



LUNDS UNIVERSITET
Medicinska fakulteten

Danish and Swedish Radiographers' Attitudes towards their Profession and Reporting Radiography

A Qualitative Study

Authors: Martin Andersson & Rodrigo Ourcilleon

Supervisor: Bodil Andersson

Bachelor Thesis

Autumn 2015

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Abstract

Reporting radiographers can write diagnostic statements on radiological images. Unlike in Denmark, Sweden has not implemented reporting radiographers. The aim of the study was to examine how Danish and Swedish radiographers' view the use of reporting radiographers through the contexts profession and professional development. Fourteen radiographers from two Danish and four Swedish hospitals were interviewed with a semi-structured interview guide. The interview material was analysed using qualitative content analysis. Results showed radiographers in both countries were positive towards using reporting radiographers as long as they undergo proper education and have clearly defined areas of responsibility. Swedish radiographers were more ambivalent than their Danish counterparts regarding the responsibilities for reporting radiographers. There is need for further research into these subject matters and the inclusion of viewpoints from other professional groups in the radiology department. Future quantitative studies may also be used to provide valuable generalisation of viewpoints.

Keywords

Reporting radiography, Radiographer, Image Diagnostics, Image Reviewing, Profession, Professional Development, Role Extension, Co-Operation, Competence, Education.

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Abstract

Beskrivande röntgensjuksköterskor kan skriva diagnostiska svar på röntgenbilder. Till skillnad från Danmark så har Sverige inte implementerat beskrivande röntgensjuksköterskor. Syftet med denna studie var att undersöka hur danska och svenska röntgensjuksköterskor betraktar användandet av beskrivande röntgensjuksköterskor ur kontexten profession och yrkesutveckling. Fjorton röntgensjuksköterskor från två danska och fyra svenska sjukhus intervjuades med en semi-strukturerad intervjuguide. Intervjumaterialet analyserades med kvalitativ innehållsanalys. Studiens resultat visade att röntgensjuksköterskor i båda länder var positiva till användandet av beskrivande röntgensjuksköterskor så länge de genomgår ordentlig utbildning och har tydligt definierade ansvarsområden. Svenska röntgensjuksköterskor var mer klivna kring vilket ansvar beskrivande röntgensjuksköterskor ska ha jämfört med sina danska kollegor. Det behövs mer forskning inom detta område och inkludering av synpunkter från berörda yrkesgrupper. Framtida kvantitativa studier kan också användas för att få fram värdefulla generalisationer av synpunkter.

Nyckelord

Beskrivande Radiografi, Radiograf, Röntgensjuksköterska, Bilddiagnostik, Profession, Professionsutveckling, Yrkesutökning, Samarbete, Kompetens, Utbildning.

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Introduction

Problem Area

The Swedish Society of Radiographers, SFR (2012), state that radiographers work with medical imaging, nursing, radiation physics and medicine. The professional role and responsibilities of radiographers are outlined differently depending on country legislation. Reporting radiographers are radiographers that additionally work with image interpretation and produce diagnostic reports (British Society of Radiographers, SoR, 2015). Sweden does not use reporting radiographers, but in countries like the United Kingdom and Denmark, reporting radiographers provide primary diagnosis on images (SoR, 2015; Buskov et al., 2012; Danske Regioner, 2012). Reporting radiographers can assist radiologists and other physicians in image reviewing and diagnostics (Brealey et al., 2005). Other benefits of reporting radiographers include less waiting for patients and decreased workload for radiologists (Buskov et al. 2012).

There have been discussions regarding the extent to which radiographers should be involved in image-diagnostics and whether their work intrudes on the duties of the radiologists (Dagens Medicin, 2011; Donovan & Manning, 2005). Radiologists have either supported or opposed training and use of reporting radiographers, so there is no consensus regarding this issue (Smith, Traise & Cook, 2009). In Sweden, a possible problem reporting radiographers can face is redefinition of professional role and responsibilities without losing track of nursing aspects (Andersson, Fridlund, Elgán & Axelsson, 2008). Sjöberg (2014) states that in order to develop the profession and its role, radiographers' thoughts on these issues need to be explored.

Background

The profession is constantly developing and radiographers' associations support professional development and place emphasis on extended training and further research (SoR, 2015; SFR, 2012; Australian Institute of Radiography, AIR, 2009). Ahonen and Liikanen (2010) state there is a link between strengthened professional competence and increased individual

motivation and development. The Swedish competence description aims to strengthen the role of radiographers in clinical practice (SFR, 2012).

Radiographers have used abnormality detection systems since the early 1980s (Neep, Steffens, Owen, McPhail, 2014). The 'red dot' system first introduced in the United Kingdom consisted of radiographers alerting referring emergency physicians by highlighting possible traumatic abnormalities on radiographs. Radiographers would mark the radiograph with a red sticker when detecting something suspect. Neep et al., (2014) state the 'red dot' system is effective, but has drawbacks as it often did not indicate location, severity and number of abnormalities. The limitations of 'red dot' have led to radiographers using initial commenting and clinical reporting. (SoR, 2015; Neep et al., 2014,). Initial commenting has developed from 'red dot' and is a term for radiographers assessing image appearances whilst making judgements based on interpretation (SoR). Clinical reporting is an activity in which radiographers with postgraduate training produce diagnostic reports. Paterson (2013) refers to an intention to replace the 'red dot' practice with written statements. Image interpretation and diagnostics affects the professional role and the way radiography is conducted (Buskov et al. 2012). It is significant to explore how radiographers view reporting radiographers, as it makes the profession itself and radiography more visible.

Sjöberg (2014) mentions how major changes have occurred in radiography due to technological advances within the field. The implementation of the Radiology Information System (RIS) and the Picture Archiving and Communication System (PACS), resulted in digitalisation of radiological data and imagery. Digitalisation has fundamentally changed the way radiography is conducted and radiographers are required to have further skills in image viewing and interpretation. Radiographers in Sweden are referred to as "x-ray/radiologic nurses" (*röntgensjuksköterska*), and their professional outlook can differ from radiographers in other countries (Lundvall, Dahlgren & Wirell, 2014). In Sweden, radiographers' responsibilities include nursing care as well as technical apparatus and image production (SFR, 2012). Studies of Swedish radiographers' professional practice and official guiding documents also state the need for further education, research and quality assurance (Lundvall et al., 2014; SFR, 2012; SFR 2008). Studies have concluded that there are limitations when it

comes to research, competence development and further education amongst radiographers (Ahonen & Liikanen, 2010).

Reporting radiographers are used in Denmark and therefore it is of interest to acquire views from a country that uses them. Danske Regioner (2012) stated a need for reporting radiographers in order to provide faster diagnosis and more effective patient care. It was further stated that this implementation can assist radiology and orthopaedic departments, allowing for more flexible work organisation and optimal use of resources. Another possible outcome would be to enable radiologists to perform more challenging medical tasks whilst letting reporting radiographers report on more basic examinations. The admission to the educational program is comparable to a Master of Medical Imaging. The requirements are a radiographer working licence and at least two years of clinical work experience. The program consists of two levels, the first one offering education in reporting radiography of the peripheral skeleton. In the second level, the axial skeleton is studied (Ibid).

Aim

The aim of the study is to examine how Danish and Swedish radiographers' view their profession and the use of reporting radiographers through the contexts profession and professional development.

Method

The data gathered from interviews was analysed using qualitative content analysis. Hsieh & Shannon (2005) states qualitative content analysis focus on characteristics of language and the contextual meaning in texts. Qualitative content analysis requires understanding and co-operation between the researcher and participants to ensure texts based on interviews are mutual, contextual and value bound (Graneheim & Lundman, 2004). Hsieh and Shannon (2005) state that qualitative content analysis seeks interpretation of content in text by using a systematic classification process with the purpose of identifying and analysing patterns and themes. This study has an inductive approach to analysis. An inductive approach is suitable on texts containing individuals' own experiences, views and opinions (Ibid). Inductive content analysis is useful when there has been limited research into a particular subject matter.

The inductive approach can be supplemented with relevant theories or other research findings in the discussion section (Ibid).

The interviews in this study were semi-structured. These interviews offer the advantage of not requiring a strict order of questions, as it often happens that many related questions or aspects are commented on simultaneously (Danielson, 2013). Semi-structured interviews are placed between interviews with fixed questions and open-ended unstructured interviews lacking a fixed interview schedule (Liamputtong & Ezzy, 2009). Semi-structured interviews aim to explore complexities and characteristics of what people mean and how they interpret things. The role of the interviewer is to encourage the interviewee to talk about relevant issues (Ibid). Henricson and Billhult (2013) state that qualitative content analysis require the authors to interact with the informants and maintain a flexible and adaptable mind-set in regards to what might appear when subjects and topics discussed change during interviews.

Sampling

The authors visited four Swedish and two Danish hospitals. Permission to interview was given by the head of the radiology department at each hospital. A form describing the study aim and method was sent, and it also contained a request to recruit radiographers to interview (appendix 1). A second form was given to heads of units, requesting them to act as intermediators who could find radiographers that fulfilled the requirements and were interested in taking part (appendix 3). A consent form was then sent to the recruited radiographers (appendix 2).

The participants were divided in two groups. The first group consisted of Swedish radiographers and the second group consisted of Danish radiographers. Inclusion criteria for Danish and Swedish radiographers were a minimum of two years of working experience. A further inclusion criterion for Danish radiographers was that they currently shared workplace with reporting radiographers, but did not work as reporting radiographers themselves. There were no age restrictions. Fourteen individual interviews took place in total, consisting of eight Swedish radiographers and six Danish radiographers. The interviewees were of mixed gender (seven men and seven women) and the interviewees had a varied amount of working experience, ranging from two to thirty five years.

Data Gathering

Individual interviews took place at the interviewees' workplace. The authors used an interview guide (appendix 4) consisting of fixed and open-ended questions. Interviews in Denmark were in English in order to avoid language misunderstandings. The first two interviews were pilot interviews conducted to test the interview guide. The interviews were deemed satisfactory and thus included in the study. The interviews lasted 25-50 minutes and were recorded simultaneously on a telephone and tape recorder to ensure security of recordings. Certain questions had follow-up questions attached to them, whilst other questions were of a more fixed nature. Exploratory, clarifying, defining and interpretative questions were included in the interview guide to support the interviewer, but also to assure that answers were thoroughly understood and that enough data was gathered. All recorded material was transcribed word for word, with all names and locations left out to ensure confidentiality. The written transcripts provided foundation for data analysis. The recorded material will be destroyed or deleted at conclusion of study.

