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Making the invisible visible: a qualitative study of the values, attitudes and norms of radiologists relating to radiation safety

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Abstract

Some shortcomings regarding safety have emerged in inspections by the Swedish Radiation Safety Authority of Swedish radiology departments which perform 5.4 million radiological examinations and 100 000 nuclear scans annually. To ensure safety in the healthcare system and to build a strong environment of radiation protection for patients (and for employees) there must be a strong culture of safety. To understand an organization’s behaviour, decisions and actions it is important to study its cultural values. The aims of this study were to discuss how values, attitudes and norms affect radiologists’ decisions as well as how they influence the implementation of various radiation protection measures. To investigate this, focus group interviews and in-depth individual interviews were performed in a sample from a number of radiology departments at hospitals in Sweden. The results show that the core value was derived from the patients’ perspective with the focus on the knowledge that he or she has come to the healthcare system for a particular reason: to discover disease or, in the best case, to be declared healthy. The majority attitudes were based on experiences associated with aspects that the radiologist could not influence. This often concerns increased pressure on radiology investigations from clinics in the various operational units. Under the concept of norms, the radiologists in the study requested that the development of regulations and guidelines should be connected to issues of justification for various radiological queries.

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Keywords: radiologists, culture, radiation protection, attitudes, norms, core values

(Some figures may appear in colour only in the online journal)

1. Background

Radiation is a natural part of the world around us. It has been calculated that nearly one third of the average annual radiation dose received by a person living in Sweden is from medical activities (Andersson 2007). Advances in medical imaging and procedural technology and utilization growth have resulted in an increase in radiation exposure (Lau and Pérez 2008, Douglas et al. 2012). For this reason, it is important that those who work with radiation in the medical field employ all reasonable methods to achieve ‘As Low As Reasonably Achievable’ (ALARA) exposure to radiation. It is also important that they appreciate the importance of protecting both the patient and themselves, in order to avoid long-term and short-term adverse effects. The radiation dose contribution from medical diagnostics has increased by 25 per cent since 1995. Admittedly, the patient dose for individual examinations has been reduced, but the number of high radiation doses from CT examinations has increased (Andersson 2007).

Radiology procedures can be risky and, because of this, the organization conducting them is classified as risky (Leitz 2004). For precisely this reason, radiology departments have been rigorously regulated. Radiation safety is dealt with, at an international level, by the International Atomic Energy Agency (IAEA) and International Commission on Radiological Protection (ICRP). At a European level, it is governed by ICRP 2007a, 2007b, Europeiska Unionens Råd 2014, European Commission 2014). At a national level, these questions are dealt with by the Swedish Radiation Safety Authority (SSM).

Despite these regulations, it should be noted that when the Swedish Radiation Safety Authority carried out inspections at a number of Swedish County Councils, major shortcomings emerged:

> It is often deficiencies in organizations’ steering and management that are the cause of radiation safety not being good enough. It is common that deficiencies in the organization result in unclear responsibilities. This in turn results in inadequate routines in relation to how patients should be examined or treated, and how staff training is implemented. Since the County Councils do not follow up their activities, they are also not aware of these conditions.

(Frank 2012, p1)

These have been judged to be the reasons why other requirements have also not been met. These shortcomings also reveal the risks of serious side effects and of both acute and delayed radiation injuries are also increased (Frank 2012).

There exist in health care excellent examples pointing to the importance of structuring work around well-developed guidelines. But these examples also demonstrate how compliance with such guidelines may be difficult and, at the same time, that their implementation and enforcement may be a lengthy process (SOSFS 2007).

When developing guidance tools, it is useful to take into account the social settings (Lau 2012). These social settings consist of communication, emotions and behaviour (IRPA 2014).

In order to understand the behaviour, decisions and actions of an organization, it may be valuable to study its culture. To build a strong environment of radiation protection for patients (and for employees) there must be a strong culture of safety in the healthcare system (Health...
Culture is an important part of the organization. It can, for example, affect the possibilities for change and development towards increased radiation protection (Tuleja 2005, IRPA 2014).

Studying organizational cultures is a popular theme, but despite this, it is difficult to find a universally accepted definition of the term (Lima 2007, Alvesson 2009). Schein (2010) states his definition of the term as any group that shares a history of developing a common culture and, for that reason, the organizational culture is the culture shared by people in a particular organization.

