assessment of referrals for diagnostic imaging - A qualitative study

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Introduction

Justification of performing or obtaining diagnostic images requires the benefits of the examination to outweigh the associated risks.¹ A large number of radiology referrals are reported to be unjustified for a number of reasons,^{2,3} with many referrals providing insufficient clinical details.⁴⁻⁷ The volume of unjustified examinations is roughly estimated at 30%,⁷⁻¹⁰ in a European context. Conducting unjustified examinations result in unnecessary radiation doses to patients, as well as high costs and misuse of radiology resources.¹¹ Assessment of referrals for appropriate imaging is legally the responsibility of the practitioner (usually the department's radiologists),¹² who takes clinical responsibility for an individual's medical exposure.¹ However, increasing use of diagnostic imaging¹³ and current shortages of radiologists¹⁴ have inspired new thinking. The United Kingdom (UK) Ionising Radiation (Medical Exposure) Regulations of 2017¹⁵ suggest that the radiographer may be delegated responsibilities of the practitioner. This includes the tasks of assessing referrals for appropriate imaging. At the same time, regulations, practice breadth and use of terminology vary between countries. In this study, "*referral assessment*" is used as an umbrella term to include vetting,¹⁶ justification and authorisation of imaging,¹⁵ as well as the practice of assigning protocols to imaging referrals.^{17,18}

There has been a development in recent years, focusing on the enhancement and skills development of the radiographers' role within the radiology team. This has resulted in new and advanced radiographers' roles,¹⁹ and platforms for creating solutions involving task-sharing between radiologists and radiographers.^{20,21} Assessment of radiology referrals to ensure that diagnostic imaging is appropriately conducted and justified is one such role. Radiographer role advancements have assisted to remove bottlenecks and improve workflow in radiology.¹² At the same time, studies and reports have illustrated the need for better communication and a

change in workplace culture to improve the practice of justification amongst radiographers.^{12,20} Radiographers normally function as “gatekeepers” in the justification process: in this case referring to their responsibility of informing the radiologist or referring clinician if referrals are suspected to be unjustified.¹² Studies additionally report radiographers to be efficient and accurate when assigning protocols for CT and MRI examinations,^{17,18} which we regard as a part of the referral assessment task. Research has shown that postgraduate education and leading professional roles are associated with higher radiographer performance in referral assessment.²² However, how institutions make use of the radiographer workforce in assessing referrals and how the work is organised for this purpose is largely unknown. This study identifies workplace factors facilitating the radiographers’ assessment of referrals for medical imaging.

Methods

This was a qualitative study informed by phenomenological ideas,²³ which allowed for interpretation of human lived experience through transcribed texts from in-depth interviews. Ethical approval was granted through the Norwegian Centre for Research Data (NSD) under approval number 781462. Data were securely held at all times.

Development of interview topic guide

A topic guide (Table 1) was developed using an interview framework by Kallio, et. al.²⁴ The guide consisted of 15 questions about the participants’ demographics, referral assessment, workload, teamwork and communication. Together with an addition of 20 relevant keywords, the guide ensures consistency across the individual interviews. The topic guide consisted mainly of open-ended questions, enabling participants to express their perceptions and experiences. The topic guide was tested through a 60-minute pilot interview with a radiographer working in Norway, prior to data collection. The pilot test intended to see if the study topics

would be sufficiently investigated by the proposed contents of the guide, and if the order and flow of questions would suit the conversation. The test did not lead to further changes, and the pilot interview data was not included in the final results.

Table 1: Interview topic guide

Interview topic guide with keywords

Background

1. For how long have you been working as a radiographer?
2. Have you completed or started any postgraduate courses?
3. Which imaging modalities do you have experience with, and which do you currently work with?
4. Tell me about your professional role at your workplace. Do you have any additional responsibilities?
5. For how long have you had this role?
6. Do you work at a private institute or a public hospital?
7. Approximately how many radiographers are currently working at your department?

Part 1, referral assessment

8. How do you assess referrals for imaging exams at your workplace? Can you give me an example?
9. How are things organised at your department to help you with the task of assessing referrals?

Keywords for follow-up: Training, experience, modalities, guidelines, internal or external protocols.

Part 2, workload

10. Approximately how many hours do you spend assessing referrals weekly?
11. How are things organised in your department to help you handle the workload?
12. Is the workload shared equally between all of the radiographers at your department?