Data Analysis

The analytical process for this study was split into two stages. The first stage was describing manifest content, which is the actual content gathered. It is of great importance to transcribe gathered data in order to pinpoint where the participants go from discussing one aspect to another (Danielson, 2013). Domains outline a rough structure and are parts of texts that deal with a specific issue (Graneheim & Lundman, 2004). In this study, domains addressed specific topics in an interview guide. Three domains were predefined by the authors in order to separate different issues discussed. The authors' preconceptions created the domains *Image diagnostics*, *Reporting radiographers*, and *Professional development/professional role*. The domains were not part of the data-analysis, but were used to build up the interview guide and provide basis for coding. The answers given by the informants were condensed into meaning units or codes, which stemmed from a certain domain. Codes are labelled so that data is thought about in a certain way and placed into context (Graneheim & Lundman, 2004).

The codes in this study were later used for the second stage of analysis which was categorisation of the material. Inductive content analysis bases itself on interpretation of texts,

and avoids predetermined categories and themes. Categories and themes instead appear from the texts themselves during data analysis (Hsieh & Shannon, 2005). Categories are groups of content that belong together, but despite existing within a theme, they are mutually exclusive due to each category having its own unique data (Danielson, 2013). Themes are deeper interpretations that reflect common patterns between categories. During analysis, themes are established by examining the underlying meanings of all categories, and a theme thereby link categories with each other. Analysis of latent content means making deeper interpretations of texts and their meaning (Ibid). An appendix (#5) to this study illustrates the analytical process.

Ethical Considerations

A research ethics application was approved by the Swedish Ethics Board of Nursing Sciences (VEN 64-15). A copy of the interview guide and the appendices to the interview subjects, department as well as unit heads was included in the application. In Denmark, ethical approval was given by head of departments or radiographers in leading positions. One head of unit in Denmark requested to view the interview guide prior to the interviews, which the authors agreed to. The gathered data has been stored safely and locked away during the course of the study. Only the authors and the supervisor have had access to data. Each interviewee signed an informed consent form that assured their confidentiality and right to cancel the interview at any time without stating a reason for doing so. This study follows research guidelines from the Northern Nurses' Federation on independency given to the participants of the study, beneficence of other groups to make use of the study, to not harm in any way a group included in the study and lastly to defend vulnerable groups so that they are not exploited (NNF, 2003). The Swedish code of work ethics for radiographers echo these guidelines, as it states that radiographers are to strive for development in their field whilst following guidelines for research ethics (SFR, 2008). The interview subjects received no financial compensation for participating in the study.

Results

Coding and categorisation of data produced one overriding theme named “Reporting Radiography as part of the Radiographic Profession.” Within this theme there are six categories: “education and training”, “professional development”, “views on profession”, “reporting radiographer requirements”, “resources” and “reporting radiographers in the health care system.” Within these six categories there are fourteen subcategories. The following table displays the theme, the categories and subcategories.

Reporting Radiography as part of the Radiographic Profession	
Education and Training <ul style="list-style-type: none"> ● Basic Education ● Further Education 	Professional Development <ul style="list-style-type: none"> ● Increasing Skills ● Increasing Responsibility
Views On Profession <ul style="list-style-type: none"> ● Current Views ● Future Views 	Reporting Radiographer Requirements <ul style="list-style-type: none"> ● Education/Training ● Areas of Responsibility
Resources <ul style="list-style-type: none"> ● Staff Aspects ● Financial & Time-Saving Aspects 	Reporting Radiographers in the Health Care System <ul style="list-style-type: none"> ● Impact on Health Care Organisation ● Impact on Patients and Caring Aspects ● Limitations or Downsides ● Radiologists’ Views

Education and Training

This category contains the subcategories “Basic Education” and “Further Education”. The first subcategory consists of general views on the education and training to become a radiographer and what could be improved. The second subcategory concerns the possibilities of further education through for example, courses and learning activities.

More than half of the interviewees expressed a desire for the **basic education** to expand, especially in regards to subjects such as pathology and diagnostics.

”We have too little of that in the education. More pathology and cases, I think. Our basic education is too small for our job. Generally it should be one year more.” [Interview 3]

The most common reasoning behind these opinions was that pathology and diagnostics played a large role once they started working as radiographers, and therefore needed more knowledge in these subjects. This was considered a necessity in order to judge which examination is the most adequate and also image quality. Although the interviewees stated that practical training improve skills in these areas, they believed such training was lacking. A more hands-on approach as well as a bigger co-operation between hospitals and universities was considered as a way to place emphasis on practical training.

“If the school could be closer to the hospital it would be easier to get some practical knowledge.” [Interview 11]

It was also mentioned that an expanded basic education could provide opportunities for the student to specialise in an area of interest.

“The students could choose a specialisation after the basic education. To know more of a modality could have been good.” [Interview 3]

This was considered as a way of inspiring the students to remain in the program due to larger possibilities in the future, but also as a way of preventing a future shortage of radiographers. This subject developed into discussions about **further education** after becoming certified radiographers. The majority of the interviewees, including all the eight Swedish radiographers, expressed disappointment for the lack of information on further education given to them both at university and once they started working.

“It’s [further education] not presented openly. You must produce.” [Interview 6]

This quotation is a harsh example of a very common opinion that arose from the interviews, that which all the Swedish radiographers were particularly sensitive towards. All Swedish radiographers agreed that they are on their own when it comes to finding courses aimed at expanding their education. It is worth mentioning that most of them felt encouraged by their workplaces once they found a course of interest.

The opinions concerning how or if the workplace presented courses were contradictory at points. While many concluded that the lack of information was “*a pity*”, “*limiting*” and that “*the cards should be on the table*” [Interview 2], all of them thought that it was their own responsibility to find courses. One radiographer later commented that this was “*an old culture that still remains*” [Interview 7]. This culture may bring frictions in the work environment due to competition between colleagues or even betrayal if the information is not shared. A factor contributing to these differences and frictions is age and current social status. One radiographer pointed out how much easier it is to study for those with no children nor a steady relationship.

Another negative effect described by one of the radiographers was the sense that it was always the same individuals taking courses as these individuals were more familiar with the process of finding courses for further education. The interviewee believed there could be more radiographers in the radiology department that were equally interested in taking part of the courses but lacked the practical skills to find them on their own.

“You have to take responsibility for your own development... But the administration forgets that they should give us a chance and that sometimes they need to help by showing us.”
[Interview 4]

Most radiographers felt that the encouragement from their workplaces should be shown in more practical ways. Electronic mail was considered ineffective as it was easy to lose track of each e-mail. A pinboard that could be placed in their workplace was considered to be a better suggestion so they could feel up-to-date with available courses.

Most radiographers from both Sweden and Denmark agreed that the main obstacles are the economic aspects related to taking a course.

“If I am taking a course and go away one day per week, there will be a hole in the schedule. You will be that someone who is not here.” [Interview 2]

Some interviewees even expressed guilt as they were aware of the shortage of radiographers in their department, as well as the economic aspects of taking courses deemed as expensive. A

Danish radiographer commented further on this issue, citing as an example a course which could not be filled, and therefore was cancelled. The reason was that not enough radiographers could apply due to resource factors.

Professional Development

This category consists of two subcategories, “Increasing Skills” and “Increasing Responsibility”. Increasing skills focus on how radiographers’ improve competence and knowledge over time. Increasing responsibility reflects on how radiographers’ take on more responsibilities due to having developed more skills in their line of work.

The radiographers’ placed importance on applying knowledge of physics, anatomy, and technical aspects in order to perform as a radiographer. There was a consensus amongst Danish and Swedish radiographers in regards to how initial skills from the basic education are used at first to ensure the quality of the images. This was considered by all radiographers to be of utmost importance. A radiographer must also consider the referral and consultation to decide which examination is the most appropriate so that a correct diagnosis can be ensured. To make this decision, a radiographer must take into consideration the patient’s physical characteristics and health care needs.

“There is so much puzzling that one must consider, it’s almost art.” [Interview 8]

“Even though I’ve been working for many years now, I believe every day has something new to offer.” [Interview 7]

As **initial skills developed** through time and experience, some radiographers mentioned how they became more comfortable and confident in their professional role. This confidence made them more aware of other aspects of being a radiographer. In most cases, focus was placed in image reviewing and the diagnosis. This developing knowledge in diagnostics was used to optimise their work, as they gained a deeper insight on what the patients are capable of and how future examinations could be performed.

“I look at the diagnosis, the fractures, which way do they turn, which joints are involved, and decide if I should angle my beam.” [Interview 13]

While knowledge about diagnostics could be improved through advices and recommendations from radiologists and radiographers, a method that was commented on by all radiographers was reviewing older images and analysing their diagnosis. The interviewees explained how their skills improved in more than one way. Besides the diagnosis itself, doctors may write notes regarding the image quality and what could be improved, allowing for optimisation of the radiographer's work. Cases described as interesting were often followed up by the radiographers in order to test their interpretive abilities, one of the Danish radiographers referred to this practice as a competition with other radiographers:

“It makes your work a bit more fun and satisfying.” [Interview 10]

Another method which was highly appreciated was the opportunity to attend conferences with the radiologists. In these meetings, the radiologists gave feedback regarding the quality that was sought after for optimal diagnosis by reviewing images in front of the radiographers. However, these conferences were not available for all radiographers. Due to time and staff resources, there was a lack of radiologists that be present.

There was a third method to improve the radiographers' knowledge of diagnostics but it was only available to the Danish radiographers, as it involved consultation with reporting radiographers. The interviewees described how they would often review some of their images previously taken and then come up with questions to discuss with the available reporting radiographers. This opportunity was described as a great source of information as the radiographers were able to ask questions not only related to diagnostics and image reviewing but also regarding choice of protocols, the positioning of the patient and other factors closely related to the radiographic process.

