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Workplace factors facilitating the radiographers' assessment of referrals for diagnostic imaging

A qualitative study



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This thesis is worth 30 study points

Sammendrag

Formålet med denne masteroppgaven er å identifisere faktorer ved arbeidsplassen som oppleves som tilretteleggende for radiografens delegerte arbeid med vurdering av henvisninger til radiologisk bildediagnostikk. Oppgaven inneholder en artikkel og en kappe. Kappen er skrevet etter Universitetet i Sørøst-Norge (USN) sine retningslinjer, mens artikkelen er skrevet i tråd med kriterier for publisering i det vitenskapelige tidsskriftet «*Radiography*». Den vedlagte artikkelen beskriver i hovedsak det empiriske materialet, mens kappen utdyper viktige grunnleggende temaer og metoder som fikk mindre plass i artikkelen. Kappen belyser også relevante teorier og tidligere forskning, med hensikt i å sette tematikken i en større kontekst.

Oppgavens problemstilling er:

«Hvilke faktorer ved arbeidsplassen oppfatter radiografen som tilretteleggende for sitt arbeid med å vurdere berettigelsen av henvisninger til bildediagnostiske undersøkelser?»

En kvalitativ metodikk ble vurdert som passende for å identifisere radiografers tilretteleggende faktorer ved arbeidsplassen fordi den er egnet til å få fram detaljerte beskrivelser av deres hverdag og perspektiver. Det empiriske materialet består av individuelle intervjuer av en times varighet med fem radiografer med erfaring med vurdering av henvisninger. Systematisk tekstkondensering (STC) ble brukt for å analysere de transkriberte tekstene, hvor også analyseverktøyet NVivo ble bruk som hjelpemiddel. STC er inspirert av fenomenologiske ideer og har et beskrivende design. Analysen resulterte i fem tilretteleggende faktorer som til sammen inneholdt elleve undertemaer. Radiografene opplevde (1) formelt ansvar, (2) opplæring, (3) retningslinjer, (4) ressurs allokering og (5) et støttende miljø som tilretteleggende for deres arbeid med vurdering av henvisninger.

De identifiserte faktorene gir anledning til å drøfte mulige implikasjoner knyttet til den radiologiske arbeidsplassen, men også en drøfting opp mot kjente barrierer i form av radiologers bekymringer rettet mot oppgavedeling med radiografer. Studien synliggjør radiografens behov for en arbeidsplass som tilrettelegger for en funksjonell utforming av den aktuelle arbeidsoppgaven. De nevnte faktorene kan hjelpe den radiologiske arbeidsplassen med å forbedre eller opprette en hensiktsmessig arbeidsflyt for vurdering av henvisninger.

Stikkord: radiograf, rolleutvidelse, berettigelse, vurdering av henvisninger, bildediagnostikk

Abstract

The purpose of this master's thesis is to identify workplace factors that radiographers perceive to facilitate their delegated task of assessment of referrals for diagnostic imaging examinations. The thesis contains an article and an essay. The essay is written in accordance with guidelines from The University of South-eastern Norway (USN), while the article is written to fit the criteria for publication in «*Radiography*» journal. The appended article mainly describes the study's empirical data, while the essay further outlines fundamental topics and methods that were given less room in the article. The essay also illuminates relevant theories and previous research, with the intent of setting the main topics in a bigger context.

The research question for the thesis is:

“What factors within the workplace are perceived as facilitating for the radiographers' work with assessment of referrals for diagnostic imaging?”

A qualitative method was considered appropriate for identification of facilitating workplace factors because it allows for detailed descriptions of the radiographer's everyday work and perceptions. The empirical data consists of individual one-hour interviews of five radiographers with experience with referral assessment. Systematic text condensation (STC) was adapted through the analysis of the transcribed texts, in combination with the NVivo analysis software. STC builds on phenomenological theory and utilizes a descriptive design. The analysis resulted in the discovery of five facilitating factors that contain eleven subordinate themes. The radiographers perceived (1) formal responsibilities, (2) training, (3) guidelines, (4) resource allocation and (5) a supporting environment as facilitating for their work with referral assessment.

The identified facilitating factors provide the opportunity to discuss possible implications in connection to the radiological workplace, as well as deliberations against known barriers arising from radiologist's worries concerning task sharing with radiographers. The study makes visible the radiographers need for a workplace that facilitates a functional design of the current task. The listed factors may help the radiology workplace to improve or implement an appropriate workflow for the referral assessment task.

Keywords: radiographer, role advancement, justification, referral assessment, diagnostic imaging

Author`s Preface

Four years ago, when embarking on this part-time master`s education I was filled with motivation and aspirations for the future. Today, with a feeling of pride and accomplishment, I know that I am capable of juggling a busy full-time job with a demanding education, even in the midst of a worldwide pandemic.

I wish to thank my supervisors Catherine Chilute Chilanga and Kristin Bakke Lysdahl for their constructive guidance and for being available with their competence and advice, even during evenings and weekends. I highly appreciate your guidance and valued our online meetings along the way. Additionally, I want to thank my department leader Else-Gunn at Haukeland University Hospital for supporting me through the most stressful parts of this project, giving me valuable time to study and for providing feedback on an article draft. Thank you, Thomas, Stein Magnus, Milka, Hege & Annette for taking the time to critically review or proofread drafts of my writing. I also want to direct a special “thank-you” to Professor Hilde Merete Olerud for motivating me to start this journey in the first place. Without your engagement and warm hospitality, I would likely not be submitting this thesis today.

Last, but not least, I want to thank my husband Børge for the endless love and support that motivated me to keep working even on days where I would rather do everything else. This has been a road full of “firsts”, and I am so happy to finally submit a complete thesis. Even though it is scary to let go of the chance to make further corrections, I am proud of the work that I present. I feel lucky and humble to be able to complete this journey, as well as I am thrilled about the opportunity to share my project with peers through a possible future publication of the appended article.

I hope readers will find this thesis insightful!

Bergen, 15th of May 2021

Helene Mork-Knudsen

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List of abbreviations

CT = Computed Tomography

ICRP = International Commission on Radiological Protection

IAEA = International Atomic Energy Agency

ISRRT = International Society of Radiographers & Radiological Technologists

MRI = Magnetic Resonance Imaging

RA = Referral Assessor

RANZCR = The Royal Australian and New Zealand College of Radiologists

RIS = Radiological Information System

STC = Systematic Text Condensation

UK = The **United Kingdom** of Great Britain and Northern Ireland

US = Ultrasound

WHO = World Health Organization

1 Introduction

1.1 Thesis structure and main topic

This article-based master's thesis contains two parts. First, a supportive essay or “introductory chapter” highlighting important areas of the study topic that were given a smaller place in part two. More specific theoretical and methodological framework will thus be presented, followed by a brief results presentation, discussion and conclusion. The second part is an [article manuscript](#) written for the peer reviewed, UK¹ based “*Radiography*” Journal. The manuscript follows their specific editorial policies ([Annex F](#)) and was submitted to the editor on the 10th of May 2021 ([Annex H](#)). The main topic of this thesis is the task of radiology referral assessment, which is the process of determining if the requested examination is justified (see [chapter 1.2.1](#)). This project is constructed upon the understanding that the radiographer's ability to perform this task is affected by a set of factors within the workplace. Researcher pre-understandings are available through [chapter 3.1.2](#). For the purposes of this study, the **workplace** is limited to the radiology department and **facilitating workplace factors** are limited to factors positively affecting the radiographer's ability to perform the referral assessment task, also referred to as “*vetting*” of referrals. Before proceeding to the study aim and research question, readers will be introduced to essential parts of the topic: justification, assessment of referrals, traditional roles and relevance to the radiology workplace.

1.2 Justification of medical imaging examinations

According to The International Commission on Radiological Protection (ICRP) a medical imaging examination is justified when its benefits are greater than its associated disadvantages (2007). The International Atomic Energy Agency define a useful investigation as one in which the result, either positive or negative, will alter a patient's management or add confidence to the clinician's diagnosis (IAEA, n.d.). The number of non-useful and/or unjustified examinations is roughly estimated at 30%, although various studies indicate different numbers and percentages (Friberg, 2017; Malone et al., 2012; Rawle & Pighills, 2018; Sobiecka, Bekiesińska-Figatowska, Rutkowska, Latos, & Walecki, 2016). The percentage variation may be connected to different study methods used to determine the justification. Numbers will additionally vary between workplaces and may likely be higher in some places. Nevertheless, when a large number of diagnostic imaging examinations performed at a single hospital are unjustified, this will negatively impact patient waiting times, radiologist workload, patient outcomes (like delayed diagnosis), and overall economic costs (Ryan et al., 2019).

¹ The **United Kingdom** of Great Britain and Northern Ireland

1.2.1 The referral process and assessment of referrals

Radiographers and radiologists assess risks and benefits, taking into account a variety of criteria when justifying imaging through the assessment of referrals (Koutalonis & Horrocks, 2012). A typical referral process will now partly be explained through eight steps (Figure 1) retained from Olerud, Lysdahl, Myklebust, Almén, and Katsifarakis (2017). Firstly, a referral is sent to the radiology department following a patient-physician consultation. Note that radiology referrals may also be sent from other recognised health practitioners such as chiropractors, osteopaths, nurse specialists or physiotherapists (Pitman, 2017). When received, a radiologist or radiographer considers the referral with respect on adequate information content, followed by a decision of the appropriate examination (steps 2-3). This is the process that is referred to as “assessment of referrals”.

