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Reading screening mammograms – Attitudes among radiologists and radiographers about skill mix

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ABSTRACT

Introduction: Because of shortage of personnel for the Danish mammography screening programme, the aim of this study was to investigate the attitudes of radiologists and radiographers towards a future implementation of radiographers reading screening mammograms.
Materials and methods: Seven combined phenomenological and hermeneutical interviews with radiographers and radiologists were performed. Stratified selection was used for sampling of informants. The interviews were analysed against theory about quality, organization and profession.
Results: Quality related possibilities: radiographers do routinely measure the performance quality, radiographers obtain sufficient reading qualifications, and skill mix improves quality. Quality related obstacles: radiologists do not routinely measure performance quality. Organization related possibilities: shortage of radiologists, positive attitudes of managers, and improved working relations. Organization related obstacles: shortage of radiographers and negative attitudes of managers. Professional related possibilities: positive experience with skill mix. Professional related obstacles: worries about negative consequences for the training of radiologists, and resistance against handing over tasks to another profession.
Conclusion: Attitudes towards radiographers reading screening mammograms are attached to either quality-, organisational or professional perspectives. Radiographers are capable of learning to read mammograms at sufficient performance level but routine measurement of performance quality is essential. Resistance against skill mix may be caused by an emotionally conditioned fear of losing demarcations. The main motive for skill mix is improvement of the utilization of resources. No evidence was found regarding the organisational and financial consequences of skill mix. Despite of this all radiologists and radiographers experienced with skill mix were strong advocates for reading radiographers.

1. Introduction

In Denmark, a national breast screening programme has been required by law since 2008. Like in other countries, there is a shortage of personnel for the Danish mammography screening programme. This problem is partly being solved using mammography screening assistants for the imaging process. These assistants are non-radiographers given a brief course on mammography screening related radiography [1]. In the UK, this sort of skill mix is organized after The Four Tier Model in which one of the tiers also gives the opportunity for radiographers to take over at least parts of the radiologists reading of screening mammograms, i.e. as first or second readers [2].

Several papers describing the performance of radiographers reading screening mammograms have been published. Wivell et al. (2003) let two radiographers in the UK read a test set of 1000 mammograms, which had been previously read by radiologists. Ninety known interval cancers were included in the test set. The radiographers referred more women than the radiologists, but the radiographers also detected all cancers originally detected by the radiologists. Furthermore the radiographers detected 32 interval cancers of which none were detected by the radiologists. Subsequently three radiographers performed the function as second reader of 54,000 screening mammograms, which were first read by a radiologist. Neither referral rate, nor cancer detection rate, nor expenditure of time respectively was found to be significantly different between radiologists and radiographers [3].

Duijm et al. (2008) let radiologists as well as radiographers double read screening mammograms in Holland. In period A, 66,225 mammograms were double read by two certified screening radiologists. In period B, 78,325 were double read by two radiologists as well as two radiographers. All mammograms referred

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by the radiographers only were re-evaluated by the radiologists, resulting in 544 re-evaluated mammograms, 102 extra referrals and 29 extra detected cancers. The cancer detection rate per 1,000 women screened increased significantly from 4.86 to 5.62 when the mammograms were read by radiographers also, but the positive predictive value of referral decreased from 47.5% to 35.9% [4].

In a review Van den Biggelaar et al. focused on radiographers' mammography reading performance compared to the performance of radiologists. They also looked at the effect of training. It was reported, that radiographers scored higher false-positive rates than the radiologists, however, radiographers and radiologists performed at comparable sensitivity. In one study the sensitivity was higher for the radiographers than for the radiologists. The radiographers' performances were measured before and after training and the diagnostic odds ratio increased after training mainly because of increased specificity [5].

According to these studies, trained radiographers are capable of reading mammograms with performances similar to those of radiologists. Despite of this, there is a resistance against this type of skill mix especially among radiologists in Denmark [6].

Kletzenbauer (1996) completed a questionnaire survey on British radiographers' attitudes to non-radiographers taking over radiographers' tasks. The questionnaire contained topics that were mainly trade-union politically oriented. The radiographers had mainly negative attitudes to this type of skill mix, but the attitude of managing radiographers was more positive [7].