It has been mentioned by Danish and Swedish radiographers alike that they felt a **higher sense of responsibility** over time. At first they considered their areas of responsibilities as limited to choosing the right protocols and evaluating images. This was done by verifying that the images included the bones, organs or other structures of interest described in the referral's consultation. But as competence grew, so did the tasks they took upon themselves, for example deciding if less or more images needed to be taken, if contrast media was needed, or

if another image reconstruction could be added due to findings that were not previously mentioned in the referral.

“We carry a bigger burden the more we work.” [Interview 6]

Once the radiographers felt more secure about their decisions, tasks that were more extensive in regards to the patient could be made. The interviewees from both Denmark and Sweden described how they would contact the radiologists and discuss whether it was more suitable to change the modality altogether if the diagnostic quality was not compromised. This had the potential result of a lower radiation dose in the case of a conventional x-ray replacing a CT scan.

“I feel that we are taking a greater responsibility. We focus more on the diagnostics and we discuss with the radiologists which can lead to the patient receiving an accelerated diagnosis.” [Interview 5]

The radiographers could also inform the radiologists of findings that could be deemed as serious. This could result in a faster diagnosis and treatment. One Danish radiographer gave an example of how a CT scan could be ordered right away ahead of future surgery if a patient came from the emergency room with a hip fracture that the radiographer was able to see on the spot.

Views on Profession

This category was divided into two subcategories: “Current Views” and “Future Views”. Current views cover the radiographers’ perception of their own profession as well as how they believe their profession is viewed by other professional groups. Future views concern general thoughts on what the future holds for the profession.

As mentioned, radiographers in Sweden are referred to as “x-ray/radiologic nurses”. When asked about their **current views** on this matter, all but one radiographer thought the profession should be renamed as radiographer. The interviewee that was against changing the professional title had previously worked as a nurse and argued that the profession would risk losing its nursing aspects and become more technical. In clear contrast to this view, one

radiographer wanted the renaming, as she believed the nursing occupation was still regarded by society as a calling and that *“you are meant to answer to a calling without getting paid.”* [Interview 4] Others found the nurse title problematic, arguing that nursing aspects look different for radiographers compared to nurses. More voices that were in support of renaming stated that it would make it easier to compare the title internationally, increase the professional status and salary as well as make more people interested in the profession.

All radiographers stated that the combination of technical aspects and patient care was the part of their work they enjoyed the most and they all mentioned the importance of establishing a good relationship with patients. Co-operation with other professions was also seen as an important part of the occupation and while some radiographers thought communication with other health care professionals could be improved; all the interviewees thought co-operation was working well in their department.

“You need to quickly be able to understand what kind of patient this is and how you should look after patients in order to get a good examination.” [Interview 4]

“We are dependent on the radiologists’ setting the right diagnosis on the images that we produce, and they are dependent on us taking the right images and that the images are good.”
[Interview 5]

One radiographer in Denmark who had a long working experience believed there was a closer co-operation with radiologists when she was new, and that these days; the young radiographers are instead closer to the reporting radiographers whilst the radiologists of today are *“sitting somewhere.”* [Interview 10] She herself asked questions and discussed things with the radiologists, but believed that young radiographers are more afraid of doing so and that they feel safer asking a reporting radiographer. The majority of radiographers were positive towards spending time with doctors who were training to become radiologists. The interviewees believed it is good that prospective radiologists get insights into how radiographers work and that it also improves co-operation. One radiographer believed that it would not help new doctors to see how examinations are made, but that spending time with radiographers could improve their diagnostic skills.

A Swedish radiographer commented on current patient flow, saying that the amount of CT examinations had increased and put more strain on radiologists. He believed the result of this development was that:

“The time from referral to examination has greatly decreased, but the time from examination to diagnosis has increased.” [Interview 6]

In general, the interviewees thought other professions and the outside world had little knowledge of what a radiographer does or even is: *“I reckon they think we are nurses who push a button.”* [Interview 6] When talking about radiographers in the health care system, many believed that other health care professionals viewed radiographers as second rate nurses or even photographers. One Swedish radiographer thought this problem comes from radiographers not being good at profiling themselves and others thought it was because the radiology department is perceived as isolated from the rest of the hospital.

“I think it needs to be respected and valued more. [It is] a varied job. That’s what you need to show... so that young people get attracted to it.” [Interview 8]

This viewpoint was contradicted by those who had positive experiences of working with other departments. One radiographer believed reporting radiographers could improve how radiographers are viewed within the hospital, but that the general public would still not know what a radiographer does. Opposing this view, another radiographer stated there had been some media coverage of reporting radiographers:

“I don’t know if the average public awareness of the profession has heightened, but I’ve seen it mentioned in the media so in that way it’s strengthened the awareness of our profession.”
[Interview 13]

The radiographers believed that the profession would become more technical **in the future** and that image modalities would continue to develop. There were calls for radiographers to become more educated and specialised within their field compared to how things currently are. One radiographer referred to specialising as having the technical insights necessary to work with every image modality without excluding modalities. Another radiographer believed specialisation was good, but that the profession should not get too specialised, as *“you can’t*

be sure you want to work with one thing the rest of your life." [Interview 11] Many believed that other health care professionals need to be better informed about how important a radiographer's work is. This could increase the radiographer's role as a link between the diagnostic and treatment process.

Several radiographers believed that the future technical developments place an even greater emphasis on patient care. One radiographer in Denmark wanted the radiology department to become better at taking care of a patient all the way by ensuring continuity in the treatment process. She wanted the patient to meet as few radiographers and radiologists as possible and believed such a system would limit the amount of mistakes and miscommunication.

"I think we should as radiographers see what we can do more than take pictures. What can we do to make this safer for the patient and a better experience?" [Interview 14]

The Danish views on the future of reporting radiography were positive, as all radiographers believed the implementation had been successful and that there would be more reporting radiographers in coming years. They believed more people will educate themselves in that field and that the radiology departments would continue to request more reporting radiographers. One Danish radiographer saw reporting radiography as a way to widen the professional competence by giving radiographers more functions. She believed that with enough education, a future reporting radiographer could meet the patient, do the examination and describe the images.

"Perhaps in ten or twenty years... when we document after taking the pictures we might as well dictate them. I have talked with the patient, I have taken the pictures and I describe them." [Interview 14]

In Sweden, views were generally positive in that the majority of those interviewed believed the development was heading in that direction and that departments would use reporting radiographers in the future. Even the radiographer that seemed most skeptical towards this stated his interest in becoming a reporting radiographer as long as the proper education existed. There were differences in opinion in regards to how many years it would take for such an education to come to Sweden:

“It will come within a five-ten year period.” [Interview 2]

“I want to say two years... But I think unfortunately ten years is more likely. I’m skeptical about this coming to Sweden.” [Interview 4]

“Within ten years perhaps. I’m careful [in estimating], because it is quite a big change. The health care system is a bit heavy when it comes to those kinds of things.” [Interview 6]

Reporting Radiographer Requirements

This category reflects thoughts on requirements needed to become a reporting radiographer. The subcategories are “Education/Training” and “Areas of Responsibility”. In the education aspect, focus is on the amount of working experience required to become a reporting radiographer. Areas of responsibility include radiographers’ thoughts on a reporting radiographer’s professional role and what modalities a reporting radiographer could or should write diagnostic statements on.

All the interviewees believed that a reporting radiographer **education** needs to be extensive, thorough and preceded by clinical working experience. No radiographer thought that reporting radiography should be made part of the radiographer basic training/education; it should always be a master’s education and a specialisation. Three radiographers in Sweden were in favour of having special interviews with prospective reporting radiographers to test their knowledge and skills.

“I believe you must have worked at least two/three years. It takes almost a year before you are comfortable enough to make your own decisions. That’s when you start looking at the images in a different way.” [Interview 4]

The views on how many years of prior working experience a radiographer should have before becoming a reporting radiographer ranged from around two years to, in one case, ten years. The most common answer was 2-3 years of working experience, with Swedish radiographers leaning more towards 3-5 years and Danish radiographers towards 2-3 years. Having years of working experience was seen by many as a way to make sure that the reporting radiographer had adequate knowledge in diagnostics and familiarity with modalities, but one Swedish

radiographer placed more emphasis on individual competence and knowledge than number of years spent working:

“That bit [working experience] doesn’t need to be that important, as long as you have the brain with you.” [Interview 3]

One Danish radiographer echoed this viewpoint when talking about how things were when reporting radiographers started working in the department:

“We were one of the hospitals who started it up as a project before it was a thing here in Denmark. There were radiographers with less than two years of experience... and from the way they described the pictures, there was no benefit from being a radiographer for a longer period. They still managed to get about the same quality.” [Interview 12]

However, despite these statements, the two radiographers believed that working experience was always beneficial and that it should remain as a requirement. Ambivalence towards working experience was reflected in the views of another Danish radiographer when she stated that two years is enough as a minimum, but that they would be better in their work if they had spent even more years as radiographers. On the other hand, the same radiographer believed that if you had too many years as a requirement, many radiographers would not apply for such an education, as they would find it hard to return to studying.

Of the fourteen interview subjects, most believed a reporting radiographer could or should write diagnostic statements on different imaging modalities. Some interviewees however, believed that the **areas of responsibility** must be more limited so that reporting radiographers only write diagnostic statements on conventional x-ray images. The views of those who believed that reporting radiographers could write statements on other modalities differed somewhat. Some thought that reporting radiographers working with CT or MRI would have to be specialised and work solely with those modalities, whilst others did not see a problem in letting reporting radiographers write statements on all modalities. The majority of those in favour of including modalities besides conventional x-ray stated that the reporting radiographer should always start with making statements on conventional x-ray, but over time their responsibility could extend to include other modalities. Furthermore, the majority believed statements from reporting radiographers should only be made on some (perceived as

more basic) CT and MRI examinations and not on more advanced examinations. None of the radiographers believed that a reporting radiographer should write on other modalities than conventional x-ray without adequate education, training and skills.

If they're educated enough to look at the pictures then they should do it [write diagnostic statements on different modalities]. You can train anybody to do anything. [Interview 14]

Resources

This category consists of the subcategories “Staff Aspects” and “Financial and Time-Saving Aspects”. The staff subcategory concerns how reporting radiographers could affect the staffing situation at radiology departments. The main focus in the financial aspects and time saving subcategory is whether reporting radiographers can cut costs and speed up the treatment process.