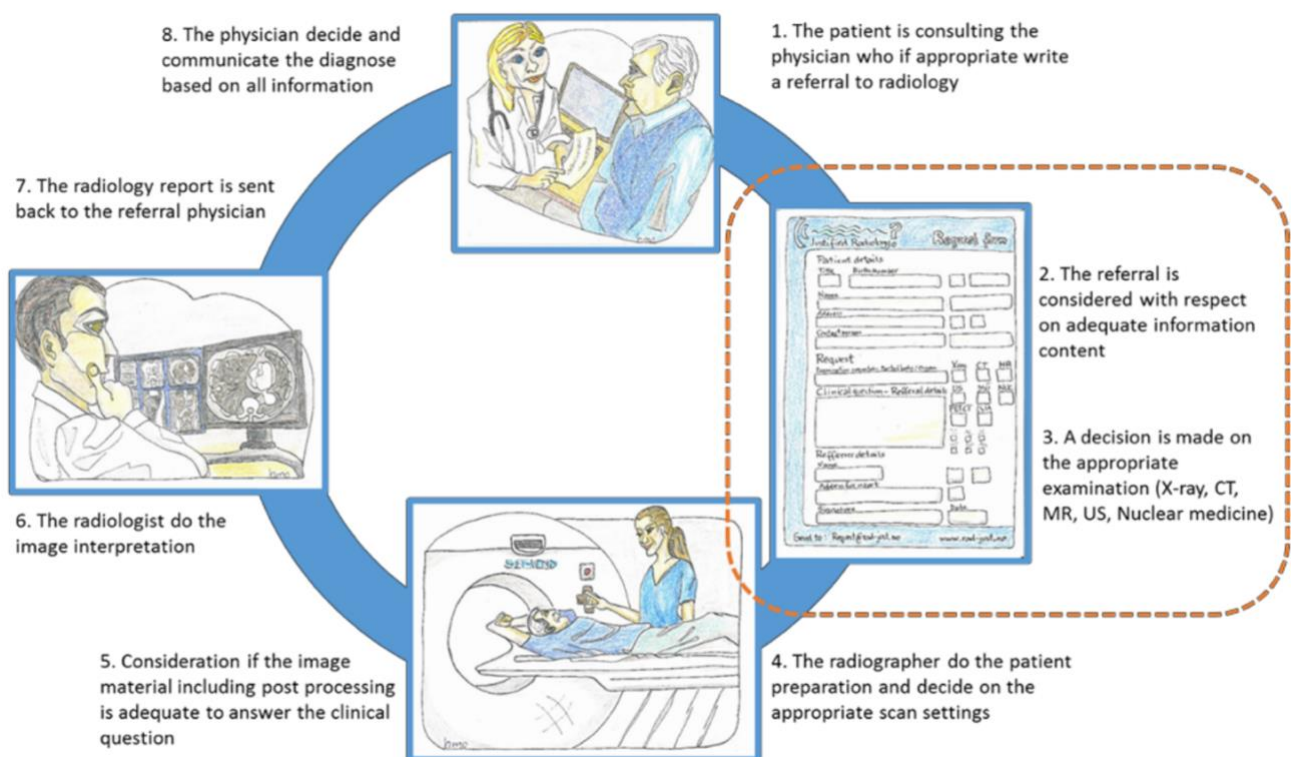


Figure 1: The referral process explained in eight steps (Olerud, et.al, 2017)

Imaging procedures are tailored to the clinical problem and patient characteristics. The concept of “personalized medicine” adapts to the referral process because it aims to deliver the right treatment to the right patient at the right time (European Society of Radiology, 2015). Department secretaries facilitate different parts of the referral process, partly by ensuring that examinations are booked at the right time (Møller & Vikkelsø, 2012). Further, the operating radiographer does the patient preparations, decides on appropriate scan/image settings and undertakes the examination. The adequacy of the image material is then jointly considered by radiographer and radiologist. Lastly, the

radiologist (or reporting radiographer²) interprets the scan and the radiology report is sent back to the physician/referrer who decides and communicates the diagnosis based on all information. The International Society of Radiographers and Radiologic Technologists (ISRRT, 2016) have made a flowchart for the justification and authorization of medical exposures, further illuminating the process (see Figure 2 in appendix, p.32). A similar chart may also be used for MRI³ or US⁴ referrals.

However, several publications illustrate a substantial amount of referrals with insufficient clinical details (Akintomide, Ikpeme, Ngaji, Ani, & Udofia, 2015; Almén, Leitz, & Richter, 2009; Sobiecka et al., 2016; Triantopoulou et al., 2005; Vilar-Palop et al., 2018). In cases where the referral is incomplete or contains wrong or misleading information, an incorrect examination may be performed unless the referral is scrutinized, and more information retrieved. This is a challenge to healthcare professionals performing the assessment, as retrieving additional information may be time consuming. Literature also shows a high percentage of referrals where inappropriate examinations are being ordered (Lehnert & Bree, 2010). Assessment of radiology referrals is thereby vital to ensure that diagnostic imaging is appropriately conducted and justified.

According to the Basic Safety Standards (IAEA, 2014) a joint approach between practitioner and referrer is required where the following is considered:

- The appropriateness of the request
- The urgency of the procedure
- The characteristics of the exposure and of the individual patient
- The relevant information from any previous procedures
- The relevant referral guidelines

The IAEA additionally state that a referral should be regarded as a request for a professional consultation or opinion rather than an instruction or order to perform. This may facilitate a change of modality when another is better suited to answer the clinical question or the rejection of unjustified referrals.

² A reporting radiographer is a radiographer that has been trained to perform image interpretation and reporting (Culpan, Culpan, Docherty, & Denton, 2019)

³ Magnetic Resonance Imaging

⁴ Ultrasound

1.2.2 Traditional roles in the justification process

According to the Ionising Radiation (Medical Exposures) Regulations (2000), practitioners are legally responsible for justifying medical imaging examinations using radiation in the UK. Local operating procedures at each radiological workplace will define who can act as practitioner and the extent of their training (Koutalonis & Horrocks, 2012). The Royal College of Radiologists (2000) define “practitioner” as a health professional who is entitled to take responsibility for an individual medical exposure, requiring specific knowledge of anatomy and risks. By virtue of their medical training, assessment of referrals is traditionally the responsibility of the department’s radiologists, making them the practitioners.

If the radiologist deems the request as appropriate and intends to continue with the examination, a radiological protocol is added to the referral notes, so radiographers know which imaging method to follow. This practice is often referred to as “protocolling” and is a part of the referral assessment task. However, the radiologists’ primary task is image interpretation and reporting (Kansagra, Liu, & John-Paul, 2016). Through the International Society of Radiographers and Radiologic Technologists’ response (ISRRT, n.d.) to the Bonn call-for-action (IAEA & WHO, 2012), they describe three levels of justifying imaging examinations. The third level requires active participation of each member of the healthcare team (referring physician, radiologist and technologist/radiographer). The members will share different aspects of responsibility for the justification process, with the radiologist being responsible for the justification in general.

The radiographer’s traditional role is often referred to as the “operator”. The European Federation of Radiographer Societies (EFRS) define radiographers as *“medical imaging experts who are professionally accountable to the patient’s physical and psychological well-being, prior to, during and following examinations and therapy, thereby taking an active role in justification and optimization of medical imaging”* (Nightingale & McNulty, 2016). As an obligatory process, the radiographer reads the radiology referral for every scheduled examination to check for clinical merit and evaluate the imaging protocols before performing the imaging. They also check for duplicate imaging. This referral-reading and review of previous imaging is performed for every patient, regardless of the assessment of the referral. This could be viewed as a radiographer “double checking”, which may enable conversations between professionals in the healthcare team about disagreements or errors regarding justification of examinations. Radiographers are also in a position to retain updated information from the patient at the time of the examination, which may alter its

justification. This takes place during planning of examinations, where radiographers observe the patient and ask about symptoms (Lundvall, Dahlgren, & Wirell, 2014).

The radiographer thereby functions as a gatekeeper in the justification process, which is described as an advocated and obligatory practice (Nightingale & McNulty, 2016; Vom & Williams, 2017). Here, the term “gatekeeper” effectively means that the radiographer is the last person who encounters the patient before undertaking the imaging examination, becoming the final person able to question the appropriateness of the referral.

1.3 Relevance to the radiology workplace

Studies have shown that referral assessment and other noninterpretive tasks consume a substantial portion of a radiologist’s time (Murphy, Sheehy, & Kavanagh, 2018). The Royal College of Radiologists consensus report (2017) stated that 97% of the radiology departments in the UK had been unable to meet their diagnostic reporting requirements in 2016 within radiology staff’s contracted hours. Radiologists staffing shortages is subsequently causing delays in hospital diagnoses, scan assessment results and was reportedly wasting millions of the UK public healthcare budget. Similar accounts have been published in Norway (Lekve, Olsen, & Fevolden, 2013). Large numbers of unwanted incidents have been linked to radiologist staff shortages and great work pressure amongst the profession in Norway, thus affecting patient safety (Helsedirektoratet, 2017).

As the technology advances, new and improved methods for early diagnosis of diseases emerge. According to Hendee et al. (2010), the growth in referrals for medical imaging services reflects these new technologies and applications. Delayed care as a result of a pressured radiology service is a potential consequence of its increasing use. When discussing such access issues, the term “bottlenecks” has been used to describe areas of radiology workflow (Lekve et al., 2013). However, it is important to consider the type of imaging service and modality choices in order to understand the complete picture of access (Morris & Saboury, 2019).

Further investigations of the delegated task of referral assessment will be of clear relevance to the radiology workplace as it has the potential to positively affect the referral process and the professionals involved.

1.4 Previous research on the topic

Searches for relevant scientific publications were frequently conducted from February 2020 through May 2021 by the use of Google Scholar, ScienceDirect, Medline (Ovid), Oria and PubMed. Some studies were discovered in relevant article bibliographies, while others were previously retrieved through my attendance of USN-courses on radiation protection and justification. Additionally, literature was shared with me by my supervisors. Only four articles focusing on the radiographer's role in referral assessment were discovered, including delegated protocol assignment and the use of a pre-exam checklist (see summary in Table 1). No studies on facilitating workplace factors to the radiographer's referral assessment task were found.