‘Culture is something that we do not always see. Culture is something that we learn . . . In summary, the culture of a group refers to its communication patterns, how a group solves problems and how a group perceives and communicates these shared values, beliefs, attitudes and behaviour.’ (p5)

A review of the literature with Tuleja’s definition in mind reveals three frequently occurring concepts that are part of the description of an organization, namely core values, attitudes and norms (Jacobsen and Thorsvik 2008, Bruzelius and Skärvad 1995, Hatch 2000, Wolvén 2000). The ‘iceberg metaphor’ (figure 1) is often used to make these concepts clear.

These concepts will be defined in this report based on this review as:

Norms: These are how it is expected that one is to act and also regulations. Norms are formed from regulations, rewards and punishments or other sanctions.

Attitudes: To be for or against something is built of the experiences one has had in a social context. These are always directed towards something, and they can be influenced by the experiences one has had.

Core values: here we are finding out through questions and reasoning how what is right and wrong is taken up within an organization, what is it that is important and how decisions are given priority.

The culture of care is characterized by respect for human dignity (Felgen 2004), and the culture of care can be expressed in that caregivers carry out actions that extend beyond what is professionally expected from them (Arman and Rehnsfeldt 2007).
2. Aim

The aim of this report is to describe how core values, attitudes and norms affect the decisions of radiologists and how they carry out various measures relating to radiation protection.

3. Methods

3.1. Design

Various methods of analysis can be used in qualitative studies. Qualitative research methods are a tool used to develop knowledge about the qualities, or properties, of various phenomena. Such knowledge can be developed at different levels in the form of descriptions that provide understanding of variation, common traits or typical properties. Many routes are available to reach this goal. They all have in common that it must be possible for the reader to follow the route selected (Malterud 2009). The previously described concepts of core values, attitudes and norms were used as a starting point for this study.

The design of the study consists of two parts: focus group interviews and individual in-depth interviews. The process in which a phenomenon is investigated from different points of view or in different ways is known as ‘triangulation’. The advantages of using triangulation of methods is that the subject can be studied from different points of view and that the result from one method can be confirmed and developed by the other methods.

3.2. Selection of respondents

A representative selection is not what is of interest for the purposes of qualitative studies: it is more a question of finding the people who have something to say. An approach known as strategic selection (Morgan and Scannell 1998) is used. Here, participants are selected in accordance with the goal of the project and the purpose of the study.

3.2.1. Selected radiology departments/respondents. In order to continue using the strategic selection method, radiology departments were selected based on inspections carried out by the Swedish Radiation Safety Authority. As such, we selected radiology departments that have been investigated but not criticized, radiology departments that have been investigated and have received criticism, and radiology departments that are awaiting investigation. This resulted in five different hospitals. The interview material ultimately encompassed 30 radiographers. The radiographers who participated in the study had work experience between 1.5 and 40 years. In some cases, an individual participated both in the focus groups and in the in-depth interviews.

3.3. Procedures

3.3.1. Focus group interviews. The focus group interviews were initiated with an open, broad question, and in general followed the structure recommended for focus group interviews (Wibeck 2010).

3.3.2. In-depth interviews. The interviews were initiated with an open question regarding the aim of the study and were then followed by a discussion on this theme. Each interview ended with a summary of the interview during which the respondent was given the opportunity to revise or confirm what had been said during the interview.
3.4. Analysis

The analysis method used in this study was theoretical content analysis, where concepts described in the literature of core values, attitudes and norms were used as the starting point. The analysis process comprised six distinct steps, described below.

1. The analysis commenced with the transcribed material being read through in order to obtain a comprehensive overview.
2. The material was then read through in a second stage, by each scientist individually, in order to discover content for which meaning corresponded to the definitions of the concepts described in the purpose. Notes were made in the text where such content was discovered.
3. Further processing during the analysis was then carried out by the two scientists together, in order to increase reliability (Granskär and Haglund-Nielsen 2008). Based on this, the individual interpretations of the meaningful content that had been found were compared. The particular concepts that the meaningful content represented were also noted in the text.
4. The various items of meaningful content found in the texts were then collated under the relevant concept: core value, attitude or norm.
5. The collated material was reviewed in order to ensure that it reflected the relevant concept. Certain parts of the material were moved during this stage, and certain parts were removed. The meaningful content that remained can be seen in the results below, in the form of quotations that describe the descriptions of the respondents.
6. Quotations with the same or similar content formed one common category, and these are presented in the results below under the relevant concept (table 1).

4. Results: radiologists

4.1. Core values

Core values are defined as what is considered within the organization as right and wrong, what is considered to be important and how decisions are given priority. For example:

Table 1. An example of the analysis process.