Staff shortage was considered an issue by Danish and Swedish radiographers, in particular the lack of radiologists. Two radiographers working at smaller hospitals also mentioned the need for more radiographers in their department. Nearly all Swedish radiographers believed reporting radiographers could affect the staffing situation in a positive way by assisting or supplementing the radiologists. All radiographers considered the radiologists' work as highly demanding and a clear majority thought that reporting radiographers would or did help them. Furthermore, many believed that hospitals with a shortage of radiologists would gain a lot by employing reporting radiographers. One radiographer thought reporting radiographers would lead to hospitals not having to bring in radiologists from staffing agencies.

“There is a big shortage of radiologists.” [Interview 7]

When it came to the **financial aspects**, all the interviewees believed that reporting radiographers should receive higher salaries. The Danish radiographers did not think reporting radiographers in Denmark were adequately paid for their work. Most of the Swedish radiographers did not expect potential reporting radiographers in Sweden to receive high salaries. The majority of radiographers in both countries did however believe that reporting radiographers provide or would provide economic benefits to the general health care system.

”The diagnosis will come quicker and thereby the patients’ treatment too, so the costs will also be lowered. If you’re in pain for a longer time, you will sooner or later need more care. And more care means more medicine and costs. I think therefore this would be positive in the long run.” [Interview 4]

Several interviewees mentioned **time-saving** as an aspect. Benefits of reporting radiographers from this perspective was seen as decreased waiting for patients, being able to examine more patients than before and a way towards faster treatment. Shorter patient queues, earlier diagnosing, the lower cost of employing reporting radiographers compared to radiologists and decreased workload for radiologists were seen as ways for hospitals to save time and money. One Swedish radiographer was more skeptical and did not see any obvious benefits for patients or in the health care budget. One radiographer in Denmark thought costs had risen following the introduction of reporting radiographers, but despite viewing the current system as more expensive, he believed the increased cost was justified, as the patients benefitted from it.

“They are doing [the] radiologists work and also the work of ER doctors, but not getting more [money]. They should get more. You don’t see an ER doctor or a radiologist going down in salary because they have left some of the work with reporting radiographers.” [Interview 13]

Reporting Radiographers in the Health Care System

This category consist of the following four subcategories: “Impact on Health Care Organisation”, “Impact on Patients and Caring Aspects”, “Limitations or Downsides” and “Radiologists’ Views”. Impact on health care organisation covers how the implementation of reporting radiographers affects the health care system and radiology departments as a whole. Impact on patients and caring aspects concern whether reporting radiographers benefit patients and whether reporting radiographers are able to, like traditional radiographers, work closely with patients. Limitations or downsides of reporting radiographers are the penultimate subcategory, and radiologists’ views on reporting radiographers are the final subcategory.

It was seen as necessary by both Danish and Swedish radiographers that images reviewed by reporting radiographers must be co-signed by a radiologist. This made some of the Swedish interviewees unsure about how much time would be saved in practice with the current

organisation. Danish radiographers on the other hand, seemed far less concerned about this, as they compared this co-signing with those done for radiologists in training. One Danish radiographer mentioned that as time passed, the reporting radiographers did not need a second signature for some of the examinations anymore as their experience was deemed sufficient for those particular images.

They can get a much faster treatment. They don't have to go between all those middlemen to get a treatment.” [Interview 9]

In regards to whether reporting radiographers are more suited at smaller or bigger hospitals, there was a clear difference in opinion between Danish and Swedish radiographers. While some of the interviewees from both countries thought there was no difference between these two options, Danish radiographers leaned more towards bigger hospitals and Swedish radiographers for smaller hospitals. Some Swedish interviewees argued that more complicated and serious cases were usually reserved for bigger hospitals. Therefore the reporting radiographer could be more useful in smaller hospitals in which the examinations are deemed as more basic. Danish radiographers, on the other hand, believed reporting radiographers were more useful in bigger hospitals, where radiologists were busier and in need of assistance.

It's better to have them [reporting radiographers] in bigger hospitals because there are a lot of people who are in a hurry. There's not enough time in general so they can contribute with that.” [Interview 9]

The premise of reporting radiographers' professional role is that they can handle both the imaging process and image reviewing. The Swedish radiographers were particularly curious about this topic and raised many questions about how this would work in practice. There was a consensus made by all Swedish radiographers that reporting radiographers should work at least half the time like a traditional radiographer. The most cited reason was keeping the contact with the patient, as this was considered important in order to maintain a reporting radiographer's unique competence. Danish radiographers both supported and confirmed this claim. One of them explained how the reporting radiographers work with image reviewing 2-3 days a week and alongside the other radiographers 2-3 days a week. When asked about how capable the reporting radiographers were at balancing these aspects, all Danish radiographers

were positive. The interviewees commented on how reporting radiographers' competence enabled them to decide how an examination should be done. According to one Danish radiographer, this extra layer of competence could be used to implement optimisations in the imaging process.

“If they have been sitting three days reviewing images and see a mistake, they can say for example how they saw something wrong with the knee x-rays and talk about it with us.”
[Interview 14]

A couple of Swedish radiographers expressed a wish for the reporting radiographers to review and write a preliminary diagnosis on images they had actually taken themselves. The reasoning was that it could give a deeper insight on the patient's case. Both Danish and Swedish radiographers considered this to be a good idea but also saw it as wishful thinking, stating it would be difficult to put into practice.

It was previously stated by all interviewees that the current co-operation in their department was good. Some Danish radiographers analysed how the co-operation was before and after the implementation of reporting radiographers. They noted that their co-operation was satisfactory but added that with the implementation of reporting radiographers; co-operation between professions had improved even more due to increased exchange of knowledge.

“The reporting radiographers are currently teaching the young doctors who come here and have conferences with the department.” [Interview 10]

Danish radiographers felt it was easier to discuss things with reporting radiographers, expressing a feeling of closeness because of their shared knowledge. The interviewees also explained that they considered the radiologists to be more occupied with other tasks so they preferred not to disturb them. If a question was considered easy enough, they could ask the reporting radiographers which were easier to get a hold of.

“Maybe we and the reporting radiographers have a better communication about the image quality.” [Interview 13]

When asked if conflicts between radiographers could arise with this implementation, a couple of Swedish radiographers saw it as a possible outcome due to changes being considered scary initially. All Swedish interviewees agreed this was a minor issue concerning specific individuals and not the implementation as a whole. Most Swedish radiographers displayed enthusiasm when asked if they could see themselves working alongside reporting radiographers. One radiographer said that one should respect the fact that a co-worker has more knowledge in a subject and therefore there should not be conflicts between radiographers and reporting radiographers. Another radiographer from Sweden stated that one should appreciate the possibility to use this extra knowledge resource.

The interviewees were asked if they believed there could be a risk of reporting radiographers gradually abandoning the **patient and caring aspects**. This risk could not be completely denied by all interviewees as one Swedish radiographer mentioned it could be difficult to focus on all aspects of the profession and image reviewing at once. Nevertheless, all radiographers from Denmark and Sweden believed that as long as reporting radiographers still worked close to patients, there should not be any risk of that happening.

“I don’t see any reason why someone would suddenly become more distant. Because as a radiographer you know that you will get worse images if you don’t have a good contact with your patient.” [Interview 4]

A couple of Swedish radiographers theorised the caring aspects could actually improve in the long run. The reason given was that the reporting radiographer could develop a broader perspective by meeting patients and reviewing images, thus feeling a stronger sense of responsibility towards the patient. This combined knowledge was said to be useful for making the examinations better for the patients, as it would be easier to palpate the patient and be surer about how images should be taken.

When asked about the **limitations or downsides** of reporting radiographers, many interviewees in Sweden had concerns over responsibility, radiographer shortage, quality of work, and lack of financial compensation.

”What happens if I miss something?” [Interview 1]

Danish radiographers were not free from concerns, but they were overall much more positive and stated fewer downsides. Swedish radiographers' were more likely to talk about potential risks involved when working as a reporting radiographer and had concerns over the extent of responsibility. The Swedish radiographers generally lacked knowledge and insight into how reporting radiographers in other countries work and what their duties are. Aspects that generated uncertainty included what modalities to write statements on, the effect of reporting radiography on current professional role, level of competence required, pay and the accountability towards mistakes. The Swedish radiographers remained overall positive towards using reporting radiographers, but they all had concerns over how such a system would work in practice. There was a belief that boundaries of responsibility for a reporting radiographer need to be clearly outlined. Concerns over making mistakes in diagnosing and the reporting radiographer's extent of responsibility were also present amongst Danish radiographers, but to a lesser extent.

One Swedish radiographer did not think reporting radiographers would have a positive impact on the treatment process, due to the general shortage of radiographers in Sweden. He believed there would be even less radiographers taking care of patients if some radiographers would be occupied with writing diagnostic statements. Another radiographer in Sweden had concerns over there not being enough radiographers taking images and she did not believe the current system would be more efficient if radiologists would have to co-sign statements made by reporting radiographers.

“As a patient, I would've wanted a doctor to look at my images because it's easy to miss a lot of things.” [Interview 8]

In regards to educating reporting radiographers, a number of Swedish radiographers were worried that the education would not be good enough and many referred to radiologists having a much more solid knowledge base when it comes to diagnostics and pathology. One radiographer in Denmark mentioned the difference between reporting radiographers educated in Denmark and those educated in England, stating the ones educated in England had a higher

level of competence. Concerns over lack of financial compensation after becoming a reporting radiographer was expressed in both Denmark and Sweden.