Table 1: Relevant literature summary

Article title	Summary
<i>Radiographers' assessment of referrals for CT and MR imaging using a web-based data collection tool</i>	The first article was published by Chilanga et al. (2020). The study investigated radiographers' compliance with guidelines in assessment of CT and MRI referrals and factors influencing their performance. The study showed a 57-58% compliance with guidelines, and a higher performance being connected to postgraduate education and leading professional roles.
<i>Brainstorming Our Way to Improved Quality, Safety, and Resident Wellness in a Resource-Limited Emergency Department</i>	The second article, by Ginocchio et al. (2020) describes the implementation of a radiographer CT protocolling system for emergency department patients. The results showed elimination of lag time between ordering and protocolling of studies (previously 17,8 min) and reports no radiographer protocol mismatch errors. They also state that the new workflow allowed residents to focus on study interpretation, which increased resident work satisfaction, wellness and educational benefit.
<i>The pre-CT checklist: A simple tool to improve workflow and patient safety in an outpatient CT setting</i>	The third article was published by Sheth, Mudge, and Fishman (2020) and concerned the implementation of a simple checklist used by radiographers as a way to screen scheduled CT appointments for recurrent problems leading to study delays or cancellations. The checklist led to further radiographer actions in $\approx 25\%$ of cases, with two of the commonly listed actions being: contacting referrer to modify/clarify an order or contacting the radiologist for protocolling.
<i>Technologist productivity and accuracy in assigning protocols for abdominal CT and MRI examinations at an academic medical center: implications for physician workload</i>	The fourth and final study by Glazer et al. (2019) evaluated the radiographer productivity and accuracy in assigning protocols for abdominal CT and MRI examinations, compared to a standard workflow where protocols were assigned by physicians. The new workflow revealed no radiographer errors in protocolling and the authors concluded that radiographers efficiently and accurately can assign protocols for abdominal CT/MRI. According to the authors, this change of workflow resulted in increased radiologist time spent on other value-added activities.

1.5 Study aim

The aim of this study was to identify facilitating factors to the radiographers` assessment of referrals for diagnostic imaging within the workplace. Insight into facilitating factors may enable establishment of practices that help improve existing referral assessment processes in radiology workplaces, and subsequently the quality of service to the patients.

1.5.1 Research question

What factors within the workplace are perceived as facilitating for the radiographers` work with assessment of referrals for diagnostic imaging?

2 Theoretical framework

When investigating a task delegated from one profession to another, it becomes natural to look at theories concerning task sharing and skills mix. Theories presented here intend to provide context to the delegation of the referral assessment task, preparing readers for the contents of the appended article. Theoretical framework is followed by the study methods, a brief results presentation and a thesis discussion.

2.1 Task sharing and distribution of labour

Originally, The World Health Organization (2008) defined the term “task shifting” as a process of delegation whereby tasks are moved to less specialized health workers. This is becoming more commonly known as “task sharing”, which is a team-based approach referring to the common performance of the clinical task. The change in terms was intended to convey the message that tasks are not taken away from one profession and given to another, but rather that additional professions are given the capacity to take on identified tasks (Schaefer, 2015).

According to Morley and Cashell (2017), collaboration and task-sharing amongst healthcare teams has shown improvement of patient outcomes. Healthcare involves participation of patients, family, and a diverse team of often highly specialized healthcare professionals. Involvement of all these team-members in a cooperative way is essential to provide high quality patient care. Current focus on reducing healthcare costs while improving quality of care puts additional pressure on public health institutions to find more efficient and effective ways to deliver quality services (Morley & Cashell, 2017). The specifics of tasks and roles within a certain profession will thereby evolve along with societal and organizational needs.

Role developments and extended practice have been debated within doctor and nursing professions. Nursing roles have evolved to fit the needs and environment of the country, with varying educational and regulatory requirements (Schober & Affara, 2009). According to East, Knowles, Pettman, and Fisher (2015), development of expanded roles for nurses has been spurred by many factors, including medical staff shortages, changing population needs and nurses` desire to further advance their careers. This has led to expanded roles like clinical nurse specialist and nurse practitioner. Researchers argue that the term “advanced level practice” has been inconsistently applied to different nursing roles. This is similar to the perceptions of Hardy and Snaith (2006), who argue that definition and distinction between the terms “extended” and “advanced” radiographer practice remain vague. An accurate definition of terms within the context of modern practice is subsequently perceived as fundamental to grading processes and potentially career progressions of the professionals. Comparable to the nursing profession, extended practice in radiography is described as task orientated and driven by the needs of the organization to provide a coherent service (Hardy & Snaith, 2006).

2.1.1 Skills mix in radiology

The term “skills mix” is defined by Buchan, et. al (2001) as a set of skills that the employee is capable of executing without regard for their title or profession. In practice, this often involves transferring of a task from highly qualified and costly staff members to groups of a “lower” competency level, also referred to as vertical task sharing (Lekve et al., 2013). In radiology, the term “skills mix” is mostly focused on delegation of tasks from radiologists to radiographers. This connects to the increasing problem of radiologist shortages, where skills mix is recommended as a long-term solution (Nakajima, Yamada, Imamura, & Kobayashi, 2008). The division of responsibilities has been based on certain skills of the two professions (Lekve et al., 2013). The traditional division of responsibilities between radiographers and radiologists has been that radiographers prepare the patient and undertake the imaging examination, providing results for radiologists to interpret.

There has been a development in recent years, focusing on the enhancement and skills mix of the radiographer's role. This has resulted in new roles, such as advanced practitioner radiographers (Society of Radiographers, 2010). For instance, the reporting radiographers. According to Hardy, et. al (2016), this is now an increasingly common practice in countries like the UK. To meet the current challenges, radiographers must embrace the potential offered for developing their clinical roles and where necessary change practice to align with local service needs that support patient-focused care (Society of Radiographers, 2010). With regard to the referral assessment task, the ISRRT (2019) state that they consider authorization and justification of medical exposures to be within the radiographers` scope of practice, with the appropriate educational training leading to clinical competency to carry

out the task as trained. Radiologists however remain central in establishing and agreeing policies and procedures relating to justification, including assigning of responsibilities and delegation privileges to radiographers (Ebdon-Jackson & Frija, 2021). On general grounds, White and McKay (2002) recommend the presence of task-specific guidelines to ensure that radiographers have the required skills and knowledge to maintain the maximum benefit to the patient. Such guidelines should be established in accordance with national legal requirements and local requirements of the workplace (Ebdon-Jackson & Frija, 2021). Specific recommendations with regard to legal requirements will not be made in this thesis, as these may vary between workplaces and countries.

3 Methods

Through this chapter, I will provide a more detailed description of some essential methods and terms from the study proceedings that were given a smaller place in the appended article ([Annex B](#)). Consequently, development of the interview topic guide, recruitment of participants and data collection will not be specified beyond the contents of the article.

3.1 Qualitative design

One definition of the term qualitative is that it is “*based on information that cannot easily be measured, such as people’s opinions and feelings*” (The Cambridge Dictionary, n.d.-c). The qualitative designs stand in contrast to the quantitative, where the focus is rather on reducing experiences into well-defined variables (Ng & White, 2005). Although less commonly used, qualitative research is recognized within the radiography profession when it comes to providing insight into certain topics of which little is known (Ng & White, 2005). As [chapter 1.4](#) illustrates, there is a lack of research on how the radiographer’s task of referral assessment is facilitated and organized. “Facilitating factors” may consist of elements that are hard to measure in a quantitative manner, such as personal relationships, teamwork or verbal “rules”. Hence, a qualitative research design was chosen to obtain detailed descriptions of radiographer’s perceptions of the organization of the task.

3.1.1 A phenomenological point of view

This qualitative project follows the research tradition of phenomenology as it has inspired the analytic methods of systematic text condensation (see [chapter 3.3](#)). Phenomenology originates from the philosophy discipline, and generally describes the lived experience of individuals to create a picture of the phenomenon (Ng & White, 2005). Through the phenomenological point of view, I may address the meaning that certain aspects of referral assessment have in the "life-world" of radiographers (Smith, 2018). The phenomenological approach is important for this study because it enables participants conscious experiences to be revealed and studied through the interpretation of text. When interviewing radiographers about their perceptions of referral assessment, they ultimately express themselves based on their experience from a subjective point of view. That enables the researcher to logically interpret that perception and describe the phenomenon as experienced by the study participants.

3.1.2 Researcher preconceptions

The term preconception is defined as *“an idea or opinion formed before enough information is available to form it correctly”* (The Cambridge Dictionary, n.d.-b). My preconceptions are made up of personal experiences and beliefs. As a diagnostic radiographer, I have previously worked with referral assessment for 3,5 years at a private radiology department in Norway. In 2018, I also completed the first run of “Justification and skill mix in radiology”, an online master’s course for radiographers as described by Lysdahl, et. al (2019). This course gave me further insights into the process of justification and made me familiar with relevant research on the topic. To give this study legitimacy, I need to be aware of how I look at and define the social reality (Solbue, 2011).

Through the phenomenological approach it is recognized that unacknowledged preconceptions may potentially have negative effects on the analysis of empirical data (Tufford & Newman, 2012). “Bracketing” is the process of putting aside my own beliefs about the phenomenon under investigation and what I already know about the subject (Chan, Fung, & Chien, 2013). This may be challenging, as some level of tacit logic will ultimately exist. However, measures have been taken to hinder my preconceptions from subconsciously impacting the data collection and analysis. Self-awareness was accomplished through reflective notes in my researcher diary. Such constant critical reflection facilitated data analysis and added strength to the research conclusions.

