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Factors that may contribute to an inadequate radiology request form

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Abstract

The radiology request/referral is an important part of the communication between the referring physician and the radiology department. It forms the basis for radiologists and radiographers to be able to carry out their work. Through the radiologic request form, the referrer orders an examination for a patient, as part of the patient's medical examination or follow-up. In conjunction with education and practice, we have noticed that reduced quality of the referrals is not uncommon. The aim was to identify the main contributing factors to unjustified referrals for diagnostic imaging procedures. A literature review was undertaken.

Analyzing the literature, the overall themes emerged, and resulted in five subcategories; 1) insufficient, inaccurate or lack of clinical information or questioning, 2) weaknesses in choosing the desired modality, 3) missing routines and 4) need for further standardization of the referring-practice, and 5) insufficient knowledge of radiological diagnostics on behalf of the referring physicians. Weaknesses in clinical history and questioning were the most frequently presented contributing factors.

Inadequate radiology referrals are a widespread problem that can hamper the work of radiologists and radiographers and affect the patient's clinical investigation and follow-up. Studies show that deficiencies in referrals might be prevalent, also internationally.

Introduction

Justification is one out of three main principles of radiation protection in medical imaging. The principle involves weighing advantages against disadvantages of the requested examination to decide on the best alternative for every patient. The best alternative would be the one with the lowest overall risk, and the exam should serve a purpose in the follow-up of the patient. Unjustified diagnostic imaging procedures is likely a worldwide problem. With increasing use of radiological imaging, comes overuse. A Swedish national survey concluded that approximately 20% of the reviewed CT-examinations were unjustified (Almén, Leitz & Richter, 2009). The entire scope of the problem may be hard to measure, as well as the solutions.

United Nations Scientific Committee of Effects of Atomic Radiation (UNSCEAR) reports are usually the scientific base for determining the risk associated with ionizing radiation. Their newest report from 2017 is a summary of the best available knowledge on the topic of radiation safety (UNSCEAR, 2017). Based on these reports, international organizations such as the International Commission on Radiological Protection (ICRP) make recommendations for safe use of medical imaging (ICRP, n.d.). The International Atomic Energy Agency (IAEA) propose a triple-A-solution; Awareness, Appropriateness and Audit (Henriques, 2010). A recent European campaign from HERCA focuses on increasing the awareness of justification amongst the referring physicians (HERCA, 2019). Awareness-building is also nicely executed by the International Society of Radiographers & Radiological Technologists (ISRRT) (Newman, 2019).

Radiation safety

During radiographic work, one always works according to the optimization principle; As Low As Reasonably Achievable (ALARA) (Do, 2016). This means that one always strives to expose the patient to as low radiation doses as possible, while also achieving good diagnostic image quality. The Swedish Radiation Protection Act states that anyone who works with radiation must have knowledge of the risks involved with the methods they perform (SFS 1988: 220). The radiographer also explicitly has a responsibility in their ethical work code to minimize the radiation dose (Örnberg & Eklund, 2008).

As computed tomography (CT) becomes more common, the risk of unnecessary or inappropriate imaging also increases (Mayo & Munk, 2010). A report from the Swedish

Radiation Safety Authority shows that inadequate referrals cause patients to be exposed to unnecessary radiation (Strålsäkerhetsmyndigheten, 2017). In addition to this, the Swedish Patient Act also states that the patient who is most in need of care should be prioritized and should receive care that is in accordance with the current evidence (SFS 2014: 821). This means, in practice, that prioritizing patients for diagnostic imaging depends mainly on the information included in the referral.

Interprofessional communication

The referral is a form of communication between different healthcare institutes (Månsson & Artursson, 2011; Pitman, 2017). A lower quality referral may be perceived as equal to lower quality communication and can lead to misunderstandings. For the sender's message to be interpreted correctly by the recipient, it requires the sender to have knowledge of what the recipient needs to know (Nilsson & Waldemarson, 2016). It was found that general practitioners have limited insight into the radiological practice, rarely any direct contact with radiologists and that the communication mainly takes place through the referral. The effect of this was found to be, amongst other things, misunderstandings about the examinations (Grieve, Plumb & Khan, 2010).

Competence in the context of care can be described as knowledge that one is able to translate into actions and clinical situations (Benner, 1984). The competence description for a qualified radiographer is presented as the radiographer´s ability to apply the peri-radiographic process, assess the image quality and decide on the appropriate examination in relation to the referral and the given clinical question (Örnberg & Andersson, 2012).