<table>
<thead>
<tr>
<th>Concept</th>
<th>Quotation</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core values</td>
<td>‘The fundamental idea is to reduce the radiation doses as much as possible and still obtain a diagnosis’</td>
<td>Diagnosis and quality are highly prioritized</td>
</tr>
</tbody>
</table>

The definition also contains the idea that being forced to relinquish one’s core values is associated with strong feelings.

The radiologists express clarity in the interviews concerning the fact that they are qualified doctors and thus place the patient firmly in focus. Consequently, the fundamental core value contains a greater focus on the medical profession than on the radiological aspect:

‘We are here in order for the patients to achieve better health.’
Based on this starting point, i.e. being a doctor, they also express great satisfaction in declaring that an apparently sick patient is healthy:

‘There is a humanitarian gain in being told that you do not have a brain tumour.’

In the interviews the radiologists describe their profession as being the result of long tradition, during which various specialities have developed. Radiologists, naturally, may have different perspectives on healthcare and on patients:

‘We are actually meant to find out something, so that other healthcare can be better.’

“We deal with investigations all the time, but the clinics maybe only consider the individual case.’

Based on these perspectives, the different specialities may also come into different dependency relationships with the patient, who may, in turn, influence the management of this:

‘... maybe they have promised the patient, and that makes it difficult to refuse . . .’

The radiologists also express that they see, against the background of these long traditions, a professional role that is undergoing change. Both the world around us and the patients are placing new demands on the profession:

‘There has to be an overview and someone who is responsible, otherwise who knows what will happen when radiology is divided up?’

‘So there’s pressure you put on yourself not to miss anything . . . but also pressure from patients . . . or the relatives also exert pressure.’

The radiologists express clearly during the interviews that their training as a doctor is fundamental, but they also emphasize the importance of the training they have undertaken after basic training, in order to qualify as a specialist radiologist. They describe that a responsibility also accompanies this function. In the function that they hold, it is the referral that constitutes the patient and it is thus the referral that makes the radiologist aware of the question of responsibility:

‘It is the doctor who is responsible for which investigation is accepted.’

‘You assess the referral, and then it becomes very obvious that you are responsible for the investigation.

Radiologists act on referrals that are written by people in various specialities. These referrals sometimes stimulate questions concerning the justification for an investigation. The radiologists, however, are acutely aware of the responsibility they place upon themselves when they start to wonder about the justification for an investigation. They have a responsibility to not only the patient, but also the referrer:

‘You take on a great responsibility every time you say “No”.’
In the interviews, the radiologists discuss their own role and that of radiology in the management of the patient within the health and medical care system. They emphasize the importance of having material from an investigation of the highest possible quality, and they make it clear that they do not want to lose the opportunity for diagnosis, which is in line with the core values that are described above:

“The worst thing there is is to perform a poor-quality investigation.”

Despite the discussion about the quality of the investigation, much of the reasoning during the interviews concerns how to reduce, in various ways, the radiation doses that patients receive. This may be achieved, for example, with the aid of modern dose-reduction systems, and by optimising the investigations:

‘The fundamental idea is to reduce the radiation doses as much as possible and still obtain a diagnosis.’

Throughout the interviews, the radiologists see themselves as a part of the investigative process that is started by the referrer or doctor that the patient attends. They describe on many occasions how a patient with a serious disease comes to them, and they describe a referrer who wants to give the patient a diagnosis, such that further investigations or treatment can proceed:

‘We’re not just splashing folk with radiation – our task is to find something out so that other healthcare can be better.’

‘If it’s been decided that an investigation must be carried out, you give the radiation that is needed to reach a diagnosis.’

4.2. Attitudes

Attitudes concern the experiences one has had and the way in which they influence the decisions one takes. Based on this, we can recognize three categories in the material, which are described below:

‘What’s most important is that there are some investigations that you should not carry out.’

The rapid development that has taken place in most radiology methods has led to significant diagnostic advances. The quality of the investigations carried out has been considerably improved, and increasingly refined diagnostic methods are now available with the new technology. The new techniques are usually also very rapid:
‘You can see a lot with the methods that are now available, and so you use them, because they really give you something. And then the referrals increase, of course.’

‘Tempted to do CT investigations . . . high diagnostic value for these and they are rapid, so you don’t think about the radiation that you are exposing the patient to.’