3.2 Transparency

The Cambridge Dictionary (n.d.-a) describes transparency as “*the quality of being done in an open way without secrets*”. By providing detailed descriptions of the project methods and accounting for researcher preconceptions, transparency increases. The study followed a research protocol established through a prior study course. This, together with the reflective student diary leads to better options for replicability and thus increases transparency (Closa, 2021). A qualitative data analysis software (NVivo) was used. This may facilitate transparency in dialogue between researcher and textual data, as well as enhance creative views on data (Sinkovics, Penz, & Ghauri, 2008). For the purposes of transparency, the specifics of the recruitment posts, contents and views have also been made available through [Annex E](#).

Additionally, some methodological choices could be viewed as transparency reducing. For instance, the transcripts were not sent to the participants for review and agreement of the contents. However, they would have been able to review the material upon request. Such “member checking” would subsequently increase the credibility of the results (Widodo, 2014). Lastly, I recognize the challenges with setting aside my own preconceptions when investigating a phenomenon about which I know a great deal. Transparency is enhanced by admitting that there is always tacit logic, which we follow without being aware of it (Malterud, 2012). The results of my own tacit logic may have had some unknown impact on this study.

3.3 Analysis, step-by-step

Malterud (2012) describes 4 steps of systematic text condensation (STC), considered especially useful for novice researchers. The approach is inspired by phenomenological ideas and has a descriptive design. The following chapter narrates my adaptation of Malterud's steps to the analysis of this study's empirical data.

1) *Total impression – from chaos to themes*

Immediately after each interview, a reflective note of first impressions was made in my researcher diary. This note contained immediate impressions from the interview, notes-to-self about focus areas and “tips” for the following interview. Shortly after each interview (and before the next) the audio file was transcribed verbatim, or word-by-word. Widodo (2014) states that transcription is seen as the act of data representation, analysis and interpretation, thus requiring a methodological orientation. I followed a naturalistic approach where laughter, pauses (...) and filling-words like “*uhm*” were included. Through this process, audio was repeatedly and attentively listened to. Pseudonyms were assigned to each participant and identifying details were anonymized. The transcription process took an average time of 7 hours per interview. I subsequently read through the transcript with an open mind as well as re-hearing the audio-file to confirm accuracy. During this first reading, I strived to maintain a “naïve” mind without inviting my own pre-understandings to make judgements of the text. Immediately after this first review of the text and audio-file, theme suggestions or key points from the interviews were entered into the reflective diary. Table 2 illustrates a post-interview note of keywords.

Table 2: *First impressions from transcript and audio file review*

Note entry P4: Immediate thoughts and preliminary theme suggestions
<ul style="list-style-type: none">- <i>Training program for vetting⁵ + application for vetting task</i>- <i>Healthy learning environment (Learning from superintendent)</i>- <i>Radiographer role, autonomy</i>- <i>Delegation due to staff shortages</i>- <i>Stress, workload and multitasking (busy hospital)</i>- <i>Communication in different forms</i>- <i>Wants better documentation and organization of task + naming role</i>

⁵ The term «vetting» is a synonym for the “referral assessment”

2) Identifying and sorting meaning units – from themes to codes

Immediately after all five interviews were transcribed, I moved on to the second step involving coding of transcripts into themes revealed by the empirical data. Through the entirety of this project, I have been striving to maintain consciousness of my own pre-understanding to hinder it from steering my results. To facilitate this process, the interview transcriptions were imported into a qualitative data analysis software (NVivo 12, 2019). By using this tool, the reduction takes place through marking the specific meaning in the text and naming the reduction by fewer words. This process is here referred to as coding. Through this process, meaning units were abstracted to reduce and group data to be able to answer the study question using themes. An example of a meaning unit reduction is available in Table 3, below.

Table 3: Example of reduction of meaning units

Meaning unit	Reduction/ code	Theme
<i>“And they know that they have very little or no notion at all when it comes to the technical side of it, and they are very curious about it. They can ask questions to me and I’m more than happy to explain things to them that they have no idea about sometimes. And the same is also true for the opposite”</i>	Radiographer teaching radiologists about technical side Radiographer learning from the radiologists	Feedback and knowledge sharing

Some meaning units would provide more than one reduction. All essential parts of the five transcripts were coded, resulting in 659 initial codes. These were subsequently grouped into themes by joining codes with similar reductions. Each transcript was primarily coded by the first author, and relevant anonymized parts of the transcript were checked and reviewed by the supervisors.

3) Condensation – from code to meaning

The time-consuming process of STC originally led me to the discovery of six main themes. Through the third step of analysis, I compared initial themes to the first thematic suggestions from step 1 (Table 2). Through this process, some themes could be merged further: the themes “communication”, “relationships” and “teamwork” merged into the theme “Supporting environment”. New and merged themes were then compared against [the research question](#), which led to a more specific formulation of themes and subordinate themes. These were reviewed and discussed with my supervisors. Once analysis and checking were complete, the themes, subordinate themes and supporting text extracts were discussed and agreed upon through student seminars and teacher guidance meetings.

4) Synthesizing – from condensation to descriptions and concepts

In step four, the pieces were put back together by writing the results chapter of the article manuscript. In accordance with STC, results were communicated by the analytic text and further concentrated into theme headings with subtheme descriptions. Descriptions were further illustrated by text extracts in the form of participant quotations. Finally, I searched systematically for data from the full transcripts that might challenge my results and conclusions.

3.4 Journal and article evaluation

For the purposes of structuring the article manuscript, a journal for submission had to be selected. I assessed several journals, including “Radiography” and “Insights into Imaging” and read through information on their websites as well as their guides for authors. I eventually selected “Radiography” because it is UK based and the theme of this thesis seemed appropriate with regard to the journal’s “Aims and Scope”, provided through their website. See further motivation in [the letter to the editor](#). The decision of selecting “Radiography” journal was supported by my supervisors.

Before submission of the manuscript, a draft of the article was critically reviewed against the “Qualitative Checklist” from the Critical Appraisal Skills Programme (2018). This process was completed by five of my professional connections, none of whom were connected to this study’s proceedings. This process increased my critical reflections of the contents.

3.4.1 Research ethics and privacy

Requirements with regard to researcher ethics, participant and data privacy has been reviewed and adapted throughout the planning and proceedings of this project. Ethical approval was granted through the Norwegian Centre for Research Data (NSD) under approval number 781462. The approval message is attached as [Annex G](#).

4 Results

This study resulted in the identification of five themes: Formal responsibilities, training, guidelines, resource allocation and a supporting environment. They comprise a total of eleven subordinate themes. Themes and subthemes are listed in Table 4.

Table 4: Themes and subthemes

Theme 1	Theme 2	Theme 3	Theme 4	Theme 5
Formal responsibilities	Training	Referral guidelines	Resource allocation	Supporting environment
<i>Subthemes</i>	<i>Subthemes</i>	<i>Subthemes</i>	<i>Subthemes</i>	<i>Subthemes</i>
<i>Documented delegation + specific role description</i>	<i>Achieving skills + maintaining skills</i>	<i>Indications + priority</i>	<i>Time + staff</i>	<i>Teamwork + mutual benefits + feedback and knowledge sharing</i>

Within the **formal responsibilities**, documentation of the delegated task and a specific radiographer role description was perceived as important. Further, a specific **training** program for the referral assessors were perceived as an important facilitator. To achieve the skills mix necessary to perform the task, facilitators were training with both radiographer and radiologist, going through a pre-set number of referrals and receiving feedback on the quality of the assessments. To maintain these new skills, radiographers needed to be able to keep the skill up-to date by practice and a system of quality control. This was additionally connected to professional development.

The implementation and use of **guidelines** were perceived as facilitating for the task of referral assessment, with clear indications for different anatomical areas listed and a guide to assess the priority of the examinations. When discussing the facilitator of **resource allocation**, the main focus was on being adequately staffed and having enough time allocated for the task. In addition to time - having the task assigned through the work-schedule for the day was connected to the importance of being able to assess referrals in a quiet environment where radiographers would not be forced to multitask.

Last, but not least, a **supporting environment** where feedback on good and bad assessments, knowledge sharing within and between professions as well as close teamwork and support from the radiologists, were essential facilitators. This theme was focused on interactions between the radiographers, as well as between the radiographer and radiologist.

A more detailed results section with supporting text extracts is presented in the [appended article](#).

5 Discussion

This study has focused on the radiographer's task of referral assessment and identified five main factors perceived to facilitate their work. Additionally, this surrounding essay has attempted to set the themes in a bigger context by examining theories concerning task sharing and skills mix. The radiographer and radiologist professions and the radiologic technologies they adapt are constantly changing and evolving. To keep up, a mix of skills is portrayed as unavoidable. The assessment of referrals is a time-consuming practice, which is likely to keep increasing along with the demand for radiologic services. New and improved workflows from delegation of protocolling, vetting or assessment of referrals to radiographers have been connected to increased patient safety and better radiologist time allocation (Ginocchio et al., 2020; Glazer et al., 2019; Sheth et al., 2020). The facilitating factors presented in this study may further assist radiology workplaces with implementing or improving existing referral assessment workflows.

However, barriers to different radiographer role extensions such as the reporting radiographer are previously described. One such barrier is the lack of support from radiologists, who have raised concerns about these role extensions. They argue that referral assessment requires "rigorous undergraduate medical and post-graduate specialist training and expertise", and that radiographers in doing so "go significantly beyond their training" (RANZCR, 2018). This positional statement was met with disappointment by radiographer societies, who argue that both radiographers and radiologists have a duty of care towards patients, to ensure timely and helpful therapies in a patient centered healthcare system (ASMIRT, 2018). Still, through a more recent message from the dean of the Royal Australian and New Zealand College of Radiologists (RANZCR), Jeganathan (2020) continually states that referral assessment can only be done by a clinical radiologist.