Routines for referral management

According to Swedish regulations, the chief of the department shall decide who should be able to issue a referral (SOSFS 2004: 11). For X-ray examinations, a referral written by a physician is always required (Karlsson Gadea & Kallenberg, 2017). The peri-radiographic process is a collective name for five central concepts that the radiographer applies in his/her work. The planning phase is one of these concepts that begins with a referral. This is the first time the radiographer is given a general idea of the patient, the patient´s needs for care as well as what images to obtain (Örnberg & Andersson, 2012).

When radiographers conduct an examination, they should also be able to observe and assess the need for patient care based on the individual needs of each patient. This means that the

planning phase may not always be the same as the implementation phase, as the referral is not always in line with the patients need (Örnberg & Andersson, 2012). Radiographers indicated that lack of information in the diagnostic imaging referral creates a problem, since the information in this referral is both vital to justify the examination and to perform it (Longrigg & Channon 2006; Matilainen, Ahonen, Kankkunen & Kangasniemi, 2017).

Methods and Materials

This is a literature review in accordance to Friberg's model, which, through review of existing research, seeks to map an area and highlight contributing factors to the area's current situation (Friberg, 2017).

Keywords and exclusion criteria

Keywords used were as follows: request, request form, radiology, radiography, radiologist, radiology report, referring physician, radiology requisition, referral and consultation.

The searches yielded between 6–41 results. Filtering used was as follows for PubMed: Journal article. For Cinahl: Peer reviewed and research article. Limitations were also made for the published year between 5-10 years in PubMed, in Cinahl no restrictions were made on years. The results in the scientific articles would describe factors that can contribute to a poor referral to the radiology department.

Selection criteria

The articles were retrieved via the PubMed and Cinahl databases. A total of 42 articles were reviewed where 35 of the articles were not considered sufficiently relevant to our purpose. Five articles used were found by secondary search based on the reference list in selected articles. The findings were narrowed down to 12 scientific articles.

Problem

A diagnostic imaging examination that is inadequate, might have many consequences for both the patient´s need of examination, as for the staff working in radiological departments. During the peri-radiographic process, it is important to obtain relevant and sufficient information directly so that the radiographer has good conditions to optimize the examination. The radiographer´s aim is to reduce the risk of incorrect imaging and thus expose the patient to only necessary levels of ionizing radiation (Örnberg & Andersson, 2012). A radiographer must work to minimize the radiation dose and/or other risks to the

patient and therefore has a responsibility to critically review the referrals. This can be difficult if the referral is inadequate to start with.

Results

When reviewing and analyzing the literature, the overall themes emerged. This resulted in five subcategories, which are presented in the following chapter under nine appropriate headlines.

Inadequate clinical information and poor history taking

Patient history were completely lacking in 10% (21/202) of the examined referrals (Afolabi, Fadare & Essien, 2009) and in 5% (17/331) respectively (Van Borsel, Devolder & Bosmans, 2016). Furthermore, the patient history was found being insufficient, respectively, in 63% (63/100) (Pack et al., 2004), 62% (80/129) (Agarwa, Blesham & Langlotz, 2009) and 25% (50/202) (Afolabi et al., 2009) of the cases. Out of 100 examined MRI referrals, 63% (63 of 100) represented a poor quality of patient history taken, as considered inadequate (Pack et al., 2004). Another study showed that the clinical history was considered insufficient or deviant in 62% (80 of 129) of the cases. Fourty-four% of the referrals (57 of 129) were written electronically, where the majority (30 of 57) of these were deviant, which was clinically significant in deciding the justification of the referral (Agarwa et al., 2009).

In another study, only 12% (24/202) were considered to have complete information while 28% (56/202) were considered to have inadequate or a total lack of information. Examples of information the staff was missing was, among other things; surname of the patient and the date of referral (Afolabi et al., 2009). Solely one single percentage (1/198) of females had been asked for the possibility of pregnancy, which is a part of needed documentation according to guidelines (Akintomide & Ikpeme, 2014). Another shortcoming of clinical information in the referral, which was considered to be of significance in the patient history, was that it was rarely specified whether the patient had been subject to high energy or low energy trauma (Fatahi, Krupic & Hellström, 2015). Creatinine value was missing in 87% (293/337) of cases when needed, which may be a crucial piece of clinical information (Troude et al., 2013).