Keywords for follow-up: Amount received, amount assessed, time spent, multi-tasking, organization, facilitation, distribution.

Part 3, teamwork and communication

13. How would you describe the teamwork and communication at your department, with regard to the referral assessment?
14. Do you perceive this teamwork and communication as beneficial for your work with assessing referrals? Can you give me some examples?

Keywords for follow-up: Teamwork, interprofessional communication, radiologist opinions, medical secretary's role, administration staff, leadership support, incorrect assessment, feedback.

Part 4, last notes

15. Is there anything you would like to add about your work with assessing referrals? Feel free to elaborate.

Recruitment of participants

Participants were recruited by convenience sampling²⁵ through two social media announcements posted through the first author's LinkedIn profile. Further recruitment took place through the snowball-sampling method,²⁶ as two participants were told about the project by connections who had seen the LinkedIn post(s). An international recruitment approach was chosen because to the best of our knowledge, there is a limited number of radiographers specifically trained and presently performing the practitioner's task of assessing referrals to justify and authorise imaging. Although the final recruited participants were from only two countries (Norway and the UK), inclusion was never limited to these two countries. The linkedin posts were monitored with respect for privacy and investigator transparency and complied with the website's terms-of-use. Twelve potential candidates contacted the corresponding author, while only five matched with the inclusion criteria (see Table 2) and were able to participate. The final selected participants received a detailed information letter and returned a signed consent form prior to the interview.

Table 2: Participant inclusion criteria

Inclusion criteria
Experienced diagnostic radiographer with at least 2 years of clinical experience
Respondents must have current or recent work experience where the task of referral assessment (in one or several modalities) was appointed/delegated to that respondent
Working with assessment of referrals task for at least one year
Willing to be interviewed in English and or Norwegian

Data collection

A total of five radiographers were interviewed between October 5th and November 30th, 2020. The in-depth online video interviews followed a semi-structured approach. This was achieved by the combination of a topic guide and spontaneous conversation, with questions flowing from

previous responses when possible. The required sample size was guided by perceived thematic saturation, with saturation being the “information power” that is critical to achieve the study’s aim.²⁷ The interviews were conducted until no new themes emerged. The interviews were conducted separately for each participant, and the topic guide was applied evenly throughout the interviews. The interview duration varied from 50 to 75 minutes.

Data analysis

The interview transcriptions were imported into a qualitative data analysis software (NVivo 12, 2019). Software, such as NVivo, facilitates transparency in the dialogue between researcher and textual data, as well as enhancing creative views on data.²⁸ Systematic text condensation²⁹ was applied through the coding of transcripts into themes. See example of a meaning unit reduction in Table 3. Transcripts were primarily coded by the first author, and relevant parts were checked and reviewed by the co-authors. During data analysis, themes and subthemes emerged. Once analysis and checking were completed, the themes, subordinate themes and supporting text extracts were discussed and agreed upon.

Table 3: Example of a meaning unit reduction

Meaning unit	Reduction/ Code	Theme/Subtheme
<i>“But if it is [documented] then there is evidence created and that becomes a legal binding document. So, a protection for all the three parties as well”</i>	Documentation creates evidence & protection	Formal responsibilities/ documented delegation

Results and Discussion

The sample group (Table 4) consisted of 3 participants from the UK, (two working in National Health Service (NHS) trusts and one in private practice) and 2 participants from Norway, (one public hospital and one private institute). Two workplaces were situated in rural locations, while three were in urban locations. The participants had from 3 to above 10 years of referral assessment experience. All participants had current or recent experience with referrals for cross sectional (MR) imaging. One participant additionally had prior experience with referrals for CT, and two participants had experience with referrals for plain imaging. Two participants had postgraduate education in MRI, while all stated having additional responsibilities at their workplace. Amongst other additions, all participants had taken on responsibilities related to education of students, radiographers and/or other employees.

Table 4: Participant demographics

Sample characteristics	P1	P2	P3	P4	P5
Country of residence	England	Norway	England	England	Norway
Hospital location*	Rural	Urban	Urban	Urban	Rural
Years of vetting experience	9 years	>10 years	>10 years	3-4 years	3-4 years
Modality vetting experience	MRI, some general X-ray	MRI	MRI	MRI, CT, general X-ray	MRI
Postgraduate education within radiology	No	No	Yes, MRI	No	Yes, MRI
Additional responsibilities at workplace**	Yes	Yes	Yes	Yes	Yes

* “Rural” and “Urban” was defined by closeness to the nearest big city centre. The urban service deliveries were in or in close proximity of the city centre, while the rural service deliveries were located in a less populated area outside the city centre. ** “Additional responsibilities” described tasks that were not performed by all radiographers.