To meet such challenges, the fifth facilitating workplace factor describing a supporting environment may be helpful. Within this theme, the mutual benefits were described. To gain support from the department's radiologists, the benefits of this practice should be visible to them. The participants in this study described how their work with referral assessment eased the workload of the radiologist. Mutual benefits through reduced radiologist workload was also acknowledged by the radiologists portrayed by Forsyth and Robertson (2007). However, the same publication revealed another set of connected radiologist anxieties (Forsyth & Robertson, 2007). One of them was the anxiety that the radiographer does not recognize own limitations, and another being a lack of clear medico-legal responsibilities.

To meet these anxieties, the facilitating factors from this study may again be of importance. By adapting the facilitators within the formal responsibilities theme, radiographers will be made aware of the scope of their practice and the specific role description to follow. Additionally, training and selection of the particular radiographers is important. In accordance with perceptions from this study, motivated radiographers with long experience should be selected and supervised by a radiologist/trained radiographer in the initial period. Measures should be followed up with an analysis of the number of errors, reduced workload for radiologists, patients' experiences and improved patient flow. Protocols and procedures for the new workflow must be in place, including updated "encyclopaedia-like" locally adapted guidelines for the radiographers to follow. Lastly, a supporting environment includes the importance of maintaining an environment where radiographers can ask questions to, and collaborate with, radiologists regarding complex referrals.

6 Conclusions

A structured training program and the use of updated guidelines are advised for radiographers delegated with referral assessment in radiology. The delegation and role extension should subsequently be well documented. The workplace would benefit from maintaining a healthy work environment where radiographers are encouraged to seek updated knowledge through teamwork. The success of implementation is perceived as closely connected to the sense of mutual benefits and support from the radiologists. By adapting facilitating factors such as the ones presented in this study and at the same time taking measures to account for possible barriers to the radiographer advancement of referral assessment, workplaces may be better equipped to plan, implement or improve existing referral assessment workflows. This is connected to a positive re-allocation of radiologist resources and may additionally benefit the radiographers by increased knowledge and professional development.

This thesis has revealed a lack of information about the organization of the referral assessment task, when performed by radiographers. Although facilitating factors have been identified in this study, more research is needed to advance the concept of the radiographer "Referral Assessor" (RA). See recommendations on future research within the [article](#) conclusions (p. 48).

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Annexes

This section contains a referral assessment flowchart (Figure 2), a [letter to the editor](#) of “Radiography” Journal, abstract and [research article manuscript](#), [topic guide](#), participant [information & consent form](#), [recruitment posts](#) on LinkedIn, [editorial policies](#), [NSD approval](#) message and the [confirmation of submission](#) of the appended article manuscript to “Radiography” Journal.

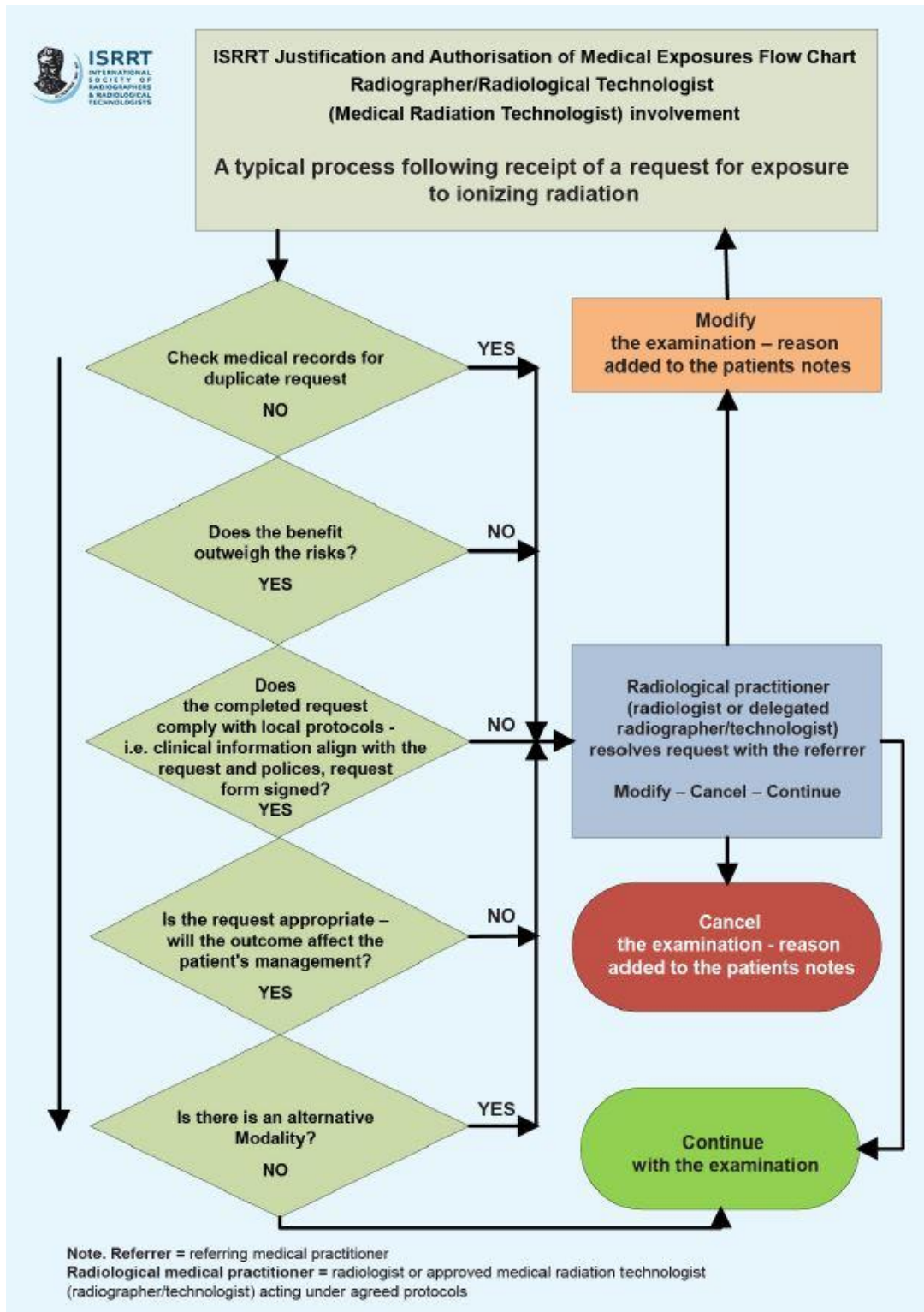


Figure 2: Justification and Authorization of Medical Exposures Flow Chart (ISRRRT, 2016)

A. Letter to the editor

Dear Editor,

We wish to submit an original research article entitled “*Workplace factors facilitating the Radiographers’ assessment of referrals for diagnostic imaging - a qualitative study*”. This study focuses on a specific radiographer role advancement that has yet to be implemented at many radiology workplaces. By investigating the radiographer’s perceptions of the facilitating factors, new insights into the task have been provided. The identified facilitating factors shown in this paper may enable establishment of practices that help improve existing referral assessment processes in radiology workplaces. We believe that this manuscript is appropriate for publication by Radiography Journal because it adds knowledge to an organisational process that would be implemented in radiology departments which subsequently add to the quality of services to the patients. We believe the aims and results from this study are in accordance with the priority areas presented in the Society and College of Radiographers “Research Priorities for the Radiographic Profession” (2016-2021).

Author’s list, contribution and approval

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Corresponding author Lysdahl made a substantial contribution to the conception and design of the study. The main author is responsible for the original acquisition, analysis and interpretation of data. Corresponding author Chilanga made a substantial contribution to drafting and revision of the article and is responsible for the integrity of the work as a whole. All authors read, edited and approved the version of the manuscript to be submitted. All authors subsequently meet the criteria for authorship in accordance with the Vancouver recommendations. We confirm that this work is original and has not been published elsewhere, nor is it currently under consideration for publication elsewhere. No reports or similar submissions have been previously written by any of the authors. All parts of manuscript to be considered are submitted and no parts have been sent via post or other form to the Editorial Office. Publication is approved by all authors and tacitly by the responsible authorities where the work was carried out. We have no conflicts of interest to disclose.

Thank you for your consideration of this manuscript.

Sincerely,
Helene Mork-Knudsen

B. Research article

Article abstract

Introduction: Radiology referrals are assessed for appropriate imaging based on the clinical information provided by the referring clinician. The task is legally the responsibility of the department radiologists, but radiologist staff shortages have led to increased delegation of the task to radiographers. Knowledge of how this task is prepared and perceived by radiographers is poor. The aim of this study was to investigate how the radiographer's assessment of referrals is facilitated by the workplace.

Methods: Five radiographers were recruited by convenience- and snowball-sampling techniques through the online social media platform LinkedIn. The participants represented different private and public hospitals and had from three to above ten years of referral assessment experience. Following a qualitative approach, 60-minute in-depth semi-structured interviews were conducted through online video meetings. Interviews followed a topic guide consisting of 15 questions and 20 keywords, previously tested through a pilot interview. Systematic text condensation was performed using NVivo 12, where initial coding led to development of five central themes, with eleven underlying subthemes.

Results: Five main factors were identified, each with subthemes identified as: (1) Formal responsibilities; Documented delegation, Specific role description, (2) Training; Achieving skills, Maintaining skills, (3) Guidelines; Clinical indications, Priority, (4) Resource allocation; Time, Staff, (5) a Supporting environment; Teamwork, Mutual benefits, Feedback and knowledge sharing.

Conclusion: The study adds new and valuable insights into workplace factors facilitating the radiographers' delegated task of assessing referrals. Workflows adapting such factors are of potential benefit to radiographers by increased knowledge and professional development, while also positively re-allocating radiologist resources.

Implications for practice: The study findings may support radiology workplaces in establishing or improving referral assessment by radiographers, and subsequently the quality of services to the patients.