“I think they [reporting radiographers] have a nice job, but it must be hard to sit around in that little room and speak in that microphone all day.” [Interview 9]

Concerns over quality of work was as mentioned centred around reporting radiographers not having the skills of radiologists, but also about certain radiographer tasks disappearing. One Danish radiographer saw their work as having the potential of becoming rather one-sided and a Swedish radiographer thought conflicts could emerge between radiographers if there were disagreements on diagnostic statements. One Danish radiographer had concerns over the lack of supervision from radiologists:

“They [reporting radiographers] also have to do a certain amount of examinations in which they need some feedback from the doctors. And some hospitals are not good at putting this into a system where they ensure that happens. If you haven’t got the time and real feedback that you are supposed to have then your education is not worth as much.” [Interview 14]

Two Swedish radiographers believed a limitation was that not enough people were aware of what it means to be a reporting radiographer and the possibilities. One stated the need to include radiologists in the discussion, as arguments in support of reporting radiographers would not get hold if only one side was making them:

“It can be made possible only when we have doctors supporting it. As long as there are only one-sided arguments from us, it will be difficult. This system can be put in practice the day it’s proven that this helps the doctors and the doctors themselves think so.” [Interview 5]

There were many different opinions amongst the radiographers in regards to **what radiologists think** of reporting radiographers. These opinions ranged from radiologists being positive and supportive towards them to openly negative or indifferent.

Most radiographers leaned towards thinking radiologists view reporting radiographers as useful, as they can help them by writing statements on image modalities considered more “basic” compared to CT and MRI. Many radiographers thought radiologists would appreciate getting some assistance by having reporting radiographers make statements on conventional

x-ray images of the skeleton in particular. The Danish radiographers perceived the radiologists in their department as supportive of reporting radiographers:

“We have some doctors who like the project and like having reporting radiographers here and have taken them under their wings to help them being better at describing pictures.”

[Interview 12]

Most Swedish radiographers thought radiologists could support the use of reporting radiographers as long as they do their work in close co-operation with them and stay away from making statements on more advanced cases or examinations. One radiographer in Sweden believed that their skepticism and reluctance had decreased in the last decade, and that radiologists are becoming more open towards this implementation due to the general development heading in that direction. However, a number of Danish radiographers believed there had been skepticism and even resistance from radiologists:

“On a larger scale there has been some resistance from the radiologists.” [Interview 13]

The radiographers believed resistance stemmed from radiologists feeling their professional role was being challenged and that they held doubts over the quality of reporting radiographers work. One Swedish radiographer thought that radiologists would see it as “degrading” to have reporting radiographers make diagnostic statements, as they lack a radiologist’s education and experience in image diagnostics. Many radiographers believed the fact that reporting radiographers are doing the doctor’s work without being doctors themselves could be viewed adversely by radiologists. Radiographers in both countries thought some radiologists are against reporting radiographers, as they view them as people taking over parts of their work. One Danish radiographer believed the radiologists “seem to not care” whether reporting radiographers exist or not and another Danish radiographer believed that they merely see them as a necessity:

“They just see it as a must. If there were enough radiologists, I think they’d wish to replace them.” [Interview 10]

The views were split in two in regards to how reporting radiographers affect radiologists’ work. Some radiographers believed reporting radiographers had or would have a positive

impact on radiologists work, others did not think their professional role would be affected or changed at all. Those who thought reporting radiographers had or could have an impact mentioned the possibilities for radiologists to specialise in more complicated cases and modalities whilst reporting radiographers assist them by writing statements on conventional x-ray images. This in turn would also decrease the workload for radiologists. Some radiographers did not think it would free up space for radiologists per say, believing a radiologist should still co-sign a statement written by a reporting radiographer. However, the freeing up of space for radiologists to focus on other examinations and matters was a recurring viewpoint in both countries:

“I think they [radiologists] could have a greater consultant role towards other physicians. With rounds, reports, demonstrations and so on. They would get more time for that and thereby more expertise.” [Interview 6]

Discussion

Discussion of Method

Qualitative content analysis is a flexible method often used in health care studies and appropriate when there is a limited amount of information or research literature (Hsieh & Shannon, 2005). The sampling allows for diversity of opinions and analysis can display data complexity. This method can provide basis for quantitative studies of not fully covered research areas (Liamputtong & Ezzy, 2009). Researchers might need deeper information on knowledge and viewpoints to make relevant surveys (Krippendorff, 2004). Results in qualitative content analysis are based on analysis and interpretation, but a certain amount of preconceptions are needed. The authors own preconceptions consisted of reading research articles and other publications on reporting radiography and the radiographic profession. Official documents from relevant institutions and organisations also provided essential background reading. Lack of preconceptions make coding and interpretation difficult and ineffective (Granskär & Höglund-Nielsen, 2012).

Due to the method's subjective nature, it is important to ensure trustworthiness is not compromised. According to Lincoln and Guba (1985), four key concepts are linked to trustworthiness. The first concept is credibility which is ensured by selecting a well-defined

group to interview. In this study the group consisted of Danish and Swedish radiographers with at least two years of experience. Another criterion was that the Danish radiographers worked alongside reporting radiographers, thus making the gathered data relevant for the aim of the study. To further establish credibility, both authors were involved in conducting, transcribing and analysing interviews. The second concept is dependability which seeks to ensure data consistency with results (Ibid). An interview-guide was used for consistency. The third concept is transferability, which is transferal of results to other settings or groups (Ibid). This study is based on interviews with a small number of participants. Limited numbers is not necessarily a concern though, as the purpose of qualitative approaches is obtaining meaningful information, not generalising as is in quantitative studies. The final concept is confirmability. Researchers must remain objective and neutral to findings (Ibid). This was done by ensuring results were derived directly from data. Quotations were included in the results section in order to clarify interpretations and analysis.

Hsieh and Shannon, (2005), state the lack of uniform definitions and procedures for qualitative content analysis as a limitation. Risks include failing to pinpoint key categories and thereby not grasping the context in which things are said. This can lead to findings not accurately representing gathered data. This method has different levels of abstraction and interpretation which can be problematic. An overly manifest analysis, slavishly rooted in original texts, lose sight of the bigger picture due to excessive coding. Abstraction and interpretation make results comprehensive and meaningful (Granskär & Höglund-Nielsen, 2012). Interpretation enables discovery of patterns and contexts, thereby facilitating category and theme development. However, too interpretative approaches can result in unsustainable and illogical categories and themes. Abandoned data risk being pressed into already existing categories (Ibid). This was a major challenge in this study, as it became clear during interpretative stages that certain data would be difficult to categorise.

This study has a weakness in that the authors found it hard to comprehend all gathered data, as the subject matter contains many aspects. Presented data had to be limited without content abandonment. Removal of aspects risked weakening the results and not representing the interviewees' thoughts. For example, due to similarities between aspects, it was decided to integrate individual views on reporting radiographers in the category **reporting**

radiographers in the health care system rather than having individual views as a separate category. The authors consider views on reporting radiographers in health care and individual views on their work as linked. Danish and Swedish radiographers may sometimes be seen as two groups, but there generally was no separate presentation of Danish and Swedish views due to the study not being openly comparative. In certain topics, it has been justified to separate Danish and Swedish views, due to there being inherent differences in certain subject matters. However, in most subject matters, views from Danish and Swedish radiographers have been integrated. It is the authors' viewpoint that results will appear scattered and fragmented if too much emphasis is placed on separating the groups.

Granskär and Höglund-Nielsen (2012) state it is beneficial to let someone not directly involved in a study assessing coding and data presentation. The coding and progression of data analysis was validated by the supervisor of the study. Samples of the coding process and data presentation were also reviewed by the study supervisor. The supervisor's role in validating can be to assess whether codes, categories and themes are in accordance with textual content and whether designations and interpretations are reasonable and credible (Ibid).

Initially, two themes emerged during data-analysis. However, as the analytical process progressed, it was decided to merge these themes into one single theme titled **“reporting radiography as part of the radiographic profession”**. The authors and supervisor believed data would be fragmented if it was divided between two different themes.

The majority of sources used in this study are from the United Kingdom. The reason for this is that the subject matter has been well covered by British researchers. There is a longer history of reporting radiography in Britain. In Sweden, there has been a lack of research on the profession and reporting radiography (Sjöberg, 2014).

Discussion of Results

Education and Training

The interviewees considered their profession as specialised. Some Swedish radiographers thought basic education was too short, arguing it needs expansion. Several interviewees saw a

lack of emphasis on pathology and diagnostics in basic education. In a Swedish study by Sjöberg (2014), one radiologist stated the radiographers' education is ill-suited to current demands and does not adequately cover the subjects of pathology, diagnostics and image reviewing. This could potentially lead to feelings of unpreparedness and affect performance. Education expansion could provide opportunities of further specialisation within the field which in turn could make the profession more attractive to students (McLeod & Montane, 2010). Donovan and Manning (2005) argue that reporting radiographer implementation must be preceded by major changes in the basic education and training.

Two interviewees wanted greater co-operation between hospitals and universities, arguing this might help students in acquiring insights into the profession and understanding of requirements. This raises questions regarding which subjects should carry more weight. There seems to be no easy answer to this as nursing theories are crucial when encountering patients whilst knowledge of subjects such as pathology and diagnostics further ensure a well performed examination. The radiographic profession balances itself between responsibilities related to nursing, medical and technical aspects (Andersson et al, 2012).

Further education is a complicated matter. In Sweden, possibilities of further education are limited to mostly in-service training and specialising. A British study concluded that even with a specialised education, radiographers seldom experience a difference in working duties or role renewal (Williamson & Mundy, 2010). Calls to make further education a priority have been made (Sjöberg, 2014). The interviewees were largely content with support from their workplace but felt encouragement for further education was often passive rather than active. Judging by the interviewees' answers, they wanted to improve themselves and their departments. Cowling (2008) refers to education as key to professional development. She mentions strong correlations between recognising professional status and having advanced and specialised professional roles.

Currently, Swedish radiographers holding a master's degree can apply for research, leading positions, and sonographer training (Swedish National Health Service, 2012; SFR, 2012). Working with image reporting is not currently available in Sweden. More than half of

radiographers who participated in Sjöberg's study (2014) answered that they would be interested in studying this subject if the possibility existed.

Professional Development

The radiographic profession demands knowledge in subjects like anatomy, pathology, nursing, physics and technics. One radiographer saw each patient encounter as a puzzle containing each of these subjects and believed expertise was developed with time and experience. Higher demands are placed on optimisation due to professional development. This resonates with a study written by Larsson (2007) which states that higher demands are placed on radiographers the more knowledgeable and competent they are.