The radiologists in the study are aware that the view of the radiological possibilities offered by the radiology department have changed, as has the view of a doctor’s own clinical examination. They describe in the interviews how the possibility of a clinical diagnosis has been replaced by a simplified view of the possibilities offered by radiology. The radiologists also state that they see a generation change under way within clinical diagnosis:

‘There’s a generation change going on. The older doctors poked and prodded the abdomen and thought they could get a clear idea of the clinical status, so they weren’t so quick to request radiology. The generation that comes after them tends to use radiology more readily.’

‘Previously you would take an X-ray to confirm that a fracture was misaligned, but now you take one to eliminate suspicion of a fracture.’

The radiologists describe in the interviews how the department of radiology is used as a way of taking control of the process of care, where previously there was the possibility of observing the patients and the development of the disease for which they attended. Such opportunities are now much more limited, and thus radiological diagnosis has become an instrument to deal with logistical problems:

“’If you cut down on bed places, you increase radiation doses’ is one way of expressing it.”

‘There’s a much higher demand for CT investigations in healthcare today, and the reason is that we carry out investigations such that the patient can be sent home earlier. Radiology becomes a central tool used to reduce the period of care.’

‘Instead of admitting a patient for observation, which also has a high educational value, you take an X-ray to be able to send them home.’

It becomes apparent during the interviews that referred patients should be medically justified, but that deviations are now being made from this important decision, for various reasons:

‘There are many reasons why you may carry out something that is not fully medically justified. It’s more a case of wanting to discharge the patient quicker, you want to avoid admitting him or her.’

‘There are guidelines, and you can always make exceptions in the medical case: sometimes you have to do things differently. But now folk come flowing in from Accident and Emergency departments and pass through CT before they go home. Lots of unnecessary examinations are done: people are not admitted for abdominal investigation since no places are available, so you send them for radiology instead.’
Radiology investigations should always be justified, and the radiologists use the interviews to state that they are fully aware of this requirement. Such decisions, however, are often very difficult to manage, since the diagnoses are often followed by discussions dealing with possible differential diagnoses. The spectrum of symptoms that the patients may display requires, furthermore, complex reasoning before a decision can be taken:

‘Well, of course, it’s easy to say so afterwards, after you’ve done the investigation and it turned out not to give anything. Then of course it’s easy to say that it was unnecessary. But it’s difficult to know this before.’

‘We have an obligation to justify things all the time. Someone who makes a referral doesn’t regard it in the same way. They order an investigation almost as if they were ordering a blood sample.’

The opportunities for the patient to make a complaint, in the event that he or she believes that erroneous treatment has been given, have also received much attention recently. This has led to a risk of various types of overdiagnosis, since a doctor does not wish to receive a reprimand in the form of a complaint:

‘A fear of the whole complaints system. It is always somebody’s fault, and you want to avoid this.’

‘There are a lot of complaints, so obviously you want to make sure that you don’t miss anything.’

The general public is becoming ever more informed, and has access to information through several channels. Thus, patients now pose greater demands on the management of an investigation, and radiology often appears to the patients to be a valuable diagnostic instrument:

‘Even so – the general public want to be X-rayed. “I’m particularly in need of an X-ray”.’

‘It’s not unusual that the patient or a relative requests investigation. I was brought up in the old-fashioned manner and I would be ashamed to issue such a referral and state that the patient has requested radiology.’

4.3. Norms

Norms are how it is expected that one is to act and also regulations. Expected behaviour can be defined based on regulations, rewards and punishments or other sanctions.
The radiologists make it clear in the interviews that they desire to engage the Swedish Radiation Safety Authority (SSM) in dialogue. Such dialogue with the Authority is mentioned both with respect to difficult decisions concerning the justification of the requested radiological investigations, and with respect to more general questions concerning the level of knowledge and procedures:

‘The requirement that we should assess the justification – an awkward business . . . I’d really like to discuss this with SSM.’

‘If it becomes clear in the audit that I’m doing something that is harmful, due to poor knowledge or poor procedures, I want help to sort this out.’

In addition to discussions concerning justification, the radiologists requested discussions and clearer regulations from the Authority with respect to radiation doses, and the reasoning behind them. There were also opinions about the focus that the Authority places during audits of operations:

‘Should we cut down on the total radiation volume, or strategies for various patient groups? SSM doesn’t lay down any rules: it just looks at how many photons we expose the cell population to. It’s clear that there’s a lot to discuss here.’