Keywords: *Radiographer; role advancement; justification; referral assessment; vetting; diagnostic imaging.* ⁶**Abbreviations.**

⁶ **RA** = Referral Assessor, **RIS** = Radiology Information System, **NHS** = National Health Service

Introduction

Justification of diagnostic imaging requires the benefits of the examination to outweigh the associated risks.¹ A large number of referrals for imaging examinations are reported to be unjustified for a number of reasons.^{2,3} One of the main reasons is insufficient clinical details in a substantial amount of referral forms, as illustrated by several publications.⁴⁻⁷ The percentage of inappropriate or unjustified examinations is roughly estimated at 30%.⁷⁻¹⁰ Conducting unjustified examinations result in unnecessary radiation doses to patients, high costs and misuse of radiology resources.¹¹ Assessment of referrals is legally the responsibility of the department's radiologists.¹² However, the increased use of diagnostic imaging¹³ and subsequent result of current shortages of radiologists,¹⁴ has led radiographers to be delegated the task.

There has been a development in recent years, focusing on the enhancement and skills mix of the role of the radiographer. This has resulted in new and advanced radiographers' roles,¹⁵ and platforms for creating solutions involving task-sharing between radiologists and radiographers.^{16,17} 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 Studies and reports have illustrated the need for better communication and a change in workplace culture to improve the practice of justification amongst radiographers.^{12,16} 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 unjustified.¹² Studies additionally report radiographers to be efficient and accurate when assigning protocols for CT and MRI examinations,^{18,19} which we regard as a part of the referral assessment task. Research have shown that postgraduate education and leading professional roles are associated with higher radiographer performance in referral assessment.²⁰ However, how institutions make use of the radiographers' workforce in assessing referrals and how the work is organised for this purpose is largely unknown.

This study aims to identify facilitating factors to the radiographers' assessment of referrals for diagnostic imaging within the workplace.

Methods

This was a qualitative study informed by phenomenological ideas,²¹ which allowed for interpretation of human lived experience through transcribed texts from in-depth interviews. By the use of a

reflective diary, the first author facilitated critical reflection throughout the research process. 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 was developed using an interview framework by Kallio, et. al.²² The guide consisted of 15 questions about the participant`s demographics, referral assessment, workload, teamwork and communication. Together with an addition of 20 relevant keywords, the guide should ensure 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 contents of the guide were not changed during the interview proceedings.

Recruitment of participants

An international recruitment approach was chosen to obtain a broader perspective, as there are indications of countries like the UK being in the forefront of radiographer role advancements.¹⁷ Participants were recruited by convenience sampling²³ through two social media announcements posted through the first author`s LinkedIn profile. Further recruitment took place through the snowball-sampling method,²⁴ as two participants were told about the project by connections who had seen the LinkedIn post(s). The 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 and were able to participate (see Table 1). The final selected participants received a detailed information letter and returned a signed consent form prior to the interview.

Table 1: 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 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 saturation, with saturation being the “information power” that is critical to achieve the study’s aim.²⁵ 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). The use of software, such as NVivo, facilitate transparency in the dialogue between researcher and textual data, as well as enhance creative views on data.²⁶ Systematic text condensation²⁷ was applied through the coding of transcripts into themes. See example of a meaning unit reduction in Table 2. Transcripts were primarily coded by the first author, and relevant parts were checked and reviewed by the co-authors. Once analysis and checking were completed, the themes, subordinate themes and supporting text extracts were discussed and agreed upon.

Table 2: 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

The five interviews generated 106 A4 transcribed pages, amounting to a total of 46 600 words.

Sample group characteristics

The sample group (Table 3) consisted of 3 participants from the UK, (two working in 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 of the participants had experience with MRI referrals, while two participants had additional experience with referrals for other modalities. Two of the participants had relevant postgraduate education, while all stated having additional responsibilities at their workplace. Amongst other advancements, all the participants had additional responsibilities related to educating students, radiographers and/or other employees.

Table 3: 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	No	Yes
Advanced role/ additional responsibilities at workplace	Yes	Yes	Yes	Yes	Yes

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 are illustrated in Figure 1 and will be outlined in the following.

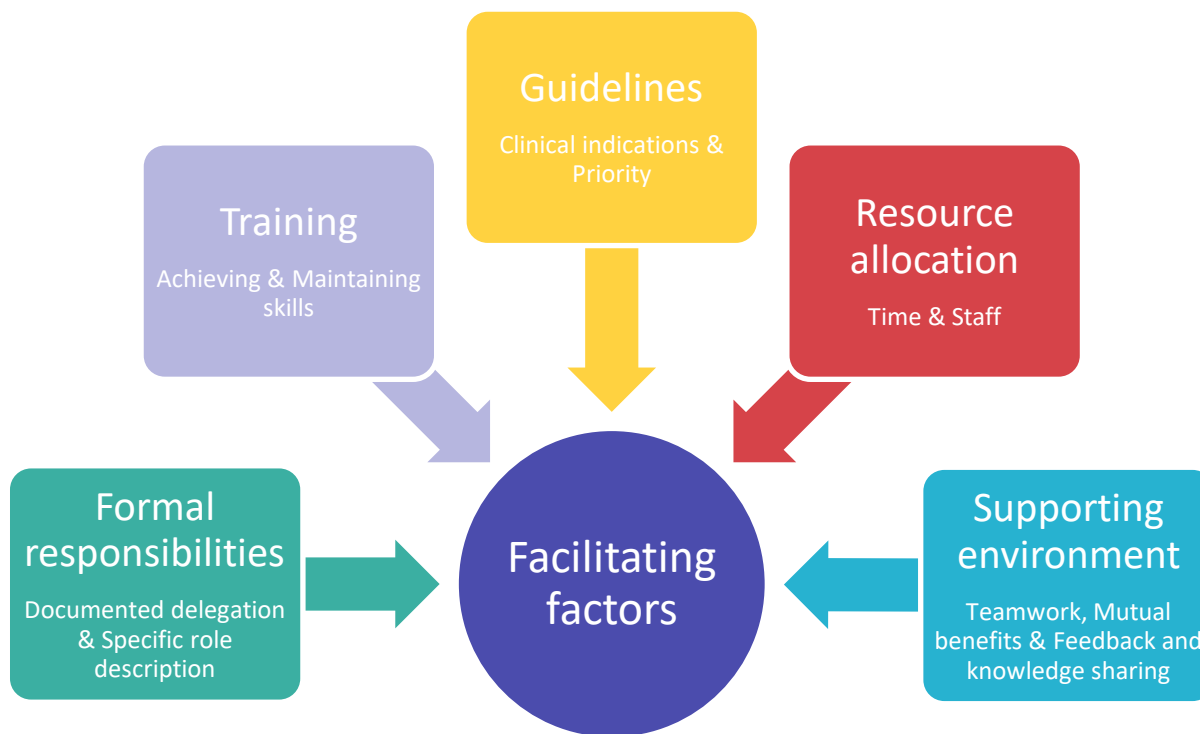


Figure 1: Themes and sub-themes identified as workplace factors facilitating radiographers' assessment of referrals

Formal responsibilities

The first subordinate theme identified within Formal responsibilities was *documented delegation*. Formal documenting of identified professional competencies and tasks performed was perceived as facilitating for the radiographers work with referral assessment. 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.

"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 (P4)."

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 formalize it and then it becomes a title and then it 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”.

Training

Training was identified as important for **achieving skills** and **maintaining skills**. Facilitators for the assessment training to **achieve skills** were perceived as; training with both radiographer and radiologist, going through a pre-set number of referrals and receiving feedback on the quality of the assessments. One participant described a course in radiation protection and anatomy as a good way

to achieve skills through the assessment training. Three participants described 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 they devised this training... And 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 facilitating 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 as well, and the clinical governance team. So, they made sure that we maintained the quality and everything 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 also justify on a regular basis and we can prioritize 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 everything and then 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.

“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.

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 guidelines were based mostly on local radiologists` experiences and to some degree on research and reported to be reviewed annually. 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.

“So, 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.

“So, 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 participants reported to seek advice from other radiographers or radiologists in determining the priority in lack of guidelines (see upcoming section: Supporting environment).

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**.

“So, daytime was like full on. Everybody there. No problem... Obviously, time allocated is the best thing. Because then you know that 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. I think. 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.

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.

“Ok. So, uhm... I would say the teamwork... uhm... the superintendents, myself and my colleagues, have been doing this for a long time. So, we are... 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, colour coding of referrals, “flags” and electronic post its, i.e., “sticky notes”.

“Every referral that 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.

“And 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.

“So, then I get feedback from the radiologists as well, which helps... And then obviously at that point 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 perceived as a barrier to a supporting environment.

Discussion

Through utilising the radiographers’ perception and experience of being delegated the task of assessing referrals, both practical and cultural factors were identified. Five main facilitating factors have been identified and presented with supporting text extracts: Formal responsibilities, Training, Guidelines, Resource allocation and a Supporting environment. The findings did not allow for a ranking of the importance of the identified factors.

Research show that radiographers may encounter barriers such as lack of understanding and support from colleagues when taking on new roles.²⁸ 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.²⁹ Documentation of formal responsibilities arising from the RA role may also benefit the radiographer in future career choices.

We identified training as important, to initially achieve the needed skills before taking on the task. This accords with studies in other fields of radiographers practice, which show that training and support must be established for advanced radiographer roles to be successful.²⁸ 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, which is also suggested by Sheth, et. al.²⁹

Based on experiences of our respondents we may suggest that workplaces adapting the RA role either adapt already renowned referral guidelines or use these as a basis to form their own. As suggested by the participants in our study, the guideline structure should follow specific clinical indications and should include recommendations on how to determine priority. Such guidelines may likely improve workflow, along with adaptation of suited checklists.²⁹ According to the Royal College of

Radiologists,³⁰ 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.³¹ Referral guidelines have proven to be of value when they are routinely used.²

A lack of resource allocation for the task of assessing referrals is already known from research on the radiologist's performance of the task.³¹ Adequate allocation of time and staffing for the task was perceived by our participants as essential for its success. This perception is supported by the literature.³² Last but not least, the radiographers highlighted a supportive environment, with teamwork, feedback and a mutual recognition of the value of radiographers` and radiologists` contributions as important. The workplaces adapting the radiographer RA role should focus on maintaining a supporting environment in the multiprofessional department. Facilitating the teamwork between radiographer and radiologist is subsequently recommended.¹⁶ According to research, the radiographer RA role has contributed to a positive re-allocation of radiologist resources.^{18,19,32} This was supported by our participants perceptions.