Facilitating factors

Five major themes were identified in the analysis: Formal responsibilities, Training, Guidelines, Resource allocation and a Supporting environment. These themes, along with their respective subordinate themes (see Figure 1) will be outlined and discussed in the following.

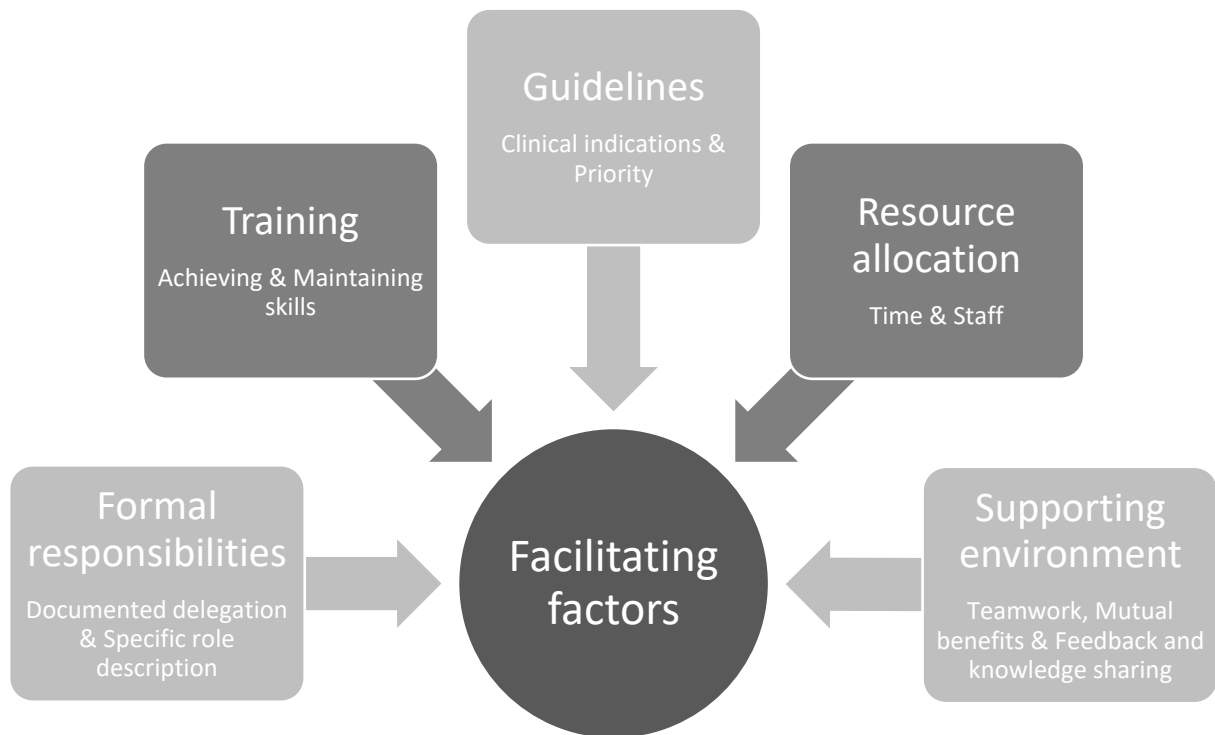


Figure 1: Themes and sub-themes identified as workplace factors facilitating radiographers' assessment of referrals

Formal responsibilities

The formal responsibilities regards the referral assessment, previously defined as an umbrella term covering vetting, justification, authorisation and protocolling. The first subordinate theme identified within Formal responsibilities was **documented delegation**. Formal documenting of identified professional competencies and tasks performed enabled the radiographers to assess referrals. Three workplaces added radiographers' names to the local "delegation document" as soon as they completed training and were delegated the task. Participants connected such

documentation to a feeling of being protected, associated with legal liability, demonstration of professionalism and guidance for performance of the task. In support, P4 stated:

“But if it is [documented] then there is evidence created and that becomes a legal binding document. So, a protection for all parties as well.”