The lack of or vague clinical questions

Clinical questions in the referral were either completely missing or lacking in several studies. Clinical questions were completely missing in 12% (71/607) of the referrals examined (Van Borsel et al., 2016) and 6% (68/400) respectively (Oswal et al., 2009). Furthermore, it was found that vaguely formulated questions (for example “abnormal findings?”) were also a factor that could contribute to poorer quality of referrals (Fatahi et al., 2015). Another study also pointed out the lack of a specific question as a contributing to deficient referrals (Landry et al., 2011).

Copying text from another referral

Copying referral text from the previous imaging referral can be problematic as the conditions of the previous referral may have changed. This was proved to be a problem in 13% (37 of 276) when both the referral and clinical question had been copied (Van Borsel et al., 2016). Another study showed similar results when it came to copying or cloning patient history from the previous referral where 14% (54 of 388) were identified as cloned (Shah, Linam & Greenburg, 2013).

Abbreviations

Abbreviations were a factor that two studies assessed to affect the quality of the referral's clinical information. Abbreviations can have several different meanings depending on where the referral originates. This was considered problematic because an abbreviation may easily be misinterpreted (Fatahi et al., 2015). One study defined abbreviations as one main reason for defective referrals. This was a problem in 26% (158/607) of the reviewed request forms (Van Borsel et al., 2016).

Non-specific body part in the desired examination

When referrers order exams electronically, there are often a lack of specific headings programmed for each stage of the referral. For example, focus group interviews with radiologists reveal that if a finger is to be examined, the referrer chooses “hand” as an anatomical region and does not always specify in the clinical information that it is just one finger (Fatahi, Krupic, & Hellström, 2015). Information about specific body parts for examination was respectively lacking in 31% (63/202) (Afolabi et al., 2009) and 27% (91/337) of the referrals (Troude et al., 2013).

Lack of referrer´s contact information

Problems may sometimes arise when a radiologist needs additional information in the referral from the referrer. Referrals that lacked the referrer's telephone number, or in cases where the referrer was difficult to reach, could be particularly problematic when the physician who wrote the referral worked outside the hospital (Fatahi et al., 2015). Telephone numbers of referring physicians were missing in 42% (168/400) (Oswal, Sapherson & Rehman, 2008) and 17% (58/337), respectively (Troude et al., 2013).

Choice of modality

One study explored which methods referrers use to select the modality for diagnostic imaging examinations (Bautista, Burgos, Nickel, Yoon, Tilara & Amorosa, 2008). Participants would fill in the most common resources they use to assist in priority and modality choices. The results show that of the 126 referrers who participated, the most common methods used were: radiological consultation (64%), specialty journals (48%), UpToDate (41%) and Google (28%). Only 2 of the 126 physicians claim to use the ACR appropriateness criteria as the first source when selecting the best imaging technique for their patients (Bautista et al., 2008). Furthermore, it emerged in focus group interviews that referring physicians sometimes seemed to choose a cheaper modality despite it having a lower diagnostic value (Fatahi et al., 2015).

Digitalization / standardization

When a referral did not go directly from a referring physician to a radiologist but instead was transcribed before reaching the radiologist, it might result in the original information being distorted or lost (Agarwal et al., 2009). Another study wanted to assess the effect of digitization and standardization of diagnostic imaging referrals. The study showed that after the standardization, much information was still missing - despite a clear improvement being observed. After digitalization, no relevant data was missing from the referrals (Troude et al., 2013). However, another study showed that despite some improvement through digitization and standardization of the referral, one could not necessarily observe an increased quality in terms of the referral content (Van Borsel et al., 2016).

Required competence

One study aimed to evaluate the effect of GP´s degree of knowledge when ordering appropriate diagnostic imaging examinations. Participating general physicians in the study had to answer twelve questions consisting of scenarios with clear clinical indications for which study to order. Fewer than half of the doctors correctly answered six or more questions (Taragin, Feng & Ryzel-Shapiro, 2003).

25% (155/620) of the ultrasound referrals reviewed were not sufficiently indicated to justify a further investigation (Landry et al., 2011). This was also described in another study that observed that 14% (54/388) of the referrals in their study contained histories that were not considered appropriate in relation to the clinical question (Shah et al., 2013).

Discussion

The radiographer´s work consists largely of the peri-radiographic process, which in turn is partly controlled by the referral. Thus, the quality of the referral is the basis for the radiographer's ability to perform tasks according to his/her competence description, as described by Örnberg & Andersson. Several articles showed that the clinical history in the referral was often incomplete, which means that both the radiologist and the radiographer receive insufficient information as a result.