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. Result categories were also mainly constructed by the first author and thereby strongly influenced by the said person. 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 facilitating for the radiographers` assessment of referrals for diagnostic imaging within the workplace. Workplace adaptation of the presented factors has the potential to improve existing workflows with referral assessment. The described workflows including these factors were perceived as beneficial for the radiographers by increased knowledge and professional development, as well as positive with regard to re-allocation of radiologist resources. 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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C. Topic guide

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:

Question 1: How do you assess referrals for imaging exams at your workplace? Can you give me an example? **Question 2:** How are things organized 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:

Question 3: Approximately how many hours do you spend assessing referrals weekly? **Question 4:** How are things organized in your department to help you handle the workload? **Question 5:** 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:

Question 6: How would you describe the teamwork and communication at your department, with regard to the referral assessment? **Question 7:** 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:

Question 8: Is there anything you would like to add about your work with assessing referrals? Feel free to elaborate.

D. Information and consent form

Are you interested in taking part in the research project

“Workplace factors facilitating the radiographer’s assessment of referrals for diagnostic imaging”

This is an inquiry about participation in a research project where the main purpose is to investigate how the workplace facilitates the radiographer’s role in referral assessment. In this letter we will give you information about the purpose of the project and what your participation will involve.

Purpose of the project

The purpose of this study is to investigate how radiology departments make use of the radiographers’ workforce in assessing referrals and how the process is organized.

We investigate:

- What workplace factors radiographers perceive to facilitate their work in assessment of referrals for diagnostic imaging

The study may further enable establishment of practices that help improve existing referral assessment processes in radiology workplaces, and subsequently the quality for services to the patients.

The project is part of a Master of Science thesis at The University of South Eastern Norway.

Who is responsible for the research project?

University Professor Kristin Bakke Lysdahl will together with lecturer & PhD fellow Catherine Chilanga be supervising M.Sc. student Helene Mork-Knudsen through the proceedings of this project.

Why are you being asked to participate?

You have been selected as a potential candidate to participate because you have identified as an experienced diagnostic radiographer between 20 and 65 years of age, currently working at an institution where the assessment of referrals is a formally appointed task. In addition to this, you must be willing to be interviewed in English and therefore have sufficient English language skills. Approximately three to five radiographers will be asked to participate in this project.

What does participation involve for you?

If you choose to take part in this project, this will involve your participation in an online interview. The interview will be held by M.Sc. student Helene Mork-Knudsen and will last for approximately one hour. For me to be able to transcribe the interview correctly it is necessary with an audio recording of the interview in its entirety. The video of your person will not be recorded.

Participation is voluntary

Participation in the project is voluntary. If you chose to participate, you can withdraw your consent by contacting and informing any one of the researchers at any time without giving a reason. All information about you will then be made anonymous. There will be no negative consequences for you if you chose not to participate or later decide to withdraw.

Your personal privacy – how we will store and use your personal data

We will only use your personal data for the purpose(s) specified in this information letter. We will process your personal data confidentially and in accordance with data protection legislation (the General Data Protection Regulation and Personal Data Act). Only the project group (student and two supervisors) will have access to the collected personal data. Your name and contact details will be

replaced with a code. The list of names, contact details and respective codes will be stored separately from the rest of the collected data. The data will be stored in a locked folder on the M.Sc. student's personal computer, only accessible to her. When published, you will only be portrayed by your occupation and country of residence and therefore not easily recognizable.

What will happen to your personal data at the end of the research project?

The project is scheduled to end in May 2021. The collected personal data will be anonymized during the proceedings of this project and will not be handed on to other parties. All personal data and audio recordings will be deleted at the end of the project.

Your rights

So long as you can be identified in the collected data, you have the right to:

- access the personal data that is being processed about you
- request that your personal data is deleted
- request that incorrect personal data about you is corrected/rectified
- receive a copy of your personal data (data portability), and
- send a complaint to the Data Protection Officer or The Norwegian Data Protection Authority regarding the processing of your personal data

What gives us the right to process your personal data?

We will process your personal data based on your consent. Based on an agreement with The University of South Eastern Norway, NSD – The Norwegian Centre for Research Data AS has assessed that the processing of personal data in this project is in accordance with data protection legislation.

Where can I find out more?

If you have questions about the project, or want to exercise your rights, contact:

- M.Sc. Student Helene Mork-Knudsen, by email: (221540@student.usn.no) or by telephone: +47 45 01 92 36.
- The University of South Eastern Norway via project leader Professor Kristin Bakke Lysdahl, by email: (Kristin.Bakke.Lysdahl@usn.no) or by telephone: +47 31 00 99 89. You may also contact project PhD fellow Catherine Chilanga by email: (Catherine.Chilanga@usn.no) or by telephone: +47 31 00 90 83.
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- NSD – The Norwegian Centre for Research Data AS, by email: (personverntjenester@nsd.no) or by telephone: +47 55 58 21 17.

Yours sincerely,

Project Leader Kristin Bakke Lysdahl
& Student Helene Mork-Knudsen

Consent form

I have received and understood information about the project *Workplace factors facilitating the radiographer's assessment of referrals for diagnostic imaging* and have been given the opportunity to ask questions. I give consent:

to participate in a 60-minute interview

I give consent for my personal data to be processed until the end date of the project, approx. late May 2021.

(Signed by participant, date)

E. Recruitment posts on LinkedIn

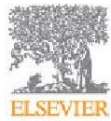
1. First post on LinkedIn. This is the written text supplementing the video in the same post. The post was published on September 19th, 2020 and is available from: https://www.linkedin.com/posts/helenemk_radiographer-radiography-referral-activity-6713106317176832000-wyIS
2. The manuscript for the recruitment video attached to the 1st post. Duration of video: 2 minutes 15 seconds
3. Forums/groups within LinkedIn where the 1st post was shared by the author
4. Follow-up post on LinkedIn (by sharing the first post with an updated text addition). Post 2 was published one month after post 1, on October 20th, 2020
5. Total feedback/views on main post (1)

1	<p>Are you interested in taking part in the research project “Workplace factors facilitating the radiographer’s assessment of referrals for diagnostic imaging”?</p> <p>The purpose of this study is to investigate how radiology departments make use of the radiographers’ workforce in assessing referrals and how the process is organized. The study may further enable establishment of practices that help improve existing referral assessment processes in radiology workplaces, and subsequently the quality for services to the patients. The project is part of a Master of Science thesis at The University of South Eastern Norway.</p> <p>I am looking to recruit 3-5 Radiographers for an online interview, lasting about 1 hour. To participate, you must fit the following criteria:</p> <ul style="list-style-type: none"> - Experienced diagnostic radiographer - Between the age of 20 and 65 - Currently employed at a workplace where referral assessment is a formally appointed task - Able and willing to be interviewed in English <p>For more information, please e-mail me at: mk.helene@hotmail.com #Radiographer #Radiography #Referral #Diagnostic #Imaging #Research #MedTech #Project #Interview #QualitativeResearch</p>
2	<p><i>“Hey! Stop scrolling for a minute, I need your attention.</i></p> <p><i>My name is Helene Mork-Knudsen, and I am a Norwegian radiographer and Master of Science Student at the University of south eastern Norway. And I need your help! If you feel like skipping to the next video, please share or like my video on your way through your feed. Thanks!</i></p> <p><i>The current worldwide pandemic is forcing us to connect in new ways, and to communicate on-line rather than in person. Instead of perceiving this as a threat to the proceedings of my project, I see it as an opportunity to reach more people through new methods of recruitment.</i></p> <p><i>So, to the point:</i> <i>I am looking for interviewees for my master’s project on justification. The purpose of this study is to investigate how radiology departments make use of the radiographers’ workforce in assessing referrals and how the process is organized.</i></p> <p><i>So, if you’re still watching, I’m crossing my fingers and toes that you might be, or that you might lead me to the right candidate for this project.</i></p>

	<p><i>I am looking for</i></p> <ul style="list-style-type: none"> • <i>English speaking radiographers</i> • <i>Who assess referrals for diagnostic imaging at their workplace</i> • <i>and who has this as a formally appointed task</i> <p><i>Have I spiked your interest? The research project is titled: “Workplace factors facilitating the radiographer’s assessment of referrals for diagnostic imaging”. If you fit the criteria and choose to participate, I will schedule an appointment for an online interview, lasting for approximately one hour.</i></p> <p><i>If you have any questions, want to hear more or if you are just ready to jump right in, please read the attached information letter and contact me at the e-mail address written below (mk.helene@hotmail.com).</i></p> <p><i>Also - if you know anyone who might know anyone who might fit the description, please give them a heads up about my request, share, like or comment this video.</i></p> <p><i>Thank you for your attention!</i> <i>I am very much looking forward to receiving your message, and wish you a happy and healthy day.”</i></p>
3	<ul style="list-style-type: none"> - On the authors public profile on LinkedIn - LinkedIn group: “Radiologic Technologists network” - LinkedIn group: “Radiologic Technologists Worldwide” - LinkedIn group: “Radiographers UK” - LinkedIn group: “The Society and College of Radiographers” - LinkedIn group: “MedicsPro – UK’s No1 Radiography Recruitment Agency – Gen/MRI/CT/Mammo/Nuclear/Cardiac/Ultrasound” - The LinkedIn post was subsequently shared on my Twitter page
4	<p>Hey! Stop scrolling for a minute, I need your attention. I am still hoping to recruit one or two radiographers for an online interview. Maybe you are the one I am looking for?</p> <p>Please take a minute to read my post and watch my video. If you want more information or just want to jump right in, e-mail me at: mk.helene@hotmail.com.</p> <p>Thank you!</p> <p>#radiography #radiographer #imaging #diagnostic #medtech #research #project #qualitative #research #interview #referral #interviewee #recruitment</p>
5	<p>From LinkedIn “<i>post analytics</i>”: The main post received 61 likes/reactions, 14 comments & was shared 33 times. 533 people viewed the video for more than 3 seconds, while the post had a total of 746 views. Analytics retrieved on the 2nd of April 2021.</p>

F. Editorial policies

Available from: <https://www.elsevier.com/journals/radiography/1078-8174/guide-for-authors>

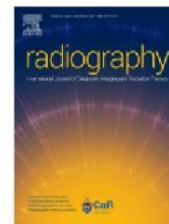


RADIOGRAPHY

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DESCRIPTION

Radiography is the official peer-reviewed journal of the Society and College of Radiographers and the European Federation of Radiographer Societies.