Forsyth and Robertson (2007) accomplished a questionnaire survey among 211 radiologists in Scotland, investigating the radiologists' attitudes towards skill mix in radiography. The authors divided the results into positive and negative attitudes presented in order of priority [8].

No work has been published investigating the nature of radiologists' and radiographers' attitude towards radiographers reading screening mammograms. Therefore, the aim of this study was to investigate the attitudes of radiologists and radiographers to possibilities of and obstacles to a future implementation of radiographers as readers of screening mammograms in Denmark.

2. Materials and methods

2.1. Design and sampling

The empirical material of this study consisted of seven individual semi-structured interviews with three radiologists and four radiographers respectively. The informants were chosen by means of stratified selection with maximum variation, representing different characteristics e.g. trade-union involvement, experience with and local organisational structure of mammography screening. The interviewees were informed in writing and orally about the aim of the present study, the interviewer's professional background, participation being voluntary and about the possibility to withdraw. Furthermore, they were informed about anonymity of interviewees and erasure of data immediately after usage.

2.2. Data collection and analysis

An interview guide was developed ad modum Kvale [9]. The results were validated during the interviews by means of specifying questions. Transcription as well as translation from Danish to English was done by the interviewer verbatim to the statements of the interviewees but sometimes slightly moderated in order to create meaningful translations. The transcribed interviews were analysed by means of Dahlager and Fredslunds' four step model [10]. This model includes a phenomenologically inspired open categorization as well as a hermeneutically inspired interpretation.

The first author's pre-understanding was influenced by her position as authorized radiographer and lecturer at the department of radiography at Metropolitan University College in Copenhagen, which has given rise to a positive attitude to radiographers' professional development in general. Despite of the good performances of reading radiographers shown in several studies, the authors were aware of the strict quality requirements of mammography screening and of the possibility that these requirements could influence the attitudes of the informants. Therefore, a quality approach was chosen as a theme for the interview guide and the analysis. Prior to the data collection two more themes were generated from two pilot interviews. These themes were an organisational approach and a professional approach. After categorizing and reorganising the data, sixteen subcategories were generated all falling into one of the three themes. Some statements could fall into more than one theme or subcategory. For the sake of clarity, these statements were categorised according to the context in which they appeared in the interview. In this way, each statement only appears in one category. In the discussion however, results from each of the three themes are combined to achieve an overall conclusive interpretation.

Both authors took part in the planning of the study's aim, design and which methods to use. The first author conducted all the interviews, was responsible for correct transcriptions, conducted the analyses and wrote the first draft of the manuscript. The second author has contributed substantial to the final manuscript. Both authors have accepted the final version of the paper.

2.3. Theoretical approaches

The theoretical basis of the quality approach was described in terms of measurement and calculation of sensitivity, specificity, positive and negative predictive values [11]. This theory constitutes the foundation of quality assessment of the reading of mammograms but it turned out to be difficult to make the interviewees deliver precise theoretically based statements on this subject.

The organisational approach was described in terms of organisational culture and the organisation of hospitals as bureaucracies in which effective utilization of resources is given a high priority [12]. Bureaucracies are influenced by functionalism and rationalism in which culture is viewed as means to achieve the aims of the organization. Inter and intra professional teamwork can be supported by a symbolism, in which members of an organization are bound together creating a common frame of understanding [13]. Especially interviewees with a positive attitude to skill mix were very much aware of this approach.

Abbotts' theories of professional jurisdictional attachment, was used for the professional approach. According to Abbott, academic traditions, superior jurisdiction as well as assignments based on fixed rules are all obstacles to handing over assignments to another profession [14]. Especially interviewees with a negative attitude to skill mix delivered statements relevant for this approach.

3. Results

3.1. The quality approach

3.1.1. Radiographers' quality

Most screening radiographers do routinely measure quality of their imaging performance.

RAD1: "*I completely vouch for the quality of their mammograms – we review their mammograms quarterly and if they don't pass, they have to start all over with 200 mammograms. . .*"