Documenting the delegation was additionally perceived to make the radiographer autonomous in decisions about referral assessment. The participants lacking formal documentation of the task-delegation, also stated that having it would be useful. In two workplaces, delegation was only documented through the superintendent radiographers` work description. The others were subsequently performing the task under verbal delegation from superintendent to senior/radiographer.

“So, formally it`s something that gets done by the superintendent radiographer. So, what tends to happen is that the superintendent doesn`t have enough time to do it. So, we take over it.”(P1)

The second subordinate theme of Formal responsibilities was *specific role description*. Formal identification of the radiographers` role of referral assessment was perceived as a facilitator. One participant suggested the task be named as part of the role extension and suggested the term “referral assessor” (RA).

“If you`re going to give this sort of responsibility, make sure it becomes an established role (...) And naming the role! That will be the best thing. As like the... referral-assessor. You could formalise it and then it becomes a title and goes with you a long way.”(P4)

This was perceived as a facilitator as it would be recognised as the radiographers` specific competence and provide strength for future career development. However, some participants described a lack of a specific role description at their workplace.

“But it should be a bit more... maybe taken a bit more seriously, I think. Because it`s never talked about. It`s just something we do.”(P2)

Participants lacking a specific role description stated that their role in referral assessment was being “taken for granted”.

Other research shows that radiographers may encounter barriers such as lack of understanding and support from colleagues when taking on new roles.³⁰ Recognition by naming and documenting the referral-assessor (RA) role may subsequently enhance the understanding that this new and advanced skillset has required specific training and practice and may ultimately benefit all involved parties. One study suggested a monetary compensation for the task.³¹ Documentation of formal responsibilities arising from the RA role may also benefit the radiographer in future career choices.

Training

Training was identified as important for *achieving skills* and *maintaining skills*. The participants expressed that to *achieve skills*, training with both radiographer and radiologist, going through a pre-set number of referrals and receiving feedback on the quality of the assessments is vital. One participant described a course in radiation protection and anatomy as a good way to achieve skills. Three participants expressed that a good training program

consisted of supervised referral assessment, training in the use of local guidelines and other relevant supporting documents.

“So, they [radiologists] came up with this plan and devised this training... I will have to do, I think they were first one hundred referrals... that I have to do with the radiologist... and then they sign off or they will give me their feedback and then I have to work on.”(P4)

“We received training from a radiologist... And then after some time, we trained four more radiographers in the assessment. They get trained by us radiographers first and foremost. When we find them ready, they have to assess for a whole day and go through them with the radiologist to explain why they did this and why they did that.”(P5)

One participant explained that the training was followed by an exam, before the trainee got their name added to the delegation document. Another participant supported this by expressing that an exam at the end of training was further beneficial for the training process. Engaging a local ethics committee to review the training process was also perceived to facilitate and maintain a high-quality assessment practice.

“It was actually accepted by the ethics committee and the clinical governance team. So, they made sure that we maintained the quality and that it would be run in a way where it will not compromise the patient care.”(P4)

All participants expressed the importance of ***maintaining the skills*** after completing the training in referral assessment. Being able to practice and keep the skills up-to date was perceived as

facilitating for the task. To ensure enough practice for the referral-assessors, all participants stated the need for limiting the task to as few radiographers as practically possible.

“The system is much smoother, because we`re able to justify on a regular basis and we can prioritise the justification. So, we`ve kind of tailored it for now, to a set number of radiographers... so that we can make sure the training is robust and they get enough time to practice.”(P3)

Implementing a system for quality control of referral assessments after completed training was perceived as a way to maintain the new skills.

“Because if you make those kinds of mistakes one week or the second week... you are off it. You need to work on your skills and we will monitor you and then you will come back on it.”(P4)

All participants perceived their work with referral assessment as useful, meaningful and educational. Some participants chose to acquire further knowledge from other literature despite availability of relevant referral guidelines to broaden their knowledge and understand clinical information and medical terminologies.

“You`re clinically looking at the patient`s indications to make that decision. And with that comes huge amounts of knowledge. I find myself googling all sorts of things at times.”(P3)

The participants suggested maintaining skills by continued professional development and constant learning. Our findings accord with studies in other fields of radiographers practice, which show that training and support must be established for advanced radiographer roles to be

successful.³⁰ The training program of the RA should involve assessing a large number of referrals under specific guidance of a specialist radiographer and/or radiologist. The goal through this training should be to facilitate the radiographers' autonomous practice of the skills. Limiting the task to a selected number of radiographers was perceived to facilitate sufficient practice of the skills and to maintain a high competence level, which is also suggested by Sheth, et. al.³¹

Guidelines

Guidelines were mainly needed for justifying referrals based on *Clinical indications* and for determining *Priority*. Three participants stated having quite extensive local referral guidelines to support them in the task of assessing referrals. These referral guidelines were based mostly on local radiologists' experiences and to some degree on research, and reported to be reviewed annually.