There are different methods to improve skills and knowledge. All interviewees mentioned reviewing older images and look at the diagnostic statement. This displays interest in pathology and image reviewing. Conferences on these subjects could facilitate inter-professional learning opportunities and effectuate a better working relationship. (The Royal College of Radiologists and the Society and College of Radiographers, RCR & SoR 2012). However, most radiographers did not have this opportunity due to resource factors, usually staff shortage. It was mentioned by Danish radiographers that reporting radiographers allowed closer exchange and bridged a gap between the professions. They believed this exchange could lead to a higher standard for the department. A study on work practice optimisation concluded that junior doctors from emergency departments improved their decision making and diagnostic accuracy after collaborating with radiographers when discussing images (Kelly, Rainford, Gray & McEntee, 2011). The authors of the study further stated that this form of collaboration facilitate improved patient care, save resources and help radiographers in their professional development (Ibid).

Increased knowledge leads to better insights on what roles radiographers could or should be having, as the interviewees commented that their responsibility towards patients grew over time. This professional development allows radiographers to make decisions that could lead to faster diagnosis and treatment (Smith et al., 2009). Donovan and Manning (2005), state that technological advances demands specialisation, but not at the expense of narrowing the

profession. Radiographers must therefore reflect on what their professional role is and how it can develop.

Views on Profession

It seems different professional titles affect how radiographers view their profession. All but one of the Swedish radiographers wanted a change from “x-ray/radiologic nurse” to “radiographer”. This could be interpreted as a sign of pessimism towards how the profession is viewed by themselves and other health care professionals. The combination of technical, medical and patient care aspects outline the competence needed in radiography (SFR, 2012). Nevertheless, there might be a case in separating these aspects from aspects commonly associated with nurses. Most interviewees did not see themselves as nurses, the commonly stated reason was short encounters with patients rather than prolonged contact. SFR (2012) states the need to strengthen and clarify radiographers’ professional role for the sake of patients and the development of health care. Price, Miller, Hicks and Higgs (2014) warn that new duties such as reporting radiography will not have much impact unless the work of the whole team is reviewed, re-profiled and given thought to how role substitution and enhancement can be used to increase effectiveness.

The Swedish radiographer has responsibilities towards patient care and the radiographic process (Andersson et al, 2012). The radiographer links the diagnostic and treatment process when patients come into contact with the radiography department. The radiographer’s competence has a considerable impact on how the patient experiences the stay in the department (Andersson et al, 2008). Technological advances are inevitable. All radiographers that were interviewed believed modalities will change in some way or another. This progress raises the question of whether patient care will change. The opinions of the interviewees varied from the profession becoming more technical to believing that advancements will enable more time to focus on patients.

All interviewees agreed that patient-centred care must be a standard in the departments. The Australian Institute of Radiography (2009) states advanced practice roles should primarily focus on benefitting patients. One Danish interviewee wished the patient could experience better continuity in health care by encountering fewer professionals in the department.

Elevated roles and responsibility can increase the radiographers' consciousness of their caring duties, thus improving patient satisfaction with their care (Ibid).

As previously mentioned, technological advances affect radiographers' role. A Swedish study displayed strong links between professional development and work satisfaction (Sjöberg, 2014). This could be a reason why most interviewees agreed that the profession needs further development and specialisation. Sonographers have been implemented in many countries and reporting radiographers has been seen as another implementation that could strengthen the profession, co-operation, and patient care (Australian Institute of Radiography, 2009; RCR & SoR, 2012; Paterson, 2013).

Danish and Swedish radiographers conveyed that the radiographic profession was undervalued and that this undervaluation would remain despite opportunities for specialisation. Donovan and Manning (2005) state the need to reflect on where the profession is headed and believe tasks should not be taken on just to cover a problem caused by resource and radiologists shortage. Paterson (2013) state that reporting radiographer implementation should be part of strategic planning for service delivery and driven by demand for such a practice. It should not be considered a "nice to have" or optional extra to keep radiographers satisfied.

Reporting Radiographer Requirements

The interviewees stated that reporting radiographers need adequate education and training to produce high quality image reviews. This has been supported in previous research; in a study by Buskov et al. (2012) reporting radiographers were considered able to provide correct diagnosis. Further studies have similarly concluded that reporting radiographers make accurate reports (Hardy, Spencer & Snaith, 2008). The British Society of Radiographers state reporting radiographers must evidence their competence through on-going and robust auditing (SoR, 2015). Already in 1999 a British study concluded that effectiveness and standards should continually be monitored and assessed (Piper, Paterson & Ryan, 1999). These notions are in line with the interviewees stating that reporting radiographers need to fulfil stringent requirements. Paterson (2013) refers to necessity of continual education in a clinical framework with defined protocols and scopes of practice.

Thoughts on working experience varied but the interviewees generally regarded it as a key aspect. Most thought two to three years of prior work experience was a reasonable requirement, resonates well with current requirements. In Denmark (Danske Regioner, 2012) and Norway (Hold Pusten, 2015), a radiographer requires two years of clinical working experience before applying to become a reporting radiographer.

Several interviewees believed reporting radiographers could obtain a higher degree of independence and responsibility. The majority did not think reporting radiographers should be completely independent, but believed their education and training enables them to work closer to and supplement radiologists. The Royal College of Radiologists and the Society and College of Radiographers (2012) have jointly stated that reporting radiographers can make significant contributions to the reporting workload by producing timely reports.

The interviewees considered reporting on conventional x-ray images as a reasonable starting point. Studies have concluded that reporting radiographers make high standard interpretations on conventional radiographs (Piper et al., 2014; Buskov et al., 2012; Woznitza, 2014). Most interviewees welcomed reporting on other modalities. The predominant argument was that role extension is possible with adequate education and training. The practice of radiographers reviewing CT images is in development stages and not well researched. There has been indications that radiographers can make acceptable interpretations on cranial CT examinations following completion of an accredited reporting programme (Lockwood, Piper, Pittock, 2014; Clarke, Allen, Arnold, Snaith, 2014). Challenges were identified as lack of study time due to staff shortages, and resistance from radiologists. Other studies have concluded specially trained radiographers produce high diagnostic rates on CT colonography examinations (Wilson, 2014; Lauridsen, et al., 2013). MRI reporting is not well researched either, but a 2009 study stated that radiographers with a certificate in MRI reporting provided correct identifications and high standard reports on abnormal appearances (Piper, Buscall, Thomas, 2009).

Resources

Interviewees mentioned the strain under which radiologists' work as well as radiologist shortage. Several studies state that radiologists' workload has increased due to a combination of more examinations and radiologist shortage (McLeod & Montane, 2010; Moran & Warren-Forward, 2011; Thomson & Pollard, 2007; Wivell, Denton, Eve, Inglis & Harvey, 2003). The interviewees thought reporting radiographers are or could be an asset to staff. One interviewee did not see health care benefits but rather individual benefits like increased pay and personal development. The interviewees largely thought reporting radiographers would benefit the staffing situation by supplementing radiologists and helping other radiographers, but believed financial compensation towards them was or would be lacking. This reflects deeper feelings of dissatisfaction regarding wages. The interviewees echoed the comments found in Sjöberg's study (2014) in which radiographers feared that new duties and finished courses would not be compensated without formal recognition.

Most interviewees believed reporting radiographers save time and money for the health care system. Sjöberg (2014) refers to doctors from emergency departments reviewing images with fracture referrals when radiologists are unavailable. In this case a reporter radiographer could be useful. This conclusion is supported by Paterson et al (2004), who states reporting radiographers could speed up the process and reduce waiting times. In 2012, a British study concluded it was cost-effective to have reporting radiographers make immediate reports at emergency departments and that wider introduction would increase service productivity within health care (Hardy, Hutton, Snaith, 2012). The same study anticipated time and resource saving along with reduced inpatient stays, but did not confirm this as an impact.

Reporting Radiographers in the Health Care System

The interviewees had many thoughts and concerns regarding how the implementation should work in practice. Most interviewees agreed on radiologist co-signing. This raises questions of how much time is saved if radiologists must review the same images. Danish radiographers compared this procedure with the co-signing radiologists do for prospective radiologists. They mentioned how some reporting radiographers did not need a co-signing if their expertise was considered sufficient.

Paterson et al (2004) states that technical and diagnostic aspects are taken into consideration when encountering patients and reviewing images. This could improve the patient care and quality of examination by giving the radiographers deeper insights into the patient's state. Some interviewees had concerns regarding care aspects being compromised by this implementation. The Danish interviewees quickly dismissed the idea of this being a risk. The Swedish radiographers had split opinions. A possibility of focusing too much on the examination and leaving the patient behind was expressed by some. Several radiographers saw a possibility of improving the care aspects by reviewing and writing statements on their own images. However, most interviewees recognised it would be difficult or impractical to have reporting radiographers review images they had taken themselves.

The subject matter of which hospitals or clinics are best suited for reporting radiographers needs more research. It could be argued that an implementation is not appropriate unless it can be used in different health care settings. In an Australian study, rural radiographers improved skills in image interpretation after having undergone a continuing education programme (Smith et al., 2009).

Image processing and reviewing should be balanced. The interviewees believed the purpose of reporting radiographers would be downplayed if they only reviewed images. A reporting radiographer can use their knowledge of diagnostics to take better images (Smith et al., 2009). The improved quality of images could reinforce their diagnostic value and ensure right diagnosis and treatment. This implementation would also improve co-operation between professions. Danish interviewees confirmed this. All Swedish interviewees displayed interest and even enthusiasm at the thought of working alongside reporting radiographers. Price and Le Masurier (2007) describes skill-mix as vertical and horizontal shifts of duties. Co-operation and working outside the box leads to improvements for both individuals and departments as the work force becomes dynamic and resources are put to maximal use (Field & Snaith, 2013). Team working in radiological reporting has been described as an effective multidisciplinary practice in clinical areas such as musculoskeletal trauma reporting, gastrointestinal imaging, breast screening and ultrasound (RCR & SoR, 2012).

There has been early coverage of skill-mix within radiology. Irving (1996) described skill-mix as radiographers being responsible for duties previously reserved for radiologists. This was made possible once proper training, education, and controls were provided to ensure high standards. The advantages were described as making better use of radiographers' competence, and relieving radiologists of more basic examinations so to free up space for them to specialise elsewhere in radiology (Ibid). Notions of reporting radiographers supporting and freeing up time for radiologists have also been expressed in more recent publications (RCR & SoR, 2012).