‘Referral from A&E for stomach pain or stomach upset: SSM has no opinion. Our protocols for radiation dose for this investigation are somewhat longer than the average – that’s what they focus on. They don’t consider whether the investigation should have been carried out at all: they don’t care about that.’

The radiologists draw attention during the interviews to developments in recent years in which other specialists come to the department of radiology and use the equipment that produces ionizing radiation. They express a concern that these new groups expose patients to unnecessarily high doses of radiation:

‘Can anyone come in and use the equipment? There’s a difference between a radiologist and a vascular surgeon (or anyone else who doesn’t work with radiation routinely) in the intervention laboratory. There’s a feeling of “full speed ahead”. Who should put the brakes on and stop things going too far? Is this a job for a government agency?’

Some of the radiologists interviewed work at departments of radiology that have been audited, while others work at departments at which an audit had not yet taken place. It was stated that it is important that audits that reveal deficiencies lead to immediate and clear consequences.

‘If your role is to carry out an audit, you should do this thoroughly, and the results should have direct consequences.’

The radiologists experience a lack of knowledge on the part of doctors who make referrals. This is not a lack of medical knowledge, but rather a lack of knowledge of the diagnostic value of radiological methods when referring patients with various queries:
‘You do carry out assessments of the justification, but it may be the case that you carry out an investigation even though it is unnecessary. Educating the clinics would have an effect.’

‘Collaboration between the clinics and us – after all, they’re supposed to write as accurate a referral as possible, so that we can make an assessment of justification.’

The radiologists discuss during the interviews the possibilities of offering clinics further education in the various radiological modalities and their clinical value for different queries. Education may also be offered in simple matters such as how referrals for conventional radiology investigations are to be written. The point is made that this information is not to be seen as correction of faults, but as points of discussion not only to increase the general level of knowledge, but also to reach consensus about which investigations are to be used when clinics refer various groups of patients for radiological investigation:

‘We have to get better at distributing information to the clinical management. We should meet house officers, specialists under training, and discuss things.’

‘You don’t have to come with accusations: rather tell them that it’s a trend we have noticed and it leads to longer waiting times for those who truly need radiology.’

‘We have an agreement with the clinics about which investigations are to be carried out in certain query situations. If they order the wrong investigation we correct this and change it.’

When the radiologists discuss optimization and radiation doses they distinguish between local working procedures used in their own department. They also view the world outside in order to be able to compare their own procedures with those used at other departments and clinics. At the local level, they emphasize how important it is to discuss the optimal balance between image quality and the radiation dose used, and how to find this balance:

‘An effective group that looks at image quality, working out what is acceptable.’

The departments of radiology at which the respondents worked also request the possibility of comparing, over the internet for example, the doses used for various investigations at the department with the doses used at other departments of radiology and clinics in Sweden. The difficulty of presenting only a reference level is, however, recognized since it is not possible to see which investigative method has been used:

‘Why is there no common agreement on the internet, for example, about the doses you are to use?’

‘Those who are really good reduce the acceptable dose for those who are trying to do a good job. This is not really a good method, the possibilities of comparing yourself with others is made more difficult.’
5. Discussion

This report has its starting point in the concept of ‘culture’ and focuses on how culture is related to the way in which decisions are made and measures performed within radiation protection. One important aspect in this case is whether this culture can be related to care culture or safety culture.

The core values are influenced by traditions. Traditions are important components of the care culture (Rytersström 2011). The radiologists who participated in the study spoke about their profession using their role as a doctor as a starting point. The doctoral profession has a very long tradition in which medical ethics act as a fundamental system of core values (Johannisson 2009). This system also places a strong focus on the patient (Sjöstrand 2007) and on treatment and cure. Against this background, it is easy to understand that the radiologists in the study express a large responsibility towards the patients who have attended for investigation and possibly also treatment. It is also easy to understand that diagnosis is given a very prominent position since the patients have attended to rule out or confirm a disease.

The radiologists that were interviewed are fully aware that radiology investigations must be justified (Strålsäkerhetsmyndigheten 2012a) before they are carried out. There are, however, aspects that place extra pressure on the conduct of a radiology investigation, based on the perspective of the clinic.

Attitudes from the radiologists in the study are built from the experiences they have in a clinical context. Tadjerbashi (2012) states that the flow of patients to Sweden’s accident and emergency departments has increased, which may have several explanations. The article points out that two such explanations are that the patients who are to be admitted must most often wait for a bed to become available on a care ward, and that the number who attend for accident and emergency care has increased dramatically. This is reflected in this study by the expression of radiologists that the radiology investigation may have become an instrument to solve the logistical problems of accident and emergency departments. The willingness to admit a patient to a care ward for observation to see how the patient’s symptoms develop is now lower than it used to be, which is a problem.