Radiography promotes evidence-based practice by disseminating high quality clinical, scientific and educational research related to all aspects of diagnostic and therapeutic radiography. We publish research articles, systematic and narrative reviews, editorials and letters of international relevance that advance knowledge and encourage innovation within radiography. We welcome radiography research submissions that embrace robust and innovative qualitative, quantitative and mixed method approaches.

Radiography is essential reading for researchers, radiographer practitioners*, radiography educators and student radiographers. We aim to influence clinical practice and patient care by informing practitioners, managers, leaders and policy makers working within or aligned to clinical imaging and radiation therapy services.

* Inclusive of all radiography practitioners including diagnostic and therapeutic radiographers, medical radiation technologists, radiologic technologists, radiation therapists, medical radiation practitioners, sonographers and nuclear medicine technologists.

ABSTRACTING AND INDEXING

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BioEngineering Abstracts
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Cumulative Index for Nursing and Allied Health Literature
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GUIDE FOR AUTHORS

INTRODUCTION

Radiography is the official peer-reviewed journal of the Society and College of Radiographers and the European Federation of Radiographer Societies.

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From January 2021, *Radiography* has moved to an online only format and aims to publish four standard issues and one special issue per annum.

Types of contribution, word lengths and illustrations

Papers related to Radiotherapy and Oncology, Clinical Imaging and Radiography Education and Research are welcomed. The contribution must align with one of the following paper types:

Original Full Length Research Papers (2,500 words; 4,000 words qualitative papers):

These papers typically comprise empirical research following the standard scientific article format (introduction, method, results, discussion, and conclusion). All original papers should have a scientific abstract which will not exceed 280 words. The article manuscript should be 2,500 words, minus the reference list and figures. However, we acknowledge that qualitative research papers may require up to 4,000 words.

Systematic Review and Meta Analyses (3,500 words):

Systematic Review articles should have a scientific abstract not exceeding 280 words and be no more than 3,500 words in length. Systematic reviews could be based upon Cochrane or meta-analysis principles. The search strategy should include sources that have been used (databases, publications etc) and should detail the search decisions made (e.g. in a PRISMA flow chart). The criteria used to select and methodologically appraise the article references must be indicated. Please ensure that tables summarise the data efficiently; additional detail may be requested to be available as online supplementary data.

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Narrative Review articles should have a review abstract of no more than 280 words and be approximately 3,500 words in length. Review articles use the existing knowledge base to generate an article. At a simple level they simply discuss and debate the issues. The sources that have been used (databases, publications, free text searches etc) should be stated.

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Technical notes (1000 words):

These could be similar to a full length research paper, but with less data, or could also be a note on a piece of imaging equipment or a novel technique. They describe issues of technical importance to clinical departments and may include the results of a small investigation. Technical notes are written in a factual manner.

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These will be commissioned by the editorial team and will cover items of contemporary interest.

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Radiography will no longer be accepting submissions of case report articles for consideration in the Journal. Authors wishing to submit case report articles on medical imaging topics may wish to submit their article to [Radiology Case Reports](#).

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A maximum of 6 figures is recommended.

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 - 2. Highlights no longer required;**
 - 3. Twitter handle can be included, please provide on your Title page.**
- Please read the Guide for Authors for further information on abstract preparation.**

Ensure that the following items are present:

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All necessary files have been uploaded:

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All animal experiments should comply with the [ARRIVE guidelines](#) and should be carried out in accordance with the U.K. Animals (Scientific Procedures) Act, 1986 and associated guidelines, [EU Directive 2010/63/EU for animal experiments](#), or the National Institutes of Health guide for the care and use of Laboratory animals (NIH Publications No. 8023, revised 1978) and the authors should clearly indicate in the manuscript that such guidelines have been followed. The sex of animals must be indicated, and where appropriate, the influence (or association) of sex on the results of the study.

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Submission of an article implies that the work described has not been published previously (except in the form of an abstract, a published lecture or academic thesis, see '[Multiple, redundant or concurrent publication](#)' for more information), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. To verify originality, your article may be checked by the originality detection service [Crossref Similarity Check](#).

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Inclusive language acknowledges diversity, conveys respect to all people, is sensitive to differences, and promotes equal opportunities. Content should make no assumptions about the beliefs or commitments of any reader; contain nothing which might imply that one individual is superior to another on the grounds of age, gender, race, ethnicity, culture, sexual orientation, disability or health condition; and use inclusive language throughout. Authors should ensure that writing is free from bias, stereotypes, slang, reference to dominant culture and/or cultural assumptions. We advise to seek gender neutrality by using plural nouns ("clinicians, patients/clients") as default/wherever possible to avoid using "he, she," or "he/she." We recommend avoiding the use of descriptors that refer to personal attributes such as age, gender, race, ethnicity, culture, sexual orientation, disability or health condition unless they are relevant and valid. These guidelines are meant as a point of reference to help identify appropriate language but are by no means exhaustive or definitive.

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Så lenge de registrerte kan identifiseres i datamaterialet vil de ha følgende rettigheter: informasjon (art. 13), innsyn (art. 15), retting (art. 16), sletting (art. 17), begrensning (art. 18), underretning (art. 19), dataportabilitet (art. 20).

NSD vurderer at informasjonen som de registrerte vil motta oppfyller lovens krav til form og innhold, jf. art. 12.1 og art. 13.

Vi minner om at hvis en registrert tar kontakt om sine rettigheter, har behandlingsansvarlig institusjon plikt til å svare innen en måned.

FØLG DIN INSTITUSJONS RETNINGSLINJER

NSD legger til grunn at behandlingen oppfyller kravene i personvernforordningen om riktighet (art. 5.1 d), integritet og konfidensialitet (art. 5.1 f) og sikkerhet (art. 32).

For å forsikre dere om at kravene oppfylles, må dere følge interne retningslinjer og eventuelt rådføre dere med behandlingsansvarlig institusjon.

OPPFØLGING AV PROSJEKTET

NSD vil følge opp ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet.

Lykke til med prosjektet!

Kontaktperson hos NSD: Lasse Raa

Tlf. personverntjenester: 55 58 21 17 (tast 1)

H. Confirmation of submission to "Radiography" Journal

Thank you for your submission to Radiography

← ↶ →



em.radiography.0.733460.840cf8d3@editorialmanager.com <em.radiography.0.7334...

1 dag kl. 17:38

på vegne av Radiography <em@editorialmanager.com>

Til: Helene Mork-Knudsen

Dear Mrs Mork-Knudsen,

Thank you for sending your manuscript Workplace factors facilitating the radiographers' assessment of referrals for diagnostic imaging - a qualitative study for consideration to Radiography. Please accept this message as confirmation of your submission.

When should I expect to receive the Editor's decision?

We publicly share the average editorial times for Radiography to give you an indication of when you can expect to receive the Editor's decision. These can be viewed here: http://journalinsights.elsevier.com/journals/1078-8174/review_speed

What happens next?

Here are the steps that you can expect as your manuscript progresses through the editorial process in the Editorial Manager (EM).

1. First, your manuscript will be assigned to an Editor and you will be sent a unique reference number that you can use to track it throughout the process. During this stage, the status in EM will be "With Editor".
2. If your manuscript matches the scope and satisfies the criteria of Radiography, the Editor will identify and contact reviewers who are acknowledged experts in the field. Since peer-review is a voluntary service, it can take some time but please be assured that the Editor will regularly remind reviewers if they do not reply in a timely manner. During this stage, the status will appear as "Under Review".

Once the Editor has received the minimum number of expert reviews, the status will change to "Required Reviews Complete".

3. It is also possible that the Editor may decide that your manuscript does not meet the journal criteria or scope and that it should not be considered further. In this case, the Editor will immediately notify you that the manuscript has been rejected and may recommend a more suitable journal.

For a more detailed description of the editorial process, please see Paper Lifecycle from Submission to Publication:

http://help.elsevier.com/app/answers/detail/a_id/160/p/8045/

How can I track the progress of my submission?

You can track the status of your submission at any time at <http://ees.elsevier.com/RADIOGRAPHY>

Once there, simply:

1. Enter your username: Your username is: [REDACTED]

If you need to retrieve password details, please go to: <https://www.editorialmanager.com/radiography> [REDACTED]

2. Click on [Author Login]. This will take you to the Author Main Menu
3. Click on [Submissions Being Processed]

Many thanks again for your interest in Radiography.

Kind regards,

Dr Julie Nightingale
Editor in Chief
Radiography

If you require further assistance, you are welcome to contact our Researcher Support team 24/7 by live chat and email or 24/5 by phone: <http://support.elsevier.com>

In compliance with data protection regulations, you may request that we remove your personal registration details at any time. (Use the following URL: <https://www.editorialmanager.com/radiography/login.asp?a=r>). Please contact the publication office if you have any questions.