The previously mentioned role and responsibility extension has faced criticism. Donovan and Manning (2005) state reporting radiographers have benefits, but believe their duties should be limited to reporting skeletal radiographs and argue other modalities require higher levels of medical expertise. Several interviewees referred to radiologists having a greater knowledge base and were therefore skeptical or careful when considering radiographers reporting on other modalities.

Donovan and Manning (2005) argue role extension should not occur merely due to radiologist shortage, as radiologists have more expertise. Donovan and Manning expressed concerns regarding performance, expertise, and communication. It is argued that whilst some studies show reporting radiographers having similar diagnostic ratings as radiologists, these studies fail to consider that radiologists and physicians make significant errors despite having received more diagnostic training. In regards to communication, they argue that reporting radiographers lack training and flexibility to produce reports of similar quality as radiologists (Ibid). Donovan and Manning further state that radiologists' insights and knowledge of treatments enable them to write reports less likely to contain information that is unhelpful to referring physicians when deciding on treatment. Other studies have concluded that radiographer reports contain insufficient radiologic vocabulary (Carter & Manning, 1999; Brealy et al., 2005; Smith et al., 2009).

The interviewees had ambivalent perceptions of radiologists' thoughts. Many believed some radiologists saw this implementation as resource in the system and a possibility of further specialisation for radiologists. Naturally, it would have been impossible to have reporting

radiographers without support from radiologists. Notions of support from radiologists have been expressed by interviewees and elsewhere (Rig Reporting, 2014; AIR, 2009; Radiografi.net).

In regards to negative views or resistance, the interviewees considered this rooted in radiologists' thinking reporting radiographers were or would intrude on their turf. In Denmark, there was open opposition towards implementation in 2009, when a number of consultant radiologists referred to it as unnecessary and argued it would not save resources or relieve radiologists (Dagens Medicin, 2009). The implementation in Norway was preceded by controversy, with radiologists being opposed to radiographer role extension into image diagnostics (Ibid). Despite the United Kingdom being a leading country in this development, radiologists in Britain have been negative towards reporting radiographers and opposed their use (Rig Reporting, 2015).

The authors of this study recognise the benefits of radiographers reporting on conventional radiographs and think it should be implemented as a practice in Sweden. However, both authors are critical towards reporting radiographers writing diagnostic statements on modalities such as CT and MRI. The reasons include the overwhelming increase of responsibilities and high demands on competence as well as doubts towards how beneficial it would be in practice. Furthermore, the authors are opposed to reporting radiographers taking on roles just to compensate for radiologist shortage. The implementation must be evidence-based and continually assessed.

Conclusion and Clinical Implications

The interviewees considered development and progress as falling upon the radiographer. However, there is a case in discussing how help should be given to radiographers seeking further education but lack the means to do it on their own. Resources come into play when it comes to further education and the departments must find ways to allow radiographers to pursue further education without worrying about a lack of productivity from their part.

Danish and Swedish radiographers were positive towards having reporting radiographers. The radiographers in Sweden wanted to work as or with reporting radiographers and Danish interviewees stated that the implementation had been beneficial for them in their work, to co-operation, and the health care system as a whole. Even the most skeptical interviewee could see positives in having reporting radiographers. Numerous studies give support to the notion that reporting radiographers benefits health care. The authors of this study believe Swedish radiographers were more positive towards having reporting radiographers at smaller hospitals due to Sweden being a large country with many rural areas. Additionally, smaller clinics have difficulties in recruiting radiologists. Denmark is a smaller country and there is a greater proximity to major treatment centres. Danish radiographers thereby thought reporting radiographers were better suited at bigger hospitals.

Reporting radiographer role extension, in particular reporting on modalities besides conventional x-ray, needs to be researched. Most radiographers in this study were positive towards radiographer reporting on other modalities, which reflects beliefs that competence can be strengthened and extended with the right education. All interviewees placed major importance on adequate education for reporting radiographers, which shows that they did not think that every radiographer should have reporting credentials. Danish radiographers were less concerned over responsibility issues and problems with role extension than Swedish counterparts. One reason could be that Danish radiographers had first-hand experience of this system in practice, having worked alongside reporting radiographers. Swedish radiographers lacked experiences of working with reporting radiographers and their concerns over what responsibilities a reporting radiographer should have and how the system would work were likely rooted in absence of experience and lack of knowledge.

The authors consider more research must be done towards how professionals in the radiology department view the implementation of reporting radiographers. Radiologists' views must be properly taken into account. An implementation cannot be made if all arguments describing benefits and limitations are one-sided. It could be of interest to interview larger groups of radiographers in further studies as well as interview other concerned professional groups. As previously stated, qualitative research could be used as a base for larger quantitative studies.

The Authors' Work Distribution

The authors have jointly written and edited this study. Interviewing has been split evenly between the fourteen interviews. Transcripts have been read and analysed jointly.

Acknowledgements

The authors wish to thank our supervisor Bodil Andersson for giving valuable feedback and helping with establishing contact with departments. A special thank you is also given to the staff at the six hospitals visited, in particular the fourteen radiographers interviewed.

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Appendices



LUNDS UNIVERSITET
Medicinska fakulteten

Appendix 1

Information letter

2015-10-28

Institution for health and caring sciences

To head of unit at radiology department.

This is a request to conduct the study Attitudes towards Reporting Radiography: A Study on Radiographers' Professional Development

The aim of the study is to interview radiographers in order to obtain their views and attitudes in regards to reporting radiography and professional development. The study focuses on how radiographers view working with image viewing / image diagnostics and their thoughts on further education in these areas.

We seek radiographers that have a minimum of two years working experience and are of mixed age and gender. The interviews are semi-structured and will consist of open-ended questions. Interviews will preferably take place via personal meeting and at the interviewees' workplace. If this is not possible, we are open to do a telephone interview or meet the interviewee at a place of his or her choosing.

The interview subjects are of course informed about the study before the interview and will in conjunction with the interview sign an informed consent. The interview is recorded and the recording will be accessible only to the writers of the study. The material will be handled confidentially and the names of those interviewed will not be given out.

An ethics application has been approved by **The Advisory Committee for Research Ethics in Health Education** (VEN) prior to the study.

The study is part of a thesis in the radiography program at Lund University.

Please feel free to contact us or our supervisor if there are any questions.

Kind regards

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Unit Manager Consent Form

Attitudes towards Reporting Radiography: A Study on Radiographers' Professional Development

Your request

- Approved
- Not approved

City

Date

Signature

Printed name and title

Area of work



LUNDS UNIVERSITET
Medicinska fakulteten

Appendix 2

Information letter

2015-10-28

Institution for health and caring sciences

Information to interview subject

Attitudes towards Reporting Radiography: A Study on Radiographers' Professional Development

We request your participation in above stated study. The purpose of the study is to interview radiographers in order to gather opinions and views on matters regarding professional development. The study focuses on how radiographers view working with image viewing / image diagnostics and their thoughts on further education in these areas.

The interview is estimated to take 40-60 minutes and will preferably take place at your workplace. If this is not possible, we can meet at a place of your choosing.

With your permission, we would like to record the interview. The recorded interview material will be stored safely after the interview and only be accessible to the writers of the study. At the end of the study, the recording will be destroyed.

Participation is of course voluntary and you have the right to cancel an interview without stating a reason. The result of the study will be presented in such a way that your identity will not be known.

The study is part of a thesis at the radiography program at Lund University.

If you would like to know more or have any other questions, feel free to contact us or our supervisor.

Kind regards

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Informed consent form

I have received information about the study Attitudes towards Reporting Radiography: A Study on Radiographers' Professional Development

I have also received information that my participation is voluntary and that I can cancel the interview at any time without stating reason.

I hereby give my consent to be interviewed and to the interview being recorded.

Interview subject signature

Student signature

City, date

City, date

Signature

Signature

Telephone

Telephone



LUNDS UNIVERSITET
Medicinska fakulteten

Appendix 1

Informationsbrev
2015-10-28

Institutionen för hälsa, vård och samhälle

Till verksamhetschef/enhetschef på aktuell röntgenavdelning.

Förfrågan om tillstånd att genomföra studien **Attitudes towards Reporting Radiography: A study on radiographers' professional development**

Studiens syfte är att intervjua röntgensjuksköterskor för att få en inblick i åsikter och attityder i frågor som rör röntgensjuksköterskans profession. Studien riktar in sig på röntgensjuksköterskors arbete med bildgranskning/bilddiagnostik och hur en sådan utveckling betraktas av röntgensjuksköterskor.

Röntgensjuksköterskorna ska ha arbetat i yrket i minst två år, vara av blandat kön och ålder. Intervjun kommer att vara semi-strukturerad och bestå av öppna frågor. Intervjuer sker helst genom personligt möte, men via telefon ifall detta inte är möjligt. Intervjun sker helst på den intervjuades arbetsplats, alternativt en plats som den intervjuade valt.

De intervjuade kommer att informeras om studien innan intervjun och vid intervjutillfället underteckna ett informerat samtycke. Samtalet spelas in, inspelningen förvaras oåtkomligt för andra än författarna. Materialet kommer att hanteras konfidentiellt och namnen på de intervjuade kommer inte att lämnas ut.

Ansökan för rådgivande yttrande har skickats och godkänts av Vårdvetenskapliga etiknämnden (VEN) innan den planerade studien genomförts.

Studien ingår som ett examensarbete i röntgensjuksköterskeprogrammet.

Om Du/ni har några frågor eller vill veta mer, skriv gärna till oss eller till vår handledare.

Med vänlig hälsning

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Blankett för medgivande av verksamhetschef

Attitudes towards Reporting Radiography: A study on radiographers' professional development

Er anhållan

- Medgives
- Medgives ej

Ort

Datum

Underskrift

Namnförtydligande och titel

Verksamhetsområde



Informationsbrev
2015-10-28

Appendix 2

LUNDS UNIVERSITET
Medicinska fakulteten

Institutionen för hälsa, vård och samhälle

Information till undersökningsperson

Attitudes towards Reporting Radiography: A study on radiographers' professional development

Du tillfrågas om deltagande i ovanstående studie. Studiens syfte är att intervjua röntgensjuksköterskor för att få en inblick i åsikter och attityder i frågor som rör röntgensjuksköterskans profession. Studien riktar in sig på röntgensjuksköterskors arbete med bildgranskning/bilddiagnostik och hur en sådan utveckling betraktas av personal på röntgenavdelningar.