“As soon as there are updated guidelines available... it's often the radiologist who discovers them or hears about them on a seminar... then we go through our local referral guideline and agree that “we have to change something here”, or “from now on we'll be doing it like this.”(P5)

“... and then we look at papers that might have been written about it.”(P3)

Independent of the extensiveness of local referral guidelines, all participants described assessing referrals based on different *clinical indications*. Having a guide to assess appropriateness based on indications was perceived as facilitating for the task. The locally

developed referral guidelines were described as “encyclopaedia-like”, where clinical indications for examinations and protocols were listed next to the connected anatomical areas.

“Within the department here we`ve drawn up very robust documents that specify clinical queries... All those [anatomical areas] have different clinical indications written next to them on a big document and we also have time allocated to them and whether or not the patient needs contrast. And then the protocol the radiographers would follow.”(P3)

All participants described having to determine the **Priority** of each referral, i.e., “triaging” where the referral was given a date or timespan for intended completion. This took place through the Radiology Information System (RIS) where radiographers assigned referrals with appropriate levels of urgency.

“When I`m justifying or assessing the referrals I am also looking at their priority status, so whether they have the two-week-rule on the oncology pathway, whether they`re urgent, whether they`re routine or that kind of thing as well.”(P3)

All participants perceived determination of priority as challenging. Hence, having this process described in detail in the guidelines would facilitate the radiographers in their referral assessment task.

“The hardest thing is that time perspective. How long does the patient wait with that back-pain, before getting the MRI?”(P5)

The respondents reported to seek advice from other radiographers or radiologists in determining the priority in lack of guidelines.

The use of referral guidelines may likely improve workflow, along with adaptation of suited checklists.³¹ Referral guidelines have proven to be of value when routinely used.² According to the Royal College of Radiologists,¹⁶ written protocols for departmental justification of common requests with subsequent authorisation should be in place. Availability of imaging referral guidelines with dose information is required.³² Based on experiences of our respondents we may suggest that workplaces adapting the RA role either adopt already renowned referral guidelines or use these as a basis to form their own.

Resource allocation

All participants agreed that having *time* allocated for the task and having enough *staff*, facilitated the referral assessment. The participants agreed that the best thing was having the task assigned through the shift-schedule and performing it in a separate, quiet environment where they would not be disturbed or expected to multitask. This practice was dependent upon sufficient *staffing*.

“Daytime was like full on, everybody there. No problem... Obviously, time allocated is the best thing. Because then you know you are doing this thing. So, less pressure. So, possibly productivity is better.”(P4)

“The best is to have time allocated for it. Just to have time allocated in the shift schedule and having it as a task for the day, not being put as an operator of a machine at the same time.”(P5)

Lack of *time* allocation was perceived by three participants as a result of a lack of management understanding of the importance of the task.

“And that has been the hardest thing, I think for people... for the management to understand. That actually, you can't multitask with this because that's when serious mistakes get made and you scan the wrong thing for the wrong patient, or you put the wrong information in, or you justify something incorrectly. Just too dangerous.”(P3)

“We don't get time to do the assessment. I think it's just something that we are expected to do parallel to the other tasks that we are doing... I think it's because they [management] may not realize the importance of the job. If you realized that, you would designate timeslots for this type of work.”(P2)

The participants who experienced the workflow without and with adequate resources (i.e., time allocated or adequate staffing) perceived the latter as having decreased the assessment error-rate.

A lack of resource allocation for the task of assessing referrals is already known from research on the radiologist's performance of the task,³² and reported as a great challenge facing radiology services.³³ Adequate allocation of time and staffing for the task was perceived by our participants as essential for its success.

Supporting environment

The participants' work with referral assessment was facilitated by a perception of being part of a supporting environment, of which three features were identified: *Teamwork*, *Mutual benefits* and *Feedback and knowledge sharing*.

Teamwork was by all participants described as working together with fellow radiographers, radiologists and other members of the radiology staff to produce the best possible quality of referral assessments. This teamwork was perceived to increase along with evolving personal relationships and years of experience. Teamwork further appears to influence the radiographers' standard way of practice.