Changes within the medical care system also affect radiology departments. The radiologists in the study describe how many investigations have arisen about which they are doubtful. Strålsäkerhetsmyndigheten (2012b) describes how the number of computer tomography investigations has increased dramatically in the Nordic region during the past 20 years. Today, computer tomography investigations contribute 50–80% of the total radiation dose from radiological investigations to which the population in the Nordic countries is exposed. It is also worrying, according to SSM, that greater numbers of children are being investigated with computer tomography, since children are more sensitive to radiation than adults. This is reflected in the results from this study in the statements of the radiologists. The statements contain opinions concerning the easy availability of radiology-based diagnosis, and the opinion that the clinics believe that technological advances have produced methods that can give a rapid and, in the best case, definitive reply to a query. There are some worrying statements from radiologists in the study, who have noticed that the clinical examination of the patient has been given low priority, with more attention being given to a rapid radiological investigation. Evidence for this cannot be found in published studies, but both groups in the study make the claim, and it is made by participants from all clinics.

Norms are built through daily work and the radiologists emphasize that issues and reasoning involving radiation safety are generally complex. The issues cover decisions to be made about optimization and justification of investigations, and they cover dose limits and reference levels (Strålsäkerhetsmyndigheten 2012b). These aspects may lead to changes in work procedures and changes in training for radiographers, radiologists and those making referrals
from clinics. The radiologists express in this work a serious need for support in their reasoning and decisions. They point to a need for increased support from the Swedish Radiation Safety Authority and its representatives in order to develop and implement guidelines and regulations for radiological operations, and thus to be able to adapt suitable investigation methods and radiation dose levels in order to obtain a high quality for the radiology investigations carried out. There are good examples from the health and medical care system of how important work that is structured around well thought-through guidelines is. These examples, however, also show that compliance with the guidelines may be difficult, and that their implementation may take a long time (SOSFS 2007).

In summary, we can conclude that radiologists are influenced in their decisions and the actions they take by their core values, which demonstrate a serious responsibility for the patient. They are also influenced by their attitudes, aspects of which influence their professional activity but are, at the same time, outside of their control. With respect to the norms that are described in the study, these do not have as large an influence on decisions and actions. They may, however, function as a guidepost for future work in quality development within the radiation protection work carried out at the clinics.

In addition to fulfilling the aim of the study, we can conclude that the results show some familiar characteristics, such as resistance from certain groups and that the respondents point out the significance of the management and that there is a major need for communication. This is a characteristic of a process of change. From this, it is possible to draw the conclusion that if the introduction of the concept of a ‘safety culture’ into a care culture is desired, it is important to see this as a process of change. Such a process poses huge demands on both resources and time, in order for the change to be achieved.

Finally, we can also draw conclusions about the selection of the departments investigated, i.e. departments that had been audited without criticism, departments that had been audited and received criticism, and departments that had not yet been audited.

A comparison between these three types shows clearly that departments that had not been criticized had established well defined structures for the organization of their work within radiation protection. These departments have clear guidelines for the documentation and follow-up of operating procedures with respect to aspects of radiation safety. This process is supported by a management with great interest in radiation protection issues and also by functions with clearly defined responsibilities such as Radiological Management Function (RMF, radiologists) and Radiation Protection Radiographer (RPR, radiographer) are also included in this and the atmosphere between the employees was positive and attractive.

6. Conclusion and recommendations

- On the initiative of the Swedish Radiation Safety Authority, a discussion is to be initiated within the radiology profession to draw up guidelines with respect to justification and recommendations for relevant radiation doses.
- Clarify the distribution of responsibility and the mandates possessed by the radiation protection functions that have been implemented in the form of radiology management functions (RALF).
- Provide doctors who make referrals with greater knowledge of the possibilities, radiation doses and risks associated with diagnostic methods.
- Clarify how the requested investigations are described and related to the relevant referral.
Clinical management must draw attention to issues of radiation protection in a clear manner, and must at the same time provide a good example of how these issues are handled and given priority.

The clinical management has an important function when the radiation protection organization is being constructed in that various functions and roles are defined and provided with the opportunity to act based on the expectations that have been placed on the function.

Act to ensure that the expertise of medical physicists is used in an optimal manner by bringing this professional group from a consultancy role to a more active role in the radiation safety work of the department.

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