Intervjun beräknas ta cirka 40-60 minuter och genomförs av en av oss. Vi träffas helst på din arbetsplats alternativt en plats du själv föreslagit.

Med Din tillåtelse vill vi spela in intervjun på band. Inspelningen kommer att förvaras inlåst så att ingen obehörig kan ta del av den. Efter att arbetet har slutförts och godkänts förstörs materialet.

Deltagandet är helt frivilligt och Du kan avbryta när som helst utan att ange någon orsak. Resultatet av vår studie kommer att redovisas så att Du inte kan identifieras.

Studien ingår som ett examensarbete i röntgensjuksköterskeprogrammet.

Om Du har några frågor eller vill veta mer skriv gärna till oss eller vår handledare.

Med vänlig hälsning

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Samtyckesblankett

Jag har tagit del av informationen om studien **Attitudes towards Reporting Radiography: A study on radiographers' professional development**

Jag har också tagit del av informationen att deltagandet är frivilligt och att jag kan avbryta när som helst utan att ange någon orsak.

Härmed ger jag mitt samtycke till att bli intervjuad och att intervjun spelas in på band.

Underskrift av undersökningsperson

Underskrift av student

Ort, datum

Ort, datum

Underskrift

Underskrift

Telefonnummer

Telefonnummer

Appendix 3

Till enhetschef på aktuell röntgenavdelning.

Du tillfrågas om hjälp med att kontakta röntgensjuksköterskor/radiografer för deltagande i nedanstående studie.

Radiographers' Attitudes towards Reporting Radiography: The Development of the Radiographic Profession.

Studiens syfte är att intervjua röntgensjuksköterskor för att få en inblick i frågor som rör yrkesutveckling. Studien riktar in sig på hur röntgensjuksköterskor betraktar arbete med bildgranskning/bilddiagnostik samt röntgensjuksköterskors tankar kring vidareutbildning inom dessa områden.

I Danmark kan röntgensjuksköterskor efter att ha gått en masterutbildning självständigt bedöma bilder. Sverige saknar i nuläget en likvärdig utbildning. Det är av författarnas intresse att få ta del av perspektiv från båda länder om s.k. beskrivande radiografer/röntgensjuksköterskor samt professionsutveckling.

Studien ska använda sig av intervjuer med öppna frågor som beräknas ta 45-60 minuter. Intervjuer sker genom personligt möte under arbetstid på en plats som studenterna erbjuder alternativt en som studiedeltagaren föreslår. Deltagarna ska vara röntgensjuksköterskor i Sverige samt danska radiografer som delar arbetsplats med beskrivande radiografer/röntgensjuksköterskor. Deltagarna ska ha minst tre års yrkeserfarenhet som röntgensjuksköterskor/radiografer samt vara av blandat kön och ålder. Vi söker sex röntgensjuksköterskor/radiografer från respektive land.

Intervjuerna spelas in och transkriberas därefter. Inspelningen förvaras oåtkomligt för andra än författarna. Materialet kommer att hanteras konfidentiellt och förvaras i hemmet. Namnen på de intervjuade kommer inte att lämnas ut.

Vi anhåller om hjälp av dig att välja ut undersökningsdeltagare enligt våra ovan angivna urvalskriterier. Din uppgift blir att agera som kontaktperson eller mellanhand genom att tillfråga personal som uppfyller ovanstående kriterier om de är intresserade av att delta i studien. Med andra ord är din insats central för vår rekrytering av studiedeltagare.

Dessutom ber vi att Du hjälper oss med att skicka informationsbrev om studien till dem som visat intresse samt en förfrågan om de vill delta i studien eller inte. I brevet bifogas dessutom svarstalong och ett svarskuvert adresserat till Dig. Vi kommer efter överenskommelse att hämta svarskuverten vid senare tillfälle.

Studien ingår som ett examensarbete i röntgensjuksköterskeprogrammet.

Om Du har frågor eller vill veta mer, ring eller skriv gärna till oss eller till vår handledare.

Med vänlig hälsning

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For how long have you worked as a radiographer?

Which modalities do you work with? (CT, MRI, Conventional X-ray etc.)

- How do you come into contact with image diagnostics in your everyday work?
- Would you say that you use knowledge in/of diagnostics in your profession?
- Do you often follow up your examinations by reviewing/checking the images? Please elaborate on what you reflect on regarding the diagnostics/pathology!
- What are the advantages and disadvantages of radiographers working with image reviewing and making primary statements on diagnosis?

Follow-up questions:

- *Do you think reporting radiographers benefit patients?*
- *How do you think the health care chain and the economy are affected by there being reporting radiographers in the clinical setting?*
- How do you perceive the reporting radiographers' work?
- Is the profession strengthened by having reporting radiographers or do you not perceive any change in how the profession is viewed from the outside?

- **What are your thoughts on the cooperation between different professions in the radiology department?**

Follow-up questions:

- *How do you perceive the work distribution?*
- *What do you think can be improved?*
- *What is it like as radiographer to work together with reporting radiographers?*
- *Do you think reporting radiographers improve cooperation with radiologists?*
- How do you perceive the radiologists' views on the development towards having reporting radiographers? Postive? Negative?

Follow-up question:

- How do you think the professional role of radiologists' is affected by this development?
- What are your thoughts on radiographers' acting as supervisors to future radiologists during their education/training?
- Prior to becoming a reporting radiographer, how many years of clinical working experience do you think a radiographer should have?
- Should the radiographer basic training contain more courses in pathology and diagnostics?
- What are your thoughts on meeting patients in the job and on the "nursing aspects" of being a radiographer?
- Do you think reporting radiographers work close to the patients as well?
- Do you have any other thoughts on the profession's future and its development?

Exploratory questions

- *Could you elaborate more?*
- *Could you describe in more detail?*
- *In what way?*
- *Could you give some examples?*
- *Why do you think/feel that?*

Interpretive questions

- *So you mean that... - Have I understood correctly?*

Defining questions

- *Could you give some examples?*

Clarification questions

- *It sounds like you are saying... - Have I understood correctly?*

Intervjuguide

- Hur länge har du jobbat som röntgensjuksköterska?
- Med vilka modaliteter jobbar du? (DT, MR, Konventionell röntgen, osv.)
- Hur anser du att du kommer i kontakt med (bild)diagnostik i ditt arbete?
- Anser du att du använder dig av kunskaper inom diagnostik i din profession?
- Följer du ofta upp dina undersökningar genom att granska bilderna? Utveckla vad du reflekterar över kring diagnostiken!
- Vilka fördelar och nackdelar finns med att röntgensjuksköterskor jobbar med bildgranskning och sätter primärdiagnos?

Följdfrågor:

- *Hur tror du patienter gynnas av att det finns beskrivande radiografer/röntgensjuksköterskor?*
- *Hur tror du att vårdkedjan samt ekonomin påverkas av att ha beskrivande radiografer/röntgensjuksköterskor på avdelningen?*
- Stärks professionen av att det finns beskrivande röntgensjuksköterskor eller upplever du ingen förändring i hur professionen betraktas?
- Vad anser du om samarbete mellan professioner på röntgen?

Följdfrågor:

- *Vad anser du kan förbättras?*
- *På vilket sätt skulle beskrivande radiografer/röntgensjuksköterskor kunna förbättra samarbetet med radiologer?*
- Hur upplever du radiologernas syn på utvecklingen med beskrivande radiografer/röntgensjuksköterskor?

Följdfråga:

- *Hur tror du deras yrkesroll påverkas av denna utveckling?*
- *Vilka tankar har du kring att röntgensjuksköterskor agerar som handledare till framtida radiologer under deras utbildning?*
- Kan du föreställa dig att arbeta som eller tillsammans med beskrivande röntgensjuksköterskor?

- Hur många år arbetserfarenhet tycker du en röntgensjuksköterska ska ha innan hen utbildar sig till beskrivande radiografer/röntgensjuksköterskor?
- Hur tror du röntgensjuksköterskors patientkontakt och omvårdnadsaspekter på röntgen skulle påverkas om beskrivande röntgensjuksköterskor infördes?
- Borde grundutbildningen innehålla fler kurser om patologi och bilddiagnostik?
- Har du några andra tankar kring yrkets framtid och dess utveckling?

Utforskande frågor

- Skulle du kunna utveckla mer?
- Kan du beskriva mer i detalj?
- På vilket sätt?
- Varför tänker/tycker du så?

Tolkande frågor

- Så du menar att... -Har jag uppfattat det korrekt?

Definierande frågor

- Kan du ge exempel?

Tydliggörande fråga

- Det låter som att du säger att... -Har jag förstått det korrekt?

Appendix 5

The six categories and fourteen subcategories fit into one overriding theme named **“reporting radiography as part of the radiographic profession”**. This table illustrates how the analytical process was conducted:

Meaning Units	Condensation	Code	Subcategory	Category	Theme
<i>“Our basic education is too small for our job.”</i>	Small education	Limitations	Basic education	Education and training	Reporting radiography as part of the radiographic profession
<i>“We carry a bigger burden the more we work.”</i>	A bigger burden	Responsibility	Increasing responsibility	Professional development	
<i>“They think we are nurses who push a button.”</i>	We are nurses	Outside views	Current Views	Views on profession	
<i>“[working experience] doesn’t need to be that important, as long as you have the brain with you.”</i>	Working experience is not that important.	Working experience	Education/training	Reporting radiographer requirements	
<i>“The diagnosis will come quicker and thereby the patients’ treatment too, so the costs will also be lowered.”</i>	The costs will be lowered.	Costs	Financial and time-saving aspects	Resources	
<i>“Maybe we and the reporting radiographers have a better communication about the imagequality.”</i>	A better communication	Co-operation	Impact on health care organisation	Reporting radiographers in the health care system	