"So, I would say the teamwork... uhm... the superintendents, myself and my colleagues, have been doing this for a long time. So, this job, this justification assessment is second nature to us. So, we're very good. I know in my head what my colleague would put, because we both would think the same way."(P3)

Teamwork with regard to the referral assessment was by all participants achieved through the use of electronic communication systems. This was practiced by creating lists in the RIS named "priority radiographer" and "priority radiologist" where complex referrals could be allocated to radiologists or superintendent radiographers. Additional examples of such teamwork were the electronic "chat" function (i.e., sending of electronic short messages), colour coding of referrals, "flags" and electronic post its (i.e., "sticky notes").

"Every referral the radiographers are unsure about is "flagged" to the radiologist and they will assess them."(P5)

The respondents reported a sense of *mutual benefits*. Having the support from the department radiologists was perceived as an important facilitator for their work with referral assessment.

“Without a doubt, support from the radiologists – that`s your biggest thing. We`re really lucky here!”(P3)

The participants also recognised how the radiographers` assessment of referrals were beneficial for the radiologists as they were able to ease their workload.

“So, as far as they`re concerned we do them a huge favour, because it means they can report. So, they don`t have to be doing this. Otherwise, it`s taking them hours of a day.”(P3)

“So, they are happy. They say it helps a lot that we do it.”(P5)

However, some of the participants expressed a feeling of guilt if frequently needing to “disturb” radiologists with questions about referrals. The radiologist`s availability in person was also perceived as a facilitator for the radiographer`s work with referral assessment.

“I can write a chat, I can call. But it`s not the same as having personal contact... it would be better to have the radiologists in-house.”(P2)

A culture of *Feedback and knowledge sharing* promoted a supporting environment. Giving feedback about good and bad referral assessments and sharing knowledge about examinations

and protocols within the team was perceived as facilitating for the referral assessment through all five workplaces.

“I get feedback from the radiologists as well, which helps... And then I feed that back to the justifying radiographers so that they then can learn from this as well. So, it’s important that you close the loop all the time.”(P3)

On the contrary, one participant described a culture of not giving unrequested feedback on a radiographer colleague’s assessments of referrals.

“I have learned in my years here that it’s considered impolite to interfere with your colleague’s work... I don’t have a say and I even tend to not look at anything that’s been vetted by my colleagues. I simply leave it as it is.”(P1)

Such “lack of feedback” was individually reported by one participant when asked about communication in the team, and was perceived as a barrier to a supporting environment. Although this may indicate subjective assessments, the individual did state that ultimately there were no huge differences in the final assessments between the radiographers in the group. Increased inter-rater reliability for assessments may indicate adherence to local written protocols for departmental justification. Such protocols facilitate the vetting process by providing standardization,¹⁶ and are essential to ensure compliance with the IR(ME)R legislations.¹⁵

The workplaces adapting the radiographer RA role should focus on maintaining a supporting environment in the multiprofessional department. Facilitating teamwork between radiographers

and radiologists is subsequently recommended.²⁰ According to research, the radiographer RA role has contributed to a positive re-allocation of radiologist resources.^{17,18,33} This perception was supported by our participants.

Limitations

This study has a number of limitations. The study included only senior radiographers who had an interest in the task of referral assessment. With such a uniform and small participant population, the findings of the study cannot be generalised. However, the study has shown agreement on important perceptions in two national contexts. This might suggest that perceptions presented in this study may also represent views of other radiographers in similar positions. Another limitation is that the first author has personal experience with referral assessment and may have coloured interviews or data analysis with pre-existing knowledge and theories without intent. The only vetting experience from Norway was with MRI referrals, which could also skew the results. Lastly, one interview was done in Norwegian. Extracts from that interview have been translated from Norwegian to English by the first author, who speaks both languages fluently. This may have led to translation bias.

Conclusions

The study identifies formal responsibilities, training, guidelines, resource allocation and a supporting environment as important factors that could support radiographers in assessment of referrals for appropriate diagnostic imaging. Workplace adaptation of the presented factors has the potential to improve existing workflows. The identified factors enhance professional knowledge and development of radiographers, while positively re-allocating radiologist resources. Subsequently, improved quality of patient services may be achieved. Future research

should include a larger and more diverse group of participants to get further insights into the current topic.

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Declarations of interest

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