The radiologists receiving the imaging referral based their choice of examination type on the content of the referral. The examination is then affected by the radiographer´s ability to perform optimal work. This is partly because 1) a bad referral makes it more difficult for the radiographer to optimize the examination, in the form of imaging and patient care, and partly because 2) it can make the radiologist's choice of modality more difficult. In the end, it is the patient who suffers if the referral is inadequate (op.cit).

If incomplete or unclear referrals result in too many or incorrect examinations being undertaken of a patient, it would mean a higher radiation dose than necessary for the patient, which is also stated by the Swedish radiation authorities (Strålsäkerhetsmyndigheten, 2017). By placing higher demands on the content of the referral, the risk of unnecessary imaging can be reduced. This is demonstrated in a study that had radiologists carefully review referrals and suggest more appropriate examination methods than the referrers had asked for (Sodhia, Krishna, Saxena, Sinha, Khandelwal & Lee,

2015). The Swedish Patient Safety Act states that caregivers must investigate events that have caused or could cause a health injury and prevent these events (SFS 2010: 659). We are considering the extent to which the care provider should make demands on the quality of the referral, given that it can lead to damage to patient care if the referral is inadequate.

In line with the need for care and the number of examinations, higher demands are also made for efficiency improvements. Valuable time may be lost due to a poor referral. If it is unclear which body part is to be examined, it will be more difficult for the radiographer and the radiologist to check for any previous clinical questions and reports. Additional practical information that was missing from the referral was, as mentioned, the patient's creatinine value. If a radiologist does not understand the clinical situation or the question sought, which the imaging should answer, it is difficult to choose the right examination for the patient to undergo and for the radiographer to perform.

The clinical question for the patient's examination was a factor that made the referral inadequate and could create a difficult situation. Studies show that the clinical question was either vaguely or completely missing (Van Borsel et al., 2016; Fatahi et al., 2015). When a referral has a vaguely written question or insufficient information on the patient's history, it may be difficult for the radiographer to justify the choice of imaging and to apply the ALARA principle. This can be difficult to do if a clinical question consists of only: "“abnormal findings?”. Then, we should ask ourselves whether the examination is sufficiently indicated. Studies have shown that such referrals were not considered appropriate and did not have sufficient indication for a study to be conducted (Landry et al., 2011; Shah et al., 2013).

Swedish Radiation Safety Authorities describe that the scope of the subjects included in the medical education may differ between the universities because the universities themselves can decide the extent of the content (Danestig, 2014). This, in the absence of any national systematic quality control during the general practitioners (GP) service, makes it difficult to secure the EU's requirements for suitable syllabuses such as medical radiation (op.cit). Training is important for referrers and demonstrates that GP were able to answer only half of the questions presented.

“If you do not have the right competence (Taragin et al 2003), you should seek direct communication with a radiologist instead of merely having a referral as a communication tool.”

A study described that in about a third of the cases, referring physicians used “Google” for their choice of modality (Bautista et al., 2008). The Swedish Patient Act states that care must be consistent with evidence (SFS 2014: 821). The patient's continued situation then becomes dependent on whether the referrer manages to “Google” the correct modality.

Further doubts from an ethical perspective, are that the choice of modality should be made based on the best interest of the patient. Referring physicians sometimes seem to choose modality based on financial interest (Fatahi et al., 2015). From a health-economic perspective, health should be improved based on the available resources (Arlind & Thomas, 2012). If the patient needs to come back for further examinations because of a conscious choice of cheaper alternatives of modality; this affects both the society financially, and also risks unnecessary suffering for the patient.

The selected articles in this literature review come from a variety of countries. This might make direct comparisons of the problem area somewhat difficult. Some of the studies chose to define "inadequate" in relation to guidelines and procedures that existed around referrals, something that seems to differ between countries and/or regionally. However, we believe that there is a strength in utilizing articles that present studies from different parts of the world as it gives a greater perspective of the problem area.

Conclusion

The quality of the referral affects the ability of the radiologists and radiographers to perform their work in the best possible way and the quality of the referral thus affects how the patient's treatment progresses. Clinical decisions may be greatly influenced by a poor referral. Poor referrals are afflicted with insufficient, incorrect or missing clinical information.

Furthermore; incorrect clinical questions, referring physicians’ weaknesses in the choice of modality, or also insufficient knowledge of diagnostic imaging need progress to ensure quality imaging.

Inadequate referrals for diagnostic imaging have been identified in many parts of the world. To a large extent, similar factors contribute to these deficiencies. Radiographers are a key profession to ensure that the exams they perform, are indeed justified. To achieve this, radiographers may utilize the “Triple-A” approach; Awareness, Appropriateness and Audit (Henriques, 